

Well-being and work motivation brought by technological changes, coping and adaptations during and post COVID-19 pandemic: Barriers and opportunities

Edited by

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Well-being and work motivation brought by technological changes, coping and adaptations during and post COVID-19 pandemic: Barriers and opportunities

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Editorial: Well-being and work motivation brought by technological changes, coping, and adaptations during and post COVID-19 pandemic: Barriers and opportunities

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Editorial on the Research Topic

Well-being and work motivation brought by technological changes, coping and adaptations during and post COVID-19 pandemic: Barriers and opportunities

It is relevant and important for the field of psychology to establish how technological changes and adaptational strategies during the COVID-19 pandemic reflect on the promotion and sustainability of human wellbeing, and work motivation. The technological changes are aimed at facilitating adaptation during the fluctuating and restrictive circumstances brought by the pandemic and potentially in the post-pandemic society. However, sometimes they may hinder this adaptation, because they require learning and mastering new knowledge and skills to adopt them most effectively and efficiently.

The 14 manuscripts in this Research Topic aim to clarify if the technological changes occurred during and post COVID-19 pandemic have in any ways affected wellbeing and work motivation, and which coping mechanisms have been effective to increase and/or maintain overall wellbeing. There is evidence that COVID-19 pandemic has impacted all spheres of human life, potentially changing our everyday life and challenging welfare. The state regulatory mechanisms imposed remote working, introduced and expanded e-health services as a part of public health policy, and electronic education as social measures to facilitate the fight against transmission of COVID-19. That is why the increased use of technology plays an important role in human life during this pandemic as a mean for implementing, sustaining, and nurturing work tasks, as well as for maintaining social contacts.

The changes brought to human life by COVID-19 pandemic might be perceived differently depending on the individuals' system of reference. The same factors might be perceived as barriers by people intolerant to uncertainty, loss, suffering, frustration, or as opportunities for growth and development by other people. The most common causes

of psychological concern during the pandemic included worrying about family, friends, partners, fears of getting and giving the viral infection to someone; frustration and boredom; and changes in normal sleep patterns (Misra et al.). The prolonged pandemic has made numerous people pessimistic, angry, and nurtured anxiety and depression, which have increased the burden on medical staff and hospitals (Tang and Lee). Online medical support has been offered to reduce the risk of infection.

Individuals' mental health and wellbeing have been protected by means of the existing sources of consolation, hope and strength such as human sense of community, closeness, gratitude, and a belief that the pandemic may spur some positive social change (Lossio-Ventura et al.). Even some personality traits usually regarded as negative could be a protective resource. For example it has been established that higher individual employees' narcissism is related to increased felt responsibility for constructive change in organizations, especially in high environmental uncertainty prompted by the COVID-19 pandemic (Lang et al.). Psychological capital that encompasses optimism, self-efficacy, resilience, and hope positively correlates with occupational wellbeing and work engagement (Guo et al.).

Different coping strategies were used to adapt to changes in life imposed by the prevalence of COVID-19 pandemic and by the social measures taken to prevent it. Part of these coping mechanisms are devoted to positively managing and overcoming stress and adapting in different spheres, such as work. It has been found that avoidant coping contributes to teachers' increased burnout and diminished job-related affective wellbeing during COVID19 school closures (Stan). It has been recommended that teachers adopt coping strategies consistent with their personality traits—problem-focused coping and emotionfocused coping for extroverted conscientious teachers; social support focused coping for neurotic teachers (Stan). The teleworkers evaluated higher the coping strategies used by their managers and colleagues than the non-teleworkers (Romeo et al.).

Digitalization and technological changes triggered by the COVID-19 pandemic within short time periods have posed various change demands on employees counteracted by providing organizational change support in different forms (Schlicher et al.). It has been found that behavioral intention to use the new technology correlates positively with organizational change support (instrumental support, informational support, emotional support, and appraisal support), need satisfaction, favorable attitudes toward change, but negatively with frustration and satisfaction with the change process (Schlicher et al.). More change demands (work task changes and work role changes) are related to higher frustration and more unfavorable attitudes toward change (Schlicher et al.).

Technology is a double-edged sword and creates barriers (limited access to Internet, hesitation and distrust of the unfamiliar, isolation, compromises with quality of products and services), as well as opportunities (spending time with family, new skills acquired, providing and seeking help *via* social media, source of information and practices regarding health) for individuals (Misra et al.). The use of technology correlates positively with people's resilience, motivation to work, self-efficacy, and emotional wellbeing during COVID-19 pandemic (Misra et al.).

Perceived severity of coronavirus disease and social influence affected the perception of increased utilitarian and health benefits of technology of mobile payment, which in turn influenced the behavioral intention to use the quick response code mobile payment (Tu et al.).

The elevated level of telecommuting (i.e., working a portion of work hours away from the workplace using technology to conduct work tasks) leads to minimal psychological detachment from work (mentally disconnecting from the work situation), which in turn leads to low wellbeing (low job satisfaction and high emotional exhaustion) that may be improved by family interfering with work (Cheng and Zhang). The teleworkers had a better perception of the organizational measures (internal communication about the situation, management and work organization measures, health and prevention measures, labor and salary measures) taken to deal with the pandemic situation with the exception of the strategies focused on communication with clients, which the non-teleworkers rated more positively (Romeo et al.).

Some age, occupational and personality differences exist in this regard. It has been established studying three different age groups of students (2004, pre-COVID, and post-COVID) that psychological immune capacities of students, i.e., their self-regulation and resilience, seem to decrease through the years (Takács et al.). Students' self-perceived wellbeing (positive attitude toward oneself, others, and student life) contributes to students' openness to learning and to aesthetics, cognitive and behavioral autonomy, intrinsic motivation and identification motivation (Bochiş et al.).

It has been proven the efficacy of integration of three types of knowledge—technological, pedagogical, and content knowledge, for increasing the job-related affective well-being of the teachers (Stan). Teachers should improve their personal technology-related teaching skills to increase their wellbeing in online teaching settings (Stan).

Because of the COVID-19, the occupancy rate of hotel companies has been greatly affected, but high customer engagement (expressed as identification, enthusiasm, attention, absorption and interaction) and positive service evaluation (as service quality, perceived value and customer satisfaction) had positive effects on brand trust of hotel companies and on customer behavioral intention (to re-use a hotel and positive word-of-mouth) (Chen et al.).

Teleworking was more positive evaluated (in relation to technological means; access to information; supervisors' role; time management; productivity, quality and effectiveness, overall satisfaction with teleworking) by the employees in the industrial, distribution and consumption, and service sectors in comparison with the employees in the spheres of education, public administration, and healthcare (Romeo et al.). The attitude of colleagues in teleworking was more negatively evaluated by the employees in the sectors of industry, education, administration, and healthcare in comparison with the employees in the spheres of distribution and consumption, and services (Romeo et al.).

The non-teleworkers were slightly more highly motivated than the teleworkers (Romeo et al.). The most highly motivated teleworkers were those who considered that their managers performed well when coping with the situation and were satisfied with the results they achieved in terms of productivity, quality,

and effectiveness (Romeo et al.). The most highly motivated non-teleworkers were those who considered that their managers performed well when coping with the situation (Romeo et al.).

It is necessary to develop managers' competencies in order to develop and maintain relations of trust and support, to foster employees' sense of meaningfulness and responsibility at work in order to keep them motivated (Romeo et al.).

The interventions for improving wellbeing and decreasing burnout should be evidence-based, accessible, promoting knowledge and skill development, facilitating self-awareness, selfregulation, autonomy, collaboration, acceptance, and inclusion of different social groups (Adnan et al.). This has been stated for critical care healthcare professionals, but it is relevant to the other occupational spheres, too.

To conclude, research conducted within this Research Topic was focused on better understanding the relationship between wellbeing and motivation considering the technological changes, as motivational drives direct human behavior to achieve personal, physical, emotional, and social wellbeing, in promoting optimal functioning and adaptations in the face of adversities brought by the COVID-19 pandemic.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Identifying Silver Linings During the Pandemic Through Natural Language Processing

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COVID-19 has presented an unprecedented challenge to human welfare. Indeed, we have witnessed people experiencing a rise of depression, acute stress disorder, and worsening levels of subclinical psychological distress. Finding ways to support individuals' mental health has been particularly difficult during this pandemic. An opportunity for intervention to protect individuals' health & well-being is to identify the existing sources of consolation and hope that have helped people persevere through the early days of the pandemic. In this paper, we identified positive aspects, or "silver linings," that people experienced during the COVID-19 crisis using computational natural language processing methods and qualitative thematic content analysis. These silver linings revealed sources of strength that included finding a sense of community, closeness, gratitude, and a belief that the pandemic may spur positive social change. People's abilities to engage in benefit-finding and leverage protective factors can be bolstered and reinforced by public health policy to improve society's resilience to the distress of this pandemic and potential future health crises.

Keywords: silver linings, protective factors, COVID-19, natural language processing, topic modeling, sentiment analysis

INTRODUCTION

The COVID-19 pandemic has presented an unprecedented challenge to human welfare. Despite rising numbers of vaccinations, cases continue to surge in many parts of the world causing both our healthcare systems and our collective well-being to be stretched to their limits (Nelson et al., 2020). In the face of this tragedy, individuals have had to confront profound grief, loss, and uncertainty about the future that can severely impact their mental health (Mumphrey and Kelleher, 2020).

The challenges of coping with a global pandemic can be seen in the rise of depression, acute stress disorder, anxiety disorders, and worsening levels of subclinical psychological distress, all of which have substantially increased in prevalence since the pandemic's onset (Brooks et al., 2020; Burhamah et al., 2020; Czeisler et al., 2020; Huang and Zhao, 2020). In response, public health organizations like the World Health Organization have highlighted the need to provide psychosocial support to individuals struggling with their mental health during and in the aftermath of the pandemic (World Health Organization, 2020).

Finding ways to support individuals' mental health may be particularly difficult during a pandemic, when many conventional methods of support such as peer-to-peer interaction, social belonging, and community activities may no longer be safe or accessible (Campion et al., 2020). Furthermore, coping mechanisms such as short-term problem-solving or emotion management may be insufficient for meeting the needs of the moment. As a result, solutions are needed that can mitigate threats to mental health by building on existing protective factors and encouraging positive coping strategies, without requiring activities that may run counter to COVID-19 prevention measures.

One opportunity for intervention to protect individuals' health and well-being is to identify the existing sources of strength and hope that have helped people persevere through the pandemic, so that public health policy and messaging can fortify these strengths. Colloquially known as "silver linings," the act of finding positive ways that one's life has changed as a result of a traumatic or stressful event is known as *benefit-finding* in the study of resilience (Folkman and Moskowitz, 2007). This is a particular form of meaning-focused coping that helps people process difficult situations by changing how they make sense of the situation in their own lives or in the world around them (Folkman, 2008).

The protective effects of benefit-finding have largely been found in the context of bereavement after losing loved ones, anxiety about health threats, and surviving natural disasters—all of which are reflected in the COVID-19 pandemic. Indeed, early research on resilience in the pandemic has found that benefit-finding is associated with reductions in psychological distress. A recent study by Cox et al. found that increased benefit-finding was associated with not only greater life satisfaction, meaning, and vitality but also decreased reports of depression and stress (Cox et al., 2021).

In light of calls to understand the role of positive coping strategies in the pandemic and in the path forward as the world heals (Burke and Arslan, 2020), we sought to identify and characterize the types of benefits found by individuals during the COVID-19 pandemic. We asked:

RQ1: What, if any, are the benefits, or 'silver linings', that have helped people persevere through the COVID-19 pandemic?

Based on previous work on protective factors linked to increased resilience during COVID-19, we predicted that two factors that would emerge in our analysis would be time spent with loved ones and gratitude.

In this paper, we use a mixed-method approach that includes computational natural language processing (NLP) methods, including sentiment analysis and topic modeling, along with qualitative thematic content analysis to identify these protective factors from a survey. NLP methods have long been used to explore people's thoughts and feelings during emotional events and crises by processing patterns in language use at scale—an affordance that may be particularly valuable during rapidly evolving situations such as the COVID-19 pandemic (Cohn et al., 2004; Tausczik et al., 2012; Wolohan, 2020). Similarly, in-depth thematic content analysis is often used to identify more granular patterns in text responses.

As it becomes increasingly clear that addressing the full impact of the pandemic requires implementation of public health policy on mental health (Bearden and Karlsgodt, 2021), the goals of this paper are 2-fold. We aim to identify these silver linings to understand how people find solace in times of crisis, and to consider how we may carry forward positive societal changes caused by the pandemic into a post-COVID world. Understanding the sources of hope that have helped people weather the psychological toll of COVID-19 can inform public health policy to improve society's resilience to the distress of this pandemic and future health crises.

METHODS

Procedure

In March 2020, we launched an online survey on three social media platforms (Twitter, Facebook, and Nextdoor) to identify the impact of the COVID-19 pandemic on participants' lives. Any individual 18 and older was eligible to participate. They could participate by clicking on the link to the survey embedded in the social media post upon seeing the recruitment materials. The survey was approved by Stanford's Institutional Review Board and all participants consented to the study.

The survey included a total of 21 questions including demographics and the impact of COVID-19 on individuals' lives, which is reported in Nelson et al. (2020). In this work, we focused on the evaluation of free-text responses to the question "Although this is a challenging time, can you tell us about any positive effects or 'silver linings' you have experienced during this crisis?" The authors agreed to make the data available upon reasonable request.

Participants

We recruited a convenience sample of 4,582 participants over the 7-month period from March to September 2020. We excluded 1,469 participants who did not respond to the silver-linings question that was central to our analysis, resulting in a final sample size of 3,113 responses. The average age of participants was 47.41 ± 15.2 years (range: 18–99), 71.5% were women, 59% were white as shown in **Table 1**. Participants of 68 different countries completed the survey, mostly from the U.S. (82.8%) followed by Guatemala (2.8%), Canada (2%), New Zealand (1.7%), and the U.K. (1.4%).

Statistical Analyses

We used a combination of computational and qualitative methods of natural language processing to identify the themes in participants' text responses. Given the large size and the richness of the dataset, our approach sought to leverage the complementary strengths of both methods. Computational methods of natural language processing were used to automatically evaluate and extract themes from the responses at scale, and to examine the structure and distribution of silver linings themes across responses. Qualitative methods of thematic content analysis were used to confirm the themes, to identify more fine-grained, specific topics, and to select exemplar quotes for each theme.

TABLE 1 | Participant demographics and sentiment analysis results (18 <= age <= 99).

Characteristic	ALL responses to silver lining (N = 3,113)	polarity Score 0.22	Relevant topics
Gender			
Female	71.5%	0.23	Family time, sense of community, quality time with spouse
Male	25.4%	0.19	Time with family, time with wife, work from home
Others [‡]	3.1%	0.22	Anxiety stress of traffic, art therapy, alcohol to-go
Age, years, (mean ± SD)	47.41 ± 15.2		
18–30	14.7%	0.23	Work from home, family over zoom, air pollution from car
31–45	31.3%	0.24	Time with family, work from home, money on gas, virtual happy hours
46–64	38.4%	0.21	Spending time with family, cooking at home, college kids
65+	12.3%	0.18	Family members, contact with family, intense appreciation for health care
Other	3.3%	0.22	Close look at family budgeting, time at home, close look at family
Race			
White	59.0%	0.22	Marked improvement in air quality, sense of community, contact with family
Asian*	6.4%	0.25	Daily walks, zero commute time, appreciation for family, action plan for career
Black	5.7%	0.23	Covid-19 like HIV, annual income over \$80k, college kids, basic clothing
Latin/Hispanic	1.3%	0.24	Bay area traffic, quality time with family, video chats
Other [†]	27.6%	0.19	Trabajar desde mi casa, ganar dinero diario debe ser un derecho
Countries			
U.S.	82.8%	0.22	Time with family, money on gas, time for exercise, productive working from home
Guatemala	2.8%	0.21	Trabajar desde mi casa, family time, ganar dinero diario
Canada	2.0%	0.19	Family at home, public health, cooking at home, favorite Canadian, tea household chores
New Zealand	1.7%	0.22	Great sense of community concern, flexible sleep work schedule, good government leadership
U.K.	1.4%	0.20	Lockdown light in UK, cook from scratch, appreciation of healthcare
Month			
March	53.8%	0.23	Family budgeting, appreciation for job, family over zoom
April	37.7%	0.22	Clean air, time for exercise, time for reading, cooking at home, family time
May	5.4%	0.15	Family time, yard work, break from pollution, proper management of money
June	1.0%	0.26	Acrylic painting, anxious temperament, watch Netflix
July	1.0%	0.25	High school, family members, home projects
August	0.8%	0.12	Video chat, behavior around handwashing, local air quality
September	0.3%	0.25	Performative nature of office work, different coffee subscriptions

*Asian includes Asian and Pacific Islander; [†]Other race category includes Other, Native American, and those with empty values. [‡]Other gender category includes other and those with empty values.

Computational Analyses

This section describes the computational methods of natural language processing used to automatically evaluate the text of the silver linings responses from the online survey. As seen in **Figure 1**, we outlined the basic steps of: (A) Preprocessing; (B) Sentiment Analysis; and (C) Topics Extraction.

(A) Preprocessing:

We preprocessed the dataset of survey responses to preserve the confidentiality and integrity of protected health information (PHI). Thus, we applied the following rules of preprocessing: (1) specific occurrences for email addresses were replaced with generic tokens; (2) named entities such as people's names were also replaced with generic tokens; (3) text was lemmatized; (4) all text was changed to lowercase; (5) stop-words were suppressed, such as “an,” “also,” etc.; and (6) links were omitted.

(B) Sentiment Analysis:

The aim of our analysis is to measure the intensity of responses related to silver lining topics in the early stages of the pandemic. Thus, we sought to understand the emotional properties of participants' responses with sentiment analysis. The objective of sentiment analysis is to discover emotion, opinion, and subjectivity expressed in a piece of text (Feldman, 2013). In this study, we used TextBlob, a Python-based library for processing textual data, to explore patterns in how people discussed silver linings in the pandemic (Loria, 2018). TextBlob provides an API for tasks such as part-of-speech tagging, lemmatization, sentiment analysis, among others. For sentiment analysis, TextBlob returns a score called polarity within the range [−1, 1]. Each response is evaluated in terms

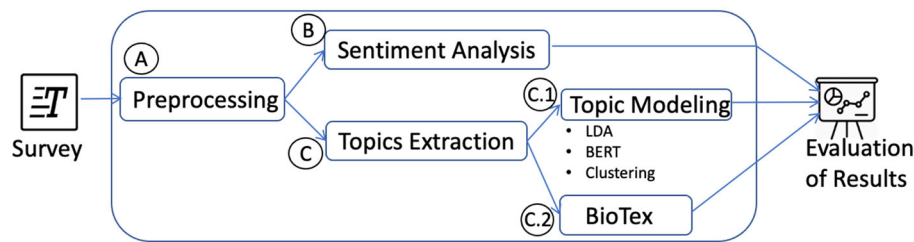


FIGURE 1 | Workflow of the Natural Language Processing methods applied to analyze the text of the survey.

of polarity where -1 represents very negative and $+1$ represents very positive.

(C) Topic Extraction:

In order to identify the types of silver linings participants reported experiencing, we used NLP methods of topic modeling and clustering to digest, analyze, and automatically extract topics from survey responses. Topic modeling aims to discover latent topics inherent to a set of textual responses, by identifying groups of words that frequently occur together (Lossio-Ventura et al., 2021). Clustering methods group texts based on their similarity.

In this study, we characterized the responses via feature extraction by employing a combination of the latent Dirichlet allocation model (LDA) and semantic representation transformers called Bidirectional Encoder Representations from Transformers (BERT), then grouped similar responses using k-means clustering. Based on studies demonstrating that this combination improved performance on numerous language analysis tasks (Rangrej et al., 2011; Peinelt et al., 2020; Xie et al., 2020), this approach allowed us to better reveal the most common types of silver linings in participants' responses.

The LDA is a probabilistic model that describes a set of texts as a mixture of distinct topics, which are represented as a mixture of distributions of words (Blei et al., 2003). LDA uses a Bayesian approach to learn these distributions, which allows it to compute the probability that a text belongs to a given topic. We implemented this with Gensim version 4.0.0, an open-source library for unsupervised topic modeling (Rehurek and Sojka, 2010). Parameters of LDA were set as suggested in previous studies to obtain optimal performance on short texts. The hyperparameters of LDA were set to $\alpha = 0.05$ and $\beta = 0.01$. We set the number of iterations to 1,000 and number of topics to 25. Thus, the output vector of each response had a dimension of 25. This produced a vector of probabilities for each participant's survey response, where the elements are probability scores of that response belonging to a particular topic. The sum of all elements of the vector is 1.

BERT is a language representation model released by Google. Recent studies have successfully employed BERT for topic analysis (Zhou et al., 2019; Liu et al., 2020, 2021). BERT enhances the semantic representation of texts with its feature extraction and fine-tuning transfer learning capabilities (Vaswani et al., 2017; Devlin et al., 2019). In this analysis, we used the BERT implementation provided by Hugging Face PyTorch. BERT parameters were set as suggested in Hugging Face PyTorch. Pad was set to the longest sequence in the batch (i.e., 512) and

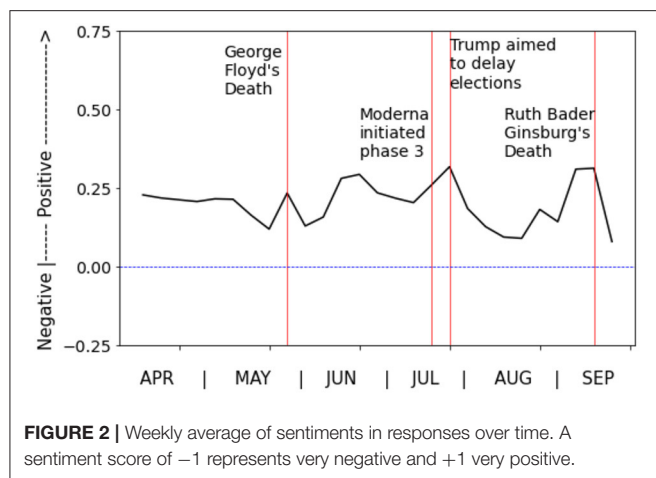
the pretrained model chosen was "bert-base-uncased." Thus, we encoded each response and obtained a vector embedding of dimension 768.

Next, we entered the LDA and BERT vectors for each survey response into the clustering algorithm. We used one of the most well-known algorithms, k-means (with k-means++ initialization) implemented from Sklearn (MacQueen, 1967). We varied k (i.e., number of clusters) ranging from 2 to 20, and the initialization was set to k-means++. Note that the clustering algorithm received a vector of dimension 793 ($25+768$). The output of the clustering task is clusters (topics) of responses. To evaluate the performance of the clustering method, we applied a cluster validity index, the Silhouette Coefficient (SC) (Rousseeuw, 1987). The SC index evaluates the clusters/topics based on two aspects: the similarity of responses within the same cluster (cohesion), and the difference between the responses of different clusters. Then we created wordclouds of the most important keywords from each topic. Note that the extracted keywords that represent each topic are single-word terms.

Finally, we used BioTex, an information retrieval tool that extracts multi-word terms (multi-word keywords) from text responses for different languages such as English and Spanish (Lossio-Ventura et al., 2016). BioTex implements several measures to extract multi-word terms, such as TF-IDF, LIDF-value, among others. This tool is based on several linguistic patterns also known as lexical categories such as nouns, adjectives, etc. For instance, BioTex is able to extract multi-word terms such as "quality time with spouse" which is composed of the following lexical categories: "adjective-noun-preposition-noun."

Qualitative Analyses

To further identify more granular themes from the corpus of open-ended responses in the dataset, we used qualitative methods of thematic content analysis. The coding process was conducted by two trained human coders following Braun and Clarke's (2006) guidance for completing thematic content analysis. First, two members of the research team (AL and EL) familiarized themselves with the data by reading over all of the responses. Next, they met regularly to generate codes and identify initial themes that emerged from a process of discussion and iterative review. These themes were subjected to further review by the research team, yielding a final set of nine themes of silver linings that participants reported as a result of the COVID-19 pandemic. Themes were named, defined, and finalized in a codebook. The manual coding of responses was conducted by two raters: AL who



coded 86% of the responses and a research assistant who coded 25% of the responses. Both coders used the same codebook and demonstrated good inter-rater reliability as evaluated by Cohen's kappa ($=0.70-0.94$). Upon completion of the coding process, the research team integrated the themes identified into existing literature and identified exemplar quotes.

RESULTS

Computational Analyses: Sentiment Analysis and Silver Linings Identified Through Natural Language Processing

The results of the sentiment analysis are presented in Table 1, including comparisons by demographics such as participants' gender, age group, and country of residence, and keyword examples of relevant topics associated with each group. We report the polarity analysis, which is the sentiment scores of mean responses categorized as positive, negative, or neutral in emotion. As expected, we found that the overall sentiment of participants' responses was positive when describing the silver linings they found in the pandemic, with the average polarity score being 0.22. Moreover, in general, women (polarity = 0.23) tend to slightly be more positive than men (polarity = 0.21) and they usually reacted to topics related to kids, followed by parents and partners.

The weekly average sentiment score of all responses over time are shown in Figure 2. Despite the stressors and tragedies of 2020, the average sentiment appears to remain positive overall. However, we can see that emotions in responses were less positive in the aftermath of distressing events, such as the murder of George Floyd and the death of Ruth Bader Ginsburg. On the other side, emotions in responses were more positive following hopeful events such as the announcement of the creation and testing phases of COVID-19 vaccines.

We then identified the types of silver linings people experienced using topic modeling and clustering. Note that we performed experiments using the Silhouette Coefficient (SC) index to measure the performance of the topic extraction step with the number of clusters/topic ranging from 2 to 20 ("k"). The SC obtained the best results when considering 5 clusters;

this means the methods automatically created 5 groups where each group contained messages of a topic. Figure 3 depicts the results of clustering (i.e., grouping similar responses) and topic extraction (most frequent words from each topic) of free-text responses based on the combination of LDA and BERT embeddings methods.

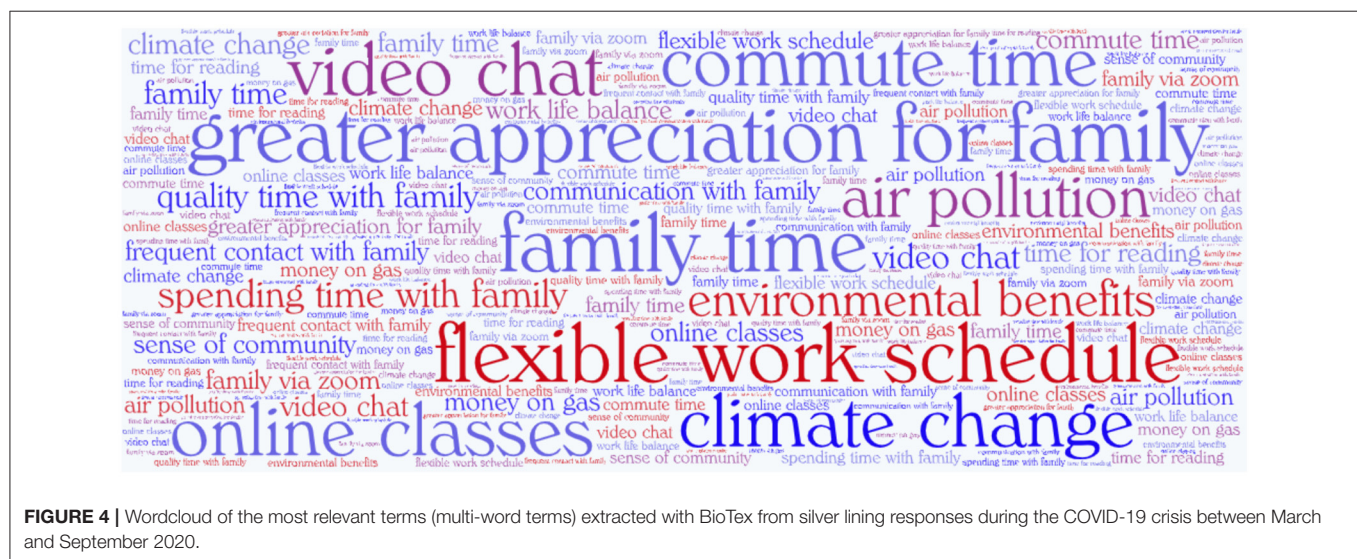
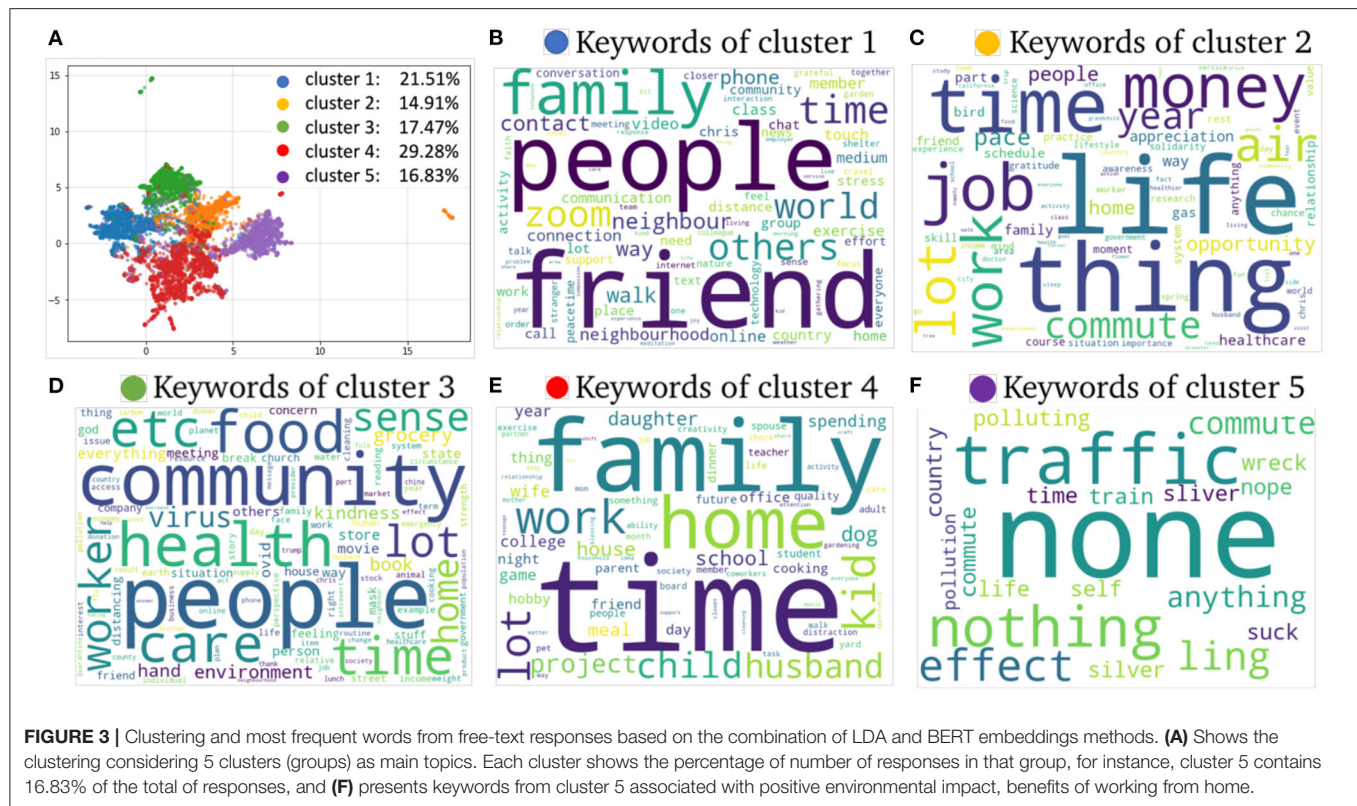
Figure 3A shows the clustering with 5 clusters as main topics. Each cluster shows the percentage of number of responses in that group, for instance, cluster 5 contains 16.83% of the total of responses. Figures 3B–F presents the most frequent words (single-word terms only) from all clusters, for instance, Figure 3F suggests that the cluster is associated with positive environmental impact. Topic modeling shows the different topics of discussion on silver linings are diverse, but the five most common topics that were automatically identified were finding benefits in (1) time with family, (2) work from home and flexible schedules, (3) sense of community and neighborhood, (4) reduced human impact on the environment, and (5) free time to develop skills. We confirmed these topics with BioTex. Figure 4 shows the most relevant terms (multi-word) automatically extracted with BioTex from all response, which are representative from the 5 topics previously identified.

Qualitative Analyses: Silver Linings Identified Through Thematic Content Analysis

Thematic content analysis allowed us to identify more fine-grained types of silver linings than those extracted with NLP methods. Indeed, the content analysis confirmed the five topics identified through NLP and yielded four additional themes, finding that people reported finding silver linings in (1) feeling gratitude for what they have, (2) improved health literacy (i.e., around correct illness prevention), (3) viewing the pandemic as an impetus for positive social change, and (4) appreciating the communication opportunities made possible by technology.

Table 2 shows the results from the thematic content analysis. Paralleling findings from the NLP analysis, we observe that almost half of participants (46.4%) said that they found benefits in having increased quality time with their loved ones due to staying home during the pandemic. For some, this was driven by changes in their household, as a result of children moving home to their parents or individuals moving in with their partners. For others, this was facilitated by an increased use of technologies like social media and video-chats, which enabled people to connect with their friends and family despite being physically distant. In fact, some people (13.0%) explicitly cited technology as a silver lining of the pandemic, mentioning that they learned how to use tools like Zoom to build and maintain their relationships.

In addition, approximately a third of participants (29%) found benefits in the "slowed down" pace of life during the pandemic. They enjoyed having more time to rest, work on professional projects, pursue new hobbies or skills, and reflect on their lives. More specifically, some (13.6%) also felt that their experiences of the pandemic urged them to be more grateful for what they had. Still others (12.7%) explicitly mentioned the benefits of being



able to work from home, such as enjoying the increased flexibility of work hours and the absence of stressful commutes. Finally, a subset of participants (5.6%) viewed the reduction of human travel and activity as a silver lining because it lead to a reduced impact on the environment.

People also found silver linings in the positive effects they anticipated would happen in the wake of the pandemic. Some (10.2%) felt that the necessity of taking health precautions to prevent the spread of COVID-19 would lead to improved health literacy among the general public, and subsequently lead to

improved collective health in the future. In addition, some (7.6%) felt that the severity of the pandemic would serve as an impetus for positive societal changes.

DISCUSSION

Principal Findings

The goal of this paper was to identify the silver linings that individuals reported finding in the COVID-19

TABLE 2 | COVID-19 silver lining identified from manual content analysis.

Topics	Example	Participants reporting silver lining type	No. %
Quality time with loved ones	"I'm in touch with my family who [lives] faraway a lot more. Kids are starting to help more in the house with cleaning and cooking. I'm getting two walks a day with my husband therefore having more quality time together!"	1,538/3,113	46.4%
Community coming together	"People reaching out to friends and family to make sure they are okay—physically and emotionally. People helping neighbors who can't go to the store on their own. People saying hello (at a safe distance) on the trails—respecting the rules but also the importance of staying friendly/being civil. People ordering from local restaurants and other ways to keep local businesses solvent." "I love seeing the kindness and generosity of my community."	544/3,113	16.4%
Life slowing down	"Having real time to do nothing, guilt- and FOMO-free, and the headspace to take up low-stakes hobbies just for fun, as in caring more about enjoyment than talent." "Self introspective reflection, thinking about what really matters, getting closer to God."	962/3,113	29%
Feeling gratitude for what they have	"Greater appreciation for family, friends, and health." "Appreciating the small things in life that have disappeared."	451/3,113	13.6%
Impetus for positive social change	"After this, we will be more aware of the damage we have caused, and everything will have a change. We are going to be cleaner people." "My therapy and psychiatry firm previously refused to do appointments via telehealth... Given the pandemic, they have been forced to adopt telehealth practices. I'm hopeful that they will continue this practice afterwards."	253/3,113	7.6%
Positive environmental impact	"Greenhouse gas emissions are down." "Mother nature is healing as there is less pollution, less people outside and most of all ozone layer is healing." "There is no traffic on the road, it is very quiet. This will be good for the planet."	185/3,113	5.6%
Improved health and health literacy	"Trying to prioritize sleep and my physical and mental well-being. Doing all my cooking at home and not buying take-out/restaurant/convenience food." "Increased awareness of hygiene."	340/3,113	10.2%
Benefits of working from home	"I don't have to drive 1.5 h to and from work daily." "I'm finding I am much more productive." "I think it is good that society is finally learning how to effectively work remotely from home. Hopefully, working remotely options will remain for many workers on a full-time basis or several times per week helping many workers to have more of a work-life balance after this crisis moving forward."	421/3,113	12.7%
Benefits of technology use	"Friends and family members are getting much better at technology and joining me on Facebook and Instagram where I've always done a lot of my socialization. So my physical contact with the world is a lot smaller but my community also feels a lot bigger and closer now."	431/3,113	13.0%

pandemic. During times of hardship, the act of finding silver linings, or benefits, can help people persevere by orienting them to the presence of protective factors in their lives.

We found that although people's emotions were impacted by COVID-19 and distressing events from the year, people were able to find sources of positive emotion in their lives. The public's sentiment score remained positive overall despite the tragedies and stressors that occurred in early stages of the pandemic. Using computational and qualitative natural language processing techniques, we found nine themes of silver linings. They found strength and hope in having quality time with loved ones, seeing local and global communities coming together, feeling the pace of life "slow down," enjoying the benefits of working from home, appreciating the benefits of technology use, and viewing the pandemic as an impetus for positive societal changes, particularly improved health literacy and improvements to the environment.

Silver Linings in the Pandemic: Denoting the Presence of Protective Factors

Although the pandemic took a severe toll on collective well-being, we found that people were able to find silver linings to their experiences. This is consistent with previous work on benefit-finding in the aftermath of traumatic events (Folkman, 2008). Positive psychology research has found that people in adverse situations often report finding different kinds of benefits from their experiences, despite its negative impact (Affleck and Tennen, 1996; Werner, 2000; Tennen and Affleck, 2002; Folkman, 2008).

The process of identifying benefits may be helpful because it helps orient people to the presence of *protective factors* in their lives, which are "skills, strengths, or resources that can help them deal more effectively with stressful events" that serve as psychological buffers that protect individuals from the potential harms of adverse situations, such as living through a pandemic [Fuller-Iglesias et al., 2008; Substance Abuse

and Mental Health Services Administration (SAMHSA), 2019; Conversano et al., 2020; Magson et al., 2020; Maine Center for Disease Control Prevention, 2020; Bearden and Karlsgodt, 2021]. Reflecting on silver linings may help people better recognize the *external protective factors* in their lives—such as having strong relationships with family or friends—or their own *internal protective factors*—such as having dispositional mindfulness or practicing gratitude (Wood et al., 2008; Lomas et al., 2014; Vieselmeyer et al., 2017; Gee, 2021). As a result, they are better positioned to take advantage of these resources.

In our study, the silver linings that emerged from our analyses revolved broadly around finding a sense of community, closeness, and gratitude—all of which may help orient people to the presence of protective factors in their lives. For example, some people reported feeling a sense of increased closeness with their loved ones and found that the pandemic gave them a unique opportunity to spend quality time with their families. For these people, the act of actively recognizing and appreciating their close relationships as a “silver lining” may help them engage in meaning-focused coping with the pandemic by finding a source of positive meaning in their experiences (Folkman, 2008). In addition, this silver lining denotes the presence of the protective factor of having a supportive or valued relationship with their loved ones, which has been linked to improved psychological well-being and resilience in the face of threats (Fuller-Iglesias et al., 2008). Indeed, a recent study found that people with greater perceived family support were less lonely and had better mental health during the COVID-19 crisis while social distancing measures were in place (Li and Xu, 2020).

Similarly, the silver lining of “appreciating what one has” denotes the presence of an important internal protective factor which is the practice of gratitude. People who reported this silver lining felt an increased sense of appreciation for what they had and a greater sense of clarity about what mattered in their life. They expressed appreciation for some of the positive lifestyle changes that have emerged, reflecting on the normalization of working from home, greater awareness of physical and mental health needs, and novel uses of technology that have allowed individuals and communities to connect when in-person interactions were limited. Extensive studies have demonstrated the beneficial effects of gratitude on well-being (Sansone and Sansone, 2010; Wood et al., 2010). In the context of the pandemic, a number of studies have found that practicing gratitude and appreciation for the positive aspects of one’s life protected individuals against some of the harmful mental health impacts of the pandemic among a variety of communities (Butler and Jaffe, 2021; Nguyen and Le, 2021).

Many people also found a silver lining in seeing their communities come together to support one another in a time of crisis. For some, this entailed seeing their neighbors and peers join together to help others in their local community. For others, this meant seeing people like healthcare workers, essential workers, and volunteers work on a global scale to combat the virus. Previous research on recovery from traumatic events has found that there can often be a collective outpouring of support and prosocial behavior in the aftermath of the crisis (Zaki, 2019). However, it is not always easy to recognize this, particularly

in times of distress. Reporting this silver lining may denote an orientation toward the protective factors of seeing the “positive” in other humans, to focus on what can be controlled, and to draw a sense of strength from adversity at the individual and collective level (McCrae, 1984; Tedeschi and Calhoun, 2004). Because of this orientation, people who recognize this sense of communality may be better able to participate in helping others or accessing forms of support at the community level.

Notably, many individuals found solace in viewing the pandemic as an impetus for necessary positive societal changes—a call to action to address urgent issues such as climate change, misinformation, and disparities in health and healthcare. Indeed, work on resilience through adverse life events has demonstrated that individual resilience is closely linked to interactions with systems-level factors, such as access to resources and public policy (Gee, 2021). Our results suggest that having a vision of a better future may be a key protective factor that helps individuals persevere through times of grief and uncertainty. Critically, however, belief in a better, more equitable future of a post-COVID world must be matched with concrete actions to make that vision a reality.

Limitations

Limitations to our research includes the non-representative nature of our sample and relatively small dataset used, which may affect the NLP methods, such as word representations and the creation of a relevant vocabulary coverage of COVID-19. For example, it is possible survey respondents were able to work from home or had not lost loved ones at the time of response.

Moreover, the NLP-based topic extraction approach we implemented allowed to improve the performance when revealing the most common topics, grouping similar responses, and in translating the unstructured response to input features for the clustering algorithm. However, it is worth to mention that there is currently no standard way of combining topics with pretrained contextual representations such as BERT.

CONCLUSION

By definition, “silver linings” are the signs of hope and strength, however faint, in an otherwise tragic situation. While no silver lining may be able to mitigate the impact of the pandemic on people’s lives, our results show what silver linings people have turned to in order to persevere through the challenges of the pandemic. In a time of limited resources, understanding the silver linings that have given people hope, strength, and solace can inform efforts to support individual and collective recovery from the psychological and emotional challenges of the pandemic. As a result, we may be better able to heal from this crisis and better prepared to respond to potential future crises.

DATA AVAILABILITY STATEMENT

The data used in this study can be made available upon reasonable request to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Stanford's Institutional Review Board and all participants consented to the study. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JALV and AL conceived and designed the study, performed the analysis and interpretation of data, wrote the initial draft, and revised subsequent versions. JALV set up the natural language processing applications. AL manually annotated the survey dataset. EL, NL, and JH as senior investigators and provided relevant feedback. EL led and supervised the project. All authors read, revised, and approved the final manuscript.

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Exploring Coping Strategies of Different Generations of Students Starting University

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Introduction: Coping strategies and adaptation skills are key features in successfully adjusting to university challenges. Coping skills are an essential part of the Psychological immune system, which leads to successful adaptation. Due to COVID-19 most universities have changed their face-to-face teaching for online education. Nevertheless, there is little concrete empirical evidence on how this generation of students with the ongoing impacts of disruptive changes can cope with it. Colleges and universities need to make changes in order to retain this new generation of students. Our aim was to explore the characteristics and changes in coping skills of university students from three different age groups.

Method: Psychological coping skills were measured by the Psychological Immune Competence Inventory (PICI). Differences were detected between generations. Group comparisons (pre-2004, pre-Covid, and post-Covid) groups were compared) using PICI subscales using independent sample analysis of variance. The sample consisted of 4,731 university students, 2,768 (58.5%) were men and 1,730 (36.56%) were women.

Results: Students from 2004 showed significantly higher scores in the Self-regulation subsystem scale compared to students in the pre-Covid and post-Covid groups. Self-regulation subsystem: $F(2, 2,569.607) = 444.375, p < 0.001, \eta^2 = 0.27$: small effect, $\omega^2 = 0.27$; Resilience: $F(2, 2,372.117) = 1171.855, p < 0.001, \eta^2 = 0.14$: small effect, $\omega^2 = 0.14$. Based on the results, the explained variance ratio was at least 10% based on self-regulation and resilience.

Conclusions: Psychological immune capacity of students seems to decrease through the years. Nonetheless, interventions may have a further facilitating role in the maintenance and development of psychological immunity during college years.

Keywords: university student, COVID-19, Generation Z, Generation Y, psychological immune system inventory questionnaire

INTRODUCTION

Literature Review

The meta-analyses conducted strongly predict the success of higher education students based on past school performance, socioeconomic status (e.g., Sackett et al., 2009), parental education, higher intelligence, and learning and self-regulatory strategies (e.g., Richardson et al., 2012). Schneider and Preckel (2017) conducted a review of variables associated with achievement in higher education in their study, thus providing a systematic and comprehensive overview of the international higher education research literature. The variables of all empirical studies related to student performance over the past two decades have been examined. The study described 105 variables that contained data from nearly two million students. The review allowed different educational methods and institutions of higher education to be compared based on impact indicators. According to that study, higher education research has two central questions: one about teaching methods and the other about attributes of students that can predict their academic performance. The following characteristics describe students who perform well during their studies in higher education: self-efficacy, intelligence, and targeted use of learning strategies.

Researchers have been analyzing and discussing about how students cope with stress in their academic lives for a very long time and it is essential to continue to understand this issue. Many researchers have also studied the relationship between psychological characteristics and dropout from higher education. According to Chen (2008) there is a relationship between coping strategies and psychological well-being in college. It has been proved that positive coping strategies had significant buffering effects on psychological health problems. There are various studies which showed that in general, self-efficacy is one of the main coping strategies that helps to improve university students' performance (Freire et al., 2020).

Coping With University Stress

Coping with challenges during academic studies is affected by a large number of factors. Dealing with stress, anxiety, and/or difficult emotions at university can interfere with the ability to pay attention, learn new information. Stress factors can be: lack of time, overloaded curriculum, tests, perfectionism (i.e., setting expectations toward oneself too high), competitiveness among students and family problems.

Towbes and Cohen (1996) claim that stress could be a major issue for university students as they have to adapt to academical, social and individual challenges. Most students face continuous pressure for a good academic performance (Oman et al., 2008). Although the concept of coping strategies is still a controversial issue (Stanisławski, 2019), numerous distinctive adapting behaviors have been considered within the long history of research about stress. Some of the coping behaviors are considered more "active," i.e., cognitive reframing (Tobin et al., 1989), whereas other strategies are more "passive" (e.g., social withdrawal). Some other coping behaviors have been identified during collective crises by Fullana et al. (2020); for example,

following routines or maintaining healthy habits during COVID-19 breakdown.

Lazarus claims that according to the basic concept of coping, we are in a constant, two-way interaction with our environment (Lazarus, 1993). Coping is an assessment process designed to respond to external and internal challenges. Coping strategies are defined as efforts to regulate emotions, behaviors, cognitions and environmental aspects in response to the stress of everyday events. Each situation requires the use of a specific coping strategy. In many cases, managing the situations exceeds the resources the individual has. When facing a difficult situation, we evaluate how threatening or challenging the situation is according to our own goals and resources. And then we activate our resources to handle it and apply coping strategies. We distinguish several coping strategies. Problem-focused coping is activated when the situation is evaluated as changeable and controllable and we strive to focus on the problem solution. Emotion-focused strategies are activated when the situation appears unchangeable and we seek to reduce our negative feelings. There are even other classifications of coping strategies, such as social support. It is important to map and develop our coping strategies in order to activate the most effective coping strategies during difficult situations to deal with stressors. In dealing with crises that unfold in everyday life situations, we mobilize our psychological competencies. As Galiana et al. (2020) claims, even by elder people coping strategies have a great impact on well-being.

Higher education students may confront numerous unpleasant challenges in higher education. Denovan and Macaskill (2013) claim that college students apply many types of coping mechanisms e.g., self-control, trust, and positive thinking in order to better adjust to stressful situations. The type of coping strategy used depends on the perceived level of self-efficacy by the individual (Vanderclay et al., 2014; Zambianchi and Ricci-Bitti, 2014; Gárriz et al., 2015).

Being aware of our strength helps to cope mentally and emotionally with stress at university. Coping strategies can be: respecting your limits, setting priorities, avoiding comparisons, leisure activities (watching movies, literature, sport, meeting with friends), assertiveness, building community, cognitive restructuring, and social networking. Li et al. (2018) investigated 262 university students in China and established that self-esteem had a mediating role in the relationship between social support and academic achievement. The main objective of the study of Morales-Rodríguez and Pérez-Mármol (2019) was to explore if anxiety, coping strategies, and emotional intelligence were related to the levels of self-efficacy in a sample of Spanish university students ($N = 258$). According to the results, general perceived self-efficacy is statistically related to state and trait anxiety, and to coping strategies of problemsolving, emotional expression, cognitive restructuring and social withdrawal. Kotera et al. (2021) got similar results, they compared Malaysian ($N = 153$) and United Kingdom students ($N = 105$) by paper-based measures about mental health problems, negative mental health attitudes, self-compassion, and resilience. Mental health problems were positively associated with negative mental health attitudes, and negatively associated with self-compassion and resilience. As a

result of the survey, self-compassion training was suggested to university students for improving their mental health.

The results show that putting effort by the institution into developing core skills can have a developing effect on self-esteem which according to the results fully mediates the relationship between social support and academic achievement (Bredács, 2016).

Psychological Immune System

In dealing with crises in daily life, the individual mobilizes his or her psychological competencies. The adaptive and maladaptive coping are activated along self-efficacy: the higher the self-efficacy skills, the stronger coping strategies will be activated. Psychological immune competence, as defined by Oláh (2009), is a collective concept of psychological characteristics based on the defense system of the personality. The psychological immune system protects the personality from the damaging effects of stress on physical and mental health (Oláh, 2005; Oláh et al., 2010; Bredács, 2016). At what level and with what results a person is able to cope with stress depends largely on his or her psychological immune competence, the inviolability and unpredictability of the situation, and the coping capacity of the personality (Jaiswal et al., 2020). Coping is one of the main variables that moderates the dynamic interaction between stress from the environment and the response elicited by the individual (Oláh, 2005). Two forms of coping can be distinguished: problem-focused and emotion-focused. Problem-centered coping means that the individual tries to achieve change by focusing on the problem, either in the environment or in themselves. In the case of emotion-focused coping, the individual is not able to deal directly with the problem, but by using different strategies (conscious or unconscious) tries to eliminate the psychological pressure evoked by the situation (Oláh, 2009; Kaur and Som, 2020). According to Oláh (2005), cognitive personality traits contribute to an individual's successful coping. In his concept, he created a broad and comprehensive system, a set of personality traits that help with coping, which he called the psychological immune system. The psychological immune system unites personality resources that help the individual to endure and cope with a stressful situation, while the person's integrity and developmental potential are not damaged, but strengthened during the active stress response of the situation. The psychological immune system provides active protection against external and internal factors that may hinder the individual's integrated functioning. The psychological immune system is composed of three subsystems: approach-belief subsystem, monitoring-creating-executing, and self-regulatory subsystem. Units of the approach-belief subsystem are optimism, a sense of coherence, the ability to seek challenges, and the ability to monitor the physical and social environment by tuning the cognitive apparatus to positive consequences. The components of the monitoring-creating-executing subsystem are ingenuity, problem-solving ability, self-efficacy, and the ability to mobilize social resources and social creativity. The subsystem unites the personality traits by mobilizing, and thus enables an individual to shape their environment or themselves according to their goals. The self-regulatory subsystem includes coping potentials

that provide control over attention and conscious functioning, which are: synchronicity (directing attention and keeping the focus to reach the desired goal), persistence, irritability inhibition, impulsivity control, and emotional control. The three subsystems interact dynamically with each other, thus stimulating and regulating each other's functioning and enabling the self's development and fulfillment through the integration of self-seeking information (Oláh, 2005). The development of a well functioning psychological immune competence in education should be a key factor to student development (Bredács, 2016). Oláh (2009) draws attention to higher education that those who are able to set meaningful goals for themselves and see the meaning of the work invested are able to trust in the efficiency and development of their own skills, evaluate themselves more positively and consider themselves persistent enough to achieve. A low psychological immune competence can be an indicator of anxiety and lack of self-confidence. Oláh et al. (2010) also studied participants from different cultures and confirmed that those who manage to set clear goals for themselves are better aware of their own abilities, and thus can effectively mobilize the energy resources needed to perform the tasks. The more they can be in harmony with their own abilities and feel to have a sense of control, the less they will feel unstable or anxious, and their perseverance and satisfaction will increase. As part of the process, their own talent and self-efficacy can unfold.

The conception of psychological immune system has various related studies to factors in the field of health psychology. Recent research surveying psychological immune system among emergency nurses (Gombor, 2009), gymnasts (Bóna, 2014), and military soldiers (Hullám, 2005), showed that psychological immune competence had a positive correlation with life satisfaction and well-being measurements (e.g., personal growth, self-acceptance, purpose in life) and a negative correlation with burnout (Oláh, 2009). Voitkane (2004) showed that a significant relationship existed between psychological immune subsystems and personal goals. Gombor (2009) involved Swedish nurses in his study and the results showed that psychological immune system was the best protective factor against burnout. Furthermore, psychological immune competence is strongly correlated with mental and physical health (Oláh, 2009), with the hope of attaining goals, with life satisfaction, life expectancy (Oláh et al., 2010) and negatively with depression (Voitkane, 2004).

Millennials and Gen Z

According to Mannheim (1952), a generation is a group of people of the same age in a similar social location experiencing similar social events (in Pilcher, 1994). Articles and books focus on the characteristics of generations in colleges and universities with the belief that generations differ in values, attitudes toward studying and behaviors (Gabrielova and Buchko, 2021). Higher education is full of challenges and it is essential to analyze coping mechanisms to understand generations in order to retain them at the university. We focus in this article on the two youngest generations, Millennials and Generation Z.

The generation which was born 1995–2012 is called Generation Z (McCrindle and Wolfinger, 2014), and is an

interesting crossover from the previous Generation Y (or Millennials). The birth period of the previous generation is 1981–1995 (National Endowment for Financial Education, 2015). They are called Millennials because they were raised in the digital age, a sign of the upcoming new millennium (Anderson and Jiang, 2018). We can also call Generation Z as iGeneration because they always had access to the internet, iPods, and iPhones. This immediate ability to retrieve and transmit information could have a strong influence on their thinking and learning methods. Given the size of this group of people, it is perhaps not surprising that much effort has been devoted to understand them and seeking to improve their skills as students.

The first of the Generation Z cohort started graduating from high school in 2013, and college in 2017 or are still studying.

While Generation Z shares many traits with the millennial generation, they also bring in new patterns of behaviors at the university (Iorgulescu, 2016). Like Millennials, they are interested in obtaining new information quickly. Many Millennials need to be trained to develop essential studying skills, because Generation Z has been less involved in face-to-face communication. They want to be socially connected with everyone (Turner, 2015).

Generation Z is a kind of generation growing up with a culture of overprotective parents, a generation that has not received the opportunity to develop proper life management skills (Lukianoff and Haidt, 2015). Becoming a self-conscious individual involves making decisions and taking responsibilities for actions in uncertain situations and under unknown circumstances. Having overprotective parents hindered them in their proper social, emotional and intellectual development, which serves as an obstacle to be able to explore challenges of life and navigate in different working environments such as universities and colleges (Turner, 2015; Gabrielova and Buchko, 2021). There is little information about how Generation Z is going to be influenced by COVID-19.

Covid-19 and Its Effect on This Generation

Currently, there is little literature about COVID-19 in relation to how it effects coping skills at universities, so it is worth discussing it and have an overview of recent studies about students' mental health.

Some researchers started to examine the effects of COVID-19 pandemic on university students' mental health. Browning et al. (2021) highlight that university students are increasingly considered a vulnerable population, since they experience extremely high levels of anxiety and depression. As the education has changed radically due to COVID-19 pandemic, it calls attention to the fact that students suffer with more mental health problems. Padrón et al. (2021) applied a path-analysis model integrating stressors, coping, and mental health. According to their results, coping strategies partially were a mediator valuable between the effect of stressors and psychological health. Agbaria and Mokh (2021) investigated the relationships between active, problem-focused, and maladaptive coping with stress during the first wave of coronavirus outbreak among college students. They found that positive social support may increase

students' ability to cope effectively with the current situation. Another interesting research was conducted by Vitales et al. (2021). One-hundred males and one-hundred females from each generation participated in the survey (Baby Boomers, Generation Y, Generation X, and Generation Z). It was only their psychological-spiritual coping strategies where they found significant difference among the generations. Arora et al. (2021) examined the impact of coronavirus and online education on students' anxiety and self-efficacy, and they found that coping strategies had a moderating role between anxiety and self-efficacy. The correlation was lower in students with higher levels of coping strategies (self-efficacy) than in students with lower levels of coping strategies (self-efficacy). Nomura et al. (2021) also reported that interventions should be made because COVID-19 had an effect on the prevalence of depressive symptoms as well as suicide-related ideation among Japanese university students. Szczepańska and Pietrzyka (2021) found a strong correlation ($N = 135$) between the severity of lockdown measures during COVID-19 pandemic and the students' activity levels in public spaces. Students were affected by the absence of direct social interactions, which caused a considerable deterioration in students' physical and psychological well-being, and the overall quality of life (Szczepańska and Pietrzyka, 2021). Coping with stress among graduate and professional students ($N = 305$) during the lockdown was also discussed by Wasil et al. (2021). Students reported top problems relating to productivity (27% of sample), physical health (26%), and emotional health (14%). As a coping strategy movement activities (like sport) were the most frequently identified (50%). Students who reported a common strategy had lower depressive and anxiety symptoms. In general, results suggest that students' psychological health was substantially affected by the COVID-19 pandemic situation and that the academic and relational changes were the most notable sources of stress.

Gonzalez et al. (2020) analyzed the effects of COVID-19 on the learning performance of students. The results show that there has been a significant positive effect of the COVID-19 restrictions on students' academic performance: students have improved their strategies of learning. They expected better scores in students' effectiveness. Lee et al. (2021) analyzed a student course satisfaction survey, conducted during the 2020 summer term, and it appeared that due to COVID-19 students were more resilient during the first lockdown than was often assumed. These studies reinforce the need to monitor and promote mental health in university students to boost their resilience in times of crisis.

Based on the literature above, there are two major immediate needs for high quality research to be conducted. Nevertheless, research on coping skills of Generation Z are still limited, and in order to better adjust the higher education to students' needs not just during the COVID-19 crisis but also in general, the impact of the various types of coping skills on students' adjustment is largely unknown (Apgar and Cadmus, 2021).

Research on stress among students and its effects have been well-documented from various perspectives. Researchers agree that students share common academic stressors such as time-management, exam anxiety and course related stress (Malarvili and Dhanapal, 2018). However, there is a lack of studies

comparing the perceptions of Generations Y and Z regarding coping skills, especially in the field of higher education. Thus, this quantitative study aimed to identify the difference between coping skills of Generations Y and Z students. These are key factors of coping with university stress and maintaining mental health. For the purpose of this study, Generation Y are those born between 1981 and 1994, while Generation Z includes those born from 1995 to 2012 (McCrindle and Wolfinger, 2014). The reason for choosing Generations Y and Z as the sample is due to the fact that these are the latest generations who entered higher education and the difference among them can lead us to recommendations on what we should change in higher education in order to improve their coping skills. Understanding the differences and their strengths might help us to find new methods that support the current generation to successfully adapt to academic and life challenges.

This article examines the coping skills of today's generation of students in order to provide new perspectives on how different staff members of the university can support Generation Z in their academic success. The result of this discussion is significant because the results could be a remedy for the concerns of administrators, faculty members, teachers and practitioners on how to apply intervention strategies.

The main aim of the study was to examine the differences between Generation Y- from 1981 to 1994- and Z- from 1995 to 2012- regarding to the self-regulation and resilience subsystem. Self-regulation subsystem is related to emotional control, perseverance, impulse and irritability control, thus this system helps dealing with stress-related tensions. Being less resilient can lead to insufficiency in adapting to changes in the environment which means that the younger generation could have problems with adaptation and difficulties to deal with academic and interpersonal challenges. It is self-regulation that allows coping with stress and controlling feelings. The self-regulation subsystem is in control of the goals achievement and controlling feelings after failure. This subsystem can interfere within the young people that present more difficulty moving away from bad feelings related to discomfort. This population can be identified as risky because they are less capable of mobilizing social resources or efficient tools of stress management.

Research Hypotheses

The research hypotheses of the current study are:

H1: Generation Z has significantly stronger approach-belief subsystem than the Generation Y.

H2: Generation Z has significantly stronger creative-executive social and individual effectiveness (Monitoring- Creating- Executing subsystem) than Generation Y (2004s).

H3: Generation Y has significantly stronger self-regulation than Generation Z.

H4: Generation Y has significantly stronger resilience than Generation Z.

H5: There is no significant difference between pre- and post-COVID generations' psychological immune systems.

MATERIALS AND METHODS

Participants

The global sample consisted initially of 4,731 first-year university students recruited from various academic areas. In the final sample, 2,768 (58.5%) were men and 1,730 (36.56%) were women, 233 participants did not indicate their biological sex (4.9%). The mean age of the participants was 20.06 years; and the age range was between 16 and 51 years. The inclusion criterion was to be first-year student at the time of the study. Exclusion criteria included failing to respond to the questionnaire. We excluded 233 cases because they failed to respond to enough items. The students in the sample studied in the academic areas of humanities (33%), computer science and engineering (64%).

Procedures

The study protocol was designed and executed in compliance with the code of ethics set out by the university in which the research was conducted, with the informed consent of all participants, as required by the Helsinki Declaration. Participants were assured of anonymity and the confidentiality of their responses.

In 2004 undergraduate first-year students were approached at the beginning of the semester. They were asked to complete a hard copy of the questionnaire. The participants were informed that the data collected would remain anonymous and used only for research purposes. It took the participants an average 20 min to complete the self-report questionnaire.

Participants from Generation Z (in each October beginning from the semester 2013 until 2020) filled out the questionnaires using an internal web application. Students were invited to participate in filling in the questionnaire mainly at an academic course (Preparation course for academic studies and learning strategies) and the students were also encouraged to spread the link to fellow students using the same platform.

The present study protocol was approved by the Ethics Committee of the University of Anonymus, with the registration number: 61, and prior to beginning the questionnaire, participants were provided with the goal and requirements of the study. They were also asked to give their explicit agreement to participate in the study and were informed that participation was completely anonymous and voluntary. On average, the survey took 20 min to complete and there was no reward or compensation for participating. The first year of university education is the hardest because students have to face unexpected and unknown difficulties.

Data Analyses

Group comparisons (pre-2004, pre-Covid, and post-Covid) groups were compared) using PICI subscales using independent sample analysis of variance. The homogeneity of variances was tested with Levene's test, and in the case of damage to the homogeneity of variances, the Welch's analysis of variance was

used. In addition to significance, effect variance (eta-square and omega-square) indicators were also calculated in each case. Kruskal–Wallis H test was used for testing whether there were differences between the examined groups.

Instrument: Psychological Immune Competence Inventory Survey

Psychological immunity can be measured with the psychological immune competence questionnaire (Oláh, 2005). This questionnaire contains 16 scales for measuring personal protective characteristics. Participants were asked to respond to each item on a 4-point Likert scale (1 = “does not describe me at all” and 4 = “fully describes me”), indicating how well the statement describes them. The higher a person scores on the scale, the stronger is his/her psychological immune system. In this research, we used subscales of approach-belief subsystem, monitoring-creating-executing subsystem, self-regulating subsystem and resilience. One example of an item from the managed instrument: “When I look at my life, I see it evolving meaningfully and consistently.” Resilience is the ability that helps us cope with stress, and to reduce the negative effects of stress. A general accepted level of reliability is that α of 0.6–0.7, and 0.8 or greater is a very good level (Ursachi et al., 2015). The reliability of scales was at a very good level in this study (Table 1).

Psychological Immune Competence Inventory showed high reliability and validity during testing. The descriptive statistics of the scales are in Table 2.

The homogeneity of variances was impaired for all subscales according to the Levene test. Approach-belief subsystem [$F(2, 4343) = 109.660, p < 0.001$], monitoring-creating-executing subsystem [$F(2, 4351) = 126.381, p < 0.001$], self-regulating subsystem [$F(2, 4346) = 158.797, p < 0.001$], resilience [$F(2, 4345) = 313.082, p < 0.001$] at a significance level of 5%. Thus, Welch's analysis of variance was used to compare the means of the groups.

RESULTS

Differences between groups were significant for all subscales based on the Welch test. Approach-belief subsystem: $F(2, 2503,216) = 145.612, p < 0.001, \eta^2 = 0.48$: small effect;

$\omega^2 = 0.48$. Monitoring- creating- executing subsystem: $F(2, 2,419,480) = 146.151, p < 0.001, \eta^2 = 0.47$: small effect, $\omega^2 = 0.47$. Self-regulating subsystem: $F(2, 2,569,607) = 444.375, p < 0.001, \eta^2 = 0.27$: small effect, $\omega^2 = 0.27$. Resilience: $F(2, 2,372,117) = 1171.855, p < 0.001, \eta^2 = 0.14$: small effect, $\omega^2 = 0.14$.

These significant differences were also supported by the Kruskal–Wallis H test for all 4 subscales at $p < 0.001$. Result of the Kruskal–Wallis tests: approach-belief subsystem: $H(2) = 186.856, p < 0.000$; monitoring- creating- executing subsystem: $H(2) = 169.996, p < 0.000$; self-regulating subsystem: $H(2) = 629.152, p < 0.000$; resilience: $H(2) = 1495.277, p < 0.000$; psychological immune competence: $H(2) = 892.047, p < 0.000$.

We examined the differences between the generations based on the psychological immune systems:

Regarding the approach-belief subsystem, Generation Y had a higher average score than Generation Z, and the difference was significant; however, the explained variance ratio was at least 10%, which is why it should be discarded (Hypothesis 1). The analyzes performed were adequate to the proposed hypotheses and the differences between the compared groups were significant but the hypothesis was rejected because the explained variance was too small, and the effect sizes were small.

Considering the monitoring-creating-executing subsystem, Generation Y had a higher average score than Generation Z and the difference was significant; however, the explained variance ratio was at least 10%, which was why it was also to be discarded (Hypothesis 2). The analyzes performed were good enough to the proposed hypothesis and the differences between the compared groups were significant but the hypothesis was rejected due to the fact the explained variance was too small, and the effect sizes were small.

There were significant differences between the generations regarding the self-regulating subsystem (Hypothesis 3) and resilience (Hypothesis 4). Generation Y had significantly higher scores compared to the other younger generations.

We found no difference between the pre- and post-Covid generations regarding their psychological immune systems (Hypothesis 5). The confidence intervals can be found in Table 2 and there was no difference between the groups (pre- and post-Covid).

DISCUSSION

The monitoring-creating-executing subsystem is responsible for understanding and preparing actions to control the environment. Being open to positivity helps the enactment of positive coping strategies and discovering new solutions (Oláh, 2005, 2009). The monitoring-creating-executing subsystem can activate the access to the person's resources and problem-solving capacity (Kaur and Som, 2020). Since the approach-belief subsystem consists of competences that are open to improvement, with appropriate interventions- like strengthening creativity, promoting to discover alternative solutions- students can be facilitated to change their attitudes, or map their possibilities whether they can make modifications in the environment

TABLE 1 | Reliability measures of the psychological immune system inventory subscales.

Scale	Number of items	Cronbach alpha (α)	mean	variance
approach-belief subsystem	6	0.8	2.7	0.02
monitoring- creating- executing subsystem	4	0.76	2.91	0.02
self-regulating subsystem	3	0.79	2.6	0.1
resilience	3	0.77	2.63	0.09
psychological immune competence	16	0.88	2.74	0.05

TABLE 2 | Descriptive statistics of the scales.

Scales	Groups	N	Mean	Std. Deviation	Std. Error	Min	Max	95% Confidence Interval for Mean	
								Lower Bound	Upper Bound
Approach-belief subsystem	Generation Y (2004)	1,557	17.73	2.7	0.07	7	24	17.60	17.87
	Generation Z	1,557	15.93	4.44	0.11	0	24	15.70	16.15
	Pre-Covid (2013–2018)								
	Generation Z	1,232	15.68	5.01	0.14	0	24	15.40	15.96
	Post-Covid (2019–2020)								
Monitoring- creating-executing subsystem	Total	4,346	16.51	4.2	0.06	0	24	16.38	16.63
	Generation Y (2004)	1,565	12.63	1.66	0.04	5	16	12.55	12.71
	Generation Z	1,557	11.47	3.02	0.08	0	16	11.32	11.62
	Pre-Covid (2013–2018)								
	Generation Z	1,232	11.23	3.47	0.1	0	16	11.03	11.42
Self-regulating subsystem	Post-Covid (2019–2020)								
	Total	4,354	11.82	2.83	0.04	0	16	11.73	11.90
	Generation Y (2004)	1,560	9.86	1.76	0.05	3	12	9.77	9.94
	Generation Z	1,557	7.86	2.7	0.07	0	12	7.72	7.99
	Pre-Covid (2013–2018)								
Resilience	Generation Z	1,232	7.7	2.94	0.08	0	12	7.54	7.86
	Post-Covid (2019–2020)								
	Total	4,349	8.53	2.68	0.04	0	12	8.45	8.61
	Generation Y (2004)	1,559	10.87	1.31	0.03	3	12	10.81	10.94
	Generation Z	1,557	7.98	2.64	0.07	0	12	7.85	8.11
Psychological immune system	Pre-Covid (2013–2018)								
	Generation Z	1,232	7.78	2.86	0.08	0	12	7.62	7.94
	Post-Covid (2019–2020)								
	Total	4,348	8.96	2.73	0.04	0	12	8.88	9.04
	Generation Y (2004)	1,554	51.11	5.34	0.14	24	64	50.84	51.38
	Generation Z	1,557	43.23	10.35	0.26	0	63	42.72	43.75
	Pre-Covid (2013–2018)								
	Generation Z	1,232	42.39	12.27	0.35	0	64	41.70	43.07
	Post-Covid (2019–2020)								
	Total	4,343	45.81	10.35	0.16	0	64	45.50	46.12

(Bredács, 2016). The components which are part of the auto-regulating subsystem are the following: emotional control, perseverance, impulse control, irritability control, help in handling the tensions that arise due to stress, and also help coping by controlling feelings. The self-regulating subsystem is in control of the process of accomplishing goals, and helps to control emotional states after failure. The self-regulating subsystem score was lower for the younger generations, pre- and post- Covid generations (Generation Z). However, lower scores in the self-regulating subsystem allows us to see that they have difficulties in shutting out the discomfort evoked by negative feelings. They can be identified as a risk population as they are less capable of mobilizing social resources or effective stress management tools. The lower resilience can lead to insufficiency in adapting to the changing demands of the

environment. It means that the younger generation (Z) could have adjustment problems, they can have difficulties to adapt to academic challenges. One of the conclusions could be that the younger generation needs prevention programs in order to strengthen their auto-regulating subsystem, their resilience and flexibility. There is a need to develop these competences of the psychological immune system that help the individual to experience more successful adaptation even in more demanding life situations like COVID-19.

When an individual is able to dive into completely whatever s/he is doing, s/he becomes involved in it (Bredács, 2016). This happens during academic activities and also while being with friends. Apathy, uneasiness, and other negative feelings might indicate adjustment problems and can appear as a potential risk for dropout at university.

There were no differences found in the other subsystems of the psychological immune system, namely the monitoring-creating-executing subsystem and the approach-belief subsystem, which suggests the following: Both generations (Y and Z) are able to find the entire world challenging and easily get involved in studying. The difference is in the self-regulation subsystem which refers to the fact that Generation Z is less able to control their feelings in stressful situations and have weaker self-regulation skills during academic activities. It is probable that generation Y has less capacity to transform negative feelings, evoked by life situations into constructive responses. These abilities can be strengthened by effective prevention programs. Our result is in concordance with the studies of younger generations (e.g., Oláh et al., 2010; Bredács, 2016) according to which the teenagers with stronger psychological immune systems are more likely to cope well with different situations.

Our research highlighted the strengths and weaknesses of the Generation Z at the university. The role of the psychological immune system in a healthy psychological profile and coping behavior is unarguable. Those who have stronger psychological immune competences can reframe challenges easier by giving them different, new meaning, and tackle difficult situations. The focus of this present study was a comparison of psychological immune system components in order to see the differences among students who entered the university between 2004 and 2020. Fundamental difference was found in the self-regulation subsystem and resilience. However, the new generation does not differ in the other factors analysed in this study (approach-belief subsystem and monitoring-creating-executing subsystem). It means that when facing new situations, students are able to see them as a challenge in a positive way and to cope with them creatively. The difference is that Generation Y is more impatient and they have a lack of ability to delay. They grew up in front of the computer and they are likely to get used to instant responses. They might become impatient if they do not find an information immediately, their tolerance level of not instant gratification is lower. Probably they have more difficulties in their interpersonal relationships. This kind of expectation of instant gratification when managing human relationships can easily result in frustration, because their expectations might differ from the reality. In this study differences between pre-Covid and post-Covid generations were not found, probably other psychological scales are needed to detect further differences.

A possible help could be in the education to promote mental health development at the university. Peer to peer programs also could be useful in order to strengthen coping mechanisms of students. There is a need for prevention programs that aim to develop the above mentioned abilities of university students, aiding better coping strategies with stress. Our study supports the idea of promoting prevention programs for all generations to strengthen their autoregulation skills and resilience.

Limitations of the Study

The contributions of this study should be assessed, taking into account some limitations of the study. One of the limitation

lies in the composition of the sample, which was dissimilar in terms of gender representation. The use of online self-reports as a data collection method may limit the validity of the results, since the questionnaires are applied on an online form which does not guarantee who is answering. The instrument applied is a self-report instrument which also could lead to some biases in responses.

CONCLUSION

Various international studies mainly compare representatives of different generations, and less attention is paid to the psychological factors of adjustment at university within one generation. The aim of the present empirical study was to find differences in coping strategies among generations of students. As far as we know, there are limited studies focusing on analyzing different generations using the psychological immune system scales in the educational sector. However, knowing these differences would help to improve the learning process, to provide more efficient guidance, vocational-, counseling-, and other supporting services.

The present study was conducted to analyze the difference between psychological immune system subscales among university students in two generations (Z and Y). Our aim was to understand better how the psychological immune system can promote academic success.

The result reflects well the differences between the generations, how much they have changed over the past 20 years. This result shows that the young generation is fast in information processing but in the social dimension they are less effective compared to the other generation. These results could underline, in line with other researchers from the positive psychology context (e.g., Oláh, 2009), that flexibility in coping enhances university students' perception of control over their challenges, making them feel better able to handle them. The results of our research may represent a significant contribution, in that they help increase our understanding the difference between generations.

When a difficult life situation occurs, the difference is also reflected in the various reactions of the generations. The pre-Covid and post-Covid generations did not differ regarding coping skills. The full capacity of the generations is still waiting to be discovered, but the data shows, when a life-threatening situation affects everyone, it will be reflected in the flexibility of adaptation.

The bigger issue is socialization, if Generation Z lacks their self-regulation skills, which appeared in the self-report questionnaire. It means that they are less flexible, or resilient as Generation Y used to be. Probably, COVID-19 is going to still weaken the ability of handling emotional experiences. The Generation Z might become emotionally unstable as a result of bad experiences. If an individual has difficulty managing their emotional tensions, the additional external stress makes it even more difficult. This can be interpreted that Generation Z is weaker in handling negative emotions compared to Generation Y.

The practical significance of the study lies in tailoring preventive educational programs to the results of this study. This study underpins the need to monitor and promote mental health of university students, especially to help to strengthen their resilience in times of a crisis, like the COVID-19 pandemic. Interventions could be designed that support self-regulation skills of students that helps to eliminate the negative effects of stress also in the educational setting, and thus can lead to better academic performances.

Lines for Future Research

New studies are needed to expand the sample and use more rigorous study design (e.g., longitudinal studies). In order to make the results more generalizable to the university student population, future studies should use more thorough recruitment procedures that would give more balanced samples in terms of gender and field of studies. Participants should be recruited from different subject areas. In order to facilitate generalization of the results, new studies are needed which involve students from other countries and cultural contexts. Future studies could include not only questionnaires but also in-depth interviews with the students.

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DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Eötvös Loránd University Psychological Ethical Committee. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RT contributed to the conception and design of the study, led the data collection, analysis, and interpretation, and wrote and revised the manuscript. JT contributed to the design of the study, collected and interpreted the data. ST contributed to the design of the study, analyzed and interpreted the data, and revised the manuscript. ZH and AO contributed to the design of the study and revised the manuscript. All authors read and approved the final manuscript.

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Technology as a Double-Edged Sword: Understanding Life Experiences and Coping With COVID-19 in India

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The two waves of COVID-19 in India have had severe consequences for the lives of people. The Indian State-imposed various regulatory mechanisms like lockdowns, encouraged remote work, online teaching in academic institutions, and enforced adherence to the COVID protocols. The use of various technologies especially digital/online technologies not only helped to adapt to the “new normal” and cope with the disruptions in pursuing everyday activities but also to manage one’s well-being. However, the availability and accessibility of digital technologies to various sections of the population were not uniform. This paper reports a series of three studies examining the nature of pandemic stress, the impact of technology use on people’s emotional well-being during turbulent times, and the effects of technology use on psychological resources like resilience, self-efficacy, motivation to work, and emotional well-being. The differences in the residential background (Urban/Rural) and SES (Low/High) in the extent of the use of technology and strength of psychological resources were assessed. The findings indicated that the most common causes of concern included worrying about family, friends, partners, fears of getting and giving the viral infection to someone; frustration and or boredom; and changes in normal sleep patterns. It was noted that technology was a double-edged sword and created barriers as well as opportunities for the people. Also, self-efficacy mediated the relationship between the use of technology and emotional wellbeing. The results have policy implications for building resilient communities in the post COVID period.

Keywords: emotional well-being, digital technology, COVID-19, self-efficacy, resilience, work performance

INTRODUCTION

While hearing the words COVID-19, myriad images of misery, pain, and panic come to our minds. A series of negative emotions is ignited and experienced, and memories of chaos and helplessness are activated. For most people, these emotions and memories are intensely frightening and deeply negative in nature. During the last 2 years, many countries across the continents were forced to impose lockdowns for months, enact unprecedented physical distancing, and ask to wear masks to contain the spread of COVID-19 and save human lives. Thus disruptions, discomforts, and affective disturbances were deliberately chosen so that breathing can be ensured. The impact of such extraordinary measures needs to be understood as they are bound to have delayed and long-term

consequences for human development. Uncertainties about health, economic, social, and personal lives severely impact health, wellbeing, and productivity. Taken together they posed a variety of challenges for everybody irrespective of caste, creed, or religion (Sodi et al., 2021). The sudden changes and the fear of the unknown caused anxiety, fear, stress, and overwhelmed people. People have struggled with such a situation for more than a year. They had to deal with unmet expectations and unforeseen challenges, leaving everyone feeling extremely vulnerable. Given the situation, individuals devised their own ways of coping with the pandemic. In this context technology played a significant role, becoming essential for the completion of various tasks including maintenance of social relationships, and performing work-related tasks (Goldschmidt, 2020). The arrangement of life during the pandemic was characterized by social isolation and social distancing, and people tended to rely on technology to participate in professional activities, undertake various civilian assignments and tasks, and stay connected to the family, friends, and the world in general. In fact, technology seemed to help people maintain a grip on their social and emotional well-being. Technologies came to rescue and help navigate through the troubling events and happenings in the life world.

The two major waves of COVID-19 in India, one in 2020 and the other in 2021, have overawed the citizens in almost all respects—infrastructural, physical, mental, and emotional—as has occurred in many other parts of the world (Purkayastha et al., 2021). However, being the most populous democratic country in the world, India had to face a massive health emergency of enormous magnitude, leading to short-term as well as long-term impacts on the quality of personal, social, and community lives. During both the waves, the Indian Government adopted various regulatory mechanisms like imposing lockdowns, encouraging the practice of remote work, online educational instruction in academic institutions, and adherence to the COVID protocols in public places what has been called adherence to the “new normal.” During these times when direct face-to-face social interactions remained minimal, direct social interactions had increasingly been replaced by technology-enabled interactions as had happened in other parts of the world. With its great diversity, it is important to examine the extent to which the use of various technologies especially digital technologies have facilitated coping with this situation and enhanced emotional wellbeing. However, in the context of India, technology has emerged as a double-edged sword mainly because of the digital divide. While India has a major presence in the sphere of digital technologies at a global level and the volume of its growth has surpassed many countries, the availability, and accessibility in the different parts of the country and to various sections of the population are not equitable (APC News, 2021). According to a report by Digital in India (Global Digital Insights, 2021), the number of internet users was 624.0 million in January 2021. The internet penetration in India was 45.0 percent in January 2021. This report notes a vast increase in the total number of mobile connections is also seen with 1.10 billion mobile connections in January 2021 which is equivalent to 79.0 percent of the total population being mobile users. Despite this increasing expanse, it is also a reality that this technology benefited some people adapting to the challenges imposed by COVID-19 while a large

section of the population, the marginalized, slum dwellers, poor, and those living in rural and remote areas could not avail the benefits of this vast expansion. It may be noted that while digital initiatives serve as the invisible thread holding the social fabric together, their efficacy in mitigating the stresses and fostering well-being depends on the availability and access to them. Against this backdrop this paper aimed at examining the perceptions of the use of technology and its impact on the emotional wellbeing of people from diverse segments of society. We argue that this relationship between technology use and well-being will be different for these segments. We also examine the differential use of technology as a barrier in some contexts and also provide opportunities in others.

The COVID-19 Scenario in India

The first case of COVID-19 in India was reported on 30th January 2020. After it was declared as a pandemic by the WHO, on 19th March 2020, the Indian Prime Minister Narendra Modi addressed the nation on the issue of the pandemic calling for a self-imposed curfew on 22nd March, so as to prepare the citizens for the coming days (Jain et al., 2021). It has been noted that a strong national identity is useful as leverage when you are seeking to garner favors for sound public health, and precautionary actions for the benefit of the larger population (Van Bavel et al., 2020). Using this strategy, Modi imposed the first complete lockdown, which lasted 21 days. Overall, four lockdowns were imposed. Its frequency varied across different regions of India. Given the short gap after the announcement of the lockdown, panic and fear rose dramatically (Jha, 2020), people were stranded in different parts of the country with no mode of transportation to reach home, and the uncertainty of life and livelihood prevailed. This period also saw other socio-economic complexities such as lack of good healthcare infrastructure (Tejaswi, 2020), lack of resources to conduct education online (Sudevan, 2020), condition of the poor, labor migration (Rashid et al., 2020), uncertainties regarding the nature and impact of the virus, and concerns regarding the falling gross domestic product (OECD, 2020), among others.

The second wave of COVID-19 infections in India in March 2021 overwhelmed hospitals and urban and rural communities. According to a report by Centre for Science and Environment (CSE, 2021), the second wave in India, distressed the rural areas in terms of rate of infections, and lack of resources far more than the urban centers. The second wave of COVID-19 in India has had severe consequences in the form of spiraling cases, reduced supplies of medicines and essential treatments, and increased deaths particularly in the younger segment of the population (Asrani et al., 2021). The grim situation constrained the movements of people for a long time and left them desolate and apprehensive. We posit that the use of technology helped people negotiate life and overcome the situation in addition to other practices aimed at preventing disease and managing resources.

Technology and Emotional Well-Being

The American Psychological Association (APA) has stated that spending entire weeks at home (with limited resource supply, reduced stimulation, and curtailed social contacts) can

seriously damage people's health and wellbeing, by intensifying the negative emotional states, such as fear, anxiety, depression, frustration, and/or irritability (APA, 2020). This has been demonstrated by a large number of studies examining the impact of COVID-19 (Cellini et al., 2020; Soraci et al., 2020; Riter et al., 2021; Singh and Quraishi, 2021; Zinchenko et al., 2021). Surbhi et al. (2021) noted that Indian undergraduate students particularly experienced heightened fear, anxiety, and stress and attempted to address these negative feeling states by practicing gratitude. Exclusive to COVID-19 is the use of digital communication technologies that have helped people cope with the pandemic, for example by reducing loneliness and isolation and increasing belongingness *via* social support (Gabbadini et al., 2020). For the purpose of the present study, the use of technology includes various functions such as accessing technology for healthcare, for work/education, accessing resources such as groceries, etc., making digital payments, and staying in touch with friends and family. Thus, this variable encompasses not just the medium but also the access to technology. The use of technology, when conceptualized in this way, can be a boon, but may also be a stressor. Technology has proved to be beneficial during these times but limited access to certain groups has led to diminished impact, thus we also examine this relationship across various groups in order to understand any differences in the interaction of these variables. Further, the present series of studies examines not just the stressors experienced during COVID-19 times but also if the use of technology helped individuals' resilience, motivation to work, and self-efficacy through fostering emotional well-being. Indeed, people stayed virtually connected with others through technology. Virtual conversations (e.g., phone calls, text messages, video chats, and interaction on social media) guaranteed social support, health care facilities, consultations, professional engagements, and education. Past research has highlighted two main social interaction processes (i) online sharing of emotions (Rimé et al., 2019), and (ii) online provision of social support (Herbert and Brunet, 2010). Sharing of emotions and availability of social support may be the key factors enhancing well-being.

Broadly, well-being is considered an individual's appraisal of one's quality of life (Diener, 1993). Emotional well-being is a key dimension of subjective well-being and explains the degree of the presence of positive feelings (Keyes, 2000). Theoretically, it is the balance of the feelings of positive and negative emotions. Keyes (2002) also suggests that it is measured by an individual's response to structured scales measuring the presence of positive affect, the absence of negative affect, and how much a person is satisfied with life. Thus, it constitutes an important variable to explore in the context of COVID-19. It is essential to understand how a person's quality of life, in terms of emotional well-being was impacted during COVID-19. Thus, this study took one step further and made an attempt to understand what might possibly alleviate the symptoms of reduced quality of life by exploring the role of technology. Hence, a series of studies have been designed to understand an individual's experience of stress and to examine how the use of technology can influence emotional

well-being. Such explorations will deepen our understanding of how these variables interact in real life and how they may inform social policy eventually. In total three studies were conducted. Study-1 assessed the pandemic stress. In particular, the various stressors experienced by people were identified. Study-2 analysed the factors influencing well-being and also the role of technology through in-depth interviews and Study-3 examined the use of technology and its relationship with emotional well-being. The role of self efficacy, resilience and motivation to work in mediating the effect of pandemic stress on emotional well-being was also examined.

STUDY 1: ASSESSMENT OF THE NATURE OF PANDEMIC STRESS

The Pandemic has created a considerable amount of uncertainty and stress among people (Sodi et al., 2021). At a global level stress was experienced by citizens in many nations due to the pandemic. Although both the developing and developed nations have been hit badly, the developing nations are hit harshly as they have inadequate health systems and are poorly prepared and this was true for India as well. When health, economic and other resources are inadequate the nature of stress experienced may be different. The first study attempted to measure the nature of pandemic stress in India. The specific behaviors and experiences of people were assessed.

Method

A total of 328 participants (mean age = 29.32 years) participated in the study. The questionnaire was shared digitally, *via* Google forms platform to cover participants from across the country (pan- India). As the research focuses on studying the impact of access to technology - on life experiences and coping with COVID-19, data regarding the typology of residence (rural/town/metropolitan city/city) was collected in place of the geographical region. In this study, out of 328 participants – 11.58% (38 participants) were from a rural background, 17% (56 participants) from towns, 35.97% (118 participants) from metropolitan cities and 35.36% (116 participants) were from cities. Data collected included demographic details, perceptions of the role of technology in different areas of life (e.g., healthcare, accessing resources, digital payments, online education/work) and various psychological attributes (e.g., motivation to work, emotional well-being, resilience, and self-efficacy). The surveys were created in both Hindi and English to cover participants from different regions, genders, socio-economic levels and age groups. Participants provided details regarding their family structure, type of residence and socio-economic levels. The participants indicated their consent before commencement of their participation. Gender wise the data revealed that 55 percent of the participants were women. Analysis based on gender was abandoned as the mean scores obtained did not suggest substantial degree of gender differences. Additionally, 57 percent of the participants lived with their parents/spouse, 30 percent in a joint family and about 8 percent lived alone. There was an

almost equal division amongst participants from lower and upper economic status levels with a 51.3 percent and 48.8 percent split, respectively. In this data, it was noted that 88 percent of the participants were from the urban sector, with 77 percent below the age of 36 years in age. The participants were residing in the different regions of India and contacted digitally during the peak of the pandemic in June 2021. The participants provided written consent and voluntarily participated in the study.

Measures

This study used the Pandemic Stress Index (Harkness et al., 2020) to understand the most relevant concerns during the COVID-19 experience. The Pandemic Stress Index [PSI] (2021) was created to measure the stress and behavioral changes experienced by individuals during COVID-19. The Stress Index was initially created using a sample of Latino and sexual minority people at the University of Miami, by researchers at the Centre of Excellence for Health Disparities Research. It contains items that are self-administered, wherein participants respond to all items by checking the stressors experienced. It should be noted that the Pandemic Stress Index is not a scale, rather a checklist of specific experiences, which measures the psychological impact of COVID-19. Even though it was initially created for Latino and sexual minority men at the University of Miami, it has been widely used across different samples to measure stress experiences as the items in the checklist are too general to be applied in different contexts with varied samples. At present, this index is available in seven languages to cover wide geographical regions (Firkey et al., 2021; Hart and Han, 2021; Samuelson et al., 2021). The index studies three sections – behaviors during the COVID-19 pandemic, its impact on everyday life, and a checklist of the experiences during the pandemic. In this study, the section on experiences was used to map the extent of pandemic stress for participants. The checklist contains 19 items, wherein participants respond by checking all the stressors experienced. Examples of items include “Which of the following are you experiencing (or did you experience) during COVID-19 (Coronavirus)? (Check all that apply) - being diagnosed with COVID-19, fear of getting COVID-19, fear of giving COVID-19 to someone else, worrying about friends, family, partners, etc.” For this study, we used 18 items out of the 19 checklist items – as most respondents were uncomfortable responding to the item on “decrease/increase in sexual activity.”

Procedure

The participants were requested to check all items and be reflective of their experiences. Percent frequency distribution was then, used to analyze the data and identify the pattern, as it is useful to observe the relative frequency of responses for the various components of the stress measure.

Results

The findings shown in **Figure 1** indicated that the most common causes of concern included (in order): worrying about family, friends, partners, etc.; fear of getting COVID-19; fear of giving COVID-19 to someone; frustration and or boredom; and changes in normal sleep patterns.

The results showed that during the COVID-19 pandemic period people experienced a variety of stressors. Life has been taxing for most people, and concern for the well-being of family and friends emerged as a major stressor. During the period when the data were collected, the pandemic was at its peak and a significant number of people were critically ill and some even lost their lives. Fear of being infected with COVID-19 was an important concern and paranoia-like reaction about the disease was noted, from the responses in the Pandemic Stress Index. Self-concerns were also there because of the very nature of the pandemic. Concern for near and dear ones was a critical concern as there were incidents in which whole families and communities were affected. The lockdowns and long periods of being confined to the home and being far away from near and dear ones were other major stressors. Boredom, loneliness, and fear of being isolated from the community seemed to bother most people.

Overall, these results implicate that this pandemic period had proved to be very difficult for most of the participants and they experienced a large number of stressors that negatively affected the emotional well-being of people.

STUDY 2: IMPACT OF TECHNOLOGY ON THE EXPERIENCE OF COVID-19

Extending the preliminary exploration in Study-1, another study was designed to understand the experience of stress more closely. It focused on understanding the participants' emotional well-being and related experiences during the pandemic. It also alluded to technology in an effort to understand the role played by it in pursuing the life activities and coping with challenges during the pandemic.

Method

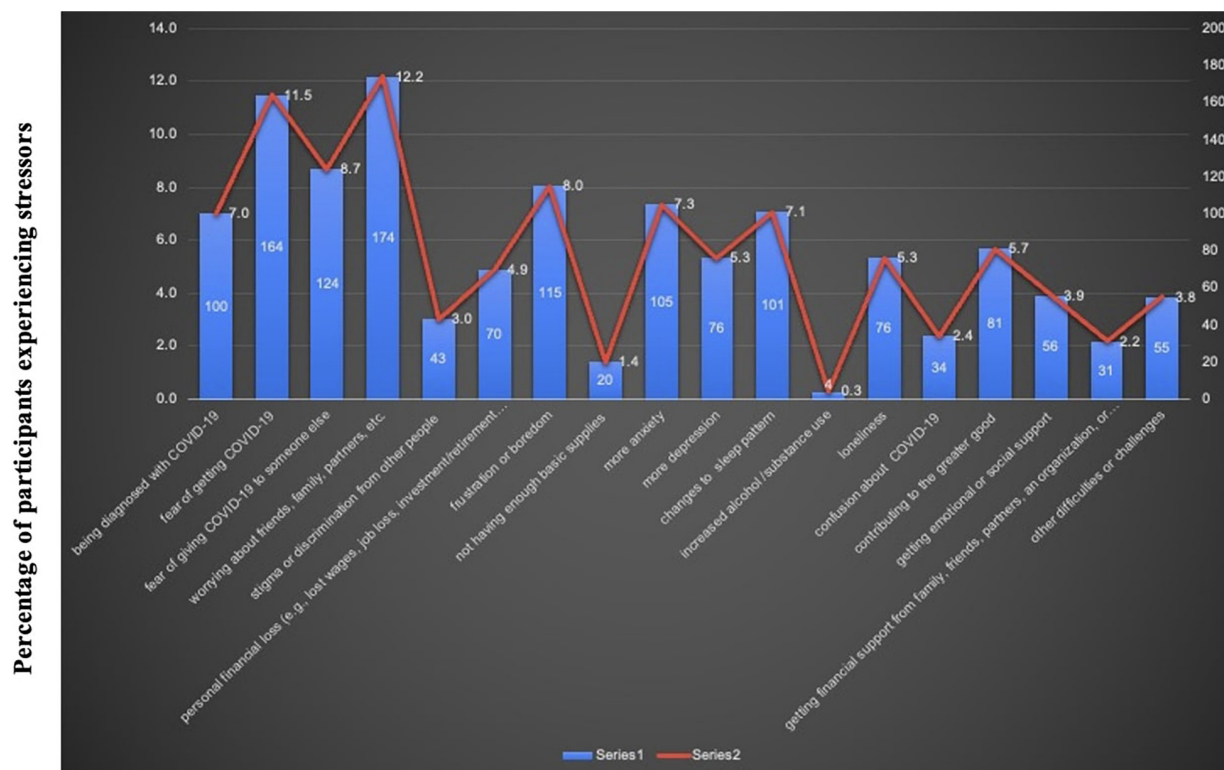
Semi structured, in-depth interviews were conducted ($n = 25$) from the Sikar district in Rajasthan, a state in Northern India. Out of the total number of in-depth interviews conducted there were 17 participants from a rural area and eight were an urban area. It was noted, that amongst the 25 participants, 12 were students, only four were homeworkers and the remaining were employed.

Measures

The semi structured interviews dealt with the entire period of COVID-19. They focussed on impact of the pandemic on income, coping with stress, health, dealing with uncertainty and the overall effect of COVID-19 on everyday life. The interview also had items related to the role of technology during these times. The interviews were conducted telephonically, to observe the protocol of social distancing and an environment comfortable for the participant. The interviews were conducted after getting the verbal consent of the participants. The duration of interviews ranged from 30 to 75 min, with 45 min as the average length.

Analysis

Post the data collection, transcription of the interviews was undertaken while taking care to note nuances in the voices of the



Nature of stressors during Covid-19.

Where series 1 – Number of participants experiencing stressors

Series 2 – percentage of participants experiencing stressors

FIGURE 1 | Percent frequencies of experiences of different stressors during COVID-19 pandemic.

participants. The data were then coded and analyzed following the procedure of thematic analysis (Braun and Clarke, 2006). Accordingly, the analysis included six steps. The first involves familiarizing oneself with the qualitative data, second – using line by line coding to generate initial codes, third – generating the themes, fourth – reviewing the themes, fifth – naming the themes and sixth – generating the report. While coding the data the research questions were used as a guide. As Braun and Clarke (2006) have noted a theme is a coherent and meaningful pattern in the data relevant to the research question. The analysis created a narrative involving the generated themes while supplementing them with excerpts from the data set. The purpose of the last step was to create a story that is comprehensible and scientific.

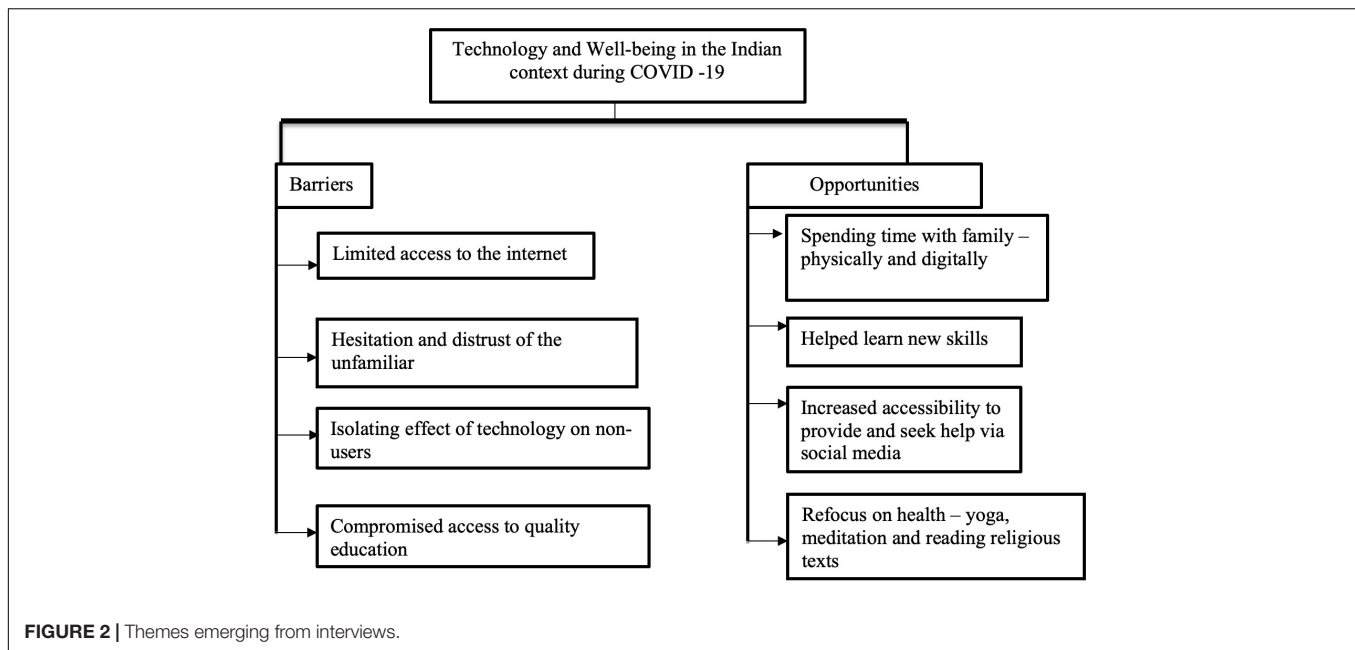
Results

The themes emerging from the data obtained from interviews are presented in **Figure 2**.

It may be recalled that to control the magnitude of the COVID-19 pandemic, India had to undergo not one – but two phases of complete lockdowns (March 2020–June 2020 and April

2021–June 2021). Individuals across rural and urban landscapes had to adapt overnight to unfamiliar technologies given the stringent rules. It was found that contextual factors such as lack of a smartphones caused significant obstacles, including but not restricted to – being able to register for vaccination, access resources through online shopping sites and using applications for digital payment. Even though the number of India's internet users increased by 47 million or 8.2 percent, the internet access remains restricted at 45 percent. To provide a more realistic assessment of the digital divide it may be noted that the number of mobile users in India stands at 1.10 billion, while the number of internet users is 624 million (Digital in India, 2021). These statistics provide a necessary context for the sub-themes, which is supplemented by the following excerpt:

“... when the vaccination drive was happening, they (government) should have noted who has an android phone or not. For no reason, even during the registration for a vaccination, we faced obstacles. So, if one does not have an android phone, can they not get vaccinated? Now the government has understood, and made it offline. Initially it was a real struggle.”



Barriers

Limited Access to the Internet

This theme emerged as a prominent concern. Irrespective of the professional status of the participants, limited network connectivity caused recurring interruption impeding their ability to cope with job requirements adequately. For example, a student shared his family's woes in accessing teaching materials ("my brother has to go to a field at a distance, to download the YouTube/video link, and he then comes home and studies it. So, in this sense, it has been inconvenient") while another working professional explained how even during COVID-19, she had to think differently to meet the job requirements – as most of her students did not have access to internet ("First of all, the internet does not work. Secondly 60–70 percent of the people do not have android phones. We were very concerned for such students, and even tried to go to their homes, to keep their learning process intact"). This concern reflected itself in other domains including digital payments ("I do not struggle in understanding the process of digital payment, but sometimes the payment does not go through, as the server is down. So, when the payment fails, and charges are levied, it creates a problem then").

Compromised Access to Learning Opportunities

Related to the previous theme, the lack of stable and reliable internet connectivity has plagued both the parents as well as students. Many college students experienced heightened anxiety and negative mood state due to the high degree of uncertainty prevailing in the conduct of online education. Internet issues often led to irregular classes. As one student explained: "there was a serious problem with the internet, due to which classes would not happen. We used to try 3–4 times, and then feel so annoyed, that we used to leave it. This affected our learning." The parents were additionally concerned, across both the rural as well as urban settings, on the quality of academic transaction during the span of

over 2 years ("I hear other parents also commenting that education has essentially stopped in the last two years. They say classes may be happening online. But what really is happening? Also, so many parents are uneducated. They are not even able to assess if their child is studying").

Hesitation and Distrust of the Unfamiliar

This theme was highlighted by several participants particularly among the elderly from the rural sector. Younger participants from urban areas displayed openness in adapting to newer ways of consulting doctors, and making digital payments etc. ("there is a need to be more aware and friendly toward online consultation. There is limited awareness, in a small village such as Sikar. Like the younger generation is so familiar with all this"). Older men from villages sometimes contrasted it to the "normal Indian way" of functioning, and explained their hesitation in shifting to online payment ("they asked to pay online. I told them, what if my money goes into the wrong account, I cannot bring my money back." "I am an 'offline' person") and for mobile-health consultations ("one should sit in front of the doctor and take medicines, as they read the face and body structure, and then prescribe medicines. In the previous generations, this used to be the traditional practice, but it is very relevant in present time as well. Online consultations will take time to be adopted").

Alienation and Helplessness Among the Non-users

This theme is an important one and drew attention to those who were not employed, living alone or belonging to the group of elderly citizens, especially in the rural setting. A young student noticed how the pandemic was experienced as "more difficult" by her grandparents. She stated: "It was quite difficult for them, as all the grandchildren are students, who are home and were involved in their studies. And their sons, who are working were also occupied online. So, it was quite difficult for them to pass

time, even though it was a difficult time for everyone.” A 55-year-old head instructor of a school noted that perhaps smartphones were the very reason why intense loneliness was experienced during the series of lockdowns (“since android phones have come, man has become alone. . . if you give someone any work. . . They say hmm – meaning he is so addicted he cannot see any other world around him”).

Opportunities

Spending Time With Family

The idea that COVID-19 brought family members closer to each other was resonated by participants across ages and geographical expanses. This was especially highlighted by those in employment, and with children (“First of all, because of COVID I got time at home – to spend with my children and family” and “In many ways, COVID brought my family back together”). Others also highlighted how COVID brought back “good habits” amongst family members – “A bit of routine came back in life with eating healthy, unlike sleeping late at night missing breakfast etc. We stopped running after money.” It bridged the gap for those who were distanced physically, including encouraging some to switch to smartphones to communicate via video calls.

Helped Learn New Skills

This theme highlights the ways in which people sought self-improvement. The experiences shared by the participants showed nuances in terms of gender and geographical variation. Men in the villages used the internet to teach themselves to make bird feeders out of plastic bottles, as well as researching means of improving their crop (“Some crops in the field had issues, they were not growing properly, leaves were dry and yellowing – my father researched and repaired the problems”). Women in the village taught themselves some new recipes, while some in the city learned to drive, to encourage self-dependence (“Learning driving has been a big achievement for me during these COVID times, because it is a necessary skill to know”).

Increased Accessibility to Provide and Seek Help via Social Media

This theme highlighted an important contextual factor, especially in the rural sectors – the tradition and practice of serving and helping others (*Seva*). Many felt distressed and restricted because of COVID restrictions to help their community (“In my village, if anyone falls sick – I always used to try to help. Now there is a fear, because of which I have not been able to help. This is a big problem for me, and a source of pain”). However, most participants lauded the role of social media in making help accessible nationally, irrespective of location (“the help that people could access immediately was because of mobiles and internet. If someone lived in Sikar, people from Jaipur or other places could immediately tell where he could seek help”).

Restoring the Focus on Health: Yoga, Meditation, and Reading

Some participants found alternative and socio-culturally relevant means of coping and restoring their emotional well-being. Given the Indian traditional practice of Yoga and Pranayama (breath regulation exercises), the findings indicated age as a

non-criterion for such means of coping (“I used exercise and yoga to cope mainly, because not only is yoga useful for weight loss – it also creates new energy within you. I also practiced pranayama.”). Having said that, some participants shared that lockdown provided an opportunity to read inspirational and or religious books to cope with uncertainty. Findings indicated that younger participants leaned toward autobiographies and self-help books for inspiration, while older participants found solace in scriptures and religious texts.

Conclusion

A detailed understanding of participants’ life experiences and well-being during the pandemic was gathered through this study. The thematic analysis of obtained data also showed evidence of the operation of certain key psychological variables. Themes such as “spending time with family,” “helping learn new skills,” and “refocusing on health” all indicated a strong sense of resilience and self-efficacy. Windle (2010) explains that “resilience is the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma. Assets and resources within the individual, their life and environment, facilitate this capacity for adaptation and ‘bouncing back’ in the face of adversity” (pp, 12). In this way then, participants’ actions as described in the above-mentioned themes indicate a strong sense of resilience. Self-efficacy is an individual’s belief in their own capacity to perform behaviors necessary for specific outcomes (Bandura, 1977a). This too is explained by the narratives emerging from the interviews, where participants expressed an eagerness to learn new skills or work toward improving their circumstances. Further, participants discussed technology in detail as both an asset and a stressor in their work/education, highlighting the need to examine these variables closely. Thus, a third study was designed keeping these factors in mind, exploring specifically the relationship among variables such as the use of technology, motivation to work, self-efficacy, resilience, and emotional well-being.

STUDY-3: TECHNOLOGY AND WELL-BEING

This study examined the role of technology in shaping the well-being of the people during COVID-19 in greater detail, building upon the findings from the previous studies. The impact of COVID-19 on motivation to work, self-efficacy, and resilience was also explored. Additionally, the influence of the pandemic on perceptions of self-efficacy and whether such perceptions of self-efficacy mediated the relationship of technology use and well-being was also examined. For the purpose of this study, motivation to work was defined as participants’ desire to complete their work/education related assignments and tasks. We propose that higher work motivation (intrinsic) is linked to emotional well-being, as low work motivation has been linked with negative affect, depression, and anxiety (e.g., Lu, 1999). Björklund et al. (2013) also demonstrated that in organizations, employees with decreased work motivation had greater chance of experiencing exhaustion and depression in

the future. These findings substantiate the need to include motivation to work as a key variable in the examination of emotional well-being, particularly in the context of COVID-19. Self-efficacy refers to a sense of confidence in an individual's own capacity to perform tasks and is also related to the level of motivation (Bandura, 1977b). Schwarzer and Arísti (1997) explained general self-efficacy as referring to an individual's overall self-confidence in dealing with the challenges of different environmental contexts or burgeoning issues (Xiong et al., 2020). It can reflect behaviors and actions across different contexts. Self-efficacy is an important aspect of assessing the quality of life and happiness of participants. Dogan et al. (2013) demonstrated that well-being and self-efficacy have a positive and significant relationship and together influence happiness. Thus, it was crucial to include in this study.

The concept of resilience has been defined in many ways and applied to many fields over the years. For the present study resilience was operationalized as a process involving a way of "effectively negotiating, adapting to, or managing significant sources of stress or trauma" (Windle, 2010, p.1). Over time, research on resilience has moved from deficit models addressing psychopathology toward models more focused on growth and healthy development. The present study explored resilience as both addressing a deficit and also healthy development. We propose that increased levels of resilience would predict increased emotional well-being. Keeping in mind the context of the pandemic, we included factors such as self-efficacy and motivation to work as additional predictors for emotional well-being. In this way resilience is understood not only as a precursor to emotional well-being, but also as a buffer from the increasingly uncertain and anxious world of the pandemic. Thus, this study addressed the experience of the emotional well-being of people during the pandemic through a detailed exploration of the extent of usage and access to technology, their motivation to work, level of resilience, and self-efficacy. A multi-pronged statistical analysis was designed to address this complex relationship.

Hypotheses

H1: Residential background (Urban/Rural) and SES (Low/High) would yield significant differences in the extent of the use of technology, motivation to work, emotional well-being, resilience, and self-efficacy.

H2: Higher scores on the use of technology would be associated with higher scores on motivation to work, emotional well-being, resilience, and self-efficacy.

H3: Higher scores on motivation to work would be associated with higher scores on emotional well-being, resilience, and self-efficacy.

H4: Higher scores on emotional well-being would be associated with higher scores on resilience and self-efficacy.

H5: Higher scores on resilience would be associated with higher scores on self-efficacy.

H6: Use of technology, motivation to work, emotional well-being, resilience, self-efficacy, SES, and age would significantly predict levels of emotional well-being.

H7: Increased use of technology would predict an increase in emotional well-being (direct effect).

H8: Self-efficacy would mediate the effect of the use of technology on emotional well-being.

Method

A total of 328 participants (mean age = 29.32 years) participated in the study.

Measures

Impact of Technology

It was measured using a 16-item scale constructed by the authors. The items were judged with the help of experts. The items of this measure addressed the impact of technology on the following dimensions - work/education, online payment, mobile-health (m health) consultations, accessing resources and social/virtual life. This section assessed the participant's access to technology and its role in coping with the pandemic. The items of the measure were rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). This scale included items such as "Due to limited access to internet and latest technology, I have struggled to be productive at work/college" and "I experienced significant difficulty in adapting to new means of online payment." The value of Cronbach's α for this measure was found to be 0.77 and the Split-half reliability of the scale was 0.88.

Motivation to Work

It was measured using a scale constructed by the authors. The items were constructed and finalized with the help of experts. The seven items were rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). This scale included items such as "The time I spend on family responsibilities predominantly interferes with my work responsibilities" and "It is not always easy for me to perform tasks on time." Cronbach's α for this measure was estimated to be 0.82 and the Split-half reliability of the scale was 0.85.

Emotional Well-Being

It was measured using the Mental Health Continuum Long Form (MHC-LF; Keyes, 2002, 2005). Five items of the six-item emotional well-being scale (EWB1) were used which included items such as "I felt cheerful most of the time" and "I was extremely happy most of the time." The sixth item "I felt full of life, most of the time," was not included as the item was not clear to respondents. The five items were rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's α for these five items was found to be 0.85 and the Split-half reliability of the scale was 0.86.

Resilience

It was measured using the Resilience Appraisal Scale (Johnson et al., 2010). For this study, all 12 items of the scale were used which measured the participant's capacity to appraise their ability to solve problems, gain social support and cope with their emotions. The items were rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale included items such as "I can usually find a way of overcoming problems" and "In difficult situations, I can manage my emotions." Cronbach's α

for this measure was found to be 0.90 and Split-half reliability of the scale was 0.94.

Self-Efficacy

It was measured using General Self efficacy scale by Schwarzer and Jerusalem (1995). All the 10 items of this scale were used which included items such as “Thanks to my resourcefulness, I know how to handle unforeseen situations” and “If I am in trouble, I can usually think of a solution.” The 10 items were rated on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's α for this measure was found to be 0.88 and Split-half reliability of the scale was 0.92.

The reliability coefficients are indicated in **Table 1**.

Analysis and Results

The analysis was done using R Studio Version 1.2.1335. The reverse scoring was done where required, and scaling was also done to ensure equivalence. The descriptive statistics were calculated and are demonstrated in **Table 2**. The table indicates the means, standard deviations, and correlations of the variables relevant to this study.

Correlations among the variables showed strong relationships, leading to acceptance of first four hypotheses. However, emotional well-being was negatively related to motivation to work (leading to partial rejection of Hypothesis-2), indicating that an increase in motivation to work was associated with a decrease in the level of emotional well-being. The Welch's t-test was performed on the five variables under consideration, this resulted in adjusted values for df. These variables were grouped by both socioeconomic status (**Table 3**) and place of residence (**Table 4**). Overall, we may note that socio-economic

TABLE 1 | Split-half and Cronbach alpha values for measures used in study 3.

Measures	Guttman's Lambda 4	Cronbach alpha
Impact of technology	0.88	0.77
Motivation to work	0.85	0.82
Emotional well-being	0.86	0.85
Resilience	0.94	0.9
Self-efficacy	0.92	0.88

TABLE 2 | Means, standard deviations, and correlations for variables.

Variables	n	Mean	SD	1	2	3	4	5
Age	328	29.32	13.36					
Gender: male	148	29.69	13.39					
Female	180	29.01	13.36					
SES: lower	168							
Upper	160							
Impact of technology	328	52.61	8.99	–				
Work motivation and performance	328	22.33	5.84	0.54***	–			
Emotional well-being	328	15.38	4.44	0.31***	–0.05	–		
Resilience	328	43.05	8.61	0.54***	0.18**	0.50***	–	
Self-efficacy	328	35.03	7.15	0.48***	0.16**	0.47***	0.71***	–

** $p < 0.01$; *** $p < 0.001$; Numbers 1–5 in the title row indicate the variables under consideration and are annotated as such for describing the correlations.

TABLE 3 | Mean comparison of scores of low and high SES groups on various measures.

Measures	Socioeconomic status (SES)				t(df)	p
	Lower		Upper			
	M	SD	M	SD		
Impact of technology	50.97	10.32	54.32	6.96	3.46(294.06)	0.000
Motivation to work	22.48	5.94	22.17	5.76	0.47(325.89)	0.635
Emotional well-being	15.03	4.43	15.74	4.43	1.44(325.21)	0.15
Resilience	40.16	9.46	46.09	6.36	6.67(293.76)	0.000
Self-efficacy	33.69	7.43	36.43	6.57	3.54(324.24)	0.000

Welch's *T* test was used for calculations.

TABLE 4 | Mean comparison of scores of rural and urban groups on various measures.

Measures	Place of Residence				t(df)	p
	Rural		Urban			
	M	SD	M	SD		
Impact of technology	55.26	5.97	52.26	9.26	2.70 (63.25)	0.008
Motivation to work	23.87	5.29	22.12	5.90	1.88 (49.84)	0.065
Emotional well-being	15.37	3.91	15.38	4.51	0.01 (50.86)	0.991
Resilience	41.26	6.34	43.29	8.85	1.76 (57.85)	0.083
Self-efficacy	34.50	5.77	35.10	7.32	0.579 (53.90)	0.565

Welch's *T* test was used for calculations.

status emerged to be important for understanding life experiences during the period of pandemic. The place of residence was also relevant particularly in understanding the use, access, and impact of technology during the pandemic. Thus Hypothesis 1 could be partially accepted. These results complement those discussed in studies 1 and 2.

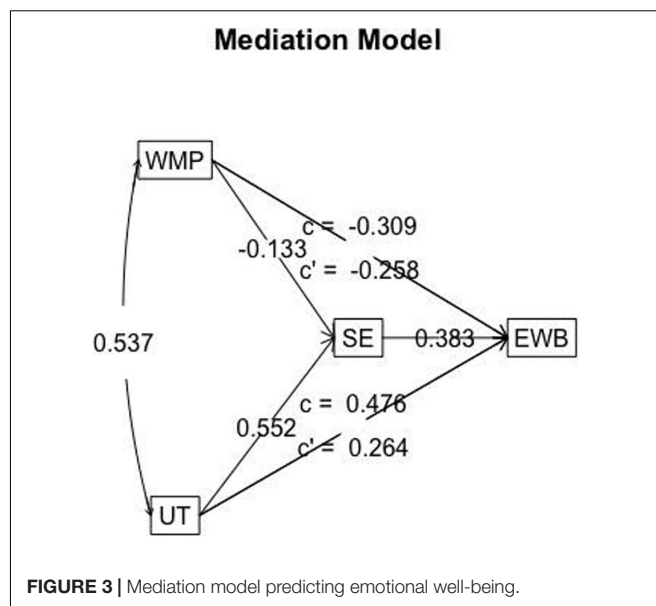
Further, a standard multiple regression was performed to obtain a clearer understanding of these relationships. It may be noted that as place of residence was significant only with variable considering the impact of technology, and barely so with work motivation, only socioeconomic status was considered for the purpose of the regression model. For the multiple regression model, impact of technology, motivation to work, resilience, self-efficacy, age, and socioeconomic status were regressed upon emotional well-being in order to understand the relationships underlying the individual's life experiences during COVID-19. A significant regression equation was found [$F(6, 321) = 27.96$, $p: 0.001$], with an R^2 of 0.3432 (**Table 5**), leading to the partial acceptance of Hypothesis-6. The multiple regression analysis meets all the model assumptions. However, the coefficients for motivation to work and socioeconomic status were negative, indicating that as their values rise, levels of emotional well-being diminish. This was supported by the previous study where participants had stated about many negative experiences regarding work during the pandemic, particularly due to lack of access and resources, and familial pressures. In this sense work became associated with stress. Although the impact of technology predicts an increase in emotional well-being, the

TABLE 5 | Summary of regression analysis predicting emotional well-being.

	β	SE β	t	p
Impact of technology	0.221	0.066	3.364	<0.001
Self-efficacy	0.162	0.066	2.447	<0.05
Age	0.133	0.048	2.754	<0.01
Work motivation and performance	-0.241	0.055	-4.406	<0.001
Resilience	0.338	0.071	4.77	<0.001
SES upper	-0.278	0.099	-2.836	<0.01
Constant	0.136	0.066	2.065	<0.5
Observations			328	
R ²			0.343	
Adjusted R ²			0.331	
F Statistic			27.959	
			(df = 6; 321)	

negative relationship with motivation to work indicates that access to technology is clearly not the only facet of importance when understanding work motivations and experiences during the pandemic. Further, since the high-level SES was also negative, we can say that the model was found to hold true more so for individuals of lower SES. This seems consistent both theoretically and empirically, as evidenced in the previous study. To conclude, we may reasonably say that the impact of technology, self-efficacy, resilience, and age significantly predicted the level of emotional well-being, however low levels of motivation to work predicted emotional well-being rather than high level. Further, this effect was more prominent for the participants belonging to a lower socioeconomic status.

Does self-efficacy mediate the relationship between the Impact of Technology and Emotional well-being? Can motivation to work predict the impact of technology on emotional well-being? The analysis explored motivation to work as a predictor of the impact of technology, which in turn predicted emotional well-being, as mediated by self-efficacy. **Figure 3** displays the mediation model analysis and the effect estimates, and **Table 6** displays the fitness indices obtained through the mediation analysis. The obtained model indicated a moderate fit (Hu and Bentler, 1999; Kline, 2005), as despite the χ^2 being significant, and χ^2/df more than 3, other indications are within the range. It is noted that the χ^2 statistic is very sensitive to sample size and is no longer relied upon as a basis for acceptance or rejection (Schermerle-Engel et al., 2003; Vandenberg, 2006). Thus, the model appears to be a good fit. However, as also indicated by the correlations regression analyses, here too, motivation to work negatively predicted emotional well-being. This is termed as inconsistent mediation (MacKinnon et al., 2007), but since the magnitude of the direct effect is larger than the indirect effect, it may be said that an increase in motivation to work will lead to a decrease in emotional well-being. However, higher impact of technology will predict higher levels of emotional well-being when mediated by self-efficacy. Thus, it was found that increased impact of technology led to increase in levels of emotional well-being (direct effect), and self-efficacy mediated the effect of impact of technology on the levels of emotional well-being (indirect effect).

**TABLE 6 |** Fitness indices for mediation model.

Indices	Obtained value	Recommended value
χ^2/df	5.381	3
p	0.02	$p > 0.05$
CFI	0.986	> 0.90
TLI	0.913	≥ 0.95
NNFI	0.913	≥ 0.95
RMSEA	0.116	< 0.08
SRMR	0.033	< 0.08
GFI	0.992	≥ 0.95
AGFI	0.916	≥ 0.90

According to Hu and Bentler (1999); and Kline (2005).

GENERAL DISCUSSION

COVID-19 has been an unprecedented experience and people have experienced myriad stressors during this time; even today in many parts of the world, the onset of another wave has been noted. India being one of the most populous countries has grappled with this pandemic in its own way. Indians suffer significantly from infectious diseases on account of a complex interplay of demographic, environmental, and socio-economic factors (Dikid et al., 2013). This can also be seen in the case of COVID-19.

This research attempted to understand the nature of pandemic stress, the impact of technology use on people's emotional well-being during turbulent times, and the effects of technology use on psychological resources like resilience, self-efficacy, motivation to work, and emotional well-being. Study 1 explored pandemic related stress in detail. The findings indicated that the most common causes of concern were worrying about family, friends, partners, etc., fear of getting COVID-19 and fear of giving

COVID-19 to someone else. Study 2 explored the experiences of the pandemic stress more closely – it highlighted how “spending time with family,” “helping learn new skills,” and “refocusing on health” helped build a strong sense of resilience and self-efficacy. The final study (Study 3) highlighted that an increased impact of technology led to increase in levels of emotional well-being, while self-efficacy mediated the effect of impact of technology on the levels of emotional well-being. Most studies of technology use in the pandemic have demonstrated negative consequences on well-being (e.g., Aziz Rahman et al., 2020; Rajkumar, 2020; Pandya and Lodha, 2021). However, the present study is unique in that it demonstrates a positive relationship between the impact of technology and well-being.

Study 1 explored the level of pandemic stress experienced by participants, while also identifying the central concerns that people had during the peak of the pandemic. The Pandemic Stress Index (Harkness et al., 2020) was used as a checklist to measure the psychological impact of the pandemic on the Indian population. Through the analysis of this checklist, concern and worry for family and friends emerged as the primary stressor. India presented a grim picture in terms of health statistics between March 2020 to August 2021. According to the John Hopkins Coronavirus Resource Centre (Covid-19 map, 2021), India has had 33,953,475 citizens infected and witnessed the death of 4, 51,000. At present (October 2021), the COVID-19 positivity rate stands at 2.45%. A leading national daily (The Hindu, 2021) elaborated on the second wave being particularly difficult for those in rural expanses, as limited inoculation sites made vaccine availability difficult leaving a sizable segment of the population vulnerable. It is natural then, that concern for loved ones would be central in the thoughts of people, as India and Indians experienced so much loss and death.

Given the expanded temporal horizon of health emergency of unspecific nature, there were wide-ranging consequences for mental health and wellbeing. Study 2 explored the impact of these stressors in greater detail. Semi-structured interviews were conducted to understand these experiences, while alluding to the role technology played in coping with this unprecedented times. Through thematic analysis, the findings indicated that participants in the rural sector struggled to trust technology, which consequently acted as a barrier in accessing healthcare and education. However, the narratives emerging from the interviews also demonstrated the participants' eagerness to learn new skills or work toward improving their circumstances across rural and urban sectors. Additionally, participants discussed technology as both an asset and a stressor in their work/education in detail, highlighting the need to examine these variables closely. These results were substantiated through a study by Venkatesh et al. (2021) wherein they found that Indian citizens used the time of the pandemic to build on their feelings of gratitude, personal strength, and professional commitment.

Technology was used during this time to allay fears and anxieties. For many people this was a new way of negotiating life demands and meeting the daily needs. This was perhaps brought about only because of the pandemic (De' et al., 2020). The results of Study-3 showed that rural people were more significantly impacted by technology as compared to urban. Rural

India has had a 13 per cent increase in Internet users in 2020, according to a report released by Internet and Mobile Association of India (IAMAI) and consulting firm Kantar (2021). The results of the present study, if examined in the context of the mobile technology expanse in the rural parts of the country, suggest that perhaps it was used for many other purposes during this time. Study 3 found the impact of technology was significant in many ways, particularly the way it is related to emotional well-being. It predicted emotional well-being both through regression (along with other variables) as well as through the mediation of self-efficacy. Although the usual literature trends suggest that increased screen time can lead to decreased mental health and well-being (Paulich et al., 2021), the present study, through its exploration of the impact and access of technology demonstrated that for people of lower socio-economic status, technology had a positive impact on emotional well-being. Goldschmidt (2020) too explained how technology became an essential part of the life during pandemic, and was important to maintain the well-being of children in particular. Pandya and Lodha (2021) also hinted at the possibility that use of technology may not interfere with well-being during times of social distancing; something that the present study has demonstrated.

The present results showed that many kinds of stressors such as anxiety about family, friends and self being infected, loneliness and boredom and unusual sleep patterns were experienced as major threats to wellbeing. The widespread experience of stressors has certainly made people miserable. Further, the ambiguity and indefinite nature of the disease condition and lack of information available enhanced the trauma. This period resulted in many kinds of resource-loss which may have contributed to the increased anxiety and tension. Two kinds of resource-loss was salient during this period: availability and access on account of restrictions imposed during the lockdown periods. In India, due to COVID-19, the uncontrollability, uncertainty, sudden changes and the fear of the unknown caused stress, fear and anxiety. This pushed for innovative thinking and out of the box solutions including creation of multiple vaccines and various testing facilities (Sodi et al., 2021).

We must acknowledge the rural-urban divide when it comes to technology access, more and more people are presently using it in rural areas. Compulsions to restrict movement and spatial confinement also facilitated the use of technology. It was a means for social connectedness, to relate to people, talk to them, and ask for help when needed. It was very helpful to access medical help and many medical professionals and hospitals started online consultations which facilitated medical help despite restrictions on movement. When access to medical facilities became problematic, tele-communication for medical consultations and delivery of various health facilities became critical; this helped people to carry on with their lives despite the stresses and strains all around. In many parts of the country during the Pandemic Wave-II oxygen/scarcity and lack of facilities, even essential drugs for the treatment of COVID-19 became a major concern. The multi-pronged efforts initiated at various levels helped to overcome this situation in due course.

Although our study was unique in many ways, certain limitations were noted. We developed two scales – impact of

technology and work motivation and performance – for this study both having good reliability. More studies need to be conducted with these scales. These studies must also expand their reach to all sections of the society. While the present study attempted to capture differences between rural and urban, socioeconomic status, as well as gender, however these variables require a closer examination. The need to understand and include gender differences in access to technology is acknowledged. The scope of the qualitative study may be increased in further studies but for the present study as the interviews were very detailed and very informative, it was found to be sufficient.

The Lessons Learnt During Covid

The pandemic required most people to redesign the different segments of life – personal, societal, economic and political at the local, national, and global level. Despite recurring issues, the use of online mediums for work and education is the new normal. Travel has become less frequent, undertaken only when there is a dire need. Assembly elections took place during the pandemic, and the thickly populated states like Bihar and West Bengal witnessed considerable mass mobilization during the pandemic. It is commendable that they were successfully completed even though there were many restrictions. It was inspiring to see that many aspects of life were being restructured by people to allow not just for survival but to achieve a degree of functionality. What is interesting to see is that this enhanced the feelings of self-efficacy and gave many people a new-found confidence to adapt to a “new normal,” to continue work, and to live life well (Varshney, 2021). A stronger society emerged after the various onslaughts of the pandemic. This strength has emerged from collaborative efforts of all the stakeholders’ i.e., Government, voluntary organizations, health practitioners and people in general. Many people employed self-focused auto regulatory coping strategies like monitoring own thoughts, actions and yogic and meditational practices. Completing the vaccination of a significant chunk of the population was no easy feat. The drive began in January 2021, and concerted efforts by the government and various stakeholders resulted in the administration of 95 crore COVID-19 vaccine doses by October, 2021. This is not a meager achievement.

Psychological preparedness was also critical in enhancing our understanding of the relationships hypothesized. It is central to the understanding of the impact of disasters as it involves an individual’s capacity to anticipate and monitor their response “readily” in face of an emergency (Reser and Morrissey, 2009). As indicated by Malkina-Pykh and Pykh (2013) preparedness involves factors such as outcome expectancy, risk perception, collective efficacy, self-efficacy, coping style, perceived responsibility, and access to resources. Given that India experienced two severe COVID waves, one can question if the population responded with better psychological health in the year 2021 – given the psychological preparedness to cope with a disaster. Is the capacity to monitor one’s resilience and efficacy (self and collective) contingent on previous recent experiences? Therefore, the latent impact of the temporal factors in conducting research on the psychological impact of COVID-19 is pivotal to consider. Both resilience and survival have helped in dealing

with the situation. Our resilience as a community is high which is the outcome of coping skills, social support that promoted positive adaptations to the pandemic related crises. Our survival has empowered us, given us agency, and can be seen in high self-efficacy. The concept of community resilience is thus critical in this regard. It is understood as the ability of a community to use its assets to strengthen systems such that they can improve the community’s health across various dimensions (The Print, 2021). It enables a community to withstand, adapt to, and recover from difficulties (Patel et al., 2017). Despite restrictions on movements during COVID, community resilience played an important role for Indian society. In a collectivistic culture the social and cultural networks and practices of the community are a major resource which helps in coping and alleviation of both individual and community stress. Oftentimes the community came together to help people in need. Future research focusing on community resilience in collectivistic cultures will reveal valuable insights on well-being outcomes and technology in the context of COVID-19. It is important to focus on the positive as well as the negative aspects, and perhaps community resilience and community togetherness are the silver lining emerging from the life experiences of COVID-19.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee at the Indian Institute of Technology, Delhi. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

GM, PS, and MR conceptualized and designed the study. PS and MR led the data collection. MR and PR performed the analysis and interpretation of the data. GM, PS, MR, and PR wrote the initial draft and revised the subsequent manuscripts. All authors read, revised, and approved the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.800827/full#supplementary-material>

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Narcissistic Enough to Challenge: The Effect of Narcissism on Change-Oriented Organizational Citizenship Behavior

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During the COVID-19 pandemic, organizations need to effectively manage changes, and employees need to proactively adapt to these changes. The present research investigated when and how individual employees' narcissism was related to their change-oriented organizational citizenship behavior. Specifically, based on a trait activation perspective, this research proposed the hypotheses that individual employees' narcissism and environmental uncertainty would interactively influence employees' change-oriented organizational citizenship behavior via felt responsibility for constructive change; furthermore, the effect of narcissism on change-oriented organizational citizenship behavior via felt responsibility for constructive change would be stronger when the environmental uncertainty prompted by the COVID-19 pandemic was high rather than low. Two studies were conducted to test these hypotheses: an online survey of 180 employees in mainland China (Study 1) and a field study of 167 leader-follower dyads at two Chinese companies (Study 2). The current research reveals a bright side of narcissism, which has typically been recognized as a dark personality trait, and enriches the understanding of the antecedents of change-oriented organizational citizenship behavior. This research can also guide organizations that wish to stimulate employee proactivity.

Keywords: environmental uncertainty, trait activation theory, narcissism, change-oriented organizational citizenship behavior, felt responsibility for constructive change

INTRODUCTION

The COVID-19 pandemic has brought significant and far-reaching challenges to the workplace. These changes, such as remote work, virtual teamwork, and digital transformations, have presented employees with new requirements that are not addressed in formal job descriptions or employment contracts. For example, employees need to learn and master new knowledge and skills in virtual offices (Schinoff et al., 2020), and online communication styles are different from those in traditional offices (Nyberg et al., 2021). In these new situations, employees' proactive behaviors—such as suggesting new ideas or methods to solve non-routine issues, taking initiative to improve efficiency, and taking responsibility for extra work during periods of organizational change—will be particularly valued. These behaviors have been examined under the rubric of change-oriented

organizational citizenship behavior (OCB-CH), defined as “constructive efforts by individuals to identify and implement changes with respect to work methods, policies, and procedures to improve the situation and performance” (Choi, 2007, p. 469). Although traditional organizational citizenship behaviors (OCBs) are important, they may fail to address the challenges in a dynamic environment (Li et al., 2017) which presents a great deal of uncertainty and ambiguity (Simerly and Mingfang, 2000). OCB-CH, which has been characterized as personal initiative, task revision, voice, innovative behavior, and taking charge (Scott and Bruce, 1994; Frese et al., 1997; Van Dyne and LePine, 1998), should be preferred. Employees are on the front lines and thus closest to changes in the environment. Consequently, they are often best informed regarding current practices and weaknesses (Lawler, 1992), and their initiative and voice can help organizations better cope with uncertainty (Seppälä et al., 2012). Therefore, it is theoretically and practically important to explore which types of employees are more likely to demonstrate OCB-CH.

Numerous personal characteristics are associated with OCBs, including altruism (Klotz et al., 2018), agreeableness (Ilies et al., 2009), conscientiousness (Jiao et al., 2013), and compliance (Organ and Ryan, 1995). Among these studies, however, OCBs were mainly viewed in terms of maintaining and reinforcing the *status quo* (Choi, 2007). Typical examples include cooperating with coworkers, helping coworkers accomplish their jobs, and voluntarily working beyond job requirements (Borman and Motowidlo, 1993). Compared with these behaviors, OCB-CH embodies not only the “prosocial” and “proactive” elements but also the “changing” element, and thus requires employees to welcome changes, take risks and display self-confidence. Therefore, OCB-CH may be associated with different personal characteristics.

Narcissism is an individual characteristic rooted in a grandiose and inflated self-view that desires attention and recognition (Campbell et al., 2005). It was originally regarded as a mental disorder (American Psychiatric Association, 1994) and associated with symptoms such as depression, anxiety, hostility, and paranoia (Miller et al., 2010). However, scholars later found that narcissism was a trait commonly encountered in individuals (Rosenthal and Pittinsky, 2006). Therefore, a distinction was made between grandiose and vulnerable narcissism by separating the extremely dysfunctional aspects of narcissism (Miller et al., 2011). Most narcissism research in organizational contexts has focused on grandiose rather than vulnerable narcissism (e.g., Chatterjee and Hambrick, 2007; Reina et al., 2014; Zhu and Chen, 2015). Consistent with these literature, we define narcissism in this research as grandiose narcissism (hereafter, simply “narcissism”), which is associated with grandiose self-image (Krizan and Herlache, 2018), enhanced sense of entitlement and superiority (Campbell and Campbell, 2009), desire and search for social admiration (Back et al., 2013), propensity to display dominance (Miller et al., 2011), aggressiveness and assertiveness, and determined will (Wink, 1991). To repeatedly reinforce their self-image (Kohut and Wolf, 1986), narcissists often undertake challenging tasks in a bold and risky way (Fay and Sonnentag, 2012) so that their behaviors can be visible and admired

(Chatterjee and Hambrick, 2007). Because individuals displaying OCB-CH is intended to induce change, take charge, and improve situations and performance (Bettencourt, 2004), OCB-CH may be associated with narcissism. To date, however, little research has investigated the relationship between narcissism and OCB-CH.

To address this gap in the literature, we relied on trait activation theory (TAT; Tett and Guterman, 2000) and developed a theoretical model to depict when and how narcissism leads to high levels of OCB-CH. According to TAT, the influence of personality traits on behaviors is contingent upon situation trait relevance, and a personality trait is more strongly related to behavior when a situation provides cues for the expression of that trait (Lievens et al., 2006). For instance, the personality trait of proactivity will be more likely to manifest itself in a person's behavior when the context allows for proactivity (Crant, 1995). The current research considers the environmental uncertainty engendered by the COVID-19 pandemic to be a highly relevant situation for narcissism and proposes that narcissists are more likely to feel responsible for constructive change and demonstrate OCB-CH in such situations. Environmental uncertainty is defined as “an individual's perceived inability to predict an organization's environment accurately” because of a “lack of information” or “an inability to discriminate between relevant and irrelevant data” (Milliken, 1987, p. 136). Due to the COVID-19 pandemic, work procedures, management systems, and work team coordination all have suffered ambiguity and uncertainty, which gives narcissistic employees an ideal opportunity to demonstrate their uniqueness by taking responsibility for reform and change. Therefore, this research proposes that narcissism and environmental uncertainty have an interactive effect on employees' felt responsibility for constructive change (FRCC), which is a motivational state in which individuals feel a personal obligation to bring about constructive change at work (Hackman and Oldham, 1976; Morrison and Phelps, 1999). FRCC inspires proactive behaviors, and empirical evidence supports a positive relationship between FRCC and OCB-CH (e.g., Loípez-Domínguez et al., 2013). Accordingly, we propose that the positive effect of narcissism on OCB-CH via FRCC will be stronger when environmental uncertainty is high rather than low.

This research makes three important contributions to the literature. First, our findings indicate that narcissism is a new antecedent of OCB-CH. Previous studies on the antecedents of OCB-CH have mostly focused on leadership styles and work contexts and found that strong vision, innovative climate, supportive leadership (Choi, 2007), transformational leadership (Loípez-Domínguez et al., 2013), and empowering leadership (Li et al., 2016) exert significant influence on OCB-CH. Previous studies have also identified individual differences such as role breadth self-efficacy (Loípez-Domínguez et al., 2013), personal values, sense of power (Seppälä et al., 2012), and promotion focus (Simo et al., 2016) as antecedents of OCB-CH. This research identifies a new antecedent of OCB-CH and enriches related research by revealing that bold, self-inflated personality traits can also lead to positive work behavior.

Second, we investigate the “bright side” of a commonly recognized “dark” personality trait. Previous research on narcissism has largely focused on its negative outcomes—such

as counterproductive work behaviors, envy, and emotional exhaustion (for a review, see Braun, 2017)—whereas relatively little attention has been paid to its positive aspects (Smith and Webster, 2018; Mao et al., 2020). In recent decades, an increasing number of researchers have begun to investigate the latter question to gain a more comprehensive view of this personality trait (Goncalo et al., 2010; Hirschi and Jaensch, 2015; Nevicka et al., 2016; Den Hartog et al., 2020). The current research responds to this new direction and contributes to the literature by finding a new association between narcissism and desirable work outcomes.

Relatedly, we propose a critical boundary condition of environmental uncertainty in examining the effect of narcissism. Previous research found the “bright side/dark side” duality of narcissism (Hogan and Hogan, 2001; Watts et al., 2013), highlighting the need for more nuanced perspectives on its effects (Liu et al., 2017). One important area of investigation involves discovering under what circumstances narcissism exerts a stronger or weaker effect on employee behavior. Environmental uncertainty is particularly relevant to narcissism in that it provides the “opportunity for glory” (Wallace and Baumeister, 2002, p. 820), activates narcissists’ desires for self-affirmation and self-enhancement, and will elevate the behavioral effects of employee narcissism. Previous studies have suggested that narcissists are more active in ambiguous and unpredictable situations (Brunell et al., 2008) and perform better in crises (Wallace and Baumeister, 2002). When they have the opportunity for self-enhancement, narcissists are more likely to take initiative and to become highly visible by engaging in challenging or bold behaviors (Chatterjee and Hambrick, 2007). Utilizing the unique situation of the COVID-19 pandemic as a research background, we propose that the effect of narcissism on individuals’ sense of responsibility for change—and, subsequently, proactive OCB-CH—will be stronger when the environmental uncertainty prompted by the COVID-19 pandemic is high.

Third, we highlight a new mechanism in explaining the positive effect of narcissism on positive organizational behavior (i.e., OCB-CH). We find that narcissism interacts with environmental uncertainty to make employees to perceive a sense of responsibility to take initiative and lead organizational change. Few studies have investigated the underlying motivational state for the positive effects of narcissism (Mao et al., 2020). This study proposes FRCC as a new underlying mechanism.

THEORY AND HYPOTHESIS

Employee Narcissism and Change-Oriented Organizational Citizenship Behavior: A Trait Activation Theory Lens

We build on TAT to explain why narcissism is a trait that is likely to be associated with OCB-CH in an environment characterized by uncertainty. We also explain the mechanisms of this relationship. TAT can be broadly applied to a range of personality traits, including narcissism (Liu et al., 2017). It

is an interactionist theory that posits that although personality traits are relatively stable and guide behaviors in general, they do not manifest equally across all situations (Liu et al., 2017) and certain situations may strengthen or weaken the impacts of personality traits on behavior (Tett and Burnett, 2003). Although “we see traits by what we see people do,” we only see strong personality–behavior connections for traits that are activated and manifested (Tett and Burnett, 2003, p. 502). Notably, situation relevance—that is, “the qualitative feature of situational demands that increase the likelihood that individuals will demonstrate more of a particular behavior over other behaviors” (Oliver et al., 2016, p. 1997)—serves as a moderator that enables the expression of trait-relevant behavior. When situations present cues for expressing trait-relevant behaviors, traits are activated, and the personality–behavior connection becomes strong (Tett and Guterman, 2000).

Narcissism is a personality trait that is characterized by “an inflated sense of self and is preoccupied with having that self-view continually reinforced” (Chatterjee and Hambrick, 2007, p. 353). Although narcissism is generally considered as a negative or even psychopathological trait (for a review, see Braun, 2017), it has also been observed that many good leaders are, in practice, narcissistic. For instance, Brunell et al. (2008) found that narcissists emerged as group leaders in leaderless group discussions. Moreover, as Morf et al. (2011) noted, narcissists believe that “if opportunity [exists] for promotion or demonstration of the grandiose and superior self, then self-affirm, self-promote and self-enhance!” (p. 402), highlighting the importance of context and opportunity in igniting the manifestation of narcissism. Prior studies have also demonstrated that narcissism has mixed impacts on behaviors (Liu et al., 2017). In particular, the relationship between narcissism and OCB-CH may be positive, given the proactive aspect of narcissism (Hirschi and Jaensch, 2015), or negative/insignificant, given the egocentric aspect of narcissism (Peterson et al., 2012).

Trait activation theory is a suitable umbrella theory to guide our conceptual framework because it introduces situations as important boundary conditions in understanding the relationship between personality traits and behaviors. According to this theoretical lens, in order to build a positive relationship between narcissism and OCB-CH, we should identify situational cues that are relevant to the proactive component of narcissism. Trait-relevant cues may exist at the task, social, and organizational levels (Tett and Burnett, 2003). In this research, we choose one organizational-level cue: environmental uncertainty. Below, we explain how narcissism and environmental uncertainty jointly influence OCB-CH via FRCC.

The Interaction of Employee Narcissism and Environmental Uncertainty on Felt Responsibility for Constructive Change

Felt responsibility for constructive change refers to “the extent to which an individual feels personally responsible for continually redefining performance (i.e., doing things better), rather than solely performing his or her own task well according to current

performance standards (i.e., doing the job right)” (Fuller et al., 2006, p. 1092). It reflects a willingness to make an exceptional effort within one’s organization and makes individuals more likely to engage in extra-role behaviors (Ran and Zhou, 2020). Several elements of narcissism should be positively linked to FRCC, and we refer to those elements as the proactive side of narcissism.

First, narcissistic employees have inflated self-views and are extremely self-confident (Campbell et al., 2002; Martin et al., 2016). They believe that they are more knowledgeable and experienced than others and that they should be dominant in leading organizational change (Zhu and Chen, 2015). Relatedly, narcissistic employees have a strong need for power and control, prefer to take a dominant role at work, and long for others’ compliance or even worship. They are thus likely to take charge and be the “first mover” or the “savior” of their organization, and shoulder the responsibility for organizational change (Spurk and Hirschi, 2018).

Second, narcissistic employees need continuous reaffirmation of their superiority (Chatterjee and Hambrick, 2007). Merely fulfilling their job requirements will not satisfy their desire to gain admiration (Wallace and Baumeister, 2002). They enjoy gaining attention and recognition by standing out from the ordinary people and achieving distinction. Initiating change is a visible way to demonstrate superiority. Narcissistic employees are thus willing to explore opportunities to advance the *status quo* (Campbell et al., 2011; Ha et al., 2020). Prior research has found that narcissistic leaders present their followers with a vision of a future that is far superior to the *status quo* (Ha et al., 2020). In a similar vein, we propose that narcissistic employees will be more motivated to take FRCC.

Finally, narcissistic employees are more willing to take risks (Campbell et al., 2004). Change and reform always involve risk (Brouthers et al., 2002). Risk-averse employees may find it difficult to overcome their fear of failure and therefore may be extremely reluctant to initiate change (Heavey et al., 2010). However, for narcissistic employees, the promise of public praise encourages them to take risky actions (Campbell et al., 2004). Narcissistic CEOs are considered to be extraordinarily useful, and even necessary in pioneering organizational and industrial change (Maccoby, 2000).

In sum, based on an inflated self-view and driven by the needs for power and self-affirmation, narcissistic employees are likely to feel more responsible for constructive change, demonstrate greater confidence in the face of uncertainty, and experience less fear regarding potential risks. However, according to TAT, the manifestation of narcissism may vary across situations. We propose that environmental uncertainty is a crucial environmental cue in determining the strength of the relationship between narcissism and FRCC. As suggested by Wallace and Baumeister (2002), “when there is an opportunity for glory, narcissists will shine, but they will underperform when the opportunity for glory is not available” (p. 1664). Environmental uncertainty provides narcissists with an excellent opportunity for self-enhancement. Narcissists’ motivation to demonstrate superiority and gain attention “can additionally be prompted by situational cues” (Back et al., 2013, p. 1016). In particular, when environmental uncertainty is high, narcissistic employees will be more likely to feel responsible for constructive change. This

is because environmental uncertainty is relevant to narcissism, especially to elements such as inflated self-view, need for power, self-affirmation, self-confidence, and willingness to take risks.

Environmental uncertainty includes uncertainties at three levels: (1) state uncertainty, or uncertainty about how the environment will change; (2) effect uncertainty, or uncertainty about how environmental changes will impact the organization; and (3) response uncertainty, or uncertainty about the consequences of organizational responses to environmental change (Ellis and Shpielberg, 2003). These uncertainties are relevant to the above-mentioned elements of narcissism and are thus expected to strengthen the relationship between employee narcissism and FRCC.

At the level of state uncertainty, environmental uncertainty is relevant to narcissism in that it provides employees opportunities to demonstrate superiority for self-affirmation. In a stable and predictable environment, attention is not easily attracted through daily routines; there is little room for employees to show their superiority (Chatterjee and Pollock, 2016) and therefore no glory to be gained (Wallace and Baumeister, 2002). However, in an environment that is full of uncertainty, employees’ behaviors are more likely to be observed, and they have opportunities to shine (Brunell et al., 2008). Employees are thus motivated to exhibit narcissism (Wisse et al., 2015), gaining self-affirmation by “undertaking challenging or bold tasks that are highly visible to a respected audience” (Chatterjee and Hambrick, 2007, p. 354). Prior research has found that narcissists perform better in crises than in stable environments (Wallace and Baumeister, 2002). In a similar vein, we argue that the relationship between narcissism and FRCC should be stronger when environmental uncertainty is high.

At the level of effect uncertainty, environmental uncertainty is relevant to narcissism because it requires a willing hero who dares to guide others. In a stable and predictable environment, everyone has a clear understanding of their roles and responsibilities, and there are few situations characterized by ambiguity or lack of direction. Thus, no such heroes are needed (Venus et al., 2019). However, in an environment full of uncertainty, narcissism is valued because people who believe that they should dominate (Zhu and Chen, 2015), be leaders (Judge et al., 2006), firmly pursue goals despite adversity (Rosenthal and Pittinsky, 2006), and behave assertively rather than cautiously and indecisively (Leckelt et al., 2015) can help organizations (Wallace and Baumeister, 2002). Uncertainty has been found to enhance the preference for narcissistic leaders, as the overconfidence and dominance of narcissistic leaders satisfy the demand for “strength and toughness” in uncertain contexts (Nevicka et al., 2013, p. 371). Therefore, narcissism will be activated and demonstrated, and the relationship between narcissism and FRCC should, accordingly, be stronger.

At the level of response uncertainty, environmental uncertainty is relevant to narcissism because it highlights the importance of risk-taking and self-confidence. In a stable and predictable environment where rules are definite, organizations and their members are certain of the consequences of their behaviors and rarely take risks. Therefore, people are encouraged to behave in a safe way, rather than in the aggressive manner that is characteristic of narcissists (Heavey et al., 2010). However, in

an environment that is full of uncertainty, the consequences of organizational responses to the environment are ambiguous, and decisions in the organization are often risky. Hence, employees need to take risks to do their jobs (Brouthers et al., 2002). Narcissism enables employees to disrupt the *status quo*, make ambitious plans, and believe that their decisions will lead to the best outcomes (Zhu and Chen, 2015). Therefore, when environmental uncertainty is high, narcissism becomes necessary and encouraged, and the relationship between narcissism and FRCC should in turn become stronger.

In sum, environmental uncertainty provides relevant cues to narcissism. Narcissism, which is characterized by inflated self-views, the need for power, self-affirmation, self-confidence, and risk-taking, can be activated by environmental uncertainty, strengthening its relationship with FRCC. Thus, we propose:

Hypothesis 1: Employee narcissism and environmental uncertainty will interactively influence employee's FRCC, in such a way that employee narcissism will be more positively related to his/her FRCC when environmental uncertainty is high.

The Interaction of Employee Narcissism and Environmental Uncertainty on Change-Oriented Organizational Citizenship Behavior via Felt Responsibility for Constructive Change

Change-oriented organizational citizenship behavior is a form of proactive behavior, defined as constructive efforts by individuals to identify and implement changes to work methods, policies, and procedures to improve situations and performance (Choi, 2007). The most proximal and direct predictors of proactive behavior are motivational processes (Bindl and Parker, 2011). FRCC has been suggested as the motivation, or "reason to," that explains valence, or "why" individuals engage in proactive behaviors such as OCB-CH (Fuller et al., 2012, p. 1054). It reflects individuals' internalized goals that are deemed to be of great value (Deci and Ryan, 2002) and thus can greatly determine behaviors.

First, FRCC reflects individuals' internal intentions to redefine and reform performance (Fuller et al., 2006), as opposed to being assigned responsibility. It is thus an identified form of self-regulation and is associated with a great sense of personal accomplishment and satisfaction achieved through initiating change (Morrison and Phelps, 1999). For individuals who possess a strong sense of FRCC, it is of positive valence for them to engage in OCB-CH. In contrast to affiliative types of OCB, OCB-CH includes challenging and risk-taking behaviors, such as personal initiative, task revision, voice, and taking charge. Individuals' sense of obligation concerning change leads them to question current practices and challenge the *status quo*, rather than simply behaving in a conscientious and compliant manner.

Second, previous studies have suggested that FRCC motivates individuals to more thoroughly process work-related information, thus helping them identify possible areas for improvement or reform (Fuller et al., 2006). This can make it more likely for individuals to initiate OCB-CH. In addition, OCB-CH involves the ability to take charge and assume the risks

of not being welcomed and, ultimately, of failure. Individuals with high levels of FRCC have a sense of ownership over their work and possess the confidence to take on a dominant role in challenging the *status quo*. This increases their willingness to take risks in order to accomplish new achievements in their tasks, making them more likely to exhibit OCB-CH.

Moreover, empirical evidence has been found for positive relationships between FRCC and OCB-CH (e.g., Loipez-Dominguez et al., 2013), taking charge (Morrison and Phelps, 1999; Parker and Collins, 2010), voice (Chamberlin et al., 2017), continuous improvement (Fuller et al., 2006), and innovation (Parker and Collins, 2010). Therefore, we propose:

Hypothesis 2: Employee FRCC is positively related to his/her change-oriented OCB.

Combining Hypotheses 1 and 2, this study further proposes that employee narcissism and environmental uncertainty will have an interactive effect on OCB-CH via FRCC. Narcissists' inflated self-view, strong need for competence and dominance, and pursuit of praise and status via risk taking and exploration generate feelings of accountability that lead them to initiate change and reform. We expected that this relationship would be moderated by environmental uncertainty, because the variable and unpredictable character of the environment is relevant to narcissists' need for self-affirmation and self-enhancement. Uncertain situations are likely to activate narcissists' desires to be highly visible, and to generate a perceived obligation to initiate change. Subsequently, FRCC should lead to their constructive efforts to identify and implement changes to work methods, policies, and procedures aimed at improving their organization. Therefore, we propose:

Hypothesis 3: Employee narcissism and environmental uncertainty interactively influence change-oriented OCB via FRCC.

The theoretical model of the current study is shown in **Figure 1**.

MATERIALS AND METHODS

We conducted two studies to test our hypotheses. Study 1 was an online survey we administered when COVID-19 broke out in Hubei province. Because at that time, COVID-19 was mostly found in Hubei province and had not spread to other provinces, we expected that employees working in Hubei would face higher levels of uncertainty compared to employees working elsewhere. Taking this opportunity, we adopted an objective indicator to capture environmental uncertainty: work locations were coded as "1" for Hubei province (i.e., high environmental uncertainty) and as "0" for other provinces (i.e., low environmental uncertainty). Study 2 used a leader-follower matched data to replicate the results of Study 1 in two high-tech companies in Beijing, China. To complement Study 1, Study 2 used a validated scale to measure environmental uncertainty in a more refined way and collected data from different sources to avoid potential common method variance (CMV).

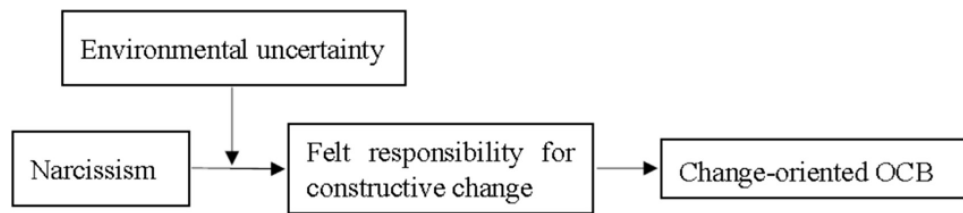


FIGURE 1 | Theoretical model.

Study 1

Sample and Procedure

We recruited 185 employees in China via Credamo (a professional survey platform recognized by top international journals; Jin et al., 2021). The survey was conducted in January 2020, 1 month after the outbreak of the COVID-19 epidemic, which was particularly serious in Hubei province. Credamo randomly distributed questionnaires in China (excluding Hong Kong, Macao, and Taiwan), and targeted employees who had more than 6 months' work experience (Harris et al., 2014). The questionnaire passed Credamo's audit, which guaranteed that it would not cause negative psychological effects on participants. Also, at the beginning of the questionnaire, we briefly informed participants that the survey was about organizational management and employee working conditions during the epidemic, their participation was voluntary, and their responses would only be used for academic purposes. Finally, 180 valid questionnaires were obtained.

The proportion of male and female participants was the same (50%). The average age of the respondents was 29.63 ($SD = 5.99$), and the average organizational tenure was 7.37 years ($SD = 5.82$). The respondents had relatively high levels of education (72.78% had a bachelor's degree or higher). Most of the respondents were general staff (40.56%) or lower-level managers (37.78%) and from private enterprises (46.11%).

Measures

We applied mature scales to measure narcissism, FRCC, and OCB-CH. We translated these scales from English to Chinese following the translation and back-translation procedure (Brislin, 1980). Two bilingual research assistants who were blind to the nature of the study and hypotheses completed the translations. Disagreements were resolved through consensus-based discussion among the authors, translators, and other bilingual researchers. A seven-point scale was used for all the questionnaires, ranging from "1" (strongly disagree) to "7" (strongly agree).

Narcissism

We used the 16-item Narcissistic Personality Inventory (NPI-16; Ames et al., 2006) to measure narcissism. NPI-16 was proved to be one of the two scales that have the strongest match with expert ratings of grandiose narcissism (Miller et al., 2014) and thus is commonly used to measure grandiose narcissism (Nevicka et al., 2011a,b). The NPI-16 assesses the tendency to hold grandiose self-views along with corresponding behavioral propensities and

is meant to assess subclinical aspects of narcissism. A sample item was "I like to be the center of attention." Cronbach's Alpha was 0.88 in this study.

Felt Responsibility for Constructive Change

Following Choi (2007), we measured FRCC by two items developed by Morrison and Phelps (1999): "I feel a personal sense of responsibility to bring about change at work" and "it's up to me to bring about improvement in my workplace." Cronbach's Alpha was 0.79 in this study.

Change-Oriented Organizational Citizenship Behavior

We adopted the 4-item scale from Choi (2007) to measure OCB-CH. A sample item was, "I often suggest changes to unproductive rules or policies." Cronbach's Alpha was 0.88 in this study.

Environmental Uncertainty Brought on by the COVID-19 Pandemic

As the pandemic broke out in Hubei province in January 2020, most cases of COVID-19 in China were in Hubei, and the government imposed various measures to facilitate the fight against its transmission in this province. The lockdown of cities and workplaces, transition to online work, use of remote workspaces, prolonged suspensions of work, and undecided work-resumption timing brought about great environmental uncertainty. Employees in Hubei thus faced higher levels of environmental uncertainty compared with employees in other provinces. For these reasons, the current survey used whether an employee's workplace was in Hubei to indicate the level of environmental uncertainty brought on by the COVID-19 pandemic: "1" (Hubei) represents a high level of environmental uncertainty and "0" (other provinces) represents a low level of environmental uncertainty.

Control Variables

Past literature indicates that employees' gender, age, education level, and organizational tenure may influence their levels of narcissism, tendencies to take initiatives, and tendencies to conduct OCB-CH to a certain extent. We also controlled for organization type and job level because employees in different types of organizations and job levels may face different levels of environmental uncertainty and feel different levels of responsibility for change. The type of industry was also controlled because different industries have experienced varying levels of environmental changes during the pandemic, and employees may feel different levels of responsibility for change and for conducting OCB-CH.

Analytical Approach

We first performed confirmatory factor analysis (CFA) using AMOS 24.0, and then applied a CMV test. After these primary analyses, we used SPSS 26.0 to conduct regression analysis to test Hypothesis 1 and Hypothesis 2, and tested the overall model (Hypothesis 3) via Monte Carlo (MC) simulation using Mplus 7.4.

Confirmatory Factor Analysis

To test factorial validity and the construct distinctiveness of narcissism, FRCC, and OCB-CH, we conducted CFA. Owing to the limited sample size, this study used the factorial algorithm method of item parceling (Rogers and Schmitt, 2004) before conducting CFA. Two item parcels were created for narcissism. These item parcels were considered indicators of the construct. In addition, all items of FRCC and OCB-CH were viewed as indicators of the two constructs. As demonstrated in **Table 1**, the hypothesized three-factor model provided a good fit, with all the fit indices within acceptable levels ($\chi^2/df = 2.17$, RMSEA = 0.08, CFI = 0.97, TLI = 0.95, IFI = 0.97). After examining the fit of all the alternative models, the three-factor model offered a superior fit for the data.

Common Method Variance Test

Because we adopted the questionnaire survey method, and all the variables were answered by a single person, there may be a CMV problem. We applied the Harman single-factor test to determine the level of CMV in the study. The results showed that the variance of the first common factor accounted for was 31.97%, far below the 50% standard (Yong and Pearce, 2013), indicating that there is no serious CMV problem among the measured variables.

Descriptive Analysis Results

Table 2 presents the means, standard deviations, zero-order correlations, and internal consistency alphas for all the variables. Consistent with our hypotheses, narcissism was positively and significantly related to FRCC ($r = 0.25$, $p < 0.01$), and FRCC was positively and significantly related to OCB-CH ($r = 0.60$, $p < 0.01$).

Hypothesis Testing

We applied regression analysis to test the hypotheses. Hypothesis 1 proposed that narcissism and environmental uncertainty would have an interactive effect on FRCC. As Model 3 of

Table 3 shows, the interaction term between narcissism and environmental uncertainty was significantly related to FRCC ($\gamma = 0.36$, $p < 0.05$). **Figure 2** and simple slope tests show that the relationship between narcissism and FRCC was significant when environmental uncertainty was high (simple slope = 0.50, $p < 0.01$), but insignificant when environmental uncertainty was low (simple slope = 0.10, n.s.). Thus, Hypothesis 1 was supported. Hypothesis 2 proposed that FRCC would be positively related to OCB-CH. As demonstrated in Model 5 of **Table 3**, FRCC was significantly related to OCB-CH ($\gamma = 0.59$, $p < 0.01$). Therefore, Hypothesis 2 was supported.

Hypothesis 3 proposed that narcissism and environmental uncertainty would have an interactive effect on OCB-CH via FRCC. We applied a path analysis model using Mplus 7.4 (Muthén and Muthén, 2012). The confidence interval was calculated via Monte Carlo (MC) simulation with 20,000 replications using R^1 (Bauer et al., 2006; Preacher and Selig, 2010). Estimation of the conditional indirect effects revealed that the indirect effect of narcissism on OCB-CH via FRCC was significant when environmental uncertainty was high ($effect = 0.17$, 95%CI [0.03, 0.32]), but insignificant when environmental uncertainty was low ($effect = 0.01$, 95%CI [-0.12, 0.13]). Thus, Hypothesis 3 was supported.

Study 1 Discussion

In Study 1, we found that employee narcissism and environmental uncertainty had an interactive effect on OCB-CH via FRCC, such that the indirect effect was stronger when environmental uncertainty was high rather than low. However, Study 1 has several limitations. First, environmental uncertainty was measured generally via proximal variables of the respondents - geographical locations (i.e., whether or not they worked in Hubei Province) and is thus not a direct measurement. Second, both independent and dependent variables were provided by employees; thus, the results of Study 1 may suffer from common source bias. Consequently, we conducted Study 2 to reexamine our hypotheses in specific corporate settings and invited both employees and their supervisors to respond to a survey to reduce common source bias. In addition, Study 2 applied employees' perception of technology uncertainty brought on by COVID 19 as a measurement of environmental uncertainty, because the primary uncertainty faced by high-tech companies comes from technology. Therefore, we believed that

¹<http://www.quantpsy.org/medmc/medmc111.htm>

TABLE 1 | Study 1 results of confirmatory factor analysis.

Model	Factors	χ^2	df	$\Delta\chi^2$	RMSEA	CFI	TLI	IFI
Baseline	Three factors: N, FRCC, OCB-CH	36.83	17		0.08	0.97	0.95	0.97
Alternatives								
Model 1	Two factors: N + FRCC, OCB-CH	125.29	19	88.46**	0.18	0.84	0.77	0.85
Model 2	Two factors: N + OCB-CH, FRCC	99.07	19	62.24**	0.15	0.88	0.83	0.88
Model 3	Two factors: N, FRCC + OCB-CH	82.37	19	45.54**	0.14	0.91	0.86	0.91
Model 4	One factor: all variables combined	145.71	20	108.88**	0.19	0.81	0.74	0.82

** $p < 0.01$. N, narcissism; FRCC, felt responsibility for constructive change; OCB-CH, change-oriented OCB.

TABLE 2 | Study 1 descriptive statistics and correlation matrix.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12
(1) Gender (0 = male, 1 = female)	0.50	0.50												
(2) Age	29.63	5.99	-0.03											
(3) Education level	3.69	0.86	0.18*	0.18										
(4) Organization tenure	7.37	5.82	0.001	0.80**	-0.18*									
(5) Organization type (0 = non-state owned, 1 = state-owned)	0.27	0.44	0.05	-0.07	0.22**	-0.12								
(6) Job level	1.83	0.82	0.000	0.18*	0.26**	0.30**	-0.03							
(7) Industry 1	0.18	0.38	0.09	0.14†	-0.21**	0.15*	0.02	-0.10						
(8) Industry 2	0.35	0.48	-0.01	-0.15*	0.05	-0.20**	0.11	0.05	-0.34**					
(9) Narcissism	4.34	0.82	-0.02	0.02	0.09	0.02	0.16*	0.29**	0.01	-0.04	(0.88)			
(10) Environmental uncertainty	0.35	0.48	0.12†	0.06	-0.25**	0.11	-0.13†	-0.14†	0.02	-0.10	-0.17*			
(11) Felt responsibility for constructive change	5.67	0.95	-0.14†	0.12†	0.12	0.17*	0.12	0.17*	-0.06	0.09	0.25**	-0.07	(0.79)	
(12) Change-oriented OCB	5.42	1.02	-0.15*	0.10	0.10	0.12	0.13†	0.31**	-0.05	0.16*	0.43**	-0.14†	0.60**	(0.88)

Coefficient alphas are reported in parentheses along the diagonal.

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$.

Employee education level: 1, junior high school or below; 2, high school or technical school; 3, junior college; 4, bachelor's degree; 5, master's degree; 6, PHD.

Job level: 1, general staff; 2, lower-level manager; 3, middle-level manager; 4, top-level manager.

Industries are classified into manufacture industry, service industry, and other industries. Two dichotomous variables (industry 1, industry 2) were created to differentiate the three industries.

Study 2 would provide additional reliable empirical evidence for the hypotheses.

Study 2

Sample and Procedure

We collected data from two high-tech companies in Beijing, China. We obtained team supervisors' contact information through the companies' human resources departments. We first contacted all team supervisors to explain the purpose and confidential nature of the study and invited them to voluntarily participate in the survey. We used WeChat to send links to online surveys to the supervisors and asked them to invite one of their subordinates to participate in the study. After finishing questionnaires for leaders, the supervisors sent links of the questionnaires for followers to their subordinates. To protect the confidentiality of participants, they were assigned random identification numbers so that supervisors' and subordinates' responses could be matched. Supervisors provided their demographic information and assessments of subordinates' OCB-CH; subordinates provided information on their demographics, narcissism, perceived environmental uncertainty brought on by COVID-19, and FRCC.

One hundred sixty-seven supervisors and their subordinates were invited to participate in the online survey. The supervisors' and subordinates' responses were then matched. The final sample included only dyadic for which both the supervisors and their subordinates responded, and each of whom had more than 6 months' organizational tenure (Harris et al., 2014). The final sample consisted of 167 leaders and their 167 corresponding subordinates. Among the supervisors, 60.47% were male and 68.27% had a bachelor's degree or higher. The average age was 34.77 years ($SD = 7.51$) and the average organizational tenure was 9.25 years ($SD = 5.68$). Among the subordinates, 61.07% were male and 67.66% had a bachelor's degree or higher degrees. The average age was 31.77 years ($SD = 6.52$) and the average organizational tenure was 10.39 years ($SD = 6.61$).

Measures

Following Study 1, we applied the same measures for narcissism, FRCC, and change-oriented OCB in Study 2 to measure these variables. In contrast to Study 1, in which we asked employees to fill out all the questionnaires, in Study 2 we invited employees to assess their own narcissism and FRCC and asked their supervisors to assess employees' OCB-CH. The measure for environmental uncertainty was also a mature English scale, and we followed the translation and back-translation procedure (Brislin, 1980) to translate it from English to Chinese.

Narcissism

Consistent with Study 1, this study applied NPI-16 (Ames et al., 2006) to measure narcissism. Cronbach's Alpha was 0.92.

Felt Responsibility for Constructive Change

We followed Choi (2007) and measured FRCC by two items developed by Morrison and Phelps (1999). Cronbach's Alpha was 0.63 in the current study. As Cortina (1993) noted, "Alpha is very much a function of the number of items in a scale, it must be interpreted with the number of items in mind" (p. 102). Although

TABLE 3 | Study 1 regression results.

	Felt responsibility for constructive change						Change-oriented OCB			
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	SE	b	SE	b	SE	b	SE	b	SE
Control variables										
Gender	−0.28*	0.14	−0.27*	0.13	−0.25†	0.14	−0.32*	0.14	−0.16	0.12
Age	−0.01	0.02	−0.01	0.02	−0.004	0.02	0.01	0.02	0.01	0.02
Education	0.12	0.09	0.13	0.09	0.13	0.09	0.01	0.09	−0.06	0.08
Organization tenure	0.04†	0.02	0.04*	0.02	0.04	0.02	0.01	0.02	−0.01	0.02
Organization type	0.25	0.16	0.17	0.16	0.16	0.16	0.32†	0.17	0.17	0.14
Job level	0.08	0.10	−0.01	0.10	−0.03	0.10	0.36**	0.10	0.31**	0.08
Industry 1	−0.04	0.20	−0.05	0.19	−0.04	0.19	0.10	0.21	0.13	0.17
Industry 2	0.21	0.16	0.25	0.15	0.24	0.15	0.32*	0.16	0.20	0.14
Independent variables										
Narcissism			0.25**	0.09	0.28**	0.09				
Environmental uncertainty					0.04	0.15				
Mediator										
Felt responsibility for constructive change									0.59**	0.07
Interaction										
Narcissism × environmental uncertainty					0.36*	0.18				
R ²	0.11		0.15		0.17		0.16		0.43	
Adj. R ²	0.07		0.11		0.12		0.12		0.40	
ΔR ²			0.04**		0.02†				0.27**	
F	2.57*		3.33**		3.11**		4.12**		14.11**	

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$.

the scales of the FRCC displayed alphas lower than 0.70, they were included in the analysis for several reasons. First, the number of items for this variable was only two. Second, factor analysis using principal components established the unidimensionality of the factor. Finally, the average item intercorrelation for the factor was 0.48. Accordingly, given the number of items, factor analysis, and item intercorrelations, as well as the fact that the scale was developed by the researchers, the scale was retained in the study (Cortina, 1993).

Change-Oriented Organizational Citizenship Behavior

We adopted the four-item scale from Choi (2007) to measure OCB-CH. A sample item was “This employee often changes the way he/she works to improve efficiency.” Cronbach’s Alpha was 0.86 in current study.

Environmental Uncertainty Brought on by the COVID-19 Pandemic

We applied employees’ perception of technology uncertainty brought on by COVID-19 as the measurement of environmental uncertainty. Study 2 was conducted in two high-tech companies in mainland China. Before conducting the survey, we interviewed some of the leaders and employees in these companies and found that the primary uncertainty they felt from COVID-19 was from technology uncertainty. In their views, COVID-19 would greatly shape the future of science, technology, and innovation. Uncertainty exists in research and development (R&D) of new products and services, the adoption of digital

tools and techniques, and changes in work habits. We thus measured technology uncertainty as an indicator of environmental uncertainty. We created a scale measuring perceived technology uncertainty brought on by COVID-19, adapted from that of Ragatz et al. (2002). Whereas the scale of Ragatz et al. (2002) measured respondents’ general perception of technology uncertainty in a work context, we examined subordinates’ perceptions about technology uncertainty under

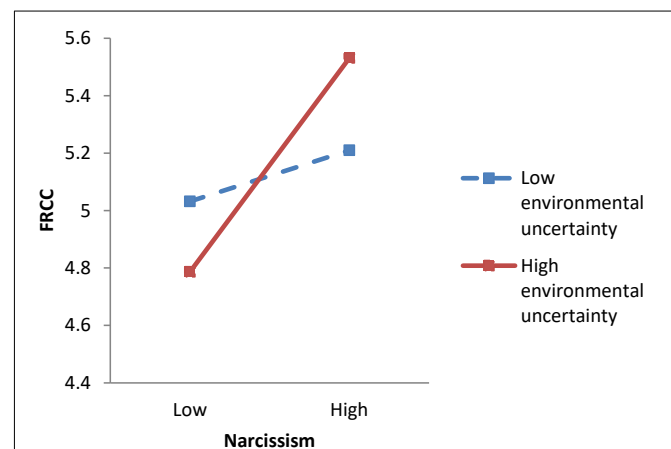


FIGURE 2 | Study 1 moderating effect of environmental uncertainty on the relationship between narcissism and felt responsibility for constructive change.

the specific background of COVID-19 pandemic. We stated in the questionnaire, “Due to the outbreak of the COVID-19 pandemic, corporations and industries have introduced or will introduce new technology to cope with challenges brought by the disease to the workplace.” We then asked participants to rate their level of perceived technology uncertainty in terms of three aspects: the newness of the technology, the level of complexity of the technology, and the rapid/unstable change rate of the technology. Cronbach's Alpha was 0.72 in this study.

Control Variables

We controlled subordinates' demographic information: (1) gender, because the previous study suggested that men tended to be more narcissistic than women (Grijalva et al., 2015), and were more likely to challenge the *status quo* and initiate change; (2) age and organizational tenure, as these factors may moderate the influence of context and dispositional variables on OCB (Wagner and Rush, 2000); (3) education level, as it may influence individuals' perception of the environment and tendency to make changes; (4) company, although the two firms were both high-tech companies, they may have different corporate cultures or policies that could influence employees' felt responsibility for change and proactive behaviors.

Analytical Approach

As in Study 1, we performed CFA using AMOS 24.0, applied a CMV test, and then used SPSS 26.0 to conduct regression analysis to test hypotheses. Finally, the overall model was tested via Monte Carlo (MC) simulation using Mplus 7.4.

Confirmatory Factor Analysis

To test factorial validity and the construct distinctiveness of narcissism, FRCC, environmental uncertainty, and OCB-CH, we conducted CFA using AMOS 24.0. As in Study 1, this study used the factorial algorithm method of item parceling (Rogers and Schmitt, 2004) before conducting CFA. We created two-item parcels for narcissism. These item parcels were considered as indicators of the construct. In addition, all items of other variables were viewed as indicators of the constructs. As demonstrated in **Table 4**, the hypothesized four-factor model provided a good fit, with all the fit indices within acceptable levels ($\chi^2/df = 2.27$, RMSEA = 0.08, CFI = 0.93, TLI = 0.90, IFI = 0.93). After examining the fit of all the alternative models, the four-factor model offered a superior fit for the data.

Common Method Variance Test

As in Study 1, we applied the Harman single-factor test to examine the level of CMV. The results showed that the variance of the first common factor accounted for was 30.26%, far below the 50% standard (Yong and Pearce, 2013). This indicates that there is no serious CMV problem among the measured variables.

Descriptive Analysis Results

Table 5 presents the means, standard deviations, zero-order correlations, and internal consistency alphas for all the variables. Consistent with our hypotheses, narcissism was positively and significantly related to FRCC ($r = 0.41$, $p < 0.01$), and FRCC was positively and significantly related to OCB-CH ($r = 0.19$, $p < 0.05$).

Hypothesis Testing

We applied regression analysis to test the hypotheses. Supporting Hypothesis 1, Model 8 of **Table 6** showed that the interaction term between narcissism and environmental uncertainty was significantly related to FRCC ($\gamma = 0.21$, $p < 0.01$). **Figure 3** and simple slope tests showed that the relationship between narcissism and FRCC was stronger when environmental uncertainty was high (simple slope = 0.92, $p < 0.01$) and weaker when environmental uncertainty was low (simple slope = 0.35, $p < 0.01$). Hypothesis 2 proposed a positive relationship between employee FRCC and OCB-CH. As demonstrated in Model 10 of **Table 6**, FRCC was significantly related to OCB-CH ($\gamma = 0.18$, $p < 0.05$).

Hypothesis 3 proposed an interaction effect between narcissism and environmental uncertainty on OCB-CH via FRCC. As in Study 1, estimation of the conditional indirect effects revealed that the indirect effect of narcissism on OCB-CH via FRCC was stronger when environmental uncertainty was high (effect = 0.14, 95%CI [0.02, 0.34]) and weaker when environmental uncertainty was low (effect = 0.05, 95%CI [0.001, 0.15]), and the difference was significant (effect = 0.09, 95%CI [0.01, 0.24]). Thus, Hypothesis 3 was supported.

Study 2 Discussion

Via a survey conducted in corporate settings during the COVID-19 pandemic, the results of Study 2 supported the hypothesis that employee narcissism and environmental uncertainty would have an interactive effect on OCB-CH via FRCC. Specifically,

TABLE 4 | Study 2 results of confirmatory factor analysis.

Model	Factors	χ^2	df	$\Delta\chi^2$	RMSEA	CFI	TLI	IFI
Baseline	Four factors: N, FRCC, EU, OCB-CH	86.43	38		0.08	0.93	0.90	0.93
Alternatives								
Model 1	Three factors: N + FRCC, EU, OCB-CH	106.29	41	19.86**	0.10	0.90	0.87	0.91
Model 2	Three factors: N + EU, FRCC, OCB-CH	179.91	41	93.48**	0.14	0.79	0.72	0.80
Model 3	Two factors: N + FRCC + EU, OCB-CH	198.13	43	111.70**	0.15	0.77	0.71	0.77
Model 4	One factor: All variables combined	381.07	44	294.64**	0.22	0.50	0.37	0.51

N, narcissism; FRCC, felt responsibility for constructive change; EU, environmental uncertainty; OCB-CH, change-oriented OCB.

** $p < 0.01$.

TABLE 5 | Study 2 descriptive statistics and correlation matrix.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
(1) Gender (0 = male, 1 = female)	0.39	0.49									
(2) Age	31.77	6.52	−0.09								
(3) Education level	1.91	0.75	0.06	0.26**							
(4) Organization tenure	10.39	6.61	−0.05	0.84**	0.12						
(5) Company type (0 = Company A, 1 = Company B)	0.41	0.49	−0.01	−0.12	−0.02	−0.12					
(6) Narcissism	4.22	0.64	−0.01	0.05	−0.01	0.05	−0.16*	(0.92)			
(7) Environmental uncertainty	4.57	1.39	0.09	−0.01	0.08	−0.03	−0.12	0.21**	(0.72)		
(8) Felt responsibility for constructive change	4.26	0.89	−0.002	0.003	−0.01	−0.03	−0.13	0.41**	0.08	(0.63)	
(9) Change-oriented OCB	3.30	0.86	0.12	0.22**	0.05	0.21**	−0.14†	0.19*	0.06	0.19*	(0.86)

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$. Coefficient alphas are reported in parentheses along the diagonal.

Employee education level: 1, junior college or lower; 2, bachelor's degree; 3, master's degree; 4, PHD.

TABLE 6 | Study 2 regression results.

	Felt responsibility for constructive change						Change-oriented OCB			
	Model 6		Model 7		Model 8		Model 9		Model 10	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Control variables										
Gender	0.001	0.14	0.01	0.13	0.05	0.13	0.25†	0.14	0.25†	0.13
Age	0.01	0.02	0.01	0.02	0.01	0.02	0.03	0.02	0.03	0.02
Education	−0.02	0.10	−0.02	0.09	−0.04	0.09	−0.02	0.09	−0.02	0.09
Organization tenure	−0.02	0.02	−0.02	0.02	−0.02	0.02	0.004	0.02	0.01	0.02
Company type	−0.23	0.14	−0.12	0.13	−0.13	0.13	−0.18	0.13	−0.14	0.13
Independent variables										
Narcissism			0.56**	0.10	0.63**	0.10				
Environmental uncertainty					−0.02	0.05				
Mediator										
Felt responsibility for constructive change									0.18*	0.07
Interaction										
Narcissism × environmental uncertainty					0.21**	0.07				
R^2	0.02		0.17		0.22		0.08		0.12	
Adj. R^2	−0.01		0.14		0.18		0.05		0.08	
ΔR^2			0.15**		0.04*				0.03*	
F	0.65		5.57**		5.48**		2.84*		3.45**	

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$.

employee perceived environmental uncertainty strengthened the positive effect of narcissism on FRCC, and subsequently, the positive indirect effect of narcissism on OCB-CH. It is thereby demonstrated that our findings are consistent across samples, and are generalizable.

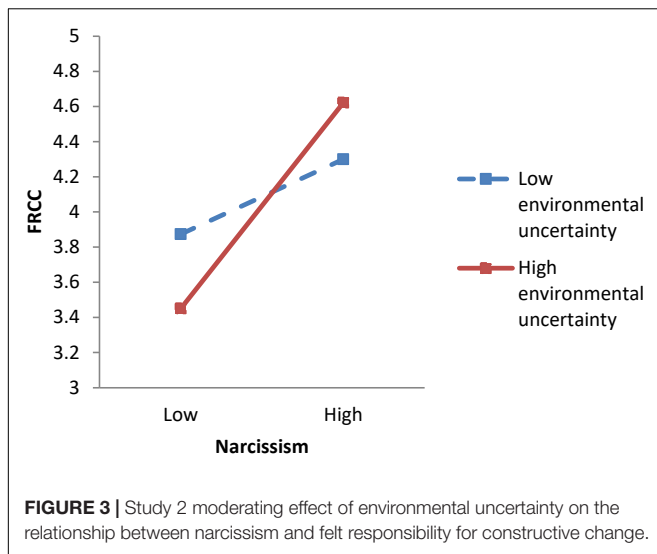
DISCUSSION

The COVID-19 pandemic has brought unprecedented uncertainties to the workplace. Employees need to perform work beyond their formal job requirements, proactively cope with dynamic environments, and take the initiative to respond to uncertainties. It is thus critical to investigate how to promote employees' OCB-CH. The results of the current study demonstrate that narcissism, long thought of as a "dark trait," can

indeed generate high levels of OCB-CH via employees' FRCC, especially when environmental uncertainty is high.

Theoretical Contributions

This research contributes to several streams of literature. First, it extends the OCB-CH literature by uncovering a new antecedent. Previous literature on antecedents of OCB-CH has demonstrated that work context—including strong vision, innovative climate, supportive leadership (Choi, 2007), transformational leadership (Loipez-Dominguez et al., 2013), and empowering leadership (Li et al., 2016)—can cultivate OCB-CH. However, it has been recommended that more attention be paid to the dispositional antecedents of OCB-CH (Seppälä et al., 2012), as internal characteristics can strongly motivate behavior (Hui et al., 2000). Personal characteristics like self-efficacy (Loipez-Dominguez



et al., 2013), sense of power (Seppälä et al., 2012), promotion focus (Simo et al., 2016), and psychological empowerment (Choi, 2007) have been found to be associated with OCB-CH. Based on these findings, we proposed and found that narcissism—characterized by an inflated self-view, a need for power and self-affirmation, and greater confidence regarding uncertainty and less fear regarding risk—was positively associated with OCB-CH. These findings enrich our understanding of the antecedents of OCB-CH.

Notably, OCB-CH is, by definition, different from other OCBs in terms of its emphasis on breaking the *status quo*, challenging routines, and disrupting social relationships to stimulate change (Choi, 2007). To date, however, there is still a lack of evidence to support the difference between OCB-CH and other OCBs. Our research provides some indirect evidence by demonstrating that narcissism is positively related to OCB-CH, in contrast to Webster and Smith's (2019) finding that narcissism is negatively related to OCB.

Second, our research contributes to the narcissism literature by revealing its positive outcomes. Management researchers, following personality psychologists, have suggested that narcissism is a common personality trait (Campbell et al., 2005). In fact, it has been found that narcissism is particularly prevalent in younger adults today, who have been described as “Generation Me” (Twenge, 2013; Braun, 2017). Narcissism was originally considered as a “dark” personality trait, as it implies self-interest, arrogance, and entitlement, and is associated with negative, aggressive, and counterproductive behaviors that impede organizational functioning (Braun, 2017). However, in practice, many leaders are characterized as narcissistic, and have self-enhancing tendencies, engage in impression management, and strive for recognition and success. They are also considered to have high self-confidence and charisma. All of these elements are related to narcissism but can also contribute to leader emergence and leadership effectiveness (Brunell et al., 2008; Campbell and Campbell, 2009). Therefore, as narcissists thrive in the leadership domain, scholars have begun to notice the bright

side of narcissism. For example, narcissism has been found to be positively related to mental toughness and performance under stress (Papageorgiou et al., 2019), information search effort and creativity (Zhou et al., 2019), occupational self-efficacy, career engagement, career success (Hirschi and Jaensch, 2015), and enhanced performance after ego threat (Nevicka et al., 2016). By exploring how and when narcissistic employees engage in OCB-CH from a TAT perspective, we extend this line of research in two ways. First, our research enriches the range of the possible positive consequences of narcissism. In particular, we found that narcissism may not only benefit individuals themselves through enhancing performance, creativity (Nevicka et al., 2016), and career success (Hirschi and Jaensch, 2015) but may also benefit organizations by promoting citizenship behaviors. Second, our research identifies important contextual factors that may trigger the positive aspects of narcissism. In particular, we found that in addition to performing well under stressful conditions (Wallace and Baumeister, 2002; Nevicka et al., 2016), narcissists may also thrive in uncertain environments. We considered a more specific aspect of environmental uncertainty (i.e., technology uncertainty) in Study 2 and replicated the findings in Study 1. In doing so, we respond to the call to further examine contingencies in strengthening the relationship between “dark traits” and “bright outcomes” (Spain et al., 2014, p. 14).

This finding also has implications concerning the long-discussed issue of narcissism and adaptability. Echoing most previous findings that, within the range of normal personality variation, narcissistic grandiosity is positively associated with adaptive psychological functioning and mental health (Jauk and Kaufman, 2018), we found that, in uncertain and volatile environments, grandiose narcissists demonstrate high adaptivity and react more positively and proactively than other individuals. The current study used samples of average employees to study the effects of narcissism, and the results concurred with the proposition in previous work that, for a subsample with low to moderate levels of grandiosity, grandiose narcissism's positive association with self-esteem and dominance preference and negative association with fear of rejection and failure generate the “happy face” of this dark personality trait (Rose, 2002, p. 388).

Additionally, our research found a new mechanism (i.e., FRCC) that could explain the effects of narcissism on OCB-CH. Although studies have begun to investigate the positive influence of narcissism on desirable outcomes, few have revealed its underlying motivational mechanism (Mao et al., 2020). We thus advance the understanding of how and when narcissism can motivate employees to engage in OCB-CH.

Finally, our research contributes to the FRCC literature by finding a new personality antecedent. Previous studies have largely focused on work context, suggesting work design (Fuller et al., 2006), innovative climate (Loipez-Domiñguez et al., 2013), servant leadership (Arain et al., 2019), and responsible leadership (Han et al., 2019) as antecedents of FRCC, while neglecting the role of personality. This is an important omission, as individual differences should generate different motivations for creating change (Fuller et al., 2012). In addition, this study took an interactionist perspective and found

that narcissism and environmental uncertainty interactively impact FRCC, responding to the proposition that FRCC is a function of both context characteristics and individual differences (Fuller et al., 2006).

Practical Implications

The COVID-19 pandemic has posed great challenges for employees in the workplace. Today's employees need to proactively respond to these changes, and our research provides some suggestions. First, managers should take a comprehensive and interactionist approach when considering narcissism. This study found that narcissism's positive effects on FRCC and OCB-CH were stronger when organizations faced high levels of environmental uncertainty. This suggests that managers and organizations should have comprehensive understandings of the different personality traits of employees and also consider the external environment. OCB-CH is critical during periods of rapid environmental change, but most employees—and even leaders—tend to be more willing to maintain the *status quo* and engage less in OCB-CH under such circumstances (Dan et al., 2017). The average compliant and agreeable employee is not sufficient for coping with uncertainty and instigating change. Narcissists perform better during crises (Wallace and Baumeister, 2002) and are likely to be the first movers with regard to change and reform. Therefore, when organizations are facing changes and uncertainties, hiring narcissistic employees may be a viable strategy, and managers should also be attentive to preserving these employees' self-efficacy by encouraging them to voice their opinions and take initiative.

Another practical implication of this study concerns the importance of employees' felt responsibility for change. In both studies, FRCC was found to be positively related to OCB-CH, meaning that employees will act proactively to improve work practices or even break old rules and innovate if their sense of responsibility can be mobilized. Therefore, organizations should foster a sense of responsibility among their employees so that employees will feel motivated and obligated to engage in more positive behaviors. For instance, organizations can invite employees to participate in decision-making, offer them more autonomy and influence, cultivate their sense of ownership over their work to promote their sense of responsibility, and encourage them to identify and implement changes and improvements.

Limitations and Future Directions

Our research has several limitations that merit future exploration. First, the cross-sectional nature of our data collection procedures could raise concerns regarding CMV. To mitigate these concerns, we used procedural and statistical remedies (Podsakoff et al., 2003). First, in Study 2, we used random identification numbers so that supervisors' and subordinates' responses could be matched to protect participants' confidentiality. With this design, we aimed to reduce participants' apprehension regarding the evaluation and encourage them to answer questions as objectively as possible. Second, we used multi-source method to measure key variables from supervisors and subordinates, with supervisors providing assessments of their subordinates' OCB-CH. The use

of other-rater (supervisor) reports, rather than employees' self-ratings, to measure behavioral results provides a more reliable indication of narcissistic employees' actual contributions to work (Mao et al., 2020). Finally, we performed Harman's single-factor test and CFA to test the data for the absence of significant CMV at the level of the statistical results. Thus, while there is reason to believe that CMV does not confound our interpretations, the possibility must nonetheless be acknowledged.

Another limitation of this study is that cross-sectional studies may not provide clear information about causal relationships. Previous research has consistently shown that personality traits are strong predictors of contextual performance (Motowidlo and Van Scotter, 1994; Van Scotter and Motowidlo, 1996; LePine and Van Dyne, 2001). Based on TAT and logical reasoning, the current research proposed and revealed that narcissism was positively related to OCB-CH via FRCC, especially in uncertain environments. However, we are still unable to draw conclusions regarding causal relationships. In addition, both of the studies in this research were conducted under the specific conditions of the COVID-19 outbreak and its duration in China. Therefore, time is limited with regard to investigating the influence of the environmental uncertainty prompted by the COVID-19 pandemic, making a longitudinal study more difficult. We nevertheless encourage future research to complement the current study by using experiments or longitudinal field studies to better address causal inferences.

Another point worth noting is that, although the current research found a positive influence of narcissism on OCB-CH, these results are limited to several boundary conditions. First, our results are based on grandiose narcissism and may not be generalizable to other types of narcissism. For example, vulnerable narcissism, which is the pathological aspect of narcissism (Back et al., 2013), represents a defensive and insecure form of narcissism. When facing an uncertain environment, people with vulnerable narcissistic traits will likely not use self-enhancing strategies to promote change. Rather, they may demonstrate a reactive and resistant posture to obscure feelings of incompetence, anger, and anxiety (Miller et al., 2011) and are therefore unlikely to engage in OCB-CH. In a similar vein, in narcissistic rivalry, people maintain a grandiose self-image based on a defensive and avoidant motivation. They strive to prove their superiority over others and are afraid of losing status and admiration as a result of any changes (Krizan and Herlache, 2018). Therefore, people engaged in narcissistic rivalry are less likely to exhibit OCB-CH. Gebauer and colleagues have even recently divided grandiose narcissism into two sub-types: agentic narcissism and communal narcissism (Gebauer and Sedikides, 2018; Nehrlich et al., 2018; Rentzsch and Gebauer, 2018). Our research focuses on agentic narcissism, which is the traditional form of grandiose narcissism and is measured using the NPI-16. Agentic narcissists care about their agentic attributes and seek attention regarding their power, status, intelligence, and creativity (Campbell and Campbell, 2009). OCB-CH can satisfy these needs and thus is likely to be associated with agentic narcissism. However, communal narcissists pay attention to interpersonal relationships and are inclined to overstate their warmth, closeness, helpfulness, and

love (Campbell and Campbell, 2009; Gebauer et al., 2012). While these characteristics may generally enable people to demonstrate citizenship behavior toward leaders or coworkers, they seem to be irrelevant to OCB-CH, given the change-oriented and agentic nature of this type of citizenship behavior. In fact, a previous study found that, although communal narcissists believed in their own extraordinary prosociality, there was no significant relationship between communal narcissism and objective prosociality (Nehrlich et al., 2018). In sum, it would be intriguing to explore the possible bright sides of other types of narcissism using alternative measures to the NPI-16.

Further, individuals in our sample showed moderate levels of narcissism (Study 1: $M = 4.34$, $SD = 0.82$; Study 2: $M = 4.22$, $SD = 0.64$). These results are consistent with Chinese culture, in which people are expected to behave modestly, as well as with the findings of previous studies using Chinese samples (e.g., Zhang et al., 2017). It would be interesting to test our model in other cultural contexts where there is a larger proportion of individuals with high levels of narcissism. Such contexts would provide the opportunity to explore whether grandiose narcissism and OCB-CH have an inverted U-shape relationship. Such a finding would mean that the positive relationship found in this research is limited to low to moderate levels of narcissism and that, when narcissism is sufficiently high, even grandiose narcissism can negatively impact OCB-CH (Jauk and Kaufman, 2018).

The results in our research are also limited to short-term effects. The questions of whether the relationship between narcissism and OCB-CH lasts in the long run and whether it indeed leads to better performance and organizational function warrant further consideration. Organizational change is an ongoing process, but existing research suggests that narcissists prioritize immediate need satisfaction and personal benefit over long-term relationships (Campbell and Campbell, 2009). The current research supports the short-term benefits of narcissism in initiating change and improvement but cannot be used to infer long-term benefits. Indeed, previous studies suggest that narcissists can induce long-term costs due to characteristics such as decreased engagement (Robins and Beer, 2001), overconfident decision-making, aggression, and volatile performance (Campbell and Campbell, 2009). Therefore, future research should study the long-term results of narcissists' behaviors and compare the short-term benefits of narcissism with its long-term costs. For instance, multi-wave longitudinal studies are needed to investigate narcissists' psychological states, behaviors, and influence on organizations.

Another related question not answered by this study is how narcissists will react if the change they would like to initiate is not implemented or fails to work, both of which are very common scenarios in organizations. We speculate that the situation would be different for grandiose and vulnerable narcissists. We expect that grandiose narcissists, who are the focus of the current study, will react positively or aggressively following negative feedback. Previous research suggests that, within the range of normal personality variation, grandiose narcissism is indicative of adaptive psychological functioning (Jauk and Kaufman, 2018) and is positively related to openness

and negatively related to neuroticism (Weiss and Miller, 2018). Therefore, in the face of setbacks, grandiose narcissists are less likely to feel depressed or pessimistic. In fact, Nevicka et al. (2016) found that non-clinical grandiose narcissists tended to react aggressively after they received information that did not match their high self-views, displayed greater willingness to perform challenging tasks and performed better on creative tasks. For vulnerable narcissists, in contrast, setbacks may provoke more negative reactions. Vulnerable narcissism has been found to be positively related to neuroticism, greater psychological distress and negative emotions (e.g., anxiety and shame), low self-esteem and feelings of inferiority, and hostile interpersonal behaviors (Weiss and Miller, 2018). Vulnerable narcissists are thus attentive to others' feedback regarding their behaviors; non-ideal results would enhance their feelings of inadequacy and incompetence as well as their negative affect (Miller et al., 2011), which may have negative consequences in the workplace. Future research can further investigate this question.

CONCLUSION

Our study investigates whether, how, and when narcissism is related to OCB-CH, a type of unconventional and challenging citizenship behavior that is especially preferred in today's business environment. We identify a "bright side" of narcissism and find that individual narcissism interacts with the environmental uncertainty prompted by the COVID-19 pandemic to have a positive influence on OCB-CH via FRCC. The association between narcissism and OCB-CH via FRCC is stronger when environmental uncertainty is higher. These results offer a more comprehensive understanding of this "dark" trait by revealing the critical boundary condition and underlying mechanism of its positive effect. This research also extends the literature on OCB-CH and FRCC by revealing a new antecedent (i.e., narcissism).

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

YL: conceptualization, data collection, data analysis, funding acquisition, project administration, writing – original draft,

and writing – review and editing. HZ: conceptualization, data collection, funding acquisition, project administration, writing – original draft, and writing – review and editing. JL: conceptualization, writing – original draft, and writing – review and editing. XZ: conceptualization and data collection. All authors: contributed to the article and approved the submitted version.

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The Adoption of QR Code Mobile Payment Technology During COVID-19: A Social Learning Perspective

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The increasing number of quick response (QR) code mobile payment users heralds the coming of a cashless society. However, the extent to which the coronavirus disease 2019 (COVID-19) pandemic accelerated the adoption of QR code mobile payment has not been sufficiently researched. Based on social learning theory, this study models how external interaction with the environment has affected the internal appraisal and behavioral intention to adopt QR code mobile payment during COVID-19. Empirical results from 248 respondents revealed that perceived severity and social influence positively affected the perception of utilitarian and health benefits of respondents, which in turn influenced the behavioral intention to use the QR code mobile payment. The theoretical contribution and managerial implications of this study are also discussed.

Keywords: QR code mobile payment, COVID-19, social learning theory, perceived severity, social influence, utilitarian benefit, health benefit

INTRODUCTION

A growing number of consumers prefer to make payments *via* quick response (QR) codes scanned with their mobile phones over using cash or bank cards in physical stores. According to a survey published by the China Internet Network Information Center (CNNIC) in February 2021, 8.74 million new mobile payment users were added between March and December 2020 (CNNIC, 2021). A large-scale survey conducted by China UnionPay revealed that QR code payments represented 85% of all mobile payments in 2020 (CUP, 2021). The popularity of QR code payments in physical stores heralds a cashless future.

Existing literature on mobile payment heavily emphasizes payment system characteristics (e.g., mobility, security, and convenience) and user-centric factors (e.g., innovativeness and optimism) (Kim et al., 2010). However, less is known about the factors that contributed to the rapid growth in popularity of QR code mobile payment in 2020; in particular, it is unclear whether the external environmental stimulus of the COVID-19 pandemic accelerated the adoption of this payment system. For example, scholars have called for closer attention to the health benefits of using QR codes during the COVID-19 pandemic (Yan et al., 2021). Therefore, it is desirable to better understand the determinants of QR code mobile payment adoption in the context of COVID-19.

This study aims to examine the increasing use of QR code mobile payment from a social learning theory perspective by considering the impacts of both external environment interaction

and internal psychological appraisal. Specifically, this study addresses the following questions: (1) How does internal psychological appraisal (e.g., utilitarian benefit and health benefit) affect the adoption of QR code mobile payment? (2) What are the effects of the perceived severity of the COVID-19 pandemic on the internal psychological appraisal of QR code mobile payment of consumers? Did the pandemic further motivate the adoption of this form of payment?

This study makes three significant contributions. First, while previous studies have focused mainly on utilitarian factors (de Kerviler et al., 2016; Park et al., 2019; Yan et al., 2021), this study adds new knowledge to the literature on QR code mobile payment by emphasizing the appraisal of health benefits in the adoption process. Second, unlike prior research that has considered mobile payment merely as a transaction tool in the common consumption context (Teo et al., 2015), this study enriches the literature on mobile payment by investigating the adoption of QR code mobile payment of consumers in response to the threat of COVID-19. Finally, this study examines the interaction between the external environment and the internal psychological appraisal of consumers to investigate the process of adoption of QR code mobile payment by applying and validating social learning theory in the mobile payment context. Overall, this study not only provides a theoretical assessment of the adoption of QR code mobile payment during the COVID-19 pandemic but also has managerial implications for companies wishing to expand QR code mobile payment to respond to disease outbreaks.

In the remainder of this study, we first reviewed prior literature on mobile payment adoption. Then, we applied social learning theory to mobile payment adoption behaviors. Then, we elaborated on how people carry out the external interaction and internal psychological processes that drive them to use mobile payment. Finally, we presented a questionnaire-based survey and a partial least squares structural equation modeling (PLS-SEM) method to empirically confirm our prediction of QR code mobile payment usage.

THEORETICAL BACKGROUND

Mobile Payment

Mobile payment is defined as the use of a mobile device to complete an economic transaction (Liébana-Cabanillas et al., 2014). Mobile payment enables the purchase of either digital goods (e.g., music and games) or physical goods (e.g., books and consumer electronics) (Kim et al., 2010). It is considered a potential “killer” of cash, bank cards, and even Internet payments because it can be used to perform transactions in both a remote online store and a physical store (Ondrus et al., 2009).

Scholars have identified four points of convenience for consumers who use mobile payment (Boden et al., 2020). First, mobile payment eliminates spatial constraints on payment, enabling consumers to purchase products from a remote online shop (Slade et al., 2015). Second, mobile payment allows consumers to pay for their goods without the constraints of requiring a physical wallet (Mallat, 2007), cash, or credit

card (Pham and Ho, 2015). Third, mobile payment has some advantages in terms of economic transaction performance characteristics (e.g., speed) compared with traditional payment tools (Teo et al., 2015). Fourth, mobile payment protects consumers from counterfeit money (Teo et al., 2015).

There are three main types of mobile payment tools as follows: short message service (SMS), near-field communication (NFC), and QR codes. SMS mobile payments are remote systems that require a communication protocol enabling the exchange of short text messages between two mobile devices (Valcourt et al., 2005). Both NFC and QR codes are proximity systems. NFC payment is based on radio frequency channel communication connecting payment devices and vending terminals without depending on mobile networks (Coskun et al., 2013). Although NFC payments are used in many scenarios, such as public transportation, their popularity is limited by the lack of devices due to the relatively high cost of NFC modules. The China UnionPay survey reported that the usage rate of NFC mobile payments was only 8% of all mobile payments in 2020 (CUP, 2021).

A QR code is a storage system employing a dot matrix or two-dimensional bar code that can be printed on study or shown on a screen to provide information and is recognized by special devices. As a payment solution, the QR code enjoys both low cost and high popularity among customers and businesses. In fact, QR code mobile payment has the potential to replace cash and credit cards in the physical store. For example, consumers can use the camera of their mobile phone to scan the QR code of the supermarket at the checkout to pay for goods. Alternatively, consumers can show a QR code on the screen of their mobile phone to a store employee, who can then scan the code using a scanner or their own mobile phone. The QR code is linked to the credit or debit card of the client. If the client does not have sufficient funds to make the QR code payment, the store will submit the payment claim later. The most popular use of QR code payments in China is through third-party payment platforms such as Alipay and WeChat Pay, rather than *via* mobile client apps provided by banks.

Determinants of Mobile Payment Adoption

The extant literature on mobile payment focuses primarily on its utilitarian function from the perspective of technological system adoption. For instance, based on the technology acceptance model (TAM) theory, Kim et al. (2010) created a framework that includes the user-specific characteristics (personal innovativeness and mobile payment knowledge) and mobile payment system characteristics (mobility, reachability, compatibility, and convenience) to test the perceived ease of use on the intention to use mobile payment. Similarly, Yan et al. (2021) demonstrated the impact of transaction factors, perceived usefulness, and personal factors on the adoption of QR code mobile payment.

Applying an extended Unified Theory of Acceptance and Use of Technology (UTAUT) model, Slade et al. (2015) explored the antecedents (such as performance expectancy, social influence, innovativeness, and perceived risk) that significantly influenced

behavioral intentions of non-users to use mobile payment in the United Kingdom. Similarly, Oliveira et al. (2016) revealed that compatibility, perceived technology security, performance expectations, innovativeness, and social influence directly and indirectly affected the adoption of mobile payment in Portugal.

de Kerviler et al. (2016) explored the benefits (utility, hedonic, and social) and risks (financial and privacy-related) of in-store mobile payment. Teo et al. (2015) discovered that effort expectancy (EE) and facilitating conditions (FC) positively affected behavioral intention to use mobile payment. Park et al. (2019) investigated multiple benefits (convenience, economy, enjoyment, and experiential) that positively influenced attitudes and adoption toward mobile payment among consumers in the United States.

COVID-19 and Quick Response Code Mobile Payment

The year 2020 witnessed the accelerated popularization of QR codes in response to the COVID-19 pandemic. Health QR codes in China are officially authorized electronic certificates of personal health status; they have been used for contact tracing, exposure risk self-triage, self-updating of health status, healthcare appointments, and contact-free psychiatric consultations to curb the spread of COVID-19 (Nakamoto et al., 2020). When entering public places (e.g., public transportation systems, malls, offices, institutions, and schools), individuals are required to present their health QR code. Health QR codes have played an important role in the containment of COVID-19.

In addition, the ubiquity of health QR codes has spawned the spontaneous use of QR codes for mobile payment due to the demand for socially distanced, contact-free shopping. To register for mobile payment using QR codes, individuals must connect their ID card and bank card to a third-party app (e.g., WeChat and Alipay) and complete an application. Previously, many potential users hesitated to apply for QR code mobile payment due to privacy concerns, financial security considerations, and the process being cumbersome. Consequently, it is worthwhile to discuss how and why many people have changed their minds and adopted QR code mobile payment during COVID-19.

Using QR codes to pay for purchases is not common everywhere. Although mobile payments are more convenient than traditional methods such as cash or bank cards, the adoption rate of QR code mobile payment is still very low in many countries; in Malaysia, for example, only 10% of all mobile payments are made using a QR code (Yan et al., 2021). Although cashless transactions may be the way of the future, the adoption growth rate of mobile payment *via* QR codes is still lower than expected. While transaction convenience and transaction speed have been found to be important utility antecedents for QR code mobile payment usage (Yan et al., 2021), personal factors (e.g., optimism and innovativeness) should not be ignored.

Social Learning Theory

Social learning theory provides a structured approach to understand how individuals learn information or behaviors by observing the environment and imitating others (Bandura, 1978).

Social learning theory posits a two-interaction model to explain the phenomenon of social learning. Learners experience both external interactions with their social, cultural, and material environment and an internal psychological process with mental elaboration (Illeris, 2003). Emphasizing social participation, social communication, and social cooperation, the external interaction process generates benefits that stem from society. The internal psychological process includes the cognitive appraisal, which represents the understanding and ability to construct the meaning of learners. Based on beliefs and knowledge, cognitive appraisals are evaluations of the utility of specific actions to support the decision of whether to imitate those actions (Heijden, 2004; Lee et al., 2012).

Previous studies have shown that social learning theory can be applied to various economic and social behaviors. People are used to learning from others, especially those with whom they are familiar. In the social-commercial scenario, consumers acquire knowledge from their interaction with online communities, reviews, and recommendations (Huang and Benyoucef, 2013). Based on external interaction and the internal psychological process, consumers acquire enough knowledge and experience to support their purchase decisions (Chen et al., 2017b). Consumers also collect information through social media to assist with the cognitive appraisal before making a purchase (Hajli, 2012).

In fact, external stimuli from the environment play an important role in the adoption of QR code mobile payment. For instance, the COVID-19 pandemic has changed the purchase behaviors of consumers, such as by forcing them to maintain a safe distance from others in physical stores, minimizing direct physical contact with products or people, and using contactless payment methods rather than cash or credit cards. Since 2020, Chinese consumers have increasingly adopted QR code payment methods in order to satisfy the need for social distancing in public places. Both the health QR code and payment QR code are based on two social media apps (WeChat Pay and Alipay); therefore, it is convenient for new users to transfer their experience of the health QR code to the payment QR code. Moreover, the influence of other people is the strongest predictor of mobile payment adoption (Slade et al., 2015). Specifically, the positive opinions of family members, relatives, friends, and superiors can encourage individuals to adopt mobile payment (Oliveira et al., 2016). Thus, social learning theory is appropriate to explain the adoption of QR code mobile payment.

Perceived Benefit

Perceived benefit is defined as the degree to which consumers believe they will benefit from adopting technology systems (Ng et al., 2009). Perceived benefit is affected by external variables; for example, social influence has been shown to be positively related to mobile payment benefits (Slade et al., 2015). Utilitarian benefit refers to the functional value resulting from using a system (Venkatesh and Brown, 2001). The utilitarian benefit of mobile payment has attracted extensive attention. For instance, de Kerviler et al. (2016) identified convenience as the main benefit of in-store mobile payment, while Yan et al. (2021) claimed that transaction speed and convenience were the main benefits offered by mobile payment.

According to the health belief model, the perceived health benefit is defined as the perceived effectiveness of protective actions in reducing health risks (Janz and Becker, 1984). The perceived health benefit is widely used to evaluate food consumption, medication regimens, and computer security behavior (Ng et al., 2009). When hearing or reading about the pandemic on the news and observing actions of others in relation to mobile payment, positive appraisal of individuals (such as perceived health benefit) on mobile payment may be enhanced.

HYPOTHESIS DEVELOPMENT

According to social learning theory, two processes combine to form social learning: external interaction and an internal psychological process (Illeris, 2003). In the context of QR code mobile payment, the learning behavior of consumers in the interaction with other people is the external interaction process. Specifically, perceived severity and social influence were the stimuli from the external environment during the COVID-19 pandemic. Furthermore, the perception of utilitarian and health benefits to be gained from QR code mobile payment represents the internal psychological process. The research model of this study, based on social learning theory, is shown in **Figure 1**.

According to the literature on social learning, various information technology adoption behaviors derive from learning from others. Consumers can observe and replicate the behaviors of other people. For instance, empirical evidence shows that learning from social commerce components (e.g., forums, communities, ratings, reviews, and recommendations) generates positive attitudes (Chen et al., 2017a,b) and diminishes demand uncertainty (Chen et al., 2017a) toward a social commerce website. Similarly, social learning theory can be employed to understand the diffusion process of an enterprise application in an organization (Lorenzo et al., 2012).

Human beings adapt their behavior to respond to threats from the external environment. Perceived severity is defined as the perceived seriousness of a potential health problem (Ng et al., 2009). People were able to learn about the severity of COVID-19 through interaction with the surrounding

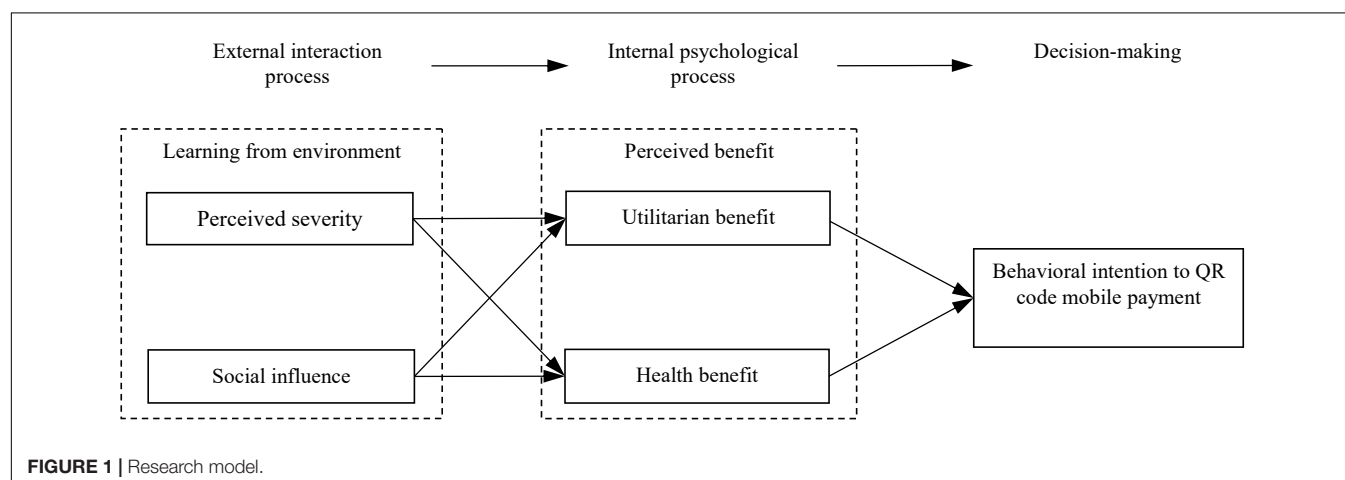
environment, including the media, other people, and the health QR code issued by the Chinese government (Nakamoto et al., 2020). Based on protection motivation theory (PMT), individuals evaluate the benefits of protective behavior based on their ability to judge severity (Bockarjova and Steg, 2014). Accordingly, during the COVID-19 pandemic, people attempted to regulate their consumption behavior in order to avoid infection. For example, people who perceived the severity of the COVID-19 pandemic to be high undertook more extensive behavioral changes (Fragkaki et al., 2021). In particular, the perceived severity of the COVID-19 pandemic positively relates to attitudes and behaviors geared toward protection (Prasetyo et al., 2020). In addition, mobile payment is a useful tool with both utilitarian and health benefits; it was also officially recommended by WHO (2020) during the COVID-19 pandemic. Therefore, we inferred that the perceived severity of COVID-19 may have stimulated a positive appraisal of the utilitarian and health benefits of QR code mobile payment.

Based on the above considerations, we posited the following hypotheses:

H1. The perceived severity of COVID-19 positively affected the perceived utilitarian benefit of QR code mobile payment.

H2. The perceived severity of COVID-19 positively affected the perceived health benefit of QR code mobile payment.

Social influence from others affects health-related behaviors. For instance, social influence factors have been proven to be predictors of the acceptance of healthcare information technology in hospitals (Lu et al., 2020). Social support was found to be a key trigger of value co-creation behavior in online health communities (Liu et al., 2020). Thus, in the context of COVID-19, opinions from important others (e.g., family, friends, and superiors at work) can be powerful motivators to accept contactless methods of payment. In fact, according to the theory of social influence, support from important others may encourage adoption of a particular technology by consumers (Venkatesh et al., 2012). Learning from



usage and/or recommendations of others, consumers acquire enough information to understand the utility or risk of a new technology. For example, Slade et al. (2015) determined that social influence was the strongest predictor of behavioral intention toward mobile payment in the United Kingdom. An online survey from Amazon's Mechanical Turk (MTurk) also showed that social influence positively affected the perceived benefits (e.g., convenience, economic, informational, enjoyment, experiential, and social benefits) of mobile payment of consumers (Park et al., 2019).

In view of the health risk posed by COVID-19, the utility of mobile payment is not limited to efficiency and transaction speed; it also offers improved safety by reducing physical contact and increasing social distancing, which, in turn, help to contain the spread of COVID-19 (Yan et al., 2021). Thus, in the internal psychological process of social learning, we suggested the inclusion of health benefits in addition to utilitarian benefits. Based on the above literature and discussion, we hypothesized that social influence positively affected the internal psychological process in favor of the adoption of QR code mobile payment during the COVID-19 pandemic:

H3. Social influence positively affected the perceived utilitarian benefit of QR code mobile payment during the COVID-19 pandemic.

H4. Social influence positively affected the perceived health benefit of QR code mobile payment during the COVID-19 pandemic.

Published studies have explained how technology adoption results from perceived benefit. For example, utilitarian benefits (e.g., convenience and transaction speed) have been shown to be the main considerations when adopting mobile payment (de Kerviler et al., 2016). In addition, the perceived health benefit refers to the perceived effectiveness of specific behaviors in decreasing health risks (Janz and Becker, 1984). The perceived health benefit is an important factor in assessing specific behaviors such as food consumption, medication regimens, and computer security behavior (Ng et al., 2009). Based on the evidence outlined above, we inferred that both utilitarian and health perceived benefits may have

TABLE 1 | Measurement items.

Construct	Measurement items	Sources
Perceived severity (PS)	PS1: COVID-19 has become a serious threat for humankind.	Shafiei and Maleksaeidi (2020)
	PS2: The negative impacts of COVID-19 are severe.	
	PS3: The news on COVID-19 scares me.	
Social influence (SI)	SI1: People who are important to me think that I should use mobile payment.	Slade et al. (2015)
	SI2: People who influence my behavior think that I should use mobile payment.	
	SI3: People whose opinions I value prefer that I use mobile payment.	
Utilitarian benefit (UB)	UB1: Using QR code mobile payment can make my life easier.	Chin et al. (2003)
	UB2: QR code mobile payment is useful.	
	UB3: I can benefit from using QR code mobile payment.	
Perceived benefit (PB)	PB1: Using mobile payment will protect my health from COVID-19.	Hojjati et al. (2015)
	PB2: Using mobile payment will help me avoid becoming infected with COVID-19.	
	PB3: Using mobile payment decreases my risk of getting infected with COVID-19.	
Behavioral intention (BI)	BI1: I intend to increase my use of QR code mobile payment in the future.	Yan et al. (2021)
	BI2: I intend to use QR code mobile payment when the opportunity arises.	
	BI3: I would like to use QR code mobile payment for purchasing instead of traditional payment methods.	

TABLE 2 | Demographic information of respondents ($n = 248$).

Characteristics		Frequency	Percentage
Gender	Male	147	59.3
	Female	101	40.7
Age (years)	<21	19	7.66
	21–30	162	65.32
	31–40	62	25
	41–50	4	1.61
	>50	1	0.4
Education	Middle school	4	1.6
	High school	9	3.6
	Bachelor's degree	199	80.2
	Master's degree	31	12.5
Occupation	Ph.D.	5	2
	Government	3	1.2
	Public institution	50	20.2
	Corporate	141	56.9
Personal income per month	Student	42	16.9
	Freelancer or self-employed	12	4.8
	≤ CNY 1000	10	4.03
	CNY 1001–5000	75	30.24
Length of SNS usage per day	CNY 5001–9000	113	45.56
	≥ CNY 9001	50	20.16
	<1 h	6	2.42
	1–3 h	123	49.6
Frequency of QR code mobile payment usage per month in 2020	4–6 h	91	36.69
	>6 h	28	11.29
	1–20 times	71	28.7
	21–40 times	82	33.0
	>41 times	95	38.3

TABLE 3 | Common method factor analysis.

Construct	Indicator	Substantive factor loading (R_a)	Sig.	R_a^2	Method factor loading (R_b)	Sig.	R_b^2
Perceived severity (PS)	PS1	0.826	***	0.854	0.059	NS	0.003
	PS2	0.841	***	0.864	−0.006	NS	0.000
	PS3	0.777	***	0.822	−0.066	NS	0.004
Social influence (SI)	SI1	0.835	***	0.860	0.052	NS	0.003
	SI2	0.904	***	0.913	−0.042	NS	0.002
	SI3	0.861	***	0.879	−0.011	NS	0.000
Utilitarian benefit (UB)	UB1	0.8	***	0.837	0.038	NS	0.001
	UB2	0.799	***	0.836	−0.043	NS	0.002
	UB3	0.788	***	0.829	−0.001	NS	0.000
Health benefit (HB)	HB1	0.852	***	0.872	0.015	NS	0.000
	HB2	0.903	***	0.912	−0.086	NS	0.007
	HB3	0.798	***	0.835	0.068	NS	0.005
Behavioral intention (BI)	BI1	0.665	***	0.762	0.153	*	0.023
	BI2	0.83	***	0.857	−0.001	NS	0.000
	BI3	0.884	***	0.897	−0.163	*	0.027
Average		0.824		0.855	−0.002		0.005

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, NS $p > 0.05$.

TABLE 4 | Results of convergent validity tests.

Construct	Item	Loading	Cronbach's alpha	Composite reliability (CR)	Average variance extracted (AVE)	rho_A
Perceived severity (PS)	PS1	0.884	0.745	0.853	0.661	0.788
	PS2	0.844				
	PS3	0.701				
Social influence (SI)	SI1	0.881	0.835	0.901	0.751	0.839
	SI2	0.868				
	SI3	0.851				
Utilitarian benefit (UB)	UB1	0.827	0.708	0.837	0.632	0.712
	UB2	0.757				
	UB3	0.799				
Health benefit (HB)	HB1	0.864	0.809	0.887	0.724	0.811
	HB2	0.834				
	HB3	0.854				
Behavioral intention (BI)	BI1	0.803	0.7	0.833	0.625	0.709
	BI2	0.83				
	BI3	0.736				

TABLE 5 | Discriminant validity (Fornell and Larcker criterion).

	PS	SI	UB	HB	BI
PS	0.813				
SI	0.263	0.867			
UB	0.426	0.394	0.795		
HB	0.24	0.431	0.378	0.851	
BI	0.347	0.398	0.543	0.544	0.791

The diagonal elements in bold and italics are the average variance extracted (AVE) square roots of the constructs, while the off-diagonal elements are the inter-construct correlations.

influenced the adoption of QR code mobile payment during the COVID-19 pandemic. Therefore, we posited the following hypotheses:

H5. The perceived utilitarian benefit positively affected the intention to adopt QR code mobile payment during the COVID-19 pandemic.

H6. The perceived health benefit positively affected the intention to adopt mobile payment during the COVID-19 pandemic.

RESEARCH METHODOLOGY

Measurement

This study uses a survey questionnaire to collect data. The questionnaire items measuring each construct were adapted from extant influential literature to suit the context of mobile payment. We adopted “social influence” from Slade et al. (2015)

TABLE 6 | Outcome of the structural model.

Path	β	Significance	Result	Effect size (f^2)	R^2	Predictive relevance (Q^2)
PS→UB	0.346	***	H1 supported	0.152	0.267	0.155
SI→UB	0.303	***	H3 supported	0.117		
PS→HB	0.136	*	H2 supported	0.022	0.203	0.136
SI→HB	0.395	***	H4 supported	0.182		
UB→BI	0.394	***	H5 supported	0.232	0.428	0.251
HB→BI	0.395	***	H6 supported	0.234		

*** $p < 0.001$, * $p < 0.05$.

to measure the impact of important others on the usage of QR code mobile payment. We further adopted “perceived severity” from Shafiei and Maleksaeidi (2020) to measure learning about the pandemic, “utilitarian benefit” from Chin et al. (2003) to measure the functionality of mobile payment in a transaction, “health benefit” from Hojjati et al. (2015) to measure health belief with respect to mobile payment, and “behavioral intention” from Yan et al. (2021) to measure attitude to mobile payment. Respondents were asked to rate the extent of their agreement on a seven-point scale (1 = strongly disagree, 7 = strongly agree) for the three items in each of these sections of the questionnaire, which comprised a total of 15 items. The measurement items and their sources in the literature are summarized in **Table 1**.

Sample and Data Collection

We administered the survey online through professional research and modeling integrated data platform called Credamo¹ from March 17 to April 16, 2021. As shown in **Table 2**, the sample comprised more male (59.3%) than female (40.7%) respondents. Most respondents (65.32%) were between 21 and 30 years old. In terms of educational level, most respondents had a bachelor's degree as their highest educational attainment (80.2%). In terms of occupation, more than half of the respondents were employed by corporations (56.9%). Furthermore, nearly half of the respondents (45.56%) earned a monthly income in the range of CNY 5,001–9,000, and nearly half (49.6%) spent 1–3 h/day on social networking services (SNS) such as WeChat. Finally, most respondents (71.3%) made QR code mobile payments more than 21 times per month during 2020.

STATISTICAL ANALYSIS

We employed the PLS-SEM method *via* SmartPLS 3.2.8 to test the proposed research model. PLS-SEM is a suitable method with high prediction accuracy in complex research models.

Common Method Bias

Collecting multiple variable data from the same respondents *via* a questionnaire may incur common method bias (CMB). We adopted two methods to check the extent of CMB. First, we

employed Harman's single factor test to evaluate CMB. Through the assessment of unrotated exploratory factor analysis, the largest factor explained 35.146% of the total variance without any single factor explaining most of the covariance of the variables. Therefore, we concluded that our statistical results were unlikely to have been affected by CMB. Second, we used a common method factor analysis to check the severity of CMB (Liang et al., 2007). Results tabulated in **Table 3** show that all substantive factor loadings (R_a) were statistically significant at $p < 0.001$, with an average of 0.824. However, 13 of the 15 method factor loadings (R_b) were not significant, with an average of -0.002 . Therefore, CMB did not significantly affect the proposed model in this research.

Measurement Model Evaluation

We evaluated the convergent validity and discriminant validity of the measurement model. In regard to the convergent validity, we checked Cronbach's alpha, composite reliability (CR), the factor loading of indicators, and the average variance extracted (AVE). The results, shown in **Table 4**, reveal that factor loading of most indicators was above 0.7, Cronbach's alpha values of all constructs were above the threshold of 0.7, CR of all constructs was more than 0.8, and AVE of all constructs was more than 0.5. These results imply that all constructs in the research model have good convergent validity (Hair et al., 2014). We further tested the discriminant validity (Hair et al., 2017) by comparing the AVE square root of each construct with its correlation coefficients. The results, shown in **Table 5**, reveal that the AVE square roots of all constructs are higher than their correlations, indicating that the constructs of the research model have sufficient discriminant validity.

Structural Model Evaluation

We employed a bootstrapping test with 5,000 resamples to estimate each hypothesis and its significance. The results indicate the support for all six hypotheses (**Table 6**). PS ($\beta = 0.346$, $p < 0.001$) and SI ($\beta = 0.303$, $p < 0.001$) were significantly related with UB; PS ($\beta = 0.136$, $p < 0.05$) and SI ($\beta = 0.395$, $p < 0.001$) were significantly related with HB. Furthermore, UB ($\beta = 0.394$, $p < 0.001$) and HB ($\beta = 0.395$, $p < 0.001$) were significantly associated with BI to adopt QR code mobile payment. In the research model, 42.8% of the variance in BI was explained by other variables, and this variance was found to be substantial.

¹ www.credamo.com

Additionally, results in **Table 6** show that our research model can explain 26.7% of the variance in utilitarian benefit (UB, $R^2 = 0.267$) of, 20.3% of the variance in health benefit (HB, $R^2 = 0.203$) of, and 42.8% of the variance in behavioral intention (BI, $R^2 = 0.428$) to adopt QR code mobile payment. Moreover, **Table 6** shows that all the effect size values (f^2) range between 0.02 and 0.35, and that all the predictive relevance values (Q^2) are above zero, confirming the high predictive relevancy of the research model.

DISCUSSION

This study examines the QR code mobile payment adoption process in China during the COVID-19 pandemic, from the perspective of social learning theory. QR code mobile payment provides consumers with higher transaction efficiency and a contactless in-store experience, which decreases the risk of infection. This study investigates how external interaction and the internal psychological process affect decision-making about QR code mobile payment usage. The empirical results reveal that perceived severity and social influence are positively related to utilitarian and health benefits, supporting hypotheses H1–H4. Utilitarian and health benefits are shown to be positively associated with behavioral intention to adopt QR code mobile payment, supporting hypotheses H5 and H6.

Theoretical Contribution

This study contributes to the current literature in several ways. First, we proposed a theoretical model to explore the intention of customers to use QR code mobile payment during the COVID-19 pandemic, augmenting the understanding of mobile payment adoption behavior in physical stores during the pandemic. Besides posing a major threat to human safety, the pandemic has affected everyday consumption behaviors. Although consumers have become increasingly apprehensive about interpersonal contact in physical stores, research on the methods they use to protect themselves in shopping areas is lacking. This study sheds light on how learning from the external environment affects the usage of QR code mobile payment of consumers. The research model provides novel insights about the external interaction and psychological processes involved in the adoption of mobile payment, thus offering a new avenue for future research on consumer behavior.

Second, this study broadens our understanding of the benefit appraisal process with regard to mobile payment usage. Although prior research has focused on utilitarian benefits such as transaction speed and convenience (Yan et al., 2021), the proposed model in this study suggests that the perceived health benefit may also enhance the behavioral intention to use QR code mobile payment. This discovery adds to the literature on the benefit appraisal process and encourages further research examining the importance of the health utility provided by contactless payment tools. These findings also respond to calls from past studies (Yan et al., 2021).

Third, the research model has important implications for social learning theory. Previous research has applied this theory in the areas of enterprise application (Lorenzo et al., 2012), social commerce (Chen et al., 2017a,b), and virtual community (Chou, 2020). This study augments the literature on social learning theory by exploring the external interaction and internal psychological process associated with adopting QR code mobile payment during the COVID-19 pandemic.

Managerial Implications

The findings in this study have several managerial implications for the extension of QR code mobile payment. They shed light on the adoption of QR code mobile payment of consumers under the influence of external interactions during the COVID-19 pandemic. The external impact of perceived severity and social influence triggers the internal psychological process of appraising QR code mobile payment, which implies that the threat of environmental risks such as COVID-19 can be important antecedents to the uptake of mobile payment. First, our findings suggest that companies can encourage the use of QR code mobile payment by reminding consumers of the pandemic. For instance, physical stores could telecast news about COVID-19 worldwide to stimulate the appraisal of, and intention to adopt, mobile payment of consumers. Second, this study suggests that companies could include the health benefit of reducing interpersonal contact as an advantage when promoting QR code mobile payment. For instance, companies or stores could persuade consumers to use mobile payment by labeling it a “smart choice for your health.”

Limitations and Future Study

Although rigorous theoretical and methodological procedures were applied in our research model, this study is not without limitations. First, the model only concentrates on the utilitarian and health benefits in the internal appraisal process, without considering other factors such as self-efficacy, innovativeness, and trust. Such factors may provide more detailed insights into the usage of QR code mobile payment. Second, the sample size of this study constrains the generalizability of the research results. Thus, in future studies, large-scale, cross-national surveys could be conducted to confirm the findings of this study. Third, this study only investigates the behavioral intention to use QR code mobile payment on the part of consumers, without considering the attitudes of shopkeepers. Therefore, we recommend that future studies also explore the factors affecting usage intention from the perspective of the retailer.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of Huazhong Agricultural University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

MT: conceptualization, methodology, and writing—original draft preparation, and review and editing. LW and HW: writing—review and editing and funding acquisition. ZD and

ZG: data collection and editing. JC: data collecting, data analysis, revising, and final approval.

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Psychological Variables Explaining the Students' Self-Perceived Well-Being in University, During the Pandemic

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Introduction: In the coronavirus disease 2019 (COVID-19) pandemic, Romanian universities switched to emergency relocation and online education, with students experiencing a sense of isolation, which affected their well-being, pace and normal learning style, relationships with other colleagues, and Professors. Beyond the technological obstacles that have arisen in learning, the aim of this study is to highlight the psychological variables that are associated and that explain the self-perceived well-being of students, in university, in the pandemic. The psychological variables studied were the following: the level of openness and personal autonomy, as personality traits of students but also the mechanisms for regulating their academic motivation.

Method: We used a questionnaire-based survey, wherein all four research instruments had been validated and adapted to the investigated population. The subjects were BA and MA students at the University of Oradea, Romania ($N = 150$), the majority being females (95.5%) with the age range of 27 years old. Pearson Correlation and Multiple Linear Regression were used to test the two hypotheses.

Results: Research data obtained in the correlation analysis, point out association relationships with moderate and high effects size, between positive attitude toward self, others and student life and: openness to learning, openness to aesthetics, behavioral autonomy, cognitive autonomy, intrinsic motivation, and identification motivation. Furthermore, in regression analysis, it was revealed that regarding the variance of results concerning students' self-perceived well-being in university (positive attitude toward oneself, others, and student life), it contributes both of students' personality traits (such as openness and personal autonomy) and their intrinsic motivation and identification motivation.

Conclusion: The fundamental conclusion of the research is that, although the personality traits of students explain in a higher percentage the variability of results in students' self-perceived well-being (in terms of positive attitude toward self, others, and student life), motivation regulation mechanisms play an important role, especially in the

conditions of online activities. The results have direct implications for the work carried out in universities. The educational policies developed by specialists and government will have to emphasize the ways of forming resilient student communities in periods of sudden transition and adaptation to change which take place in education and society.

Keywords: well-being, openness, personal autonomy, academic motivation, student

INTRODUCTION

The key constructs addressed in this article, i.e., well-being, motivation, and personality, are at the heart of the concerns of researchers in various branches of psychology. In fact, due to the changes that took place in all sectors of activity, in the coronavirus disease 2019 (COVID-19) pandemic, the researchers emphasized the importance of identifying protective and risk factors, in relation to the balanced development of people and well-being (Robu and Tufeanu, 2020). Globally, the COVID-19 pandemic has represented not only a major medical and economic crisis but also a psychological one, being associated with declining levels of subjective well-being (SWB) (Akbas et al., 2021; Rodideal and Marinescu, 2021; Zacher and Rudolph, 2021).

The factors that influence the dynamics of well-being were studied by Lyubomirsky et al. (2005), who show that 50% of the variance of well-being is due to genetic factors, 10%, to circumstantial factors (micro and macro social), and the remaining 40%, to the variance of the well-being of the intentional activities. However, in the context of the pandemic, the percentages could be reconsidered and reanalyzed, either by certain categories of participants (for example, by groups of students) or in certain specific situations, such as the transition to online education. This is because the rapid and widespread transition to online education during the COVID-19 pandemic disrupted intercollegiate relationships and student learning routines, led to less familiar instructional methods, and created technological barriers to online student learning (Huang and Zhang, 2021). They do not have access to all tools and learning materials in the virtual environment or students simply did not participate in online courses (Yusuf and Jihan, 2020). Additionally, is the fact that in online learning, pupils and students face difficulties in memorizing and concentrating (Aftab et al., 2021). In addition to the difficulties of accessing and using technology to adapt students to online education, research has also shown that its sudden implementation has had serious consequences for students' SWB (Hung et al., 2020; Lyons et al., 2020). It is known that social isolation, during the COVID-19 pandemic, has a negative effect on their well-being due to the increased emotional lability that people face in emergencies (Ivantchev and Stoyanova, 2021). Worryingly, pandemics have seen an increase in mental disorders (e.g., anxiety, depression, loneliness) among pandemics (e.g., Besser et al., 2020; Cao et al., 2020; Azzi et al., 2021; Islam et al., 2021; Liu et al., 2021).

Although researchers' interest in people's well-being increased significantly during the pandemic, less attention was paid to the study of internal psychological variables that explain the well-being of university students. Such studies are needed because researchers also point out that student well-being and learning may continue to be influenced by future uncertainties and

modified pandemic and post-pandemic teaching or training programs (Aftab et al., 2021).

In the elaboration of this study, two of the research directions followed in the field were considered, directions related to the psychological variables that can contribute to the well-being of people, in general, and of students, in particular. The first of these considers the conclusions reached by researchers regarding the association between SWB and personality variables. For example, Muntele Hendreş (2021) highlighted that an important moderating factor in people's happiness is their personality. The author points out that although people tend to react emotionally similar to identical events, the intensity and duration of their reactions are influenced by personality. Other research studies have highlighted the fact that individual personality differences play a key role in the relationship of association with the psychological well-being perceived by the population during the pandemic (Rossi et al., 2021; Simuţ et al., 2021). The second direction of our research was initiated by Deci and Ryan (1985, 2000). In the theory of self-determination, they say that the levels of motivation can be explained by a continuum of the levels of self-determination. On this continuum, three levels of motivation can be differentiated, namely: motivation, extrinsic motivation, and intrinsic motivation. Of these, intrinsic motivation is considered to contribute most to a person's development and well-being. The explanation lies in the fact that people nurture, from an early age, the desire to be stimulated cognitively, socially, and emotionally, to learn and to use their potential (Deci and Ryan, 1985, 2000). However, recent studies have shown that maintaining intrinsic motivation in difficult times, including pandemics, can be difficult to achieve (Whitfield et al., 2021). Therefore, we consider it necessary to identify those mechanisms for self-regulation of students' academic motivation, which correlate and explain the variance of their well-being in university, in a pandemic.

More detailed references on the key concepts studied, on the results of research related to the topic of our study, and the gap in the literature on internal psychological variables that influence the well-being of students in a pandemic will be highlighted in the next section.

LITERATURE REVIEW

The State of Well-Being and the Variables Related to Personality Well-Being – In and Beyond the Conceptual Framework

The delimitation of the conceptual framework for well-being was presented by Ryan and Deci (2001) through the prism of two

perspectives: hedonic and eudaimonic. The hedonic perspective on well-being pursues the level of happiness of a person, and the eudaimonic one pursues the optimal functioning level of the individual (Ryan and Deci, 2001). The most well-known approach to the study of well-being, from a hedonic perspective, is that of SWB. Several authors (Diener et al., 1985, 2009; Lyubomirsky et al., 2005) believe that people experience a high level of SWB when they feel more pleasant emotions and less unpleasant, and when they are satisfied with their own life. Thus, SWB requires both, an affective and a cognitive component, one of evaluating one's own life.

From a eudaimonic perspective, well-being is understood as *psychological well-being* (PWB). Ryff (1989) shows a multidimensional approach to it, an approach that includes: autonomy, personal growth, self-acceptance, purpose in life, mastery, and positive relationships. In just a few words, in the eudaimonic sense, PWB can be characterized by the effort to achieve intrinsic goals and values, autonomous behavior, and the state of being and acting consciously in accordance with what is happening at a certain moment.

Understood as a multidimensional construct, Robinson et al. (1991) and later Adams et al. (1997) studied well-being starting from the evaluation of six specific areas of human functioning: (1) physics, (2) spiritual, (3) psychological, (4) social, (5) emotional, and (6) intellectual. Following the line of these works of research, in Romania, G. Roşeanu, and R. Răşcanu adapted and validated the instrument that measures the well-being of students in 2008. They ask that the answers to the items related to the six specific areas should be taken into consideration when evaluating well-being, and the presentation of the results be highlighted on three subscales: (1) positive attitude toward self, world, and life; (2) negative attitude toward self, world, and life; (3) state of physical health. Thus, in our research, the concept of the well-being of students refers rather to positive emotions and attitudes versus negative ones, to physical health, i.e., to SWB, and not to clinically diagnosed mental health disorders.

But in recent decades, the interest in studying the subjective and psychological state of well-being has extended from definition and measurement to the identification of demographic and psychological variables with which it correlates. The results reached by Romanian researchers illustrate that, overall, young Romanians consider themselves happy (Bernath Vincze, 2016). However, it was found that the levels of subjective happiness and satisfaction in life in adolescents in Romania were lower compared to European averages (Vincze et al., 2015). The authors state that these inequalities are mainly due to the lower socio-economic situation, the lack of adequate social cohesion, and the presence of risk factors in adolescents in Romania. Predictors of life satisfaction in young adults were the following: self-esteem, optimism, and illusory optimism about the future (Vincze and Szamoskozi, 2015).

Research studies point out that one of the most important factors that well-being is associated with is related to personality traits (Nishimura and Suzuki, 2016; Muntele Hendreş, 2021), in which personality traits being the most consistent predictors of SWB (Diener et al., 2003). Following the line of research on personality traits that may influence well-being, our study aims

to highlight the role of openness and personal autonomy in the well-being of students in a pandemic.

Openness and Well-Being

Much discussed over the years, openness is the fifth personality factor in the Big Five model (along with extraversion, kindness, conscientiousness, emotional stability). Albu (2017) states that this personality trait has attracted the attention of many researchers, is known by various names, including *culture, intelligence, intellect, intellectance, fluid intelligence, care, attention, intellectual, or openness to experience*.

In the aforementioned study, the opening is approached in accordance with the beliefs of the author Albu (2017) and refers to the preference for diversity and non-conformism, to the existence of interests over intellectual and cultural aspects. Thus, the level of openness is measured by: the level of openness to learning, openness to the intellect, and openness in aesthetics.

Openness is relevant to students' well-being during their university education, due to both: its relevance to the intellect (Bardi et al., 2009) and high academic performance (Vedel and Poropat, 2017; Gatzka, 2021). However, the results of field studies show data that do not indicate a direct association between openness and well-being. Some of the results of previous meta-analytical studies are pointed out by Bardi et al. (2009), the conclusion being that openness to experience is neither associated with satisfaction in life (e.g., DeNeve and Cooper, 1998; Heller et al., 2004; Steel et al., 2008), nor with reactions to stressful situations (e.g., Suls et al., 1998). Even if openness to experience was not inherently linked to well-being, this does not mean that the relationship between these variables could not be re-studied in specific contexts, where a high level of openness is required. For example, in situations where rapid change occurs, there are data that suggest that individuals with a high level of openness are more likely to accept the challenges posed by such situations (McCrae and Costa, 1985). This is due to the fact that people with high openness are characterized by a need for variety and may be motivated to actively seek out what is unfamiliar to them (McCrae, 1996). This less familiar context to students could be given by the very transition and adaptation to online education, in the situation given by the COVID-19 pandemic. In addition, field studies have shown a statistically significant correlation between openness to experience and extroversion with positive emotional mood (Shiota et al., 2007), a mood that can be understood as one of the components of SWB.

Personal Autonomy and Well-Being

Similar to other psychological constructs, personal autonomy has been defined in multiple ways (Albu, 2007, 2008) and differently approached. For example, the authors differentiate between autonomy as independence and autonomy as self-endorsed functioning (Chen et al., 2013). To conceptualize and measure the level of personal autonomy, we will follow the approach promoted in the Romanian literature, by Albu (2007, 2008) and Albu and Porumb (2009). Personal autonomy is a personality trait that consists of the ability to control one's own life along with the feeling that there is a possibility to exercise this control (Albu, 2007; Albu and Porumb, 2009). In other words,

autonomy refers to a person's freedom to lead a life in accordance with his/her own desires and values (Sipos and Barratt, 2005). On the other hand, although in our study personal autonomy is considered a variable related to personality, in the theory of self-determination, Deci and Ryan (1985, 2000) define autonomy as a psychological need, along with the need for competence and affiliation. From this perspective, all individuals obtain well-being from the fulfillment of basic psychological needs (Deci and Ryan, 1985, 2000). Recent studies (Chirkov et al., 2003; Yu et al., 2018) capture the direct association between the need for autonomy and SWB in various settings and populations, including clinical samples, in family settings, in organizational work environments, or educational settings, regardless of the subjects' gender. However, in our multidimensional study, personal autonomy is approached taking into account four dimensions: cognitive, behavioral, emotional, and value (according to Albu (2007), Albu and Porumb (2009)). Therefore, this is a variable related to personality; it is not confused with the fundamental need for autonomy, from the theory of self-determination (Albu, 2007; Albu and Porumb, 2009).

Field studies have concluded that autonomy is associated with life satisfaction and that it explains the substantial variation in SWB (Inglehart et al., 2008; Welzel and Inglehart, 2010). Furthermore, it is considered that autonomy, along with material concerns (income, financial satisfaction, and satisfaction to living standards), were important predictors of happiness and satisfaction in life (Ng, 2015).

In this study, we will consider the personal autonomy of students as a variable that is directly associated with their well-being but at the same time an independent variable (predictor), along with openness, in the regression analysis. The regression model in question will be able to capture the role of personal autonomy and openness to the students' well-being in a pandemic. In addition, we want to underline the role of academic regulation mechanisms on well-being, aspects that we will refer to in the following.

Well-Being and Academic Motivation

As already mentioned in the introductory part, our study is based on the theory of self-determination developed by Deci and Ryan (1985, 2000), mainly using motivations related ideas. We believe intrinsic motivation is extremely important for obtaining academic performance and well-being in the university, in the conditions given by this pandemic. Intrinsic motivation implies the highest level of behavioral self-regulation and personal autonomy. Intrinsically motivated people are characterized by curiosity, by the desire for cognitive emotional, and intellectual stimulation, getting involved in activities for sheer pleasure (Deci and Ryan, 1985, 2000). Studies conducted around the 1990s show that individuals who are intrinsically motivated tend to use strategies aimed at in-depth information processing; be creative; achieve better academic performance; report higher levels of well-being and self-esteem; be more confident in their own strengths and gain more satisfaction from the various activities they carry out throughout their lives (Ryan et al., 1997; Sheldon and Kasser, 1998). Recent studies also indicate that intrinsic motivation and amotivation

are significant predictors of PWB among students who take online courses amid pandemics (Muzaffar and Yamin, 2021). But maintaining student motivation is already a challenge for teachers even in face-to-face environments and even more so, in distance learning (Goksel, 2021). On the other hand, some studies conclude that online learning, before the pandemic, had a positive effect on students' motivation and academic performance (Harandi, 2015; Kumar and Bajpai, 2015). However, the research data of other studies show that the academic motivation of Pedagogy of Primary and Preschool Education students does not change, regardless of the teaching environment, i.e., online or face to face (Zwanch and Cribbs, 2021). The results of a study conducted on students in Romania and Lithuania show that students' motivation for online learning in the pandemic is low to moderate, with intrinsic motivation being even lower than extrinsic motivation (Lamanauskas et al., 2021). The study conducted by Natalya and Halim (2021) is one that could better clarify the aspects related to the level of student motivation during the pandemic. The authors show that even if the academic motivation increased in the first days of the pandemic, 1 year after the implementation of online education, there was a significant decrease. However, researchers say that students can keep their intrinsic motivation high during COVID-19 isolation if they are interested in the subjects they are learning (Goksel, 2021) or if they have a high level of satisfaction with online courses (Algahtani et al., 2021). There are also some other research studies that have reached similar conclusions (see Popa and Bochiş, 2015), on groups of students in part-time education, emphasizing that an important role for student satisfaction with the hybrid training system is given by the quality of self-study materials and the quality of the relationship between peer students and teachers.

THE CURRENT RESEARCH

In this hereby presented study, we aim to define a state of matter, of university education, in a pandemic, to underline the relationship between students' well-being and internal psychological variables related to personality and mechanisms of regulation of academic motivation. Furthermore, we want to identify the answer to two questions. The first of these is: *How much of the variance in the level of self-perceived well-being of students in the pandemic can be explained by the level of openness and personal autonomy?* As mentioned before, openness and personal autonomy were conceptualized and measured as variables related to students' personalities by Albu (2007, 2017) and Albu and Porumb (2009). The second question: *How much of the variance in the self-perceived well-being of students in the pandemic is explained by the mechanisms of regulating academic motivation, statistically controlling the impact of openness and personal autonomy?* The answer to the two questions should be given with the help of multiple regression analysis, trying to highlight the role of mechanisms to regulate academic motivation on the well-being of students in university, before the fourth wave of the pandemic. Although in previous research, personality traits have been kept under control to examine the

correlation between the fulfillment of psychological needs and SWB (Sheldon and Niemiec, 2006; Nishimura and Suzuki, 2016), this study thoroughly uses existing information by underlining psychological variables that can influence students' well-being of in a pandemic.

The main goal of this study: to point out the contribution of psychological factors, more precisely, the personality structure characterized by openness and personal autonomy, but also the mechanisms of regulation of academic motivation to explain the variance of results on the scale of self-perceived well-being of students in the university; thus, the following specific research hypotheses:

- H₁:** *There is an association relationship between students' self-perceived well-being in university and: their level of autonomy, their level of openness, and the mechanisms for regulating their academic motivation.*
- H₂:** *Mechanisms for regulating academic motivation contribute significantly to explaining the variance of self-perceived well-being of university students, after eliminating the influence of personality-related variables: autonomy and openness.*

Please note that, due to the restrictions imposed by national and university policies, the students participating in the study had previously had three consecutive semesters only in online training (in synchronous and asynchronous activities) and when the research was conducted, their activity was still online.

MATERIALS AND METHODS

Participants

The subject lot was of 150 students enrolled at the University of Oradea, Romania in undergraduate and master's degree studies at the Faculty of Socio Humanistic Science, among which the majority were in undergraduate studies (72.66%) and Pedagogy of Primary and Preschool Education (62.01%). One of the peculiarities regarding the formation of student groups in the study programs of the Faculty of Socio Humanistic Science, University of Oradea, is the fact that most of the students are females. Additional data for the subject lot, according to the study program, year of study, background, gender, and age are shown in **Table 1**.

Instruments

The research tools used had been previously validated on the Romanian student population which are the following: *Personal autonomy questionnaire*, *Openness questionnaire*, *Questionnaire for measuring the types of regulation of academic motivation*, and *Inventory of students' self-perceived well-being*.

Personal autonomy questionnaire was designed under the coordination of Monica Albu (Albu, 2007; Albu and Porumb, 2009), having 36 items. It consists of four scales, one for each dimension of personal autonomy: cognitive autonomy (nine items; e.g., *I like to make decisions on my own, without depending on others*), behavioral autonomy (11 items; e.g., *I do as I think it is better, without taking into account the opinion of others*), emotional autonomy (eight items; e.g., *I express my feelings*

without hesitation, even if others do not agree with them), and value autonomy (8 items; e.g., *I stick to my principles in any situation*). For each item, the subject had to decide the degree to which the statement was true for him/her and choose one of the options, "very little," "little," "not too much, not too little," "much," and "very much." For the whole questionnaire, the coefficients of internal consistency presented by the author of the test in the validation study had values higher than 0.75 (being between 0.752 and 0.846). Also, in terms of validity, at all questionnaire scales were obtained high saturations in the extracted factor (linear correlations between scales and factor are significant at the threshold $p < 0.001$). In the present study, the alpha Cronbach coefficient for the whole scale was high, of 0.910, and for the subscales, it was between 0.803 and 0.943.

Openness questionnaire was developed, validated, and calibrated on the Romanian population by Albu (2007). It consists of 18 items that evaluate three dimensions of Openness: openness to learning (seven items; e.g., *I am interested in constantly improving my professional skills.*), openness in aesthetics (five items; e.g., *I believe there should be more buildings dedicated to culture and art.*) and the ideatic opening (six items; e.g., *I like scientific challenges.*). For each item, the subject had to decide the degree to which the statement was true for him/her and choose one of the options, "very little," "little," "not too much, not too little," "much" and "very much." According to the author, in the validation study, there was a good internal consistency for all scales, the coefficient α having values between 0.763 and 0.860 and a good validity of the instrument (Albu, 2007). In our study,

TABLE 1 | The subject lot participating in the study (Descriptive statistics).

			N	%
Faculty of Socio Humanistic Science				
Pedagogy of Primary and Preschool Education	Undergraduate studies		93	62.01%
Special Psycho-pedagogy	Undergraduate studies		11	7.33%
Other study programs within the Faculty	Undergraduate studies		5	3.33%
Integrated Education in Pre and Primary Schools – MA	Master's Degree		41	27.33%
			N = 150	100%
Year of study	I		58	38.66%
	II		50	33.33%
	III		52	34.66%
			N = 150	100%
Gender	Female		143	95.33%
	Male		7	4.66%
			N = 150	100%
Social background	Urban		69	46%
	Rural		81	54%
			N = 150	100%
Age	Minimum	Maximum	Mean	Standard deviation
	18.00	52.00	26.75	9.722

the coefficient α for the whole scale was high, of 0.918, and on subscales, it was between 0.897 and 0.921.

Questionnaire for measuring the types of regulation academic motivation was used in studies on the Romanian population by Robu and Tufeanu (2020). The tool is an adapted version of the *Questionnaire of the types of regulation of school activity* designed and validated by Drugaş (2009), by making use of the theory of self-determination. In our study, it contains 21 items, grouped in four subscales: intrinsic adjustment of motivation (seven items), adjustment of identification motivation (four items), external adjustment of motivation (seven items), and amotivation (three items). The subjects had to choose an answer on a 5-level Likert scale, ranging from 1 – total disagreement to 5 – total agreement. Here are some examples of items related to each subscale. Intrinsic motivation: *I enjoy doing the activities required by the study program I am enrolled in; Graduating the program of study and the faculty is important to me.* Identification motivation: *I feel that the study program I am enrolled in is helping me to develop as a person, or I feel that my academic study program is developing skills that I will use later in life.* Intrinsic motivation: *I rarely think about the grades I will get* (reverse scoring); *It is important for me that others appreciate what I do in college;* and, the examples of items for amotivation: *Apart from the fact that I have something to fill my time with, I see no reason to continue this study program; I don't think the study program I am enrolled in is worth graduating.*

For the sample group of students who participated in the study conducted by Robu and Tufeanu (2020), the values of internal consistency, α Cronbach, were satisfactory, with values between 0.67 and 0.74. In this hereby presented research, a satisfactory value was obtained on the internal consistency of the items at the global score, α Cronbach = 0.724, and values between 0.71 and 0.75 per subscale.

Inventory of students' self-perceived well-being was designed based on the tool designed by Adams et al. (1997) to identify the well-being felt at the individual level in several areas of life. The inventory includes 36 statements to which the subject responds on a 6-level Likert scale (from “strong agreement” to “strong disagreement”), indicating the level of agreement with each statement. For our study, the variant adapted and validated on the Romanian population was used by Roşeanu and Răşcanu (2008). According to the authors, the subscales of the research tool are positive attitude toward the self, environment, and life (14 items), negative attitude toward the self, environment, and life (13 items); self-perceived physical health (seven items). The items were revised or rephrased to identify the well-being of university students during the pandemic. Thus, the first two subscales were renamed as positive/negative attitudes toward self, others (peers and teachers), and student life. Examples of items for the subscale of positive attitude toward self, others, and student life are the following: *In general, I felt confident in my ability to learn in college; My friends and other peers relied on my help; The intellectual challenges I faced in college were vital to my overall well-being.* Examples of items for the subscale Negative attitude toward self, others and student life: *There were times when I felt inferior to most of my peers; I didn't see many perspectives in my student life for the future; My life as a student often seemed void*

of positive mental stimulation. Examples of items for the Physical Health subscale are the following: *My body seems to cope with physical illness very well; Compared to other fellow-colleagues, my physical health has been excellent.* The internal consistency of the α Cronbach items has values between 0.75 and 0.84 on the subscales (Roşeanu and Răşcanu, 2008). In our study, α Cronbach coefficients had values between 0.77 and 0.85.

Procedures

The students' subject lot entered the research based on consent, informed, and anonymous. The administration of the research toolkit took place in the second half of October when, after 2 weeks after returning to the mixed training system (online courses and on-site seminars and labs), it was decided to switch to an exclusively online system for 3 weeks, due to the increase in the incidence of the number of active cases of coronavirus infection (COVID-19), in Romania and Bihor county. The questionnaires were administered online, the average fill-in time was of 30 min.

Data Analyses

The research data were analyzed with the SPSS version 20. After removing the incomplete information from the database, the research hypotheses were tested. The correlation between well-being and personality traits (openness and personal autonomy), on one hand, and between student well-being and academic regulation mechanisms, on the other hand, was achieved with the help of the Pearson test as data distribution had been symmetrical. In order to explore the explanatory value of the mechanisms for regulating motivation (independent variable) for students' well-being (dependent variable), the hierarchical regression analysis was performed. Before entering the research data into the regression analysis, it was checked whether the database contained influential cases (using the “Cook's Distance” method), whether there were multi-collinearity issues, and whether the assumption of independent variables was verified. We can state that the database does not contain influential cases, wherein for none of the independent variables included in the model, there were no multi-collinearity problems, the values of *Tolerance* coefficient being higher than 0.50. Furthermore, for variance inflation factor (VIF), the values did not exceed 1.78. The assumption of independent errors was fulfilled with the value Durbin-Watson = 1,829. Finally, examination of the normal P-P graphic of the residual standardized regression of positive attitude toward self, others, and student life indicates a normal distribution.

RESULTS

Correlation Between Students' Self-Perceived Well-Being and Personal Autonomy, Openness, and Mechanisms for Regulating Motivation

To test the correlation between the dimensions of students' self-perceived well-being and personality-related variables, on the one

TABLE 2 | Pearson correlation between students' self-perceived well-being and personal autonomy, openness, and mechanisms for regulating motivation.

Variables		Students' self-perceived well-being		
		Positive attitude	Negative attitude	Physical health
Autonomy of values	Pearson correlation	0.326**	-0.180*	0.162*
	Sig. (two-tailed)	0.000	0.027	0.048
	N	148	150	149
Emotional autonomy	Pearson correlation	0.219**	-0.457**	0.103
	Sig. (two-tailed)	0.008	0.000	0.210
	N	148	150	149
Behavioral autonomy	Pearson correlation	0.428**	-0.161*	0.282**
	Sig. (two-tailed)	0.000	0.049	0.000
	N	148	150	149
Cognitive autonomy	Pearson correlation	0.546**	-0.229**	0.311**
	Sig. (two-tailed)	0.000	0.005	0.000
	N	148	150	149
Openness to learning	Pearson correlation	0.541**	-0.039	0.331**
	Sig. (two-tailed)	0.000	0.640	0.000
	N	148	150	149
Ideatic openness	Pearson correlation	0.360**	-0.196*	0.197*
	Sig. (two-tailed)	0.000	0.016	0.016
	N	148	150	149
Aesthetic openness	Pearson correlation	0.488**	-0.032	0.182*
	Sig. (two-tailed)	0.000	0.697	0.026
	N	148	150	149
Intrinsic motivation	Pearson correlation	0.541**	-0.108	0.363**
	Sig. (two-tailed)	0.000	0.190	0.000
	N	148	150	149
Identification motivation	Pearson correlation	0.514**	-0.245**	0.283**
	Sig. (two-tailed)	0.000	0.003	0.000
	N	148	150	149
External motivation	Pearson correlation	0.031	0.279**	-0.072
	Sig. (two-tailed)	0.705	0.001	0.386
	N	148	150	149
Amotivation	Pearson correlation	-0.109	0.267**	-0.037
	Sig. (two-tailed)	0.188	0.001	0.656
	N	148	150	149

** $p < 0.01$, * $p < 0.05$.

hand, and the mechanisms of motivation adjustment, on the other hand, Pearson correlation was used.

Research data presented in **Table 2** indicate the correlation between the research variables and the effect sizes ranging from low to high. There were high and average effect size correlations between self-perceived well-being expressed through a positive attitude toward self, others, and student life, and some of the subscales of the research tools. Thus, according to study data presented in **Table 2**, positive attitude toward self, others, and student life correlates directly with: behavioral autonomy ($r = 0.428$, $p < 0.001$, moderate effect size), cognitive autonomy ($r = 0.546$, $p < 0.001$, strong effect size); openness to learning ($r = 0.541$, $p < 0.001$, strong effect size), aesthetic openness ($r = 0.488$, $p < 0.001$ moderate to high effect size); intrinsic motivation ($r = 0.541$, $p < 0.001$, strong effect size), identification motivation ($r = 0.411$, $p < 0.001$, moderate effect size).

At the same time, we conclude that self-perceived well-being in terms of negative attitude toward self, others, and student life, on one hand, and health, on the other hand, is associated with the other variables having a low effect size, with a few exceptions. These exceptions are for the correlation between the negative attitude toward self, others and student life, and emotional autonomy (reverse correlation, $r = -0.457$, $p < 0.001$ moderate to high effect size); the association between physical health and cognitive autonomy ($r = 0.311$, $p < 0.001$, moderate effect size), openness to learning ($r = 0.331$, $p < 0.001$, moderate effect size); intrinsic motivation ($r = 0.363$, $p < 0.001$, moderate effect size).

Importance of Variables Related to the Mechanisms for Regulating Motivation, Personal Autonomy, and Openness in Explaining the Variance of Students' Well-Being in a Pandemic

We used hierarchical regression analysis to underline the contribution of mechanisms of academic motivation regulation on the PWB of students in university, in terms of statistical control over variables related to personal autonomy and openness. However, as pointed out in the previous study, in testing specific hypothesis 1, there were significant correlations only between certain research variables, so the second hypothesis of the study was revised and rephrased. In regression models, we would introduce only the variables that in the previous study correlated with a moderate or high effect size. Thus, the positive attitude toward self, others, and student life was included as a dependent variable, and the dimensions it correlated with became the independent variables of the study. So, the factors introduced in model 1 are part of the category of personality traits, such as cognitive and behavioral autonomy (the mean of the two subscales was calculated) and the openness to learning and aesthetics (the mean of the two subscales was calculated). Further on, in Model 2, we kept under control the factors introduced in Model 1, in order to isolate the influence of mechanisms of academic motivation regulation, i.e., intrinsic motivation and identification (mean of the two subscales), on the dependent variable.

The research data for the two models tested in hierarchical regression analysis showed statistically significant results ($F_{\text{change}} = 43,615$, $p < 0.01$, for the first model, and $F_{\text{change}} = 14,411$, $p < 0.01$, for the second model). As shown in **Table 3**, positive attitude toward self, others, and student life has a significantly high correlation ($p < 0.001$) with all three independent variables.

Next, the testing of each variable within the two models was performed using the Student's t -test, the results being statistically significant for each independent variable included in the two steps of the hierarchical multiple regression (**Table 4**).

First Step

The explanatory model contained the independent variables: personal and cognitive autonomy, along with openness to learning and aesthetics, which together explain 45.6% of the variance of positive attitude toward self, others, and student life

TABLE 3 | Descriptive statistics and correlation matrix for research model variables.

Variables	Mean	Standard deviation	N	1	2	3
Positive attitude toward self, others, and student life	4.846	0.885	148	0.510**	0.568**	0.558**
(1) Autonomy (behavioral and cognitive)	3.713	0.560	148	–	0.280**	0.439**
(2) Openness (to learning and aesthetics)	4.245	0.626	148		–	0.485**
(3) Motivation (intrinsic and identification)	4.121	0.657	148			–

** $p < 0.001$.**TABLE 4 |** Hierarchical multiple regression analysis of explanatory factors of well-being (positive attitude toward self, others, and student life).

Variables	R^2	R^2_{adjust}	Beta	B	SE b
Step 1	0.456**	0.449**			
Behavioral and cognitive autonomy			0.381**	0.602	0.457
Openness to learning and aesthetics			0.461**	0.652	0.101
Step 2	0.488**	0.472**			
Behavioral and cognitive autonomy			0.286**	0.452	0.113
Openness to learning and aesthetics			0.350**	0.495	0.106
Academic motivation			0.231**	0.365	0.135

** $p < 0.01$, * $p < 0.05$.

($R^2 = 0.456$). After eliminating the variance due to the other variable included in the model, a direct correlation was obtained between the positive attitude toward self, others, and student life and cognitive and behavioral autonomy ($\beta = 0.381$, $p < 0.001$). Similar results were obtained for the correlation between the positive attitude toward self, others, and student life and the openness to learning and aesthetics ($\beta = 0.461$, $p < 0.001$).

Eliminating the simultaneous influence of independent variables on the dependent variable, the value of semi-partial correlation coefficients showed, for the opening variable, a specific coefficient of determination of 26% ($r_{\text{part}} = 0.515$) and for the autonomy variable, a specific coefficient of determination of 19.3% ($r_{\text{part}} = 0.444$) on the dependent variable.

Thus, the openness to learning and aesthetics, and cognitive and behavioral autonomy were variables that explained the positive attitude of students toward self, others, and student life in the pandemic.

Second Step

The independent variables from step 1 are controlled, and in the second, intrinsic and identification motivation was introduced. In this case, the model was statistically significant, and together

with the three independent variables could explain 48.8% of the variance of positive attitude toward self, others, and student life ($R^2 = 0.488$, $p < 0.01$). Compared to Model 1, the increased value was not particularly important ($R^2 = 0.042$, $p < 0.01$), but being statistically significant, we could consider that the positive attitude of students toward self, others, and student life could be explained by the mechanisms of academic motivation regulation. In addition, at the analytical level, at the final estimation model, the values of the coefficient β were statistically significant for all three variables included in the model: openness, autonomy, and academic motivation, as shown by the data in **Table 3**.

Eliminating the simultaneous influence of independent variables on the dependent variable, the value of the semi-partial correlation coefficients on the dependent variable showed a specific coefficient of determination of 16.5% ($r_{\text{part}} = 0.407$) for openness, a specific coefficient of determination of 12% ($r_{\text{part}} = 0.353$) for autonomy, of 7% ($r_{\text{part}} = 0.278$) for intrinsic and identification motivation.

Research data underline the idea that beyond certain personality traits (openness, autonomy), the mechanisms of self-regulation of intrinsic and identification motivation have a significant influence on self-perceived well-being. These data emphasize once again the need to stimulate and increase students' interest, intrinsic and identification motivation for university training for future professions.

DISCUSSION

Unlike previous studies, this current research is based on the theory of self-determination to analyze the role of regulation mechanisms of students' academic motivation on their well-being in the pandemic, when personality variables (openness and personal autonomy) are controlled. Research results validate the results of previous studies, i.e., students' well-being is associated with their personality (Inglehart et al., 2008; Welzel and Inglehart, 2010; Nishimura and Suzuki, 2016; Muntele Hendreş, 2021) and with their academic motivation (Deci and Ryan, 1985; Ryan and Deci, 2000; Ryan et al., 1997), emphasizing that the association between these variables is present even in conditions of unexpected and problematic change in education, such as the pandemic context.

Among the three analyzed dimensions of students' self-perceived well-being in university (positive and negative attitudes toward self, others and student life, physical health), only the positive attitude toward self, others, and student life is associated with moderate or high effect sizes, with most of the subscales of the research tools (**Table 2**). Thus, specific Hypothesis 1 is partially validated.

The first of the psychological variables expressed in **Table 2** as being associated with a positive attitude toward self, others, and student life and correlated to the positive well-being toward self, others and student life was personal autonomy, as a personality trait; as concluded by other researchers (e.g., Chirkov et al., 2003; Inglehart et al., 2008; Welzel and Inglehart, 2010; Yu et al., 2018), the correlation was statistically significant. Furthermore, our study shows that students' positive attitude is

directly associated (with a moderate to a high effect size) with cognitive and behavioral autonomy (Table 2). In addition, a negative attitude toward self, others, and student life has a reverse association with the level of emotional autonomy. A possible explanation: personal autonomy is a trait that is grouped around other social dispositions such as introversion, locus of internal control, intrinsic motivation, self-confidence/arrogance, non-conformism, desire for solitude, and asocial or antisocial learning (Feist, 1999). Consequently, the fact that the very cognitive and behavioral autonomy leads to a positive attitude of students in pandemics, as autonomy could intensify individual study in the asynchronous environment, favors the fulfillment of work tasks and the achievement of personal goals independently, without requiring continuous support from outside.

The second of the psychological variables, openness, as a personality trait, is directly related to a positive attitude toward self, others, and student life. The statistically significant results of the correlation between positive attitude toward self, others and student life, and openness on two of its dimensions: to learning and aesthetics, were also the most surprising for us because, in similar studies, different results had been presented (see for example DeNeve and Cooper, 1998; Heller et al., 2004; Steel et al., 2008; Bardi et al., 2009). However, the premise from which we have drawn our first specific hypothesis stated that the level of openness can be associated with well-being under certain specific conditions such as those that require a high level of openness to adapt to rapid changes (McCrae and Costa, 1985). A further explanation: openness to experience is associated with positive emotional moods (Shiota et al., 2006), and consequently, a more positive attitude toward life. Therefore, even if the period of isolation in the pandemic was most intensely felt by extroverts (Ivanchev and Stoyanova, 2021), the results of our study show that students with high levels of openness and personal autonomy have a positive attitude toward self, others, and student life.

The third psychological variable, one being associated with a positive attitude toward self, others and student life is academic motivation, or more exactly, the mechanisms for regulating academic motivation. Continuing the line of research based on the theory of self-determination of Deci and Ryan (1985), Ryan and Deci (2000), the present study underlined the association between positive attitude toward self, others, and student life with two of the regulating mechanisms of academic motivation, i.e., intrinsic motivation and identification motivation (Table 2). Similar results have been obtained in other studies conducted before the pandemic. For example, Sheldon et al. (2004; cited in Secu, 2021) and Rudy et al. (2007) considered that, alongside intrinsic motivation and identification motivation, it is associated with a higher state of well-being. We believe, that even after three consecutive semesters online, students who managed to maintain their intrinsic and identification motivation, also showed a more positive attitude toward self, others, and student life.

Although there were interesting results in testing hypothesis 1, the focus of our research fell on the analysis of personality variables, so as to show the contribution of regulation mechanisms of motivation on students' well-being in university, in the pandemic (specific Hypothesis 2). The method used in data processing was hierarchical multiple regression, conducted

for explanatory purposes to analyze the factors with a significant influence on the positive attitude of students toward self, others, and student life. Research results in the multiple regression analysis point out that all the variables included in the regression model explain the dispersion of the results of students' well-being, with an effect size around moderate values. There were slightly higher effect sizes for independent or predictor variables related to personality (openness and autonomy) and slightly lower for academic motivation (intrinsic and identification). However, we consider that research data presented in Table 4 show that the level of intrinsic regulation of motivation and identification significantly contributes to explaining the level of variance of students' well-being in the pandemic, going beyond their personality. For explanatory purposes, we shall give an example. If students have high scores on the predictor variables (openness, autonomy), we can say that in the conditions under which students simultaneously have the following (Albu, 2007; Albu and Porumb, 2009): (1) high level of cognitive autonomy – i.e., a high capacity to make decisions on one's own, to critically analyze the received information, to have opinions without being influenced by others, to self-evaluate; (2) high level of behavioral autonomy – i.e., it acts according to his/her own beliefs, without taking into account the opinions of others, does not abandon a task when difficulties are encountered, strives to manage on his/her own; (3) high level of openness to learning – i.e., a high interest in personal development and lifelong learning; (4) high level of aesthetic openness – i.e., interest in art and beauty; and all these levels are controlled, the variations in intrinsic and identification motivation will influence students' well-being in the pandemic. This has multiple implications, especially in school and professional counseling, educational psychology, and even positive psychology. Although it has been found that in the pandemic, the interest in learning has increased only in extroverted students (see Smith et al., 2021), our findings show that not only personality but also regulating mechanisms of academic motivation will influence students' well-being. That is why it is extremely important that career decisions of young people should be in accordance with their intrinsic interests and mechanisms, and identification with specific academic activities of university education. These variables will significantly contribute to maintaining a positive attitude toward self, others, and life in the face of rapid changes that may occur, in critical situations or in crises in education, or even in their future professions.

CONCLUSION

The following lines will discuss the implications of our findings, strengths and limitations, and directions for future research.

The research contributes to the consolidation of a long series of research in positive, personality, and educational psychology, highlighting the role of variables related to personality and academic motivation in providing students' well-being in the pandemic. The study of psychological variables involved in maintaining people's well-being has been studied before, but without continuity in the research direction undertaken by us.

For example, in studies that used advanced data processing statistical methods, the role of personality variables as mediators in the correlation between well-being and level of satisfaction of basic psychological needs was highlighted (Schüler et al., 2016). However, in order to complete such results, personality variables and academic regulation mechanisms were taken into account in the present study, allowing for a deeper understanding of the way students kept their well-being toward self, peers, and teachers and to student life, in the pandemic.

This is interdisciplinary research. It uses the theory of self-determination and other empirical data and results of field research that investigate well-being and psychological variables associated with it, but in a more particular context, i.e., in the pandemic and of students. As shown by the results of the studies mentioned in the introductory part, in the pandemic, students encountered several difficulties in the transition and adaptation to online education (see for example, Yusuf and Jihan, 2020; Aftab et al., 2021; Huang and Zhang, 2021). We consider that some of these obstacles could be overcome with the help of some internal psychological variables, related to personality and regulation mechanisms of student motivation. For example, previous studies have found that in the pandemic, extrovert students, compared to introvert ones, showed a greater interest in learning (Smith et al., 2021).

Our research data suggest that students may keep a positive attitude toward themselves, others, and student life during the pandemic, if they show openness and personal autonomy, and/or if they have intrinsic and identification motivation in academic learning activities. Perhaps, the most important conclusion of this study is that intrinsic and identification motivation will contribute to the positive attitude toward self, others, and student life in the pandemic, even when personality variables are controlled. The followers of Deci and Ryan (1985), Ryan and Deci (2000) emphasized the role of intrinsic motivation for a successful activity. However, the findings of previous studies are contradictory in terms of students' motivation levels before and during the pandemic period. For example, some studies conclude that students' academic motivation remains at the same level, regardless of the environment in which the courses are conducted, online or on-site (Zwanch and Cribbs, 2021); in others, it is said that academic motivation is lower in online (Lamanauskas et al., 2021), or that, on the contrary, students' motivation is higher in online (Malinauskas and Požerienė, 2020), but also that it fluctuates in online during the pandemic period (Goksel, 2021). Furthermore, the literature and theory of self-determination, the basis of our study (Deci and Ryan, 1985, Ryan and Deci, 2000), analyzed the role of intrinsic motivation in obtaining well-being, but there is the necessity of further research to identify new regulation mechanisms of students' academic motivation in the pandemic, coping with the transition and adaptation to a less familiar learning environment, i.e., synchronous and asynchronous. Our findings show that both motivations, intrinsic and identification, have an important role in maintaining a positive attitude toward self, others, and student life in the pandemic. By explaining the variance of students' well-being in the pandemic depending on their level of academic motivation, the general implications of the research

are significant. We believe that while pandemic isolation has had a negative impact on the social relationships with other colleagues and teachers, students' openness, personal autonomy, and academic motivation can determine a positive attitude toward self, others, and student life, maybe even more in isolation than on ordinary basis.

Practical Implications

The basic idea of this research will be useful for teachers, psychologists, and school counselors and why not, even for students, so they could outline a school career in accordance with the activities they value, but also to use their personal resources in the purpose of overcoming difficulties or obstacles that arise in learning. Its findings primarily provide the necessary premises for the development of educational practices that support pupils and students in overcoming obstacles in learning activities. We believe the new model of education initiated in the pandemic, although pursuing the same purposes and contents as in the traditional system, must pay more attention to the values and attitudes promoted in the academic courses, targeting those that contribute to maintaining the well-being of university students. As Laurian-Fitzgerald and Fitzgerald (2021) point out, it is time for teachers and students to take control of their own learning, as education needs to be transformed and aligned with the realities of the 21st century through active and continuous student involvement. To this, it is added the fact that education must be carried out in a more pleasant environment for the current generation of students, based on modernism and actuality (Muntean, 2021).

Overall, we believe there is a need to stimulate students, in frontal activities, openness to experience and learning or curiosity for knowledge, by valuing their interests in activities based on differentiated teaching. Then, in independent activities, teachers can encourage the cognitive and behavioral autonomy of students, taking also into account other of their personality traits, which are associated with academic performance, such as conscientiousness (see Bochiş and Florescu, 2018). Students will develop cognitive and behavioral autonomy when they feel encouraged to explore, take initiative, and implement solutions to their problems (Niemic and Ryan, 2009). Another important aspect for teachers and specialists in the Sciences of Education is to be aware that if they build a culture of classroom autonomy, students develop their intrinsic motivation (Niemic and Ryan, 2009). Lack of autonomy, on a motivation level, too, together with the persistence of extrinsic motivation in students (e.g., They learn for grades, praise, or approval from others) does not contribute to maintaining well-being, in situations when the support of others (teachers, colleagues, or parents) can no longer be given the same measure. Certainly, increasing students' level of openness, autonomy, and intrinsic and identification motivation are the key issues that need to be considered by teachers and school counselors, not only in the university but especially throughout the entire school life of a student. Our research findings could be of interest to both employers and future graduates, especially for those who, after completing their studies, choose to work in areas where there are rapid situation changes, when they will have to continuously improve themselves

in order to overcome the difficulties at work, with the purpose of keeping their SWB. Therefore, the efforts of teachers in educational institutions and school counselors should be directed toward addressing the methods that increase the level of intrinsic and identification motivation, thus helping to maintain a positive attitude toward self, others, and student life, even in difficult situations. At the same time, effective collaboration between various specialists in the sciences of education, psychology, youth mental health, and government could help minimize and mitigate the negative impact of the COVID-19 pandemic on the SWB of pupils and students. Such a goal was pursued at a university in the UK for psychology students and the program led to gratifying results as students were introduced to key concepts related to well-being and resources to help increase it (Morgan and Simmons, 2021).

Research Limitations and Future Research Paths

Our study has several limitations that need to be analyzed, and a first thing can be connected to the selection of study participants, mostly females. However, the limit is justified by the fact that the participants were selected from specializations followed mainly by female graduates [see for example the data presented by Popa et al. (2015), related to the particularities and structure of groups of students in the Pedagogy of Primary and Preschool Education, Faculty of Socio Humanistic Sciences, University of Oradea]. Another limitation is that the research could have had a mixed, explanatory, and predictive purpose, but the small number of subjects allowed only an explanatory research design. Consequently, the research data serve only to explain the factors that influence the positive attitude toward self, others, and student life of the subject lot. Therefore, in future research, we should consider including a larger sample, a balanced distribution of respondents according to gender. However, we believe that important results have been achieved in this area. Diener and Lucas (2000 cited in Muntele Hendreş, 2021) believe that in order to develop positive psychology in a country, it is necessary to research and know the specifics of SWB in that culture so that subsequent interventions can be made taking into account the results of local research. In addition, as we pointed out in the results and discussions section, this study

emphasizes that SWB is associated with personality traits and intrinsic motivation, such results being found in similar research, from which we designed the basis of our research.

Another limitation is that the socio-demographic variables of the subject lot were not included in the study, although it is known that well-being is the expression of the balance between individual characteristics (e.g., personality predispositions or acquired skills throughout life) and environmental factors (e.g., socioeconomic status, family, social relations, and professional career). The results of pandemic studies have indicated that age, sex, marital status, socio-economic status, and chronic health conditions are predictors of emotional well-being during the COVID-19 pandemic (Al Mutair et al., 2021). However, future studies can successfully complete the results of our study, which is intended to be a favorable starting point for researchers who want to explore only the psychological variables associated with well-being during the periods of adaptation of students to new learning environments, along with the rapid changes taking place in the knowledge society.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee for Research, Faculty of Socio-Humanistic Sciences, University of Oradea. The participants provided their informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LB: conceptualization, methodology, and writing – original draft preparation. LB, KB, and MF: software, formal analysis, investigation, and writing – review and editing. LB and MF: visualization. All authors contributed equally to the article and approved the submitted version.

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Psychological Capital and Occupational Well-Being: Mediating Effects of Work Engagement Among Chinese Special Education Teachers

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This study examines whether psychological capital (PsyCap) indirectly predicts occupational well-being among Chinese special education teachers through work engagement. In total, 615 Chinese special education teachers (female = 567) completed the Psychological Capital Questionnaire, the Special Education Teachers' Occupational Well-Being Questionnaire, and the Utrecht Work Engagement Scale. The results indicated that PsyCap was positively correlated with occupational well-being and work engagement. Furthermore, work engagement mediated the influence of PsyCap on occupational well-being. Notably, the multiple mediation model indicated that the indirect effects of PsyCap on occupational well-being were mainly due to dedication and absorption. The study's results illustrate the association between PsyCap, work engagement, and occupational well-being, which may help educational administrators and social workers assist with special education and special education teachers develop and maintain good working conditions.

Keywords: psychological capital, occupational well-being, work engagement, special education teachers, absorption, dedication

INTRODUCTION

One of the key factors affecting the development of special education is the quantity and quality of teachers (Billingsley, 2004). Unfortunately, the turnover rate for special education teachers is probably higher than that for other teachers (Billingsley, 1993), resulting in insufficient numbers of special education teachers (Billingsley and Bettini, 2019). Consequently, the shortage of special educators implies that the needs of special education development cannot be met. One of the key reasons is that special education teachers are under pressure, and their work engagement and well-being are relatively low (Edward et al., 2018); thus, it is critical to improve their engagement and occupational well-being.

The job demands-resources (JD-R) model suggests that work-related personal resources [e.g., psychological capital (PsyCap)] contribute to generating greater work engagement (Demerouti et al., 2001) and have a positive influence on work outcomes (Xanthopoulou et al., 2007), including workers' well-being (Wang et al., 2017). Similarly, the conservation of resources (COR) theory posits that workers with more resources (such as PsyCap) are likely to engage more deeply in work and generate better outcomes (Hobfoll, 2002). People who engage more deeply with work may experience greater subjective well-being (Caesens et al., 2014), and empirical research has also shown that resource support can improve special education teachers' working conditions (Ghere and York-Barr, 2007; Dempsey and Christenson-Foggett, 2011).

Could PsyCap be used as a positive resource to predict well-being through work engagement? Thus far, only one study has explored this question; Adil and Kamal (2016) found that work engagement might mediate the association between university teachers' PsyCap and their job-related well-being. As special education teachers work with students with special needs, their professional characteristics differ from those of other teachers (Laloo and Buhril, 2013). Whether the mediating effects of work engagement is applicable for special education teachers? Furthermore, Adil and Kamal (2016) do not explain the specific effects of the three dimensions of work engagement in the association between PsyCap and occupational well-being. Therefore, our research attempts to verify the indirect effect of PsyCap on occupational well-being through work engagement and further explore the mediating role of the three dimensions of work engagement in the association between PsyCap and occupational well-being. To the best of our knowledge, the current study is the first to explore these issues among Chinese special education teachers specifically. Our findings will help education managers and policymakers understand how to improve special education teachers' PsyCap, which will, in turn, improve work engagement and enhance their occupational well-being, resulting in decreased turnover.

OCCUPATIONAL WELL-BEING

Occupational well-being relates to an individual's experience and satisfaction at work (Doble and Santha, 2008). Huang (2014) suggested that occupational well-being is the quality of a worker's experience and effectiveness at work. However, special education teachers experience less well-being in their work (Ouellette et al., 2019; Soini et al., 2019). Children with special needs are individually diverse and require a high level of competence from special education teachers, yet their development is extremely slow. This leads to higher levels of work stress and poor mental health among special education teachers (He, 2016; Poppe et al., 2016; Sun et al., 2019), even resulting in higher job burnout and lower well-being (Zhang and Zhang, 2012; Black and Halstead, 2021). Previous studies have confirmed that the occupational well-being of special education teachers was lower than that of mainstream school teachers in China (Zhao and

Huang, 2015). To address this problem, some researchers have explored the protective factors of special education teachers' occupational well-being (Wu et al., 2020; Xu et al., 2021), such as PsyCap, work engagement and so on (Wang, 2017; Wen and Zhang, 2020).

PSYCHOLOGICAL CAPITAL AND OCCUPATIONAL WELL-BEING

Psychological capital is an active psychological state, comprising optimism, self-efficacy, resilience, and hope (Luthans et al., 2007b). Empirical research has shown that PsyCap as a whole predicts better outcome variables than each of its individual facets (Luthans et al., 2007a). According to the JD-R model, individual resources (e.g., PsyCap) lead to work engagement and, consequently, bring about positive outcomes, such as personal well-being and professional identity (Xanthopoulou et al., 2007). This may be because people with high levels of PsyCap make greater efforts to overcome challenging tasks and adversity, possess positive attributes and firm goals, and ultimately attain success (Luthans et al., 2007b). That could be able to help workers experience improved well-being (Avey et al., 2011), and, in turn, their turnover intentions may reduce (Siu et al., 2015). Kanapathy et al. (2016) found that PsyCap positively predicts special education teachers' subjective well-being. Further, Peng et al. (2018) conducted a survey of special education teachers in southwest China (Chongqing and Sichuan province) and demonstrated that all dimensions of PsyCap—optimism, self-confidence, resilience, and hope—are positively related to occupational happiness. Together, PsyCap could be a one of protective factors of special education teachers' well-being.

WORK ENGAGEMENT AND OCCUPATIONAL WELL-BEING

Work engagement describes a fulfilling and energetic work-related mental state and comprises three dimensions: absorption, dedication, and vigor (Schaufeli et al., 2006). Dedication means engagement and enthusiasm regarding work and its challenges, and the perception that work is important. Absorption means that workers entirely concentrate on and become engrossed in their work—time quickly passes—and they are unwilling to break away. Finally, vigor means that an individual has sufficient energy and psychological resilience, and can persist when they experience difficulties (Schaufeli et al., 2002). According to the JD-R model, researchers have assumed that work engagement is a motivational construct that can improve performance at work (Schaufeli and Bakker, 2004). Individuals engaging in work often experience positive emotions, such as enthusiasm and well-being (Yang et al., 2019). For example, Wang (2017) contends that special education teachers with high levels of work engagement experience positive well-being. An empirical study has shown that special education teachers' work engagement is a positive predictor of general well-being (Fu et al., 2021).

MEDIATION OF WORK ENGAGEMENT

Bakker and Demerouti (2008) assert that individual resources (e.g., PsyCap), functioning as motivational processes, can predict work engagement. Consistent with this view, COR theory proposes that the higher the PsyCap level, the greater the motivation a worker experiences, and this encourages them to focus on work (Sweetman and Luthans, 2010). Previous studies have found the importance of PsyCap in promoting work engagement (Xanthopoulou et al., 2009; Kang and Busser, 2018). For example, Jin (2017) investigated 253 front-line special education teachers and found that those with high professional identification had higher PsyCap and were more actively focused on their work. Thus, we propose that PsyCap can facilitate special education teachers' work engagement. Furthermore, in accordance with COR theory, and considering the association between PsyCap, work engagement, and occupational well-being, we expect that special education teachers with high PsyCap experience better engagement with their work, leading to higher levels of occupational well-being.

Although some scholars have asserted that the scores for the three dimensions of work engagement should be equally used in empirical research, other studies have shown that they play different roles in the mediation model (Matthews et al., 2014; Scrima et al., 2014; Van Bogaert et al., 2014). Matthews et al. (2014) demonstrated that work engagement acts as a mediator in the association between family-supportive supervisor behaviors (FSSBs) and subjective well-being. However, when the three components were set in a multiple mediation model to test the relationship between FSSBs and subjective well-being, the results indicated that only vigor significantly mediated the relationship. Thus, to understand how PsyCap predicts occupational well-being, it is necessary to explore its relationships with the three dimensions.

THE PRESENT STUDY

Although some researchers have explored the relationship between PsyCap, work engagement, and well-being, the mediating role of work engagement has not been explored among special education teachers. The current study offers insight into the relationship between PsyCap, work engagement, and occupational well-being in the Chinese context. Consistent with the JD-R model and COR theory, we hypothesized that:

- H1. PsyCap has a significantly positive direct effect on work engagement and occupational well-being for special education teachers.
- H2. PsyCap of special education teachers might indirectly predict occupational well-being through work engagement.

Additionally, considering previous empirical evidence regarding the mediation effect of the dimensions of work engagement, we hypothesized that:

- H3. Dedication, absorption, and vigor might be correlated with PsyCap and occupational well-being, but not all of them necessarily mediate the relationship between PsyCap and occupational well-being.

MATERIALS AND METHODS

Participants and Data Collection

The random cluster sampling method was adopted in this study, and samples were drawn from special education teachers from five Chinese provinces (Shandong, Jiangsu, Zhejiang, Anhui, and Fujian) and the city of Shanghai. The purpose and details of the study were provided to all the participants. After written consent, they were invited to complete an anonymous survey consisting of demographic items and questions. Completion of the survey took 15–20 min. The study was approved by the Human Research Ethics Committee of (Zhejiang Normal University).

A total of 650 questionnaires were distributed to the participants, and the return rate was 96.15%. Some questionnaire data were excluded due to the regularity of responses to questions. Among the 625 questionnaires, 615 were found valid, with an effective rate of 94.62%. More than 92% of the participants were female ($n = 567$), and 8% were male ($n = 48$). Most participants (68.6%) reported less than 10 years of work experience as special education teachers, while 17.4% had worked in the role for more than 21 years. Approximately 64.6% of the participants had undergraduate degrees, and 8.8% had master's degrees. Finally, 7.3% of the participants reported an average monthly income below 2500 RMB (\$375.60), 27.6% earned between 2501 and 4000 RMB (\$375.75–\$600.95), 37.4% reported between 4001 and 5500 RMB (\$601.10–\$826.31), and 27.6% earned more than 5500 RMB (\$826.46).

Measures

Psychological Capital Questionnaire

The 24-item revised Chinese version of the Psychological Capital Questionnaire (Li, 2007) was used to evaluate special education teachers' PsyCap. This version includes four dimensions—optimism, self-efficacy, resilience, and hope—and has been demonstrated to have good reliability and validity. The participants responded to all the items on a 6-point Likert response scale (1 = strongly disagree, 6 = strongly agree). In the present study, Cronbach's α of the scale was 0.94.

Utrecht Work Engagement Scale

The revised Chinese version of the Utrecht Work Engagement Scale was used to assess work engagement, which has been demonstrated to have good reliability and validity (Zhang and Gan, 2005). This questionnaire includes 17 items rated on a 7-point Likert response scale (0 = never, 6 = always) and comprises three dimensions—dedication, absorption, and vigor. Higher scores signify better work engagement. In the present study, the Cronbach's α of subscales of dedication, absorption, and vigor were 0.84, 0.90, and 0.92, respectively. The Cronbach's α of the scale was 0.95.

Special Education Teachers' Occupational Well-Being Questionnaire

Occupational well-being was measured using the Special Education Teachers' Occupational Well-Being Questionnaire (SETOWQ; Wang, 2017), which includes 25 items that assess occupational well-being in five dimensions—emotional happiness, professional happiness, physical and mental pleasure, environmental satisfaction, and interpersonal harmony. All items are measured on a 5-point Likert response scale (1 = strongly disagree, 5 = strongly agree), and this scale has been confirmed to be valid and reliable (Wang, 2017). In the present study, the Cronbach's α of the scale was 0.93.

Data Analysis

Descriptive statistics and correlation analyses were performed using SPSS20.0 and Mplus7.4 to explore the predictive effect of PsyCap as an independent variable on occupational well-being, and the mediation effects of work engagement in the association between PsyCap and occupational well-being. Harman's single-factor test was used to examine the common method biases that may arise from self-reporting in cross-sectional studies. Exploratory factor analysis of all the items revealed that the first factor of the total variance was 20.86%, which was less than the critical value of 40%. Therefore, no common method variance was found in this study's data.

RESULTS

Descriptive Analyses

Table 1 presents the means (M), standard deviations (SD), and correlations of all the variables. As expected, PsyCap was positively associated with occupational well-being ($r = 0.60$, $p < 0.01$) and work engagement ($r = 0.55$, $p < 0.01$). Work engagement was positively associated with occupational well-being ($r = 0.53$, $p < 0.01$), while dedication, absorption, and vigor were positively associated with PsyCap ($r = 0.53$, 0.47, and 0.50, respectively, $p < 0.01$) and occupational well-being ($r = 0.55$, 0.46, and 0.45, respectively, $p < 0.01$).

Measurement Model

According to Anderson and Gerbing (1988), the measurement model of all latent variables and manifest variables should be

tested before examining the structural model. The hypothesized measurement model in the current study included three interrelated latent variables—PsyCap, work engagement, and occupational well-being—as well as 13 manifest variables. The confirmatory factor analysis indicated that the measurement model had an acceptable fit to the data: $\chi^2 = 237.93$, $p < 0.001$, CFI = 0.95, TLI = 0.94, RMSEA = 0.07 [90% CI = (0.07, 0.09)], SRMR = 0.05.

Structural Model

Our main assumption was that PsyCap has a significantly positive direct effect on special education teachers' occupational well-being and work engagement (H1). We hypothesized that special education teachers' work engagement mediates the association between PsyCap and occupational well-being (H2). We examined these hypotheses using structural equation modeling. The hypothesized model indicated an acceptable fit: $\chi^2 = 411.11$, RMSEA = 0.07 [90% CI = (0.07, 0.08)], CFI = 0.93, TLI = 0.91, SRMR = 0.05. The results showed that special education teachers' PsyCap had significantly positive direct effects on their occupational well-being ($\beta = 0.62$, $p < 0.001$) and work engagement ($\beta = 0.63$, $p < 0.001$), confirming Hypothesis 1 (see Figure 1). To examine Hypothesis 2, we used the maximum likelihood bootstrap estimation procedure in Mplus7.4. All relevant effects were estimated with standard errors and confidence intervals (95%; 2,000 samples were drawn). The results indicated PsyCap had indirect effects on special education teachers' occupational well-being *via* work engagement. The effects and associated 95% CI are shown in Table 2.

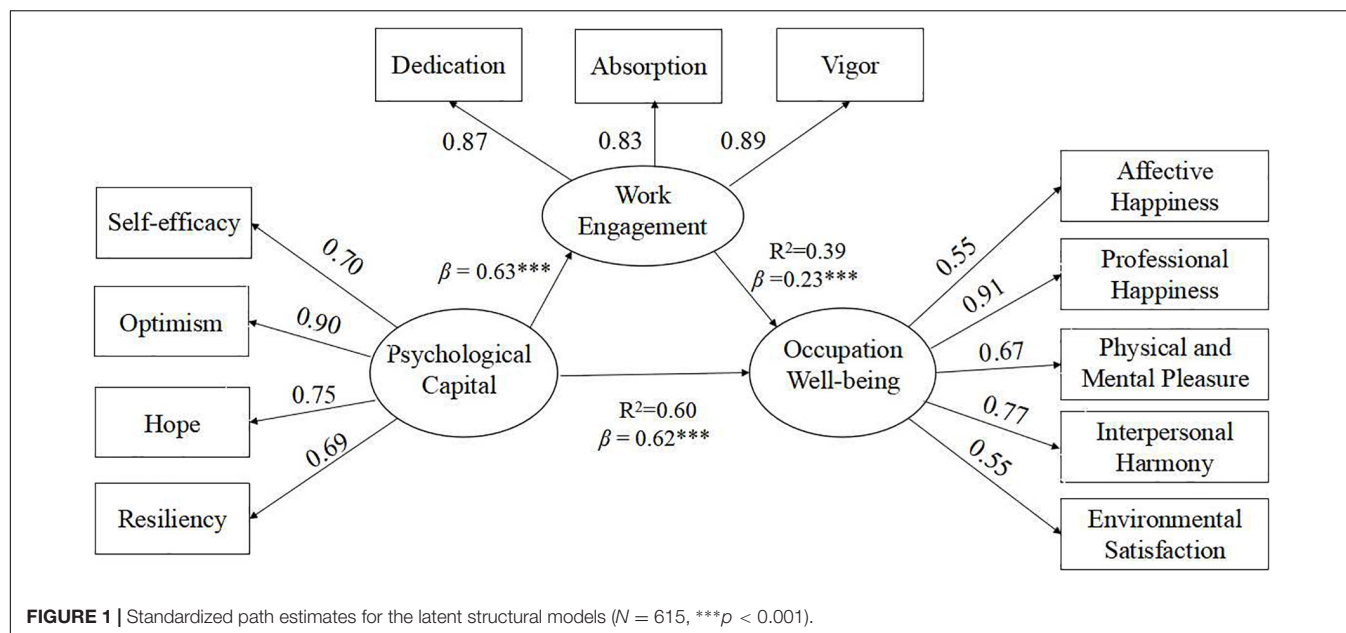
As work engagement contains three dimensions (absorption, dedication, and vigor), we conducted a multiple mediation analysis (Preacher and Hayes, 2008) to examine the mediational contribution of the components (H3). Dedication, absorption, and vigor were included as mediators between PsyCap and occupational well-being, and demographic variables were treated as covariates (gender, age, academic diplomas, major, and monthly income). The fit of the multiple mediation model was found acceptable: $\chi^2 = 336.76$, $p < 0.001$, RMSEA = 0.07 [90% CI = (0.06, 0.08)], CFI = 0.94, TLI = 0.90, SRMR = 0.04. As presented in the model (Figure 2), PsyCap positively predicted dedication ($\beta = 0.58$, $p < 0.001$), absorption ($\beta = 0.51$, $p < 0.001$), vigor ($\beta = 0.54$, $p < 0.001$), and occupational well-being ($\beta = 0.64$, $p < 0.001$). The indirect effects of PsyCap on occupational well-being *via* dedication and absorption were significant and positive (indirect effect = 0.11, 0.06), and the 95% bias-corrected bootstrap confidence interval did not contain 0 [95% CI = (0.05, 0.17), (0.01, 0.11)], except for vigor [95% CI = (−0.10, 0.02)].

Further examinations were conducted to test the size of the specific indirect effects. The results showed no significant difference between the mediating effects produced by dedication and absorption ($Z = 1.23$, $p < 0.05$), and the 95% confidence interval included 0 [95% CI = (−0.03, 0.13)]. The effect produced *via* vigor significantly differed from those *via* dedication ($Z = 2.83$, $p < 0.01$) and absorption ($Z = 2.01$, $p < 0.05$), and the 95% confidence interval did not include 0 [95% CI = (0.04, 0.22)],

TABLE 1 | Mean, Standard Deviations, and Correlations Between the Measures (N = 615).

	M	SD	1	2	3	4	5	6
1. PsyCap	4.70	0.52	–					
2. WE	4.25	0.78	0.55**	–				
3. Dedication	4.78	0.84	0.53**	0.90**	–			
4. Vigor	4.27	0.83	0.50**	0.92**	0.77**	–		
5. Absorption	3.79	0.89	0.47**	0.91**	0.71**	0.75**	–	
6. OWB	4.07	0.48	0.60**	0.53**	0.55**	0.45**	0.46**	–

PsyCap, psychological capital; WE, work engagement; OWB, occupational well-being. ** $p < 0.01$.



95% CI = (0.01, 0.15)]. Therefore, dedication and absorption can be considered as the primary mediators of the relationship between PsyCap and occupational well-being.

DISCUSSION

This study explored the association between PsyCap, work engagement, and occupational well-being of special education teachers and investigated the mediating roles of work engagement and its dimensions in the association between PsyCap and occupational well-being. We found that PsyCap of Chinese special education teachers had a significantly positive direct effect on occupational well-being, which corroborates previous evidence that PsyCap helps promote workers' performance and well-being (Kanapathy et al., 2016). COR theory argues that people strive to acquire and maintain personal resources, such as PsyCap (Hobfoll, 1989), which may contribute to the achievement of goals and improvement of well-being (Howard, 2018; Newman et al., 2018). PsyCap not only improves primary school teachers' well-being but also reduces their work stress levels, ultimately leading to a greater sense of well-being (Zhao and Zhang, 2014). Peng et al. (2018) deem that special education teachers with greater PsyCap are better at dealing with problems at work and have a greater sense of occupational well-being. Furthermore, the effect of PsyCap on well-being persists over time, and positive personal resources aid teachers in finding more meaning in life, which in turn enhances their well-being (Li, 2018).

Consistent with the JD-R model, our results suggested that PsyCap positively predicted special education teachers' work engagement, which supports prior findings (Khaleghkhah et al., 2017; Li et al., 2018). The JD-R model proposes that the characteristics of work can be divided into two types, job resources and job demands (Demerouti et al., 2001). Job

demands consume individual resources and can consequently lead to burnout, while job resources aid individuals in reducing personal consumption, reaching goals, and promoting individual development (Bakker and Demerouti, 2007). PsyCap is a personal resource that can provide teachers with energy, stimulate motivation, and promote work engagement (Mao and Xie, 2013). Special education teachers who believe in their abilities and have a positive view of engagement in work will perform well in their jobs, even when faced with difficulties; thus, they will be able to continue with their duties and remain fully engrossed in their work (Peng et al., 2018).

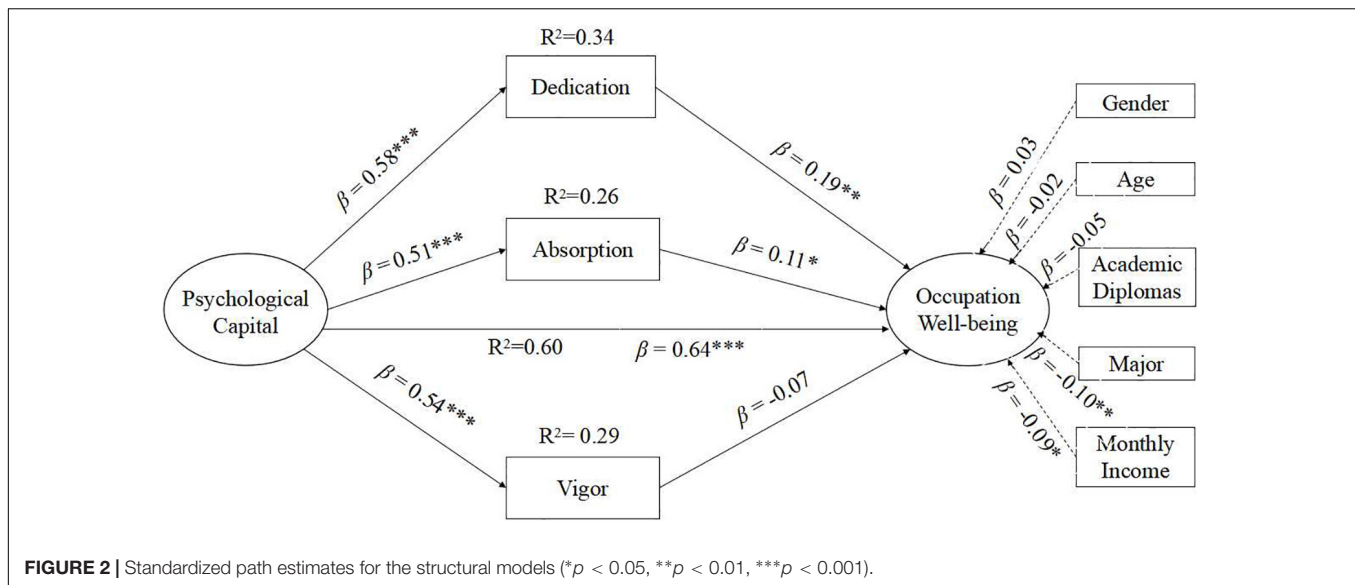
It is noteworthy that, in this study, a positive relationship between work engagement and occupational well-being was observed, and this relationship mediated the association between PsyCap and occupational well-being of the Chinese special education teachers. This finding is consistent with that of Adil and Kamal's (2016) study of university teachers in Pakistan. Their results indicated that higher levels of PsyCap among special education teachers enhance their work engagement, which in turn increases their occupational well-being.

To better reveal the internal mechanisms of PsyCap and occupational well-being, the current study conducted a multiple mediation analysis, setting the dimensions of work

TABLE 2 | The Effects and Associated 95% CI for the Mediation Model 1.

Model pathways	Estimated	SE	95% CI	
			LL	UL
PsyCap → WE → OWB	0.14	0.03	0.08	0.20
PsyCap → OWB	0.62	0.05	0.53	0.73

SE, standard error; CI, confidence interval; LL, lower limit; UL, upper limit; PsyCap, psychological capital; WE, work engagement; OWB, occupational well-being.



engagement (dedication, vigor, and absorption) as mediators. The results suggested that dedication and absorption mediated the association between PsyCap and occupational well-being, indicating that the role of those dimensions was not equal in the mediation relationship model. These results are consistent with those of previous research (Matthews et al., 2014) and may be due to the following reasons.

First, the findings may be related to the special education teaching profession. Most special education teachers tend to be caring and aware of the value and significance of their work with children with special needs, their families, and society. Therefore, special education teachers tend to focus on their work and actively participate in teaching and learning activities. They grow and gain happiness from their work to some extent.

Second, the vigor level of special education teachers is low. Although Chinese special education teachers often draw on resources of love and patience, their work is often considered trivial, monotonous, and repetitive, differing from the work of teachers involved with imparting scientific and cultural knowledge. In addition, primary school teachers usually have clear goals and are motivated to help their pupils achieve the best results that can enable them to gain access to good high schools. However, in special education, such goals do not exist, and there is little competition for promotion, so there is no sense of urgency that stimulates vigor (Chen et al., 2010). Furthermore, children with special educational needs often have functional or physiological disorders, and their teachers must practice stratified teaching and individualized rehabilitation according to each child's needs. The developmental progress of children with special needs is often slow. In addition, Chinese special education teachers demonstrate less competency in these occupational skills. Therefore, teachers' psychological resilience and vigor are easily eroded, resulting in lower work-related happiness (Chen and Yang, 2017), and even burnout (Garwood et al., 2018). Therefore, PsyCap could not predict occupational well-being through vigor.

IMPLICATIONS

In the current study, a positive association between PsyCap, work engagement, and occupational well-being of Chinese special education teachers validated the JD-R model and COR theory. Our findings imply that PsyCap is positively correlated with work engagement and occupational well-being; that is, teachers with higher PsyCap are more likely to experience work engagement and feel happier in Chinese special education schools. In line with our expectations, the association between PsyCap and occupational well-being was partially mediated by work engagement, implying that the PsyCap of special education teachers can predict their work engagement, which, in turn, can enhance their well-being. Specifically, the indirect effect of PsyCap on occupational well-being mainly occurs *via* dedication and absorption.

Some insights can be drawn from the results. Special education schools should guide teachers to pay attention to their PsyCap and help them learn how to self-regulate to improve their PsyCap levels. For example, their teaching skills can be improved through effective teaching demonstrations and group seminars so that their sense of efficacy is enhanced. In addition, schools can create a participative working atmosphere and encourage a harmonious professional relationship among teachers. This will promote teachers' positive emotional experience and encourage them to better devote themselves to their work, improving their occupational well-being.

To the best of our knowledge, this is the first study to explore the mediating role of work engagement in the association between PsyCap and occupational well-being in the Chinese context. The study was based on the JD-R model and COR theory and applied them to the domain of Chinese special education. Thereby, the study contributes to the empirical literature and aids further exploration of possible methods to improve special education teachers' enthusiasm for their work. The partial indirect effect of PsyCap on occupational well-being indicates

that there might be other variables affecting this relationship, such as teacher efficacy and social support (Dixon et al., 2014). Future research could examine external resources and other personal resources in this model.

LIMITATIONS

Although this study's results contribute to the understanding of the internal mechanisms of how work engagement operates in the relationship between PsyCap and occupational well-being among Chinese special education teachers, several limitations should be noted. First, this study adopted a cross-sectional design; thus, it is difficult to confirm causal relationships between the variables. Future studies could test these results using longitudinal studies to determine the causal relations among PsyCap, work engagement, and occupational well-being. Second, collection of PsyCap, work engagement, and occupational well-being data depended on self-report questionnaires, which could have been influenced by personal subjectivity to some extent. In the future, researchers may consider using qualitative and quantitative methods. Third, this study's participants were mainly sampled from the east coast of China; therefore, the results cannot be generalized to special education teachers across the whole country. Consequently, future studies should expand the sample size to examine the applicability of our results to the general population.

CONCLUSION

This study provides insights regarding the association between PsyCap, work engagement, and occupational well-being of Chinese special education teachers. Our research demonstrated that PsyCap and work engagement are positively associated with occupational well-being and that Chinese special education teachers' work engagement can mediate the association between their PsyCap and occupational well-being. Notably, we found that work engagement plays an important role through which

PsyCap enriches teachers' occupational well-being. Specifically, dedication and absorption were found to be the primary mediators of PsyCap and occupational well-being.

DATA AVAILABILITY STATEMENT

The raw data from this study are relevant to subsequent research and therefore unavailable. If researchers are interested in or need the data, they can contact the first author of this study.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Human Ethics Committee of Zhejiang Normal University. The participants signed the informed consent form and completed the questionnaire anonymously.

AUTHOR CONTRIBUTIONS

QG designed this study, collected the data, and wrote and revised the manuscript. YW wrote and revised the manuscript. QL and TW revised the manuscript. LZ collected the data. ZH wrote the manuscript. SC designed the study and revised the manuscript. All authors contributed to the article and approved the submitted version.

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Personality Traits, Technology-Related Teaching Skills, and Coping Mechanisms as Antecedents of Teachers' Job-Related Affective Well-Being and Burnout in Compulsory and Higher Education Online Teaching Settings

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Teachers' job-related well-being has been affected by the sudden shift to emergency remote online teaching due to the COVID-19 pandemic which has totally reshaped the task performance. Therefore, this study attempts to enlighten the possible reasons for the deterioration in teachers' job-related well-being and proposes an integrated application of three models of prediction for job-related affective well-being and burnout as teachers' indicators for the well-being in online teaching settings. The first model includes personality traits (extroversion, neuroticism, and conscientiousness) measured with the revised neuroticism, extroversion, and openness personality inventory (NEO-PI-R). The second model integrates an indispensable skill for the online teaching which is technological pedagogical content knowledge (TPCK) as technology-related teaching skill conceptualized by the TPACK framework. The TPACK model is a technology integration that identifies three types of knowledge instructors need to combine for successful EdTech integration - technological, pedagogical, and content knowledge (i.e., TPACK). The third model, a multidimensional one, includes coping mechanisms (e.g., problem-focused coping, emotion-focused coping, social support coping, and avoidant coping) as mediators in the relationship between personality traits and TPCK on the one side, and job-related well-being indicators on the other side. Findings from regression analyses were used to test the first two models, and the findings from a mediation analysis were used to test the third model to show that teachers' TPCK explains a significant amount of variance in the job-related affective well-being of the teachers. The analyses also demonstrate that avoidant coping particularly mediates the relation between burnout and job-related affective well-being during COVID-19 school closures. Results indicate the efficacy of the TPACK model in increasing the job-related well-being of the teachers. The analysis of the data led to recommend that

teachers should improve their personal technology-related teaching skills and adopt coping strategies in consistent with their personality traits. Moreover, public schools, as organizations, could advance educational technology programs to enhance technology-related teaching skills with the aim of increasing the well-being of their employees in online teaching settings.

Keywords: online teaching, well-being, personality traits, digital competence, coping strategies

INTRODUCTION

Holmes et al. (2020) indicated that the most crucial consequence of remote working during the COVID-19 crisis is the work-related well-being of the employees. The difficulties in organizing distance learning became a source of stress for many teachers (Palareti, 2020). However, a systematic review comprising studies carried out before the pandemic (January 2005–December 2019) found that teachers present high levels of anxiety or stress due to their use of educational technology in the classroom (Fernández-Batanero et al., 2021). Specifically, the absence of prior training in online teaching techniques (Çoklar et al., 2016) or the pressure to acquire technological skills or the changes in the teaching methods (Amarilla and Vargas, 2009; Jena, 2015) have been previously proven to increase the stress of the teachers. In the actual pandemic context, it can be asserted that these educational technology demands might have consequences in the decrease and burnout growth of the teachers' job-related affective well-being. Yet, independent of the type of stress, stress itself may be perceived differently by each teacher depending on the level of technological knowledge/resources (König et al., 2020) or skills, such as the self-efficacy to cope better with new and unexpected situations of high stress (Rabaglietti et al., 2021). Teachers' subjective well-being is a topic often addressed in research (Garland et al., 2020), but the digital transition in the education domain has necessitated the analysis of well-being in online teaching settings. Subjective well-being is a composite of life satisfaction, high levels of positive affect, and low levels of negative affect (Diener, 1984), where affective well-being constitutes the core aspect of subjective well-being at work (Warr, 2007; Diener et al., 2009). Also, well-being is described as a multidimensional concept, with burnout as a specific job-related construct of poor well-being (Sonnentag, 2015) measured in a previous study as a negative indicator of the teachers' well-being (Lauermann and König, 2016). Following Renshaw et al. (2015) who stated that research on teachers' subjective well-being has targeted teacher burnout while neglecting the positive dimension of teachers' subjective well-being, the present study approaches the job-related affective well-being which is considered to be the most researched positive indicator of the well-being of the teacher (van Horn et al., 2004), and burnout as a negative indicator of teacher functioning during online work or the negative side of employee well-being (Mäkikangas et al., 2016). Thus, in the current study, job-related well-being as a subjective well-being dimension was measured through two indicators, job-related affective well-being as the positive marker and burnout as the negative marker. However, how far the impact of technologies and digital services might affect people's mental, physical, social,

and emotional health, depends on the individuals' personal context, circumstances, and their capacity to deal with or take advantage of the technologies and digital services (JISC, 2019). The COVID-19 pandemic has been described as an exceptionally uncertain situation that reveals dispositional characteristics of individuals (Judge and Zapata, 2015), such as personality traits that influence how people experience and perceive the world (Leger et al., 2021), or their characteristic adaptations related to coping styles (Waaktaar and Torgersen, 2010; Zager Kocjan et al., 2021) which lead the people either to successfully overcome the situation or make them unsuccessful in overcoming the situation. Thus, the individual's response to a stressful situation is a complex result of the interactions among various factors where a psychological profile plays a key role (Steel et al., 2008) but cultural features are important as well (Biggs et al., 2017). Empirical arguments for the predictive role of personality traits for well-being was systematically analyzed (DeNeve and Cooper, 1998; Røysamb et al., 2008; Weiss et al., 2008; Anglim et al., 2020; Zager Kocjan et al., 2021) and determined that personality explained two-thirds of the variance in the affective dimensions of well-being (Josefsson et al., 2011). Consequently, there is a need for integrating the contributions of personality to well-being on the currently proposed models of teachers' job-related well-being to establish the predictive role of other personal skills or characteristics over and above the personality traits. In addition, the COVID-19 pandemic is an exceptional situation regarding the switching of professional life to an online environment for many workers. Thus, not only knowledge but also technology-related teaching skills are required to use digital technologies efficiently during online teaching (Simons et al., 2017). As a result, digital skills have become essential for the teachers during this pandemic, but in most cases, teachers have not been trained in the necessary technical and pedagogical skills to integrate digital technology instruction (Schleicher, 2020). Therefore, the literature shows that implementing new technologies fundamentally affects individuals (Colbert et al., 2016) by forcing them to adopt the most efficient digital communication tools and to develop task-related digital competencies (Ter Hoeven et al., 2016). Solid evidence for how individual information communication technology (ICT) usage influences the employees' well-being through shaping job demands, job autonomy, and relational aspects was identified (Wang et al., 2020). However, the effect of this exertion on the employees' well-being depends on a series of factors. One previous study carried out in three Norwegian universities reveals that technology acceptance significantly impacts the academic employees' work engagement as a dimension of work well-being (Shamsi et al., 2021). In the current pandemic, the Romanian

education institutions and their employees shifted to remote work which involved new job demands, entailing a massive use of technologies throughout different types of videoconferencing activities like online teaching and an impressive reshaping of educational approaches (Nania et al., 2021). Moreover, Romania does not have any system with a long history of remote learning like other countries (i.e., Australia) (Dabrowski, 2020). For this reason, the Romanian educational staff may represent a “reference population” to investigate technology-related factors for job-related well-being. Although empirical evidence has shown that learning-induced demands can negatively affect the employees’ well-being (Wang et al., 2020), these detrimental effects can be alleviated in individuals with higher levels of technology self-efficacy (Tarafdar et al., 2015). Based on theoretical arguments presented above, the present study aimed to explore the role of an understudied technology-related factor, TPACK, on job-related well-being because, according to Mishra and Koehler (2006), knowledge related to digital technology and teaching content have been shown to be necessary for teachers when teaching with technology. In addition, a previous study argued that personality traits explain individual differences in stress reactions (Zager Kocjan et al., 2021) and that teachers’ coping responses to stressors were related to their well-being (Talbot and Mercer, 2019; Herman et al., 2020; MacIntyre et al., 2020). Although a considerable amount of research on well-being and coping strategies has been published, no one has studied the relationship between them in case of job-related well-being in online teaching settings. Based on the transactional model of stress (Lazarus and Folkman, 1984), one may also expect a moderating effect of coping strategies in the relationship between personality traits and knowledge related to digital technology in online teaching on one side and job-related well-being on the other side.

Since teachers do not know how long the pandemic will increase the amount of time they are required to spend online or what is in store for them in the future regarding the social distancing practices, the present study contributes to a better understanding of the mechanisms that affect teachers’ job-related well-being in online teaching settings. Specifically, the purpose of the current study is to assess the predictive role of the teachers’ technology-related teaching skills over and above personality traits and the function of coping mechanisms as mediators in the relationship between personality dimensions and the teachers’ job-related well-being during the COVID-19 pandemic. So far, the teachers’ technology-related teaching skills as the predictor and the multidimensional model of prediction including coping strategies as mediators for teachers’ job-related well-being indicators have not been studied in any previous studies. Consequently, the present study may interest the educators because it expands the research regarding the relationship between personality traits and teachers’ job-related affective well-being and explains the dynamic of the relationship between personality and the coping strategies of the teachers’ job-related well-being under conditions of intense or enduring stress, during the pandemic period. From a practical point of view, the improvement of teachers’ job-related well-being through psychological variables, such as coping strategies or

technology-related teaching skills that can be learned, would enable positive outcomes related to well-being like long-time retention or high job performance. From a theoretical point of view, the present study aims to evaluate the risks or the potential benefits of increasing job-related affective well-being throughout the improvement of technological skills, even when the pandemic ends. Thus, the current study seeks to close an existing scientific gap in the literature regarding the role of personality traits, coping strategies, and technology-related teaching skills for reducing teachers’ burnout and increase job-related affective well-being by aiming to assess two major questions: (1) How is teachers’ job-related well-being affected by their technological pedagogical content knowledge? and (2) What impact do teacher coping strategies have on the job-related well-being in relation to teacher personality traits and/or technological pedagogical content knowledge level?

The research questions were developed to better understand the well-being as a job outcome in specific conditions enforced by the COVID-19 pandemic for a specific professional group, teachers from the Romanian public schools and the universities, with the aim of highlighting possible ways to increase the well-being in online teaching settings and to lead the way for future comparison in different cultural context. To answer the research questions, the conceptual framework for assessing the target variables is presented further.

Subjective Well-Being in Online Teaching Settings

Subjective well-being refers to the extent to which a person believes or feels that his life is going well, including both cognitive evaluations and affective feelings (Diener et al., 2018). The present study taps the affective dimension of well-being in the work context. Much of the historical research on the teachers’ subjective well-being has targeted the teacher stress and burnout (Renshaw et al., 2015); while other studies have explored the utility of the positive subjective well-being indicators, such as positive emotions (van Horn et al., 2004). The present study was guided by the Hedonistic tradition in a conceptualized well-being (Deci and Ryan, 2008), measuring the balance of positive and negative emotions (Alexandrova, 2015). Although it is possible for someone to be experiencing both the indicators at the same time (Deci and Ryan, 2008), the positive subjective well-being indicators have been empirically supported as being distinct from and in addition to the negative indicators (van Horn et al., 2004). Even though researchers have found that well-being is relatively stable despite short-term fluctuations in response to transient events (Anglim et al., 2020), teachers are faced with new normalcy brought by the COVID-19 pandemic. The fact that many teachers have been asked to support their students through online practices has opened new ideas in terms of teacher well-being. As a result, educators must take into consideration the term, “well-being in online teaching settings.” A systematic narrative review (Best et al., 2014) found a variety of results with regard to how the online world may influence well-being. Research has indicated that remote workers work more (Aborg et al., 2002) and suffered from a

perceived increase in workload (Molino et al., 2020). Although several humans–computer interaction studies underline the link between stress and individual well-being (Garcia-Ceja et al., 2016), and ways that digital technologies can affect mental processes (Passey, 2021), it is worth accentuating that there could be wider consequences in implementing digital technologies in the teaching settings. This might result in an interference with different indicators of well-being due to the complicated nature in the relationship between internet usage and subjective well-being (Ong et al., 2021). In addition, research has indicated that cultural context plays a major role in subjective well-being (Diener et al., 2018). Employing Warr's (2002, 2007) model in examining the work-related well-being, the present study measures the well-being in online teaching settings focusing on job-related affective well-being and the burnout of Romanian teachers during the 2.5 months of the COVID-19 pandemic period. Job-related affective well-being targets the positive and negative effects which are defined as positive and negative emotions and moods that a person feels (Diener and Suh, 1997); while burnout is a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed (World Health Organization, 2019). The burnout is a severe consequence of prolonged exposure to stress at work (Kalimo et al., 2003), a state characterized by deactivation and displeasure (Mäkikangas et al., 2016) as well as a syndrome characterized by emotional exhaustion, depersonalization, and lacking personal accomplishment (Maslach and Leiter, 2008). Utilizing Maslach and Leiter's (2008) dimensional model of burnout, the current study analyzes emotional exhaustion and depersonalization as negative indicators of teachers' well-being because they are considered the core components of burnout (Bakker et al., 2006). Thus, if job-related affective well-being specifically taps the affective dimension of well-being, burnout measures have been provided in the research literature, as well, when assessing the negative side of the employee well-being (i.e., Rothmann, 2008; Mäkikangas et al., 2016; Virgă and Iliescu, 2017). On the other hand, studies that examined the association between well-being and burnout have concluded that a reduced state of well-being might reflect the presence of burnout (Pillay et al., 2005; Milfont et al., 2008).

Personality Traits as Predictors for Subjective Well-Being

Before the COVID-19 pandemic, the predictive validity of dispositional personality traits was more often examined in the general population under everyday circumstances. A previous study has shown that personality traits described by the five-factor personality model are related to subjective well-being (Anglim et al., 2020; Røysamb et al., 2008; Weiss et al., 2008) and this relationship is stronger particularly when neuroticism, extroversion, and conscientiousness are analyzed (DeNeve and Cooper, 1998). Extroversion usually has the highest correlations with the measures of well-being, while neuroticism typically has the highest correlations with the negative indicators of psychological functioning as a well-being indicator (Anglim et al., 2020). However, personality traits may be good candidates for

explaining individual differences in stress reactions, including subjective well-being (Zager Kocjan et al., 2021). As a result, the personality traits were extensively analyzed recently as a predictor for changes in the perceived stress of the COVID-19 pandemic (i.e., Al-Omiri et al., 2021; Shokrkon and Nicoladis, 2021; Zacher and Rudolph, 2021). A recent study found that during the COVID-19 pandemic, individuals with high neuroticism worried more about the consequences of the pandemic and experienced more negative effects during this preoccupation (Kroencke et al., 2020). The present study follows this direction and analyzes the direct and indirect effects of personality traits (extroversion, neuroticism, and conscientiousness) for the well-being in online teaching settings. Considering that personality is critical to the experience of well-being (Anglim et al., 2020) and having unique physical distancing measures introduced during COVID-19 like online teaching, the following hypothesis was formulated:

Hypothesis 1. Extroversion and conscientiousness are positively correlated with job-related affective well-being; neuroticism is negatively correlated with job-related affective well-being (H1a); also, extroversion and conscientiousness are negatively correlated with burnout, while neuroticism is positively correlated with burnout (H1b).

Technological Pedagogical Content Knowledge as Essential Dimension for Teacher Well-Being in Online Teaching Settings

Concerns about the appropriate uses of technologies in the teaching practices as well as the digital well-being that includes teachers have been studied in-depth (Diefenbach, 2018), but the link between the uses of digital technologies and how they might positively support the teacher well-being has received limited research attention (Passey, 2021). A previous study emphasizes that factors, such as the lack of technological knowledge (La Paglia et al., 2008; Wang and Li, 2019) or problems experienced with the use of technology (Al-Fudail and Mellar, 2008) contributed to an increased level of teachers' stress. The pandemic has caused the need of integrating digital technologies into daily routines at an unprecedented rate (Dennis, 2021) and different types of knowledge related to digital technology, instruction, and teaching content are assumed to be necessary for teachers when teaching with technology (Mishra and Koehler, 2006). Technology-related teaching skills include identifying and using the appropriate technologies in a way that facilitates a broad range of learning activities relevant for students (Chi and Wylie, 2014). As many teachers had limited access to conventional teaching materials during the lockdown, those who had been trained in searching for and selecting online teaching materials may have better opportunities to provide support to their students. As a result, they might have been more confident and less stressed in online teaching settings. The literature already highlights that the lack of digital competencies among teachers has caused a high level of fatigue, stress, and a negative emotional state during the transition to online teaching

(Oyedotun, 2020; Sokal et al., 2020; Mikuska, 2021). Studies have also shown that there is a significant variance in the skills of teaching professionals (Vähäsantanen and Hämäläinen, 2019) as well as a variation between and within countries to the degree to which the teachers use digital technologies in their work (Fraillon et al., 2019). Thus, technology-related teaching skills may count for an additional effect over and above personality traits in predicting burnout and job-related affective well-being.

The technological pedagogy content knowledge (TPACK) developed by Mishra and Koehler (2006) is the paramount framework in the present research when investigating the impact of technology-related teaching skills on teacher well-being in online teaching settings. The TPACK model of Mishra and Koehler extends Shulman's (1986) perspective which postulates that teachers need a combined knowledge of content and pedagogy known as pedagogical content knowledge. Mishra and Koehler (2006) added a third component to Shulman's (1986) model of pedagogical knowledge (PK) and content knowledge (CK) which is technological knowledge (TK). As a result, four hybrid components were formed at the intersections of the different knowledge areas, known as pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and TPCK (Mishra and Koehler, 2006). Presently, the TPACK model is one of the most prominent models to enhance teacher knowledge for the effective use of digital technologies in teaching (Schmid et al., 2020). The central component of TPACK is TPCK because it is considered to arise from the integration of the other components of teacher knowledge. In this integrative view, high levels of TPCK will be constituted by high levels of TPK, TCK, PCK, TK, PK, and CK. On the other hand, in the transformative view, TPCK is considered more than the fusion of the core components and is regarded as a distinct form of knowledge. Irrespective of which approach is taken into consideration, if results remain inconclusive regarding the interplay of TPACK knowledge domains (Celik et al., 2014; Dong et al., 2015), the TPCK will provide a quicker and global assessment of knowledge required by teachers for integrating technology into their teaching in any content area. Consequently, from the survey on teachers of various subjects, a general perspective on teacher knowledge was measured using the TPACK model. At present, one of the most widely used self-report instruments is the survey developed by Schmidt et al. (2009) for assessing teachers' TPACK knowledge domains. However, previous findings argue that the TPACK model influenced the existence of technostress in teachers and their disposition toward educational technology (Joo et al., 2016).

Therefore, teachers' TPACK competence can be considered a decisive resource for teacher well-being during the adaptation to online teaching during COVID-19 school closures, and besides the traditional role of personality traits (extroversion, neuroticism, and conscientiousness), the technology-related teaching skills also play an essential role in employee well-being. Consequently, the following hypothesis was formulated:

Hypothesis 2. Technological pedagogical content knowledge is positively correlated with job-related affective well-being (H2a) and negatively correlated with burnout (H2b).

The Role of Coping Strategies for Subjective Well-Being

Coping is the process of responding to a stressor using one or more available strategies for reducing, minimizing, or tolerating stress (Gustems-Carnicer and Calderón, 2013) and it comprises an effort to handle new situations that are likely to be demanding (Lazarus and Folkman, 1984; Lazarus, 2006) when limiting the concept of coping to voluntary responses (Compas et al., 2001). A rapid shift to online teaching, as a measure imposed during the COVID-19 pandemic, can be considered as being demanding, and it entails a deliberate effort to cope with a new type of teaching and networking with the students. Researchers have outlined that the individual differences in teachers' coping skills are at the core of leading to teacher stress in addition to the competency in executing practices that effectively manage the teaching-learning process (Herman et al., 2020). Thus, teachers' use of coping responses to stressors is an important determinant of their psychological adjustment and well-being (Talbot and Mercer, 2019).

Lazarus and Folkman (1984) divided the coping strategies into emotion-focused and problem-focused strategies in their "transactional model" of stress and behavioral self-regulation but Carver and Scheier (1998) argued that this distinction is too simplistic. Consequently, they developed a multidimensional model of coping accompanied by a measurement instrument, the coping orientation to problems experienced (COPE) Inventory (Carver et al., 1989). Carver et al. (1989) identified four dimensions/factors of coping: *coping focused on the problem* (including affective approach, planning and deletion of concurrent activities as coping strategies), *coping focused on emotions* (including positive interpretation and growth, abstention, and acceptance), *coping focused on search for social support* (covered by the use of social-instrumental support, social-emotional support, and focusing on expressing emotions as coping strategies) and *avoidance coping* (denial, mental, and behavioral deactivation as coping strategies). This study opted for the previously presented classification. Substance consumption, religious approach, and humor are coping strategies proposed by Carver et al. (1989) but they have not been included in the measured dimensions since these scales seemed to be rather heterogeneous and independent ways of coping that are not related to a specific latent common factor on the Romanian population (Crasovan and Sava, 2013). Although Carver does not recommend viewing the COPE Inventory as a single scale to measure a general construct and emphasized that it is important not to preordain certain strategies as better than others (Carver et al., 1989), some researchers grouped coping strategies into larger constructs, such as "approach" and "avoidant" coping styles (Rosario et al., 2003). Approach strategies actively work to change the stressor or accept its presence in one's life while avoidant coping strategies tend toward more dysfunctional

responses, such as denial or distraction. Studies have shown that well-being correlates positively with the coping approach and negatively with avoidant coping (MacIntyre et al., 2020). A concern throughout the literature on stress and coping is how successful different coping strategies are in producing more positive outcomes, and lead to fewer negative outcomes. Research indicates that the option of a coping strategy is largely dependent on personal traits and although personality and coping are related, coping is not simply a direct manifestation of personality under adverse conditions (Carver and Connor-Smith, 2010). Other studies indicate that coping is less stable than personality and coping predicts adjustment over and above personality (Connor-Smith and Flachsbart, 2007), imposes the need to distinguish both concepts empirically, and to treat them independently, as different constructs. However, while the Big Five personality traits represent broad dispositional traits that describe a person's behavior in many different contexts across time, coping mechanisms can be seen as a characteristic adaptation (Waaktaar and Torgersen, 2010). Self-regulation, for example, has been proposed as a mechanism for explaining the relationship between personality and subjective well-being (Carver and Scheier, 1990). Resilience is an underlying mechanism through which basic personality dimensions predict indicators of psychological functioning during the COVID-19 pandemic, including subjective well-being (Kocjan et al., 2021). Other studies also found a direct link between coping and burnout, where the role of coping is to alleviate the levels of emotional exhaustion and cynicism (Yip et al., 2008; González-Morales et al., 2010). Drawing on the arguments outlined above, it was investigated how successful different coping strategies were as mediators between personality traits and well-being indicators during online teaching in the COVID pandemic, and consequently, the following hypothesis was formulated:

Hypothesis 3. Problem-focused coping (H3a), emotion-focused coping (H3b), social support-focused coping (H3c), and avoidant coping (H3d) mediate the relationship between personality traits and teacher well-being indicators.

MATERIALS AND METHODS

Sampling and Participants

The research was conducted on a convenience sample, and the responses were gathered using the snowball sample method, depending on teachers' availability. Two hundred eighty-four teachers completed the online questionnaire. The mean age in the current sample is 43.37 ($SD = 8.79$). The detailed description of the sample from a socio-demographic perspective is presented in **Table 1**.

Procedure

Data were collected using Google Forms, a commonly used method during the pandemic (Di Monte et al., 2020; Maugeri et al., 2020). Since all responses were compulsory, no missing data were recorded. The survey was shared *via* social media networks

TABLE 1 | The demographic profile of respondents ($N = 284$).

	Frequency	Percent
Gender category		
Male	44	15.5
Female	240	84.5
Marital status		
Single	74	26.1
Married/in a relationship	210	73.9
Level of teaching		
Pre-school and primary	81	28.5
Gymnasium and high school	128	45.1
University	75	26.4

of teachers and through personal email contacts between April 15 and June 30, 2021. The link containing the questionnaires was distributed to more than four hundred teachers working in pre-university and university education in Romania's Western area. Before the first section of questions, the purpose of the study and ethical aspects relevant to the informed consent, before participating, was explained. Respondents were advised on the consent page not to take part or quit at any time if they felt uncomfortable thinking about their feelings or personal characteristics, and were informed about the necessary time for filling the survey (between 15 and 20 min). The main inclusion criteria were that all teachers have the legally required qualification for teaching in compulsory and higher education and to be full-time employed, according to the methodological norms in force. Since teaching with technology differs at baseline regarding educational stages, especially when comparing primary/elementary schools with universities (Fernández-Batanero et al., 2021), the existence of possible differences in the technological knowledge across the three categories of teachers were explored. No significant difference regarding TPCK was found between the teachers of primary, secondary, and tertiary levels of education. Thus, teachers from compulsory and university education were included together because it can be considered that they have the same background regarding adaptation to online teaching settings, irrespective of their teaching levels or subject areas of teaching. Moreover, all participants passed at the same time in online teaching setting without previous training in using Microsoft Teams, Moodle, or Zoom as ICT platforms adopted by the Romanian educational system. Further, the differences between all the levels of teaching in compulsory and university education regarding job-related affective well-being and burnout as job-related indicators were checked and no differences between the groups were found.

Measures

Job-related affective well-being (JAW) was measured using the job-related affective well-being scale (JAWS) developed by Van Katwyk et al. (2000), which consisted of 10 positive and 10 negative job-related effects, the respondents had experienced in the last 30 days. The respondents were asked to choose one out of the five variable categories ranging from "never"

to “extremely often.” Examples of the items include: “My job made me feel disgusted” or “My job made me feel inspired.” Higher scores on the scale indicate higher levels of job-related affective well-being. The scale was extensively used in other cultural contexts as a measure of job-related affective well-being (Schaufeli and van Rhenen, 2006; Basińska et al., 2014) and with Romanian employees as well (Ciceș, 2012). It was checked for accuracy using the standard back-translation technique (Brislin, 1970). In terms of construct validity, confirmatory factor analysis (CFA) using R (R Core Team, 2021) revealed acceptable fit measures for the current sample [$\chi^2 = 655.62$, $df = 169$, $p < 0.001$; comparative fit index (CFI) = 0.89, Tucker–Lewis’s index (TLI) = 0.87, root mean square error of approximation (RMSEA) = 0.10 (0.09, 0.19), and standardized root mean square residual (SRMR) = 0.06]. Cronbach’s alpha value of the scale, as a reliability measure for the present sample, reveals an excellent internal consistency ($\alpha = 0.95$).

Burnout was assessed with two scales of the Maslach Burnout Inventory-General Survey (Schaufeli et al., 1996), emotional exhaustion, and cynicism. Each scale is composed of five items. Examples of the items include: “I feel emotionally drained from my work” (exhaustion) and “I have become more cynical about whether my work contributes anything” (cynicism). All items were scored on a seven-point scale ranging from 0 (never) to 6 (always). The factorial validity of the Maslach Burnout Inventory—General Survey is similar across a wide variety of occupations of employees recruited through the Internet (Bakker et al., 2002). The instrument was previously validated on a Romanian population (Bria et al., 2014) and used as a measure for the negative dimension of job-related well-being not only in a Romanian sample (Virgă and Iliescu, 2017) but in different studies measuring the teachers’ well-being (Lauermann and König, 2016). The overall burnout score composed of exhaustion and cynicism scores was used in the study since it is considered that exhaustion and cynicism represent the core dimensions of burnout (Schaufeli and Taris, 2005). In terms of construct validity, CFA indicated very good fit measures [$\chi^2 = 176.84$, $df = 34$, $p < 0.001$, CFI = 0.92, TLI = 0.90; RMSEA = 0.12 (0.10, 0.14), SRMR = 0.05] for the present sample. Both the scales had excellent reliability measured through internal consistency (emotional exhaustion, $\alpha = 0.91$; cynicism, $\alpha = 0.81$) in the current sample.

Personality traits were assessed using the short version of the IPIP scales which measure three NEO-PI-R factors, such as extroversion, conscientiousness, and neuroticism in the short version. The scales were adapted for the Romanian population by Iliescu et al. (2015). Each scale consists of 10 items, five items are scored positive, and five items are scored negative. Examples of the items include: “I feel comfortable around people,” for extroversion, “I am very attentive to details,” for conscientiousness, and “I often feel sad,” for neuroticism. All items were scored on a five-point scale ranging from 0 (strongly disagree) to 4 (strongly agree). For the present sample, scales had adequate fit measures in terms of construct validity, considering the small sample size [$\chi^2 = 1268.12$, $df = 402$, $p < 0.001$,

CFI = 0.77, TLI = 0.75; RMSEA = 0.08 (0.08, 0.09), SRMR = 0.08] and excellent internal consistency as reliability indicator ($\alpha = 0.87$ for extroversion; $\alpha = 0.78$ for conscientiousness, and $\alpha = 0.86$ for neuroticism).

Technology-related teaching skills were measured with the technological pedagogical content knowledge scale (TPACK) from the TPACK questionnaire (Schmidt et al., 2009). The scale contains five items scored on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example item is “I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn.” The scale was used in other cultural contexts as a measure of aspects related to ICT in cases of teachers (Abbitt, 2011; Chai et al., 2011; Yurdakul et al., 2012; Rienties et al., 2013). It was checked for accuracy using the standard back-translation technique (Brislin, 1970). In terms of validity, CFA indicated a very good fit of measures [$\chi^2 = 21.36$, $df = 5$, $p < 0.001$, CFI = 0.98, TLI = 0.97; RMSEA = 0.10 (0.06, 0.15), SRMR = 0.02]. Cronbach’s alpha value of the scale for the present sample reveals an excellent internal consistency ($\alpha = 0.92$).

Coping strategies were measured using the COPE Inventory developed by Carver et al. (1989). The questionnaire consists of 48 items developed to measure 12 different coping strategies. The present study used the score for second-order factors as recommended by Carver et al. (1989) from the Romanian version of COPE Inventory adapted by Crasovan and Sava (2013). The coping mechanisms measured are as follows: (1) coping focus on the problem (including active approach, planning, and deletion of concurrent activities as coping strategies); (2) coping focus on emotions (with positive interpretation and growth, restraint, and acceptance as component strategies); (3) coping focus on social support (use of the social-instrumental support, the social-emotional support, and focusing on expressing emotions scales), and (4) avoidance coping (containing denial, mental, and behavioral deactivation as scales). Examples of items include: “I concentrate my efforts on doing something about it,” for active approach as a part of problem-focused coping; “I force myself to wait for the right time to do something,” for restraint as emotion-focused coping; “I ask people who have had similar experience of what they did,” for the use of the social-instrumental support as social support focused coping; or “I go to movies or watch TV, to think about it less,” for mental deactivation as an avoidant coping mechanism. The answers were measured on a Likert scale from 1 (“I usually don’t do this at all”) to 4 (“I usually do this a lot”). The COPE inventory is regarded as a standard norm for measuring coping strategies and ability to self-regulate in response to different experienced stressors (MacIntyre et al., 2020; Agha, 2021; Gurvich et al., 2021). The present study used the dispositional or trait-like version in which respondents report the extent to which they usually do the things listed when they are stressed. The CFA for construct validity verification indicated adequate fit measures [$\chi^2 = 340.43$, $df = 48$, $p < 0.001$, CFI = 0.78, TLI = 0.70; RMSEA = 0.14 (0.13, 0.16), SRMR = 0.14] for the present sample, considering negative correlation between the factors themselves. Cronbach’s alpha value of the scales as reliability measure is 0.73 for emotion-focused coping, 0.79 for

social support-focused coping, and 0.80 for both avoidant- and problem-focused coping.

Data Analyses

To assess the validity of our measures and verify the possible occurrence of common method bias (Podsakoff et al., 2012), a CFA using the Lavaan package (Rosseel, 2012) in R (R Core Team, 2021) was conducted for the first and for the second hypothesis. Two measurement models: M1, a model with four factors (extroversions, conscientiousness, neuroticism, and TPACK), and M2, a single factor model for the first hypothesis (Podsakoff et al., 2012) were compared. The same algorithm was maintained for the second hypothesis where an eight-factor measurement model, M3 (extroversions, conscientiousness, neuroticism, TPACK, problem-focused coping, emotion-focused coping, social support-focused coping, avoidant coping, job-affective well-being, and burnout) and a single factor model, M4 were compared. Model fit was evaluated using a maximum likelihood estimation; also, two relative fit indices (TLI and CFI), and three absolute fit indices (the chi-square statistic; SRMR, and RMSEA) was calculated. The cut-off values for the acceptable fit are as follows: RMSEA < 0.05 and SRMR < 0.05; CFI and TLI > 0.90 (Marsh et al., 2004).

Two hierarchical linear regression analyses were implemented to test the first hypothesis, where job-related affective well-being and burnout had been introduced as dependent variables. Based on the theoretical and empirical arguments, personality traits and technology-related teaching skills were introduced as predictor variables. Age, gender, marital status, and level of teaching show no correlation with the dependent variable for the present sample. As a result, they were not introduced as predictors. The analyses were carried out using the same procedure for each of the two outcomes separately. The same algorithm was followed for both the dependent variables: in the first step, extroversion, conscientiousness, and neuroticism were introduced. After controlling the influence of personality traits, TPACK as technology-related skill was introduced. The regression analyses were performed in SPSS 23.0.

Based on the results from the first two hypotheses, a mediation analysis for each combination of IV, MV, and DV to verify the mediating role of each cognitive strategy in the associations between the personality traits and teacher well-being indicators was performed. To test the third hypothesis, the twenty-eight equations of regression that resulted were analyzed using the Lavaan package (Rosseel, 2012) in R (R Core Team, 2021). Hierarchical regression analysis allows for the estimation of the unique contribution of an independent variable, above and beyond what is explained by other variables (Field, 2009, p. 212). Mediation analysis allows the researchers to distinguish and estimate the direct, indirect, and total effects of an independent variable on a dependent variable (Kenny, 2008). For the present research, Baron and Kenny's (1986) analysis technique was used following the conditions for establishing a mediation. The requirements for hierarchical linear regression (Field, 2009, p. 212) and two of the three requirements for "measurement-of-mediation" design (Cook et al., 2002) were fulfilled. Even though teachers are nested into schools and some schools might provide

better access to technology and technology-related knowledge (thus implying a multilevel data structure), the author expects that the individual responses of the teachers are to be largely independent of each other. The limitation of the present study relates to the "measurement-of-mediation" method regarding the third requirement which states that no plausible alternative explanations account for the relation between the hypothesized causal and outcome variables (Cook et al., 2002). However, other variables like technology acceptance (Shamsi et al., 2021) could confound the relationship between coping strategies and job-related well-being indicators and might be an important limitation for the validity of the proposed model of mediation (Green et al., 2010; Pirlott and MacKinnon, 2016). Future research could replicate the proposed mediation model using a manipulation-of-mediation design which further strengthens the ability to infer that those coping mechanisms were the variables responsible for the process by which personality traits affected job-related affective well-being and burnout (Crano et al., 2014).

RESULTS

Measurement Models

The first model (M1) had acceptable fit indices, $\chi^2(734) = 2005.30$, $p < 0.001$, CFI = 0.79; TLI = 0.78; RMSEA = 0.07, CI (0.07, 0.08), SRMR = 0.07. The common factor model (M2) displayed poor fit: $\chi^2(740) = 4014.9$, $p < 0.001$; CFI = 0.48; TLI = 0.45; RMSEA = 0.12, CI (0.121, 0.129), SRMR = 0.11. The chi-square difference test indicated that M1 fit the data better than M2, $\Delta \chi^2(6) = 2009.6$, $p < 0.001$.

Regression Analyses

Table 2 presents the means, the standard deviations, the internal consistency, and the correlations established between the variables in the model. All predictors show significant correlations with the dependent variables, job-related affective well-being, and burnout, respectively.

For the first hypothesis which states that extroversion and conscientiousness are positively correlated with job-related affective well-being, neuroticism is negatively correlated with job-related affective well-being (H1a); also, extroversion and conscientiousness are negatively correlated with burnout, while neuroticism is positively correlated with burnout (H1b), and all correlations are in the expected direction. Extroversion and conscientiousness correlated positively and significantly with job-related affective well-being ($r = 0.42$, $r = 0.48$, $p < 0.01$) and negatively and significantly with burnout ($r = -0.45$, $r = -0.55$, $p < 0.01$). Neuroticism correlated negatively and significantly with job-related affective well-being ($r = -0.53$, $p < 0.01$) and positively with burnout ($r = 0.63$, $p < 0.01$).

For the second hypothesis which assumes that TPCK is positively correlated with job-related affective well-being (H2a) and negatively correlated with burnout (H2b), correlation is positive and significant with job-related affective well-being ($r = 0.30$, $p < 0.01$) and negative with burnout ($r = -0.31$, $p < 0.01$).

TABLE 2 | Means, standard deviations, and correlation coefficients between variables ($N = 284$).

Variables	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Extroversion	24.38	6.00	(0.87)								
2. Conscientiousness	30.01	4.78	0.46**	(0.78)							
3. Neuroticism	11.17	6.25	−0.55**	−0.57**	(0.86)						
4. TPCK	20.53	2.92	0.28**	0.41**	−0.41**	(0.92)					
5. Problem focused coping	39.99	4.31	0.27**	0.35**	−0.35**	0.37**	(0.80)				
6. Emotion focused coping	38.36	4.17	0.23**	0.27**	−0.38**	0.33**	0.58**	(0.73)			
7. Social support focused coping	33.90	4.92	0.03	−0.22**	0.17**	−0.01	0.12*	0.18**	(0.79)		
8. Avoidant coping	24.00	5.16	−0.30**	−0.50**	0.43**	−0.27**	−0.38**	−0.12**	−0.25**	(0.79)	
9. Job-related affective WB	72.64	16.3	0.42**	0.48**	−0.53**	0.30**	0.20**	0.16**	−0.16**	−0.31**	(0.95)
10. Burnout	17.94	11.4	−0.45**	−0.55**	0.63**	−0.31**	−0.22**	−0.17**	0.19**	0.35**	−0.66 (0.91)

* $p < 0.05$, ** $p < 0.01$, one single tailed. Internal consistency alphas are displayed diagonally.

TABLE 3 | Hierarchical multiple regression analyses ($N = 284$).

Variables	Job-related affective well-being			Burnout		
	$R/R^2/\Delta R^2$	β	Eff. size	$R/R^2/\Delta R^2$	β	Eff. size
Step 1	0.58/0.34/0.34**		Large	0.67/0.45/0.45**		Large
Conscientiousness		0.22**	Moderate		−0.25**	Moderate
Neuroticism		−0.32**	Moderate		0.43**	Moderate
Extroversion		0.13**	Weak		−0.10*	Weak
Step 2	0.59/0.35/0.01*			0.67/0.45/0.44		
Conscientiousness		0.23**	Moderate		−0.25**	Moderate
Neuroticism		−0.30**	Moderate		0.42**	Moderate
Extroversion		0.13*	Weak		−0.10**	Weak
TPCK		0.18*	Weak		−0.00	

* $p < 0.05$; ** $p < 0.01$.

Table 3 shows the results of the hierarchical regression with the two dependent variables. Concerning job-related affective well-being, in the first step, personality traits contributed to the variance of the dependent variable in the proportion of 12% [$R = 0.58$; $F(3,280) = 48.94$, $p < 0.01$]. Each of the personality traits is a significant predictor of job-related affective well-being: conscientiousness ($\beta = 0.22$, $p < 0.01$), neuroticism ($\beta = -0.032$, $p < 0.01$), and extroversion ($\beta = 0.13$, $p < 0.05$). In the second step, adding TPCK leads to explaining the variance of the job-related affective well-being in the proportion of 3% [$R = 0.59$; $F(4,279) = 31.14$, $p < 0.01$] and accounted for an additional 3% of the variance compared to the first model ($\beta = 0.18$, $p < 0.05$). In the second equation, personality traits were also a significant predictor ($\beta = 0.23$, $p < 0.01$ for conscientiousness, $\beta = -0.30$, $p < 0.01$ for neuroticism, $\beta = 0.13$, $p < 0.01$ for extroversion). Concerning burnout, in the first step, personality traits contributed with the variance of the dependent variable in the proportion of 11% [$R = 0.67$; $F(3,280) = 18.39$, $p < 0.01$]. Each of the personality traits is a significant predictor of burnout: conscientiousness ($\beta = -0.25$, $p < 0.01$), neuroticism ($\beta = 0.42$, $p < 0.01$), and extroversion ($\beta = -0.10$, $p < 0.05$). Regarding technology-related teaching skills, despite a strong correlation between TPCK and burnout ($r = -0.31$, $p < 0.01$) the adding of it in the second step did not improve the model and no significant correlation was found between TPCK and burnout (H1b). The

statistical support was totally received in case of job-related well-being, and partially for burnout in the case of the first hypothesis. The effect size of the β coefficient is provided in **Table 3** and was calculated following Acock's (2014) suggestion.

Mediating Analysis

For the third hypothesis which states that problem-focused coping (H3a), emotion-focused coping (H3b), social support-focused coping (H3c), and avoidant coping (H3d) mediate the relationship between personality traits and teacher well-being indicators, all the correlations between predictors and mediators was analyzed. Except extroversion on social support-focused coping, all three personality traits are significantly related to coping strategies, and each personality factor (extroversion, conscientiousness, and neuroticism) has a different effect on coping strategies (extroversion on avoidant coping: $B = -0.26$, $p < 0.001$; extroversion on social support-focused coping: $B = 0.02$, $p > 0.05$; extroversion on problem-focused coping: $B = 0.20$, $p < 0.001$; extroversion on emotion-focused coping: $B = -0.25$, $p < 0.001$; conscientiousness on avoidant coping: $B = -0.54$, $p < 0.001$; conscientiousness on social support-focused coping: $B = -0.23$, $p < 0.001$; conscientiousness on problem-focused coping: $B = 0.32$, $p < 0.001$; conscientiousness on emotion-focused coping: $B = 0.31$, $p < 0.001$; neuroticism on avoidant coping: $B = 0.35$,

$p < 0.001$; neuroticism on social support-focused coping: $B = 0.13$, $p < 0.001$; neuroticism on problem-focused coping: $B = -0.24$, $p < 0.001$, and neuroticism on emotion-focused coping: $B = -0.25$, $p < 0.001$). Further, of the four coping strategies analyzed, only avoidant coping had a significant total or partial mediating effect in relationship between the independent and dependent variables which were proposed. No mediating effect was found for problem-focused coping (H3a), emotion-focused coping (H3b), and social support focused coping (H3c) in the relationship between personality traits and teachers' well-being indicators. Since the additional effect of TPCK over personality traits was sustained by the results of the second hypothesis, the mediating role of the coping strategies in relationship between TPCK and the job-related affective well-being was analyzed. Except for the relationship between TPCK and job-related affective well-being through problem-focused coping, all predictors had a significant direct effect on the well-being indicators in the presence of coping strategies as mediators. Thus, when avoidant coping was included as a mediator, a direct significant direct effect was found in the conscientiousness and neuroticism on job-related affective well-being ($B = 1.47$, $p < 0.001$, respectively, $B = -1.27$, $p < 0.001$) but no significant indirect effect was found through avoidant coping (H3d). A direct positive significant direct effect was found in extroversion ($B = 0.98$, $p < 0.001$) and TPCK on job-related affective well-being ($B = 1.29$, $p < 0.001$) and a significant indirect effect was found through avoidant coping ($B = 0.16$, $p < 0.001$, respectively, $B = 0.38$, $p < 0.001$) which sustained the existence of a full mediation. Regarding burnout, a direct negative significant effect was found in the conscientiousness and extroversion on burnout ($B = -1.18$, $p < 0.001$, respectively, $B = -0.73$, $p < 0.001$) and a direct positive significant effect of neuroticism was found on burnout ($B = 1.06$, $p < 0.001$). Avoidant coping partially mediates the relationship between personality trait and burnout, providing the following coefficients: $B = -0.13$, $p < 0.05$ for indirect effect of conscientiousness on burnout, $B = 0.08$, $p < 0.05$ for indirect effect of neuroticism on burnout, and $B = -0.13$, $p < 0.001$ for the indirect effect in the extroversion on burnout. The effect size of the β coefficient was calculated following Acock's (2014) indication. **Table 4** depicts unstandardized coefficients for each equation of regression and the effect size interpretation.

DISCUSSION

Decisions on how to promote teachers' job-related well-being while working on-line at home need to be based on the best available evidence. This study aimed to identify a model of prediction for burnout and job-related affective well-being during online teaching. Based on the TPCK model, the additional value of TPCK as technology-related teaching skills in explaining the above-mentioned indicators of well-being in an online teaching setting, over and above personality traits were studied. In addition, following the adaptation mechanism initially proposed by the transactional model of stress, mediating role of coping strategies between personality traits and well-being indicators during online teaching in the COVID pandemic was also studied.

The analysis of the data in the study indicated that the first model which includes personality traits together has a stronger prediction power on the job-related affective well-being and burnout because the effect size is large in both the cases. However, although TPCK is reported as statistically significant as a predictor for job-related affective well-being, over and above the personality traits, the effect size is weak. Based on the findings obtained in the current sample, the results cannot be considered educationally significant. Future replication studies might be conducted on larger samples or may include other parameters related to technology. In line with a previous study (DeNeve and Cooper, 1998; Anglim et al., 2020; Zager Kocjan et al., 2021), personality traits predict teachers' well-being indicators as it was expected. In case of job-related affective well-being, the strongest predictor is neuroticism followed by conscientiousness and extroversion. By adding TPCK, the prediction model becomes stronger although the effect size is small for this sample. Regarding burnout, the strongest predictor was neuroticism followed by conscientiousness and extroversion. Neuroticism negatively predicted job-affective well-being and positively burnout, while conscientiousness and extroversion are positive predictors for job-affective well-being and a negative predictor for burnout. The review of the literature indicated that neuroticism and extroversion are nearly identical to two elements of subjective well-being, negative and positive affect, respectively; the neurotic individuals tend to be anxious or depressed, whereas the extroverts tend to be sociable, optimistic, and energetic (Steel et al., 2008). Extroversion is an orientation of one's interests and energies toward the outer world of people and things rather than the inner world of subjective experience (VandenBos and American Psychological Association, 2007). Thus, a low prediction power of extroversion on teachers' well-being indicators may be explained by the fact that social connectedness, a variable affected by the pandemic conditions is a significant mediator explaining the relationship between extroversion and perceived well-being (De Raad, 2000; Lee et al., 2008). Moreover, individuals with high extroversion reported higher levels of distress because they may not be as effective in controlling their environment once the social aspect is removed (Abbott et al., 2008). Also, the extroverted personalities were associated with telecommunication burnout, whereas introverts were found to face stress resulting from telecommunication more easily (Meymandpour and Bagheri, 2017). Neuroticism, on the other side, is characterized by a chronic level of emotional instability and proneness to psychological distress (VandenBos and American Psychological Association, 2007). Like Steel et al. (2008) the current findings showed that neuroticism was the most consistent correlate of subjective well-being followed by extroversion and then conscientiousness. Conscientiousness represents the tendency to be organized, responsible, and hardworking (VandenBos and American Psychological Association, 2007). Thus, people with higher levels of conscientiousness follow COVID-19 preventive measures rigorously. Consequently, this quality may further enhance their coping resources to prevent COVID-19 while minimizing their perceived threat of COVID-19, and resulting in lower stress (Vollrath, 2001). Thus, I can deduce that

TABLE 4 | Direct, indirect, and total effects of personality dimensions and TPCK on job-related well-being and burnout through coping styles.

Equation of regression	Predictor	Path	Estimate (B)	SE	β
1.	<i>Avoidant coping on: Conscientiousness</i>	a_1	-0.54**	0.05	-0.05
	<i>Job-related affective well-being on: Avoidant coping</i>	b_1	-0.31	0.18	-0.09
	Direct effect of <i>Conscientiousness</i> on: <i>Job-related affective well-being</i>	c_1'	1.47**	0.20	0.43
	Indirect effects through <i>Avoidant coping</i> <i>Job-related affective well-being</i> on: <i>Conscientiousness</i>	$a_1 + b_1$	0.16	0.10	0.04
2.	<i>Avoidant coping on: Neuroticism</i>	a_2	0.35**	0.04	0.43
	<i>Job-related affective well-being on: Avoidant coping</i>	b_2	-0.32	0.17	-0.10
	Direct effect of <i>Neuroticism</i> on: <i>Job-related affective well-being</i>	c_2'	-1.27**	0.14	-0.49
	Indirect effects through <i>Avoidant coping</i> <i>Job-related affective well-being</i> on: <i>Neuroticism</i>	$a_2 + b_2$	-0.11	0.06	-0.04
3.	<i>Avoidant coping on: Extroversion</i>	a_3	-0.26**	0.04	-0.30
	<i>Job-related affective well-being on: Avoidant coping</i>	b_3	-0.64**	0.17	-0.20
	Direct effect of <i>Extroversion</i> on: <i>Job-related affective well-being</i>	c_3'	0.98**	0.14	0.36
	Indirect effects through <i>Avoidant coping</i> <i>Job-related affective well-being</i> on: <i>Extroversion</i>	$a_3 + b_3$	0.16**	0.05	0.06
4.	<i>Avoidant coping on: TPCK</i>	a_4	-0.48**	0.10	-0.27
	<i>Job-related affective well-being on: Avoidant coping</i>	b_4	-0.79**	0.18	-0.25
	Direct effect of <i>TPCK</i> on: <i>Job-related affective well-being</i>	c_4'	1.29**	0.31	0.23
	Indirect effects through <i>Avoidant coping</i> <i>Job-related affective well-being</i> on: <i>TPCK</i>	$a_4 + b_4$	0.38**	0.11	0.06
5.	<i>Social support focused coping on: Conscientiousness</i>	a_5	-0.23**	0.05	-0.22
	<i>Job-related affective well-being on: Social support focused coping</i>	b_5	-0.19	0.17	-0.05
	Direct effect of <i>Conscientiousness</i> on: <i>Job-related affective well-being</i>	c_5'	1.59**	0.18	0.47
	Indirect effects through <i>Social support focused coping</i> <i>Job-related affective well-being</i> on: <i>Conscientiousness</i>	$a_5 + b_5$	0.04	0.04	0.01
6.	<i>Social support focused coping on: Neuroticism</i>	a_6	0.13**	0.04	0.17
	<i>Job-related affective well-being on: Social support focused coping</i>	b_6	-0.23	0.16	-0.07
	Direct effect of <i>Neuroticism</i> on: <i>Job-related affective well-being</i>	c_6'	-1.36**	0.13	-0.52
	Indirect effects through <i>Social support focused coping</i> <i>Job-related affective well-being</i> on: <i>Neuroticism</i>	$a_6 + b_6$	-0.03	0.02	-0.01
7.	<i>Social support focused coping on: Extroversion</i>	a_7	0.02	0.04	0.03
	<i>Job-related affective well-being on: Social support focused coping</i>	b_7	-0.58**	0.17	-0.17
	Direct effect of <i>Extroversion</i> on: <i>Job-related affective well-being</i>	c_7'	1.17**	0.14	0.43
	Indirect effects through <i>Social support focused coping</i> <i>Job-related affective well-being</i> on: <i>Extroversion</i>	$a_7 + b_7$	-0.01	0.02	-0.00
8.	<i>Social support focused coping on: TPCK</i>	a_8	-0.02	0.10	-0.01
	<i>Job-related affective well-being on: Social support focused coping</i>	b_8	-0.52**	0.18	-0.15
	Direct effect of <i>TPCK</i> on: <i>Job-related affective well-being</i>	c_8'	1.66**	0.31	0.29
	Indirect effects through <i>Social support focused coping</i> <i>Job-related affective well-being</i> on: <i>TPCK</i>	$a_8 + b_8$	0.01	0.05	0.00
9.	<i>Problem focused coping on: Conscientiousness</i>	a_9	0.32**	0.05	0.35
	<i>Job-related affective well-being on: Problem focused coping</i>	b_9	0.14	0.20	0.04
	Direct effect of <i>Conscientiousness</i> on: <i>Job-related affective well-being</i>	c_9'	1.59**	0.18	0.46
	Indirect effects through <i>Problem focused coping</i> <i>Job-related affective well-being</i> on: <i>Conscientiousness</i>	$a_9 + b_9$	0.04	0.06	0.01
10.	<i>Problem focused coping on: Neuroticism</i>	a_{10}	-0.24**	0.03	-0.35
	<i>Job-related affective well-being on: Problem focused coping</i>	b_{10}	0.07	0.19	0.01
	Direct effect of <i>Neuroticism</i> on: <i>Job-related affective well-being</i>	c_{10}'	-1.37**	0.13	-0.52
	Indirect effects through <i>Problem focused coping</i> <i>Job-related affective well-being</i> on: <i>Neuroticism</i>	$a_{10} + b_{10}$	-0.01	0.04	-0.00
11.	<i>Problem focused coping on: Extroversion</i>	a_{11}	0.20**	0.04	0.27
	<i>Job-related affective well-being on: Problem focused coping</i>	b_{11}	0.34	0.20	0.09
	Direct effect of <i>Extroversion</i> on: <i>Job-related affective well-being</i>	c_{11}'	1.08**	0.15	0.39
	Indirect effects through <i>Problem focused coping</i> <i>Job-related affective well-being</i> on: <i>Extroversion</i>	$a_{11} + b_{11}$	0.07	0.04	0.02
12.	<i>Problem focused coping on: TPCK</i>	a_{12}	0.56**	0.08	0.37
	<i>Job-related affective well-being on: Problem focused coping</i>	b_{12}	0.39	0.22	0.10
	Direct effect of <i>TPCK</i> on: <i>Job-related affective well-being</i>	c_{12}'	1.45	0.33	0.26
	Indirect effects through <i>Problem focused coping</i> <i>Job-related affective well-being</i> on: <i>TPCK</i>	$a_{12} + b_{12}$	0.22	0.12	0.04
13.	<i>Emotion focused coping on: Conscientiousness</i>	a_{13}	0.24**	0.04	0.27
	<i>Job-related affective well-being on: Emotion focused coping</i>	b_{13}	0.12	0.21	0.03
	Direct effect of <i>Conscientiousness</i> on: <i>Job-related affective well-being</i>	c_{13}'	1.61**	0.18	0.47
	Indirect effects through <i>Emotion focused coping</i> <i>Job-related affective well-being</i> on: <i>Conscientiousness</i>	$a_{13} + b_{13}$	0.03	0.05	0.00
14.	<i>Emotion focused coping on: Neuroticism</i>	a_{14}	-0.25**	0.03	-0.38
	<i>Job-related affective well-being on: Emotion focused coping</i>	b_{14}	-0.18	0.21	-0.04
	Direct effect of <i>Neuroticism</i> on: <i>Job-related affective well-being</i>	c_{14}'	-1.44**	0.14	-0.55
	Indirect effects through <i>Emotion focused coping</i> <i>Job-related affective well-being</i> on: <i>Neuroticism</i>	$a_{14} + b_{14}$	0.04	0.05	0.01

(Continued)

TABLE 4 | (Continued)

Equation of regression	Predictor	Path	Estimate (B)	SE	β
15.	<i>Emotion focused coping on: Extroversion</i>	a_{15}	0.16**	0.04	0.23
	<i>Job-related affective well-being on: Emotion focused coping</i>	b_{15}	0.26	0.21	0.06
	Direct effect of <i>Extroversion</i> on: <i>Job-related affective well-being</i>	c_{15}'	1.11**	0.14	0.40
	Indirect effects through <i>Emotion focused coping</i> <i>Job-related affective well-being</i> on: <i>Extroversion</i>	$a_{15} + b_{15}$	0.04	0.03	0.01
16.	<i>Emotion focused coping on: TPCK</i>	a_{16}	0.47**	0.08	0.33
	<i>Job-related affective well-being on: Emotion focused coping</i>	b_{16}	0.28	0.23	0.07
	Direct effect of <i>TPCK</i> on: <i>Job-related affective well-being</i>	c_{16}'	1.54**	0.33	0.27
	Indirect effects through <i>Emotion focused coping</i> <i>Job-related affective well-being</i> on: <i>TPCK</i>	$a_{16} + b_{16}$	0.13	0.11	0.02
17.	<i>Avoidant coping on: Conscientiousness</i>	a_{17}	-0.54**	0.05	-0.50
	<i>Burnout on: Avoidant coping</i>	b_{17}	0.24*	0.12	0.10
	Direct effect of <i>Conscientiousness</i> on: <i>Burnout</i>	c_{17}'	-1.18**	0.13	-0.49
	Indirect effects through <i>Avoidant coping</i> <i>Burnout</i> on: <i>Conscientiousness</i>	$a_{17} + b_{17}$	-0.13*	0.06	-0.05
18.	<i>Avoidant coping on: Neuroticism</i>	a_{18}	0.35**	0.04	0.43
	<i>Burnout on: Avoidant coping</i>	b_{18}	0.22*	0.11	0.10
	Direct effect of <i>Neuroticism</i> on: <i>Burnout</i>	c_{18}'	1.06**	0.09	0.58
	Indirect effects through <i>Avoidant coping</i> <i>Burnout</i> on: <i>Neuroticism</i>	$a_{18} + b_{18}$	0.08*	0.04	0.04
19.	<i>Avoidant coping on: Extroversion</i>	a_{19}	-0.26**	0.04	-0.30
	<i>Burnout on: Avoidant coping</i>	b_{19}	0.53**	0.11	0.24
	Direct effect of <i>Extroversion</i> on: <i>Burnout</i>	c_{19}'	-0.73**	0.10	-0.38
	Indirect effects through <i>Avoidant coping</i> <i>Burnout</i> on: <i>Extroversion</i>	$a_{19} + b_{19}$	-0.13**	0.04	-0.07
20.	<i>Social support focused coping on: Conscientiousness</i>	a_{20}	-0.23**	0.05	-0.22
	<i>Burnout on: Social support focused coping</i>	b_{20}	0.18	0.11	0.08
	Direct effect of <i>Conscientiousness</i> on: <i>Burnout</i>	c_{20}'	-1.27**	0.12	-0.53
	Indirect effects through <i>Social support focused coping</i> <i>Burnout</i> on: <i>Conscientiousness</i>	$a_{20} + b_{20}$	-0.04	0.02	-0.01
21.	<i>Social support focused coping on: Neuroticism</i>	a_{21}	0.13**	0.04	0.17
	<i>Burnout on: Social support focused</i>	b_{21}	0.21**	0.10	0.09
	Direct effect of <i>Neuroticism</i> on: <i>Burnout</i>	c_{21}'	1.12**	0.08	0.61
	Indirect effects through <i>Social support focused coping</i> <i>Burnout</i> on: <i>Neuroticism</i>	$a_{21} + b_{21}$	0.02	0.01	0.01
22.	<i>Social support focused on: Extroversion</i>	a_{22}	0.02	0.04	0.03
	<i>Burnout on: Social support focused coping</i>	b_{22}	0.5**	0.11	0.21
	Direct effect of <i>Extroversion</i> on: <i>Burnout</i>	c_{22}'	-0.88**	0.09	-0.46
	Indirect effects through <i>Social support focused</i> <i>Burnout</i> on: <i>Extroversion</i>	$a_{22} + b_{22}$	0.01	0.02	0.00
23.	<i>Problem focused coping on: Conscientiousness</i>	a_{23}	0.32**	0.05	0.35
	<i>Burnout on: Problem focused coping</i>	b_{23}	-0.08	0.13	-0.03
	Direct effect of <i>Conscientiousness</i> on: <i>Burnout</i>	c_{23}'	-1.29**	0.12	-0.54
	Indirect effects through <i>Problem focused coping</i> <i>Burnout</i> on: <i>Conscientiousness</i>	$a_{23} + b_{23}$	-0.02	0.04	-0.01
24.	<i>Problem focused coping on: Neuroticism</i>	a_{24}	-0.24**	0.03	-0.35
	<i>Burnout on: Problem focused coping</i>	b_{24}	-0.00	0.12	-0.00
	Direct effect of <i>Neuroticism</i> on: <i>Burnout</i>	c_{24}'	1.15**	0.09	0.62
	Indirect effects through <i>Problem focused coping</i> <i>Burnout</i> on: <i>Neuroticism</i>	$a_{24} + b_{24}$	0.00	0.03	0.00
25.	<i>Problem focused coping on: Extroversion</i>	a_{25}	0.20**	0.04	0.27
	<i>Burnout on: Problem focused coping</i>	b_{25}	-0.26	0.14	-0.10
	Direct effect of <i>Extroversion</i> on: <i>Burnout</i>	c_{25}'	-0.81**	0.10	-0.43
	Indirect effects through <i>Problem focused coping</i> <i>Burnout</i> on: <i>Extroversion</i>	$a_{25} + b_{25}$	-0.05	0.03	-0.02
26.	<i>Emotion focused coping on: Conscientiousness</i>	a_{26}	0.24**	0.04	0.27
	<i>Burnout on: Emotion focused coping</i>	b_{26}	-0.05	0.14	-0.02
	Direct effect of <i>Conscientiousness</i> on: <i>Burnout</i>	c_{26}'	-1.30**	0.12	-0.54
	Indirect effects through <i>Emotion focused coping</i> <i>Burnout</i> on: <i>Conscientiousness</i>	$a_{26} + b_{26}$	-0.01	0.03	-0.00
27.	<i>Emotion focused coping on: Neuroticism</i>	a_{27}	-0.25**	0.03	-0.38
	<i>Burnout on: Emotion focused coping</i>	b_{27}	0.21	0.13	0.08
	Direct effect of <i>Neuroticism</i> on: <i>Burnout</i>	c_{27}'	1.2**	0.09	0.66
	Indirect effects through <i>Emotion focused coping</i> <i>Burnout</i> on: <i>Neuroticism</i>	$a_{27} + b_{27}$	-0.05	0.03	-0.03
28.	<i>Emotion focused coping on: Extroversion</i>	a_{28}	0.16**	0.04	0.23
	<i>Burnout on: Emotion focused coping</i>	b_{28}	-0.19	0.14	-0.06
	Direct effect of <i>Extroversion</i> on: <i>Burnout</i>	c_{28}'	-0.84**	0.10	-0.44
	Indirect effects through <i>Emotion focused coping</i> <i>Burnout</i> on: <i>Extroversion</i>	$a_{28} + b_{28}$	-0.03	0.02	-0.01

* $p < 0.05$; ** $p < 0.01$.

conscientious teachers are lower in burnout and higher in job-related affective well-being since their consistency and strictness trigger efficient control of stress.

The results outlined that TPCK predicted higher subjective well-being over and above personality traits in online teaching settings. Although the influence of the digital technologies knowledge in teacher well-being has been scarcely researched (Passey, 2021), some previous results argue that the TPCK model influenced the existence of technostress in the teachers (Joo et al., 2016). Thus, the findings are in line with a recent study that highlights that the use of educational technology in the classroom is associated with higher levels of anxiety or stress (Fernández-Batanero et al., 2021). One can only assume that teachers with high scores of TPCK might be more confident and less stressed in online teaching settings resulting in enchanted job-related affective well-being and low burnout. However, although the magnitude of effect is low for the current sample, this study expands the research on the implications of technology-related teaching skills for teacher well-being in an educational setting advocating for their role in increasing job-related affective well-being because they are malleable and can be improved. Future studies could analyze in more depth on different samples regarding the role of TPCK and other technology-related teaching skills for job-related well-being.

Previous research has focused on coping strategies and how they can alleviate stress levels and promote a higher quality of life at work (Acker, 2018; Cancio et al., 2018). Coping strategies can represent a valuable resource for teachers dealing with stressors, and research has indicated that the nature and context of stress influence the relation between personality and coping because coping is tailored to match the demands of specific situations (Lee-Baggeley et al., 2005). The present study paid attention to the potential impact in the well-being domain of response-coping strategies to a specific stressor which is the request to teachers to adapt and to be efficient in online teaching without previous training. Personality should also be strongly linked to dispositional coping because personality influences the type of events experienced, which in turn influences typical coping (Bouchard et al., 2004). The present results have shown that all three personality traits are significantly related to coping strategies, and each personality factor (extroversion, conscientiousness, and neuroticism) has a different effect on coping strategies. Therefore, personality traits may influence the effectiveness of coping strategies, with strategies that are beneficial for some individuals being less effective, or even harmful, for those with different personality traits (Bolger and Zuckerman, 1995; Hudek-Knežević et al., 2005). Consistent partially with in the study by Carver and Connor-Smith (2010), the current findings highlight that personality and avoidant coping play both independent and interactive roles in influencing the well-being indicators. Further, results revealed that high levels of extroversion and TPCK predicted a high level of job-related affective well-being while high levels of conscientiousness predicted lower burnout. On the other hand, neuroticism predicted increased burnout. However, appealing to avoidant coping, the dynamic of relationship between personality traits on the two well-being indicators is

changing but it has a weak magnitude of effect on all the three indirect effects of personality traits (extroversion, neuroticism, and conscientiousness) on burnout and for extroversion and TPCK effects on job-related affective well-being through avoidant coping. The coping literature conceptualizes avoidance coping as a maladaptive (or unhealthy) coping strategy because it often exacerbates stress without helping a person deal with the things that cause the stress (e.g., Ingledew et al., 1997; Dijkstra and Homan, 2016). On the contrary, the work recovery literature considers psychological detachment as an adaptive strategy that can help individuals deal with stress (Sonnentag et al., 2008). Therefore, studies that examined avoidance coping provided mixed findings. Andreassi (2011) reported that avoidance coping has detrimental effects while another research has found it to be beneficial (Hecht and McCarthy, 2010; Rantanen et al., 2011). Since the current research provides just one score for avoidance coping measured through three avoidance coping strategies as second-order factors (denial, mental deactivation, and behavioral deactivation), it can be assumed that avoidance coping contains two underlying components (Cheng and McCarthy, 2013). In our case, one component deals with stressors by cognitively or behaviorally distancing from the situation (cognitive and behavioral avoidance) and the other one concerns a distorted view of reality that involves a kind of fanciful thinking (escape avoidance; Folkman and Lazarus, 1985) named denial in the present research. Cognitive avoidance is posited to be beneficial as it serves to replenish depleted resources that can be redirected toward various tasks (Hobfoll, 1989) since it reflects a mental distancing from a stressor (Cheng and McCarthy, 2013). Thus, in case of high neuroticism, avoidant coping (especially throughout cognitive deactivation) may buffer against detrimental effects of adverse situations and, at the same time, improve the subjective well-being of individuals by decreasing burnout. Although the magnitude of effect is weak for the current sample, the result is consistent with the previous study which emphasizes that avoidance has predicted increased negative affect for low neurotic individuals, but not for high neurotic individuals (Bolger and Zuckerman, 1995) because neuroticism involves intense emotional and physical responses to stress linked to attempts to minimize unpleasant arousal through disengagement strategies, such as avoidance (Connor-Smith and Flachsbart, 2007). Specifically, teachers who are highly stress-reactive may disengage to decrease their own unpleasant arousal. Further, since conscientiousness involves the tendency to plan, reducing the number of stressors experienced, this personality trait may be negatively related to dispositional disengagement (Connor-Smith and Flachsbart, 2007). On the other hand, research findings indicate that individuals higher on extroversion are more prone to engage in less avoidance (McCrae and Costa, 1986). The present results support these statements because in the case of teachers who are extroverts, conscientiousness, and with a high score for TPCK, adopting avoidant coping leads to a lower job-related affective well-being and increased level of burnout.

Implication for Teachers

The results of the current study might be of great interest to teachers because they emphasize two important ideas: the role

of TPCK for teachers in the job-related affective well-being and the beneficial effect of avoidant coping for professionals with high levels of neuroticism in on-line teaching settings. Following the study of Revilla Muñoz et al. (2017) which places technology training as the best option for reducing technostress, some recommendations for teachers could include suggestions to keep an open attitude toward technological innovation and to follow tutorials for improving their technological knowledge especially if school organizations do not provide free training. The present study also emphasizes that avoidant coping strategies are effective when teachers have high levels of neuroticism. Therefore, one recommendation for teachers who know themselves as being tense and prone to negative emotions (such as anxiety, depression, or anger) is to increase the frequency of breaks between online lectures while practicing mindfulness as mental and behavioral disengagement-coping strategies. A mindfulness approach combined with releasing eye strain has proven to provide an adaptive response to stressors (Riley and Park, 2015).

The present study is not without limitations. The first limitation is that the study focused on broad categories of coping rather than on specific coping strategies, and on personality factors rather than on specific personality facets. Consequently, it is possible that some specific coping strategies could be used to deal with online teaching demands, but the present study cannot reveal them since the global dimension of a coping style has been measured. Moreover, correlations between the facets of the personality factors and coping strategies could not be analyzed. The second limitation is related to the fact that the validity of responses could have been affected due to social desirability since the present study has collected data using a set of self-report measures. In addition, demands regarding teaching levels are different and could represent another source of stress next to the necessity to adapt to online teaching but the current sample was heterogenous and relatively small for each category. Consequently, more control of hidden variables is necessary. Yet, regarding theoretical and practical implications, the present study outlines the independent and interactive roles of personality traits, technology-related teaching skills, and coping strategies in influencing teacher well-being indicators in online teaching settings during the COVID-19 pandemic. Based on psychological approaches, the struggle for digital well-being in our COVID and

post-COVID world needs to enlist more strategies to improve well-being in online teaching settings, and the present study provides a deeper insight into the interplay of personality and coping. Thus, the current results could aid in the design of the more effective intervention and prevention programs fitted to the unique personality profile of individuals.

CONCLUSION

Online teaching in COVID-19 pandemic brought consequences for teachers' job-related well-being. The present study emphasizes that TPCK is a personal resource which can be enhanced and used to predict an increased level of job-related affective well-being. Moreover, avoidant-coping strategies buffer against burnout in cases of teachers with high neuroticism but an opposite effect was obtained in case of extrovert teachers. Results argue for the value of examining individual differences in variables in research on occupational stress related to the online teaching setting.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee for Research, Faculty of Socio-Humanistic Sciences, University of Oradea. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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The Impact of Hotel Customer Engagement and Service Evaluation on Customer Behavior Intention: The Mediating Effect of Brand Trust

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Because of the COVID-19, the tourism industry has been greatly affected, especially the occupancy rate of hotel companies. This study analyzes the effects of customer engagement and service evaluation on brand trust and customer behavioral intention based on 437 valid questionnaires from Chinese economy hotel companies using SPSS and AMOS. The components of customer engagement are subdivided into five dimensions: identification, enthusiasm, attention, absorption and interaction, and the impact of these five dimensions on brand trust in the COVID-19 is investigated. Finally, it verifies the influence of trust on customers' word-of-mouth (WOM) intention and customers' reuse intention. The results of this study not only enrich the research on customer engagement and service evaluation in marketing circles but also give some advice to hotel companies in the COVID-19 customer engagement and service evaluation that can enhance the trust of enterprises and promote the behavior intention of customers, which has certain practical reference value.

Keywords: service quality, brand trust, customer's intention, hotel, customer engagement (CE)

INTRODUCTION

The outbreak and spread of the COVID-19 in 2020 have caused a great impact on the tourism industry in China, with the traditional tourism industry such as scenic spots, hotels and travel agencies facing great pressure on their operations. In the case of the hotel industry, the impact of the epidemic on hotels has continued to be felt since the second quarter of 2020, highlighted by a simultaneous decline in average daily room rates and occupancy rates, challenging the profitability of hotels, with some experts predicting that the epidemic may result in hotels closing down to weather the crisis (Chen, 2020). Due to the decrease in tourism travel and business mobility, economy hotels, which mainly serve the mass tourism travelers and small and medium-sized business travelers, are facing development difficulties. How economy hotels respond has become an important issue of concern for the industry and academia.

With the rapid development of the Internet, customers can easily interact with other customers or businesses through social media. As a result, the non-transactional behaviors of customers are also drawing more and more attention from enterprises. Companies are discovering that certain non-transactional behaviors of customers, such as positive word-of-mouth (WOM) and online reviews (Van Doorn et al., 2010), can have a positive impact on the company. At the same time, companies are aware that non-transactional customer behavior can have serious consequences if not managed properly, and thus the concept of customer engagement has emerged.

In the past few years, the research on customer engagement has been diverse and complex. The individual perceived costs and benefits have an impact on customer engagement (Van Doorn et al., 2010). Customer involvement and participation, such as customer involvement in the development of new products in a company, can have a positive effect on customer engagement (Vivek et al., 2014). Zhang et al. (2021) showed that relationship quality had a positive effect on customer engagement. The drivers of customer engagement behavior are based on organizational support theory, so both perceived customer support and customer commitment are antecedent variables of customer engagement (Wang, 2020). Customer engagement is positively influenced by interactivity and information quality (Islam et al., 2017). Customer engagement is a special value-driven relationship between customers and enterprises, which has a significant impact on the relationship between other customers and enterprises (Chan et al., 2014). The value-driven relationship between enterprises and customers can create value for enterprises, and may also weaken value (Dessart et al., 2015). It is a positive relationship between customer engagement and cognitive value (Algharabat et al., 2020). Zameer et al. (2018) conducted an empirical study using m-commerce as an example and showed that mobile electronic service quality had a direct positive impact on customer engagement, while age had a moderating effect in the middle. Although scholars have examined specific aspects of customer engagement in different contexts in previous studies, this study integrates psychological and behavioral perspectives to show that customer engagement is a result of both psychological and behavioral aspects. Currently, few studies have measured the components of customer engagement in a multidimensional manner.

The tourism industry has been hit hard by COVID-19 and hotel companies are experiencing an unprecedented decline in occupancy rates. What can be done to improve consumer engagement with hotel companies? How can we improve the service rating of hotel companies? How can hotel companies gain consumers' trust in their brand? How do they generate WOM intention and reuse intention?

In this study, customers who have used economy hotels are used as the target group. The components of customer engagement are subdivided into five dimensions: identification, enthusiasm, attention, absorption and interaction, and the impact of these five dimensions on brand trust in the COVID-19 is investigated. In addition, this study divides service evaluation into three dimensions, namely service quality, perceived value, and customer satisfaction, and explores how to enhance consumers' brand trust in hotels by improving their service quality, perceived value, and customer satisfaction, which in turn leads to WOM intentions and reuse intentions.

This study provides a theoretically sound scale for marketing, which scholars can use to further expand their understanding of customer engagement. In addition, the fundamental contribution of this study is to provide a theoretical foundation and empirical evidence to support the relationship between the emerging concept of customer engagement and key factors in the development of customer behavioral intentions. In addition to theoretical contributions, this study provides some

practical insights into the practice of brand management. The development and validation of the Customer engagement Scale provide a valuable tool for economy hotels to effectively measure engagement with customer groups and rationalize marketing strategies during the COVID-19. This study is a useful reference for economy hotels to encourage customer engagement with the hotel or other customers and enhance trust in the company.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The Stimulus-Organism-Response Framework

Originally, in Stimulus-Organism-Response (S-O-R) model, invented by Mehrabian and Russell (1974), an environment stimulus (S) results in an emotional response (O) thereby fostering a behavioral response (R). The S-O-R model is applied for the framework building of this research, and there are two reasons for choosing this model.

Firstly, its importance in retail settings has been articulated by various scholars from different areas such as decision to buy (Demangeot and Broderick, 2016; Lucia-Palacios et al., 2016), impulse buying (Chang et al., 2013), service fairness (Namkung and Jang, 2010), etc. Many S-O-R based research works in the marketing context confirm the relationship between emotional response and consumer response in terms of intention, purchase, consultation and return (Choi et al., 2011; Li et al., 2012). Especially the Chinese people who are collectivism dominated in the multicultural social environment would be more sensitive to various environmental cues (Shobeiri et al., 2018; Jiao et al., 2021). Secondly, within the S-O-R model, when consumers accept multisensory input from the external environment, such as COVID-19, the internal state of consumers will also affect their approach or avoidance actions (Eroglu et al., 2003). Some researchers use S-O-R model to explain consumption behaviors stimulated by various external environments, and some predictions have been made by using S-O-R model (Russell and Mehrabian, 1974; Shen et al., 2021).

In this study, the stimulus reflects the factors that determine the performance of hotels (service evaluation). This organism reflects consumers' emotions and cognitive states (brand trust) and acts as an intermediary platform to produce specific behavioral outcomes (behavior intention). Therefore, the S-O-R model could be used to explain the relationship among customer engagement, service evaluation, brand trust, and behavior intention.

Customer Engagement

For the concept of customer engagement, Kaplan et al. (2006) defined "engagement" as the psychological concept of employee participation and engagement in the work environment. After that, based on this research, many scholars applied the concept of "engagement" to sociology, psychology, pedagogy, and other fields (Brodie and Hollebeek, 2011; Guo et al., 2016). In the previous studies, customer engagement is defined as

the emotional bond between the enterprise and customers (Rieger and Kamins, 2006), the interaction with customer participation (Nambisan, 2002; Wagner and Majchrzak, 2006), the spontaneous participation behavior through knowledge exchange among customers (Joshi and Sharma, 2004; Erat and Kavadias, 2006).

In the past few years, the perception of “customer engagement” contains psychological, behavioral and integrated dimensions. The psychological dimension considers customer engagement as the mental state or mental process of both cognitive and emotional aspects of the customer toward the company. Bowden (2009) introduced the first cognitive and affective-based measurement dimensions from a biased psychological dimension. Hollebeek (2011) described three dimensions of customer engagement: cognitive, emotional and behavioral. A type of WOM transfer, recommendation, C2C interaction, blogging, writing reviews and other similar activities by customers to a brand or company are typical of the behavioral dimension. Van Doorn et al. (2010) clearly pointed out that customer engagement was a manifestation of behavior that contained two main aspects of recommendation and review; Vivek (2009) proposed that customer engagement could be measured in three dimensions: conscious participation, social interaction, and enthusiasm in the behavioral dimension. The integrated dimension, on the other hand, integrates psychological and behavioral perspectives, pointing out that customer engagement is the result of both psychological and behavioral aspects. Dwivedi (2015) expressed it in a more directional way, dividing it into three dimensions: vigor, dedication, absorption (Dwivedi, 2015). Dessart et al. (2015) built on three dimensions that were further subdivided by subdividing the cognitive dimension into identification, absorption, and attention, the affective dimension into enthusiasm and enjoyment, and the behavioral dimension into interaction and learning. So et al. (2014) conceptualized customer engagement in the context of tourism branding into five dimensions enthusiasm, attention, absorption, interaction, and identification. In this study, from the psychological and behavioral multidimensional, and eventually referring to So et al. (2013)’s measurement dimensions, the customer engagement components are subdivided into five dimensions of identification, enthusiasm, attention, absorption, and interaction to study the impact of each customer engagement dimension on brand trust and consumer behavioral intention in the COVID-19. This method of measurement uses rooted theory and empirical testing to arrive at a relatively complete customer engagement measurement system that is consistent with management practice in the COVID-19 in China. The measurement system avoids the problem of crossover between variables in other scales, has a high degree of compatibility with the practice of economy hotels, and has a certain degree of operability.

Brodie and Hollebeek (2011) in the exploratory research of customer engagement behavior in virtual online brands confirmed that customer trust was the result variable of customer engagement. Brodie et al. (2011), while exploring the internal structure and formation system of customer engagement in online social media, think that customer engagement

formed through five sub-processes: learning, sharing, advocating, socializing and co-development can have an impact on customer trust and customer commitment. Qiang et al. (2018) hold that customer trust refers to the subjective expectation of members of social groups for the potential value that knowledge sharing may bring, while customer engagement emphasizes the participation or input level of effective interaction among members in the process of knowledge dissemination and sharing. Therefore, in the process of knowledge interaction, members’ input in cognition, emotion, and behavior can increase their trust in the community. Based on the above discussion, the following research hypotheses are put forward:

H1: Customer engagement has a direct positive impact on brand trust.

Identification is essentially a perceptual and cognitive structure (Mael and Ashforth, 1992), which means identification matching. The concept of identification comes from the theory of social identification, which holds that self-concept consists of personal identification and consists of characteristics such as ability and interest (Ashforth and Mael, 1989). People develop social identification by dividing themselves and others into different social groups. When a person thinks that he/she is intertwined with the characteristics of this group, a sense of identification will arise. From the consumer’s point of view, identification is an individual’s perception of organizational unity or belonging (Bhattacharya and Sen, 2003). At the brand level, when consumers think that their self-image is consistent with the brand image, they will have an identification (Bagozzi and Dholakia, 2006). Therefore, identification, as an important dimension of consumer participation, is of great significance to customer engagement. Hence, we hypothesize:

H1a: Identification has a direct positive impact on brand trust.

Enthusiasm represents an individual’s level of intense excitement and interest in engagement focus (Vivek, 2009). Enthusiasm is considered to be a positive emotional state of work engagement and customer engagement. Enthusiasm is characterized by a strong sense of excitement (Bloch, 1986), which is a lasting and active state. Vivek (2009) also emphasizes the importance of enthusiasm and excitement and regards enthusiasm as a unique dimension to capture consumers’ strong excitement and focus. Hence, we hypothesize:

H1b: Enthusiasm has a direct positive effect on brand trust.

Previous studies have shown that attention is a key aspect of engagement. Attention is the duration of focus on work and mental focus (Rothbard, 2001). Highly engaged people tend to focus a lot of attention consciously or unconsciously on the people they are engaged in. Similarly, personal engagement is related to attention, connection, integration, and absorption of in-role performance (Kahn, 1992). Therefore, consumer attention is considered an important aspect of customer engagement. Hence, we hypothesize:

H1c: Attention has a direct positive impact on brand trust.

Absorption has been identified by many scholars as an important indicator of customer engagement (Hollebeek and Brodie, 2009). Absorption is to be so absorbed in something that time passes so quickly that a person is very detached from the role. Absorption is a high degree of attention and absorption that transcends sensory efficiency is a state of optimum experience (Schaufeli et al., 2002). In marketing, absorption represents effortless attention, loss of self-awareness, distortion of time, and inner enjoyment. Therefore, absorption is an important indicator of customer engagement. Hence, we hypothesize:

H1d: Absorption has a direct positive impact on brand trust.

Interaction refers to customers' online and offline participation in brand activities or contact with other customers besides purchase. Interaction includes sharing and communicating thoughts and feelings about brand experience, which is an important part of customer engagement (Vivek, 2009). The main form of expression is through oral communication, recommendation, customer interaction, blogging, writing comments, and other ways to participate in company activities (Van Doorn et al., 2010). With the increase of participation intensity, the possibility of customers participating in these activities will also increase. Therefore, interactive customer engagement is an important dimension. Hence, we hypothesize:

H1e: Interaction has a direct positive impact on brand trust.

Service Evaluation

In brand loyalty literature, service quality, satisfaction, and value are described as evaluative judgment variables (Butcher et al., 2001) or service evaluation variables (Lai et al., 2009), which directly depend on customers' evaluation of actual service provision or service consumption experience. Although these variables are different concepts and represent the cornerstone of service brand loyalty, previous empirical studies have always found that these evaluation factors are interrelated (Cronin et al., 2000; Lai et al., 2009). Therefore, these well-established brand loyalty precedents can be collectively referred to as service evaluation variables, which are mainly determined by consumers' perception of service experience, which is helpful to the formation of service brand loyalty.

In a large number of marketing literature, closely related structures are combined to form a higher level of abstraction. For example, a large number of research literature show that the overall evaluation of customers, such as overall satisfaction, perceived service quality, and perceived value usually has a strong statistical relationship, which is described as the halo effect (Crosby and Stephens, 1987) or multicollinearity (Rust et al., 1995).

This effect is considered to be the result of cognitive and memory processes, in which the overall assessment synthesizes many experiences and perceptions (Garbarino and Johnson, 1999). It is irrelevant whether researchers use customer satisfaction or service quality to

determine quality return because these evaluation factors are similar in forming consumers' views on service companies (Rust et al., 1995). In addition, Cowles and Crosby adopted a similar approach when proposing and testing the relationship quality model, in which different types of cumulative evaluations (such as trust and satisfaction) are combined to form a structure called relationship quality (Cowles and Crosby, 1990). Therefore, on this basis, it is conceptually appropriate to combine perceived service quality, perceived value, and customer satisfaction to form a higher-level service evaluation structure.

Service Quality

A widely studied antecedent of trust is service quality. Service quality is the judgment of consumers on the overall excellence or superiority of products (Zeithaml, 1988). Up to now, most descriptions of service quality in service environment are rooted in unconfirmed paradigm (Berry et al., 1985; Parasuraman et al., 1985; Zeithaml, 1988), which shows that the quality of service is determined by comparing expectations with performance. A review of the literature shows that service quality has several concepts (Lehtinen and Lehtinen, 1982; Raval and Grönroos, 1996). However, the most widely used concept of service quality identifies reliability, responsiveness, assurance, empathy, and materiality as the five basic dimensions that consumers use to evaluate service quality (Zeithaml, 1988; Parasuraman et al., 1991).

When investigating the relationship between service quality and loyalty, researchers found that service quality directly determined customer loyalty to products or brands (Bitner, 1990; Zeithaml et al., 1996; Bloemer et al., 1999; Lee and Cunningham, 2001; Aydin et al., 2005; Rauyruen and Miller, 2007; Han et al., 2011; Cheng et al., 2012).

This relationship can be explained by the behavioral consequences model of service quality (Zeithaml et al., 1996), which assumes that high evaluation of service quality will lead to good behavior intention of customers, such as loyalty to service quality. This effect occurs because enhanced service quality helps consumers to develop good attitudes toward service providers and thus develop preference loyalty (Bloemer et al., 1999). Empirical evidence supports the impact of service quality on willingness to buy back (Rauyruen and Miller, 2007), willingness to recommend (Bloemer et al., 1998), and service loyalty (Caruana, 2002). Therefore, excellent service quality produces brand loyalty.

Besides having direct predictive power in explaining brand loyalty, service quality also indirectly affects brand loyalty through customer satisfaction (Butcher et al., 2001; Caruana, 2002; Olsen, 2002; Ball et al., 2004; Yu et al., 2005; Chiou and Droge, 2006; Han et al., 2011; Kim, 2011). The framework of Lazarus (1991) and Bagozzi (1992) provides a theoretical basis for indirect relations, which includes evaluation, emotional response, and coping.

This framework shows that consumers form an attitude toward the quality of products, brands, or stores by understanding the different characteristics of products, brands, or stores, thus generating a global emotional evaluation (i.e., satisfaction). This emotional evaluation then becomes the

tendency to guide the final brand selection and loyalty (Olsen, 2002), thus forming a sequential chain effect of service quality, customer satisfaction, and brand loyalty in the development of loyalty. Thus, service quality has both direct and indirect effects on loyalty (through satisfaction) (Cronin et al., 2000; Sivadas and Baker-Prewitt, 2000; Lee et al., 2004; Petrick, 2004a; Eiselt and Marianov, 2009).

Hardin (2000) defines “trust” as giving one’s interests to others without damaging one’s interests, and emphasizes that trust is a variable of uniting organizations. The research results on hotel websites show that the influence of service quality on trust is obvious (Forgas et al., 2012). Trust of enterprises in websites directly affects the service quality of personal information protection, transaction stability, information, and interactivity (Walczuch and Lundgren, 2004). Thus, hypothesis 2a is as follows:

H2a: Service quality has a direct positive impact on brand trust.

Perceived Value

Perceived value is also considered a key driver of loyalty. The most conceptual definition of perceived value is based on Zeithaml’s statement that value represents “the consumer’s overall assessment of product utility based on perceptions received and given” (Zeithaml, 1988, p. 14). From this perspective, the view of value reflects a reasonable trade-off between the cost and benefit of using a product or service (Zeithaml, 1988; Dodds et al., 1991; Grewal et al., 1998; Cronin et al., 2000; Anderson and Srinivasan, 2003; Petrick, 2004a). When proposing the relationship between perceived value and brand loyalty, Sirdeshmukh et al. (2002) describe value as a superior consumer goal that regulates consumer behavior at the level of behavior intention of loyalty (Sirdeshmukh et al., 2002).

Consumers are expected to regulate their behavior to achieve this goal, so as long as the purchase provides higher value, they show loyal behavior intention. In addition, previous studies have shown that perceived value affects revisit intention (Oh, 1999; Petrick, 2004b; Kim et al., 2008), Commitment (Pura, 2005; Han et al., 2011) and Brand Loyalty (Sirdeshmukh et al., 2002; Chen and Chen, 2010). Therefore, the review of loyalty literature indicates that perceived value plays an important role in building brand loyalty.

Combined with the view that perceived value directly determines loyalty, many researchers put forward that consumers’ perceived value also indirectly affects the loyalty intensity of products or brands they are interested in through satisfaction. Specifically, Chiou (2004) and Lai et al. (2009) found that perceived value had a positive impact on overall satisfaction and loyalty intention, while overall satisfaction affected loyalty intention (Chiou, 2004; Lai et al., 2009). Similar findings have been reported in a variety of research settings, including online banking services (Yang and Peterson, 2004), hotels (Han et al., 2011), festivals (Yoon et al., 2010), restaurants (Tam, 2004), business-to-business services (Lam et al., 2004) and the cruise industry (Petrick, 2004b), as well as the wider service environment (Cronin et al., 2000). Therefore, perceived value not

only has a direct impact on brand loyalty, but also can improve customer satisfaction, and then affect brand loyalty.

In addition, it has been proved that perceived value plays an intermediary role between perceived quality and brand loyalty. To support this relationship, Grewal and Krishnan (1998) accumulated insights based on their previous studies and other related studies reported in the literature (Parasuraman et al., 1985; Zeithaml, 1988; Dodds et al., 1991; Zeithaml et al., 1996; Grewal et al., 1998), developed a conceptual framework to clarify the general concept that quality of service enhances the perceived value and thereby loyalty. In addition, experimental studies show that the trade-off between perceived price and perceived quality leads to perceived value, and perceived value is the main factor determining purchase intention (Chang and Wildt, 1994). Some authors (Tam, 2004; Hollebeek and Brodie, 2009; Lai et al., 2009; Nam et al., 2011) provide strong evidence for the sequential chain of quality, value and loyalty, in addition to similar findings reported by Grewal et al. (1998).

The research of Jarvenpaa and Todd (1996) show that trust can offset the risk factors in the purchase environment, alleviate the uncertainty of transactions, thus reduce transaction costs and produce a cooperation-induced effect. The purpose of relationship marketing is to establish, maintain and strengthen customer relations. To ensure benefits, trust is very important in the mutual benefit relationship between buyers and suppliers. To improve trust, it is emphasized that the value awareness of suppliers must be improved. There is a view that the higher consumers’ perception of brand value, the higher their trust in the brand. Sultan et al. (2021) point out that when customers perceive the value of the products or services they consume, even if the value perception is not very high, customers will still have a high degree of trust in them. Kim et al. (2012) showed that consumers’ perceived value of low-cost airlines will affect consumers’ trust. Park and Jeon (2013) divided the perceived value of social media into functional value, emotional value, monetary value, information value, and social value, and confirmed that perceived value had a deliberate impact on trust. Kim et al. (2014) took the customers of private brand (PB) goods in large supermarkets as the object and studied the relationship between their perceived value of goods, brand trust, and purchase intention. To sum up, we can find that perceived value is an important variable that has an impact on trust. Thus, hypothesis 2b is as follows:

H2b: Perceived value has a direct positive impact on brand trust.

Customer Satisfaction

Customer satisfaction is one of the important factors affecting brand loyalty. Although most early researchers considered satisfaction as a cognitive structure (Olson and Dover, 1979; Oliver, 1980), recent definitions of satisfaction (Halstead et al., 1994; Spreng et al., 1996; Oliver et al., 1997; Olsen, 2002) seem to form a consensus, that is, the concept of satisfaction is an emotional structure, which recognizes the emotional response to product acquisition and consumption (Giese and Cote, 2000; Russell-Bennett and Bove, 2001). From this point of view, one of the most widely used definitions of customer satisfaction

indicates that satisfaction is the degree to which consumers think that owning or using services can arouse positive emotions (Rust and Oliver, 1994).

The standard approach to conceptualizing the satisfaction-loyalty relationship assumes that the increase in loyalty comes from a higher level of satisfaction (Butcher et al., 2001). This positive relationship is based on the idea that consumers form satisfactory judgments about the products or brands they consume, which in turn explains why consumers are loyal to brands (Fullerton, 2005). Based on this reasoning, empirical studies have produced evidence supporting the positive impact of customer satisfaction on attitudinal loyalty (Macintosh and Lockshin, 1997; Jones and Suh, 2000; Butcher et al., 2001; Bennett et al., 2005; Rauyruen and Miller, 2007; Russell-Bennett et al., 2007; Li and Petrick, 2008; Sun et al., 2008; Yuksel et al., 2010; Han et al., 2011), behavioral loyalty (Yoon et al., 2010; Nam et al., 2011), and compound loyalty (Shankar et al., 2003; Rauyruen and Miller, 2007; Kim, 2011). Therefore, the view that customer satisfaction leads to brand loyalty is generally accepted.

Customer satisfaction is a positive emotional state formed by customers' evaluation of products and enterprises, and it is the first variable of trust. Customer satisfaction is the initial relationship between the brand and the customer, and trust is the stage after customer satisfaction (Dwyer and Oh, 1987). In other words, satisfaction with the results will give the customer a sense of "being treated fairly," which will convince the customer that the company cares about them and build trust in them (Ganesan, 1994). Customer satisfaction has a positive impact on trust (Ganesan, 1994; Garbarino and Johnson, 1999). Thus, hypothesis 2c is as follows:

H2c: Customer satisfaction has a direct positive impact on brand trust.

Brand Trust

Brand trust is another common antecedent of brand loyalty. According to Moorman et al. (1992), trust is "a willingness to rely on an exchange partner in whom one has confidence" (p. 315). Trust leads to brand loyalty and commitment because it creates highly valued exchange relationships (Morgan and Hunt, 1994).

Loyalty and commitment are therefore the continuation and maintenance of valuable and important relationships created by trust (Chaudhuri and Holbrook, 2001). Theoretical reasoning about the relationship between trust and loyalty has identified three ways in which trust enhances an individual's commitment to relationships (Ganesan, 1994; Ganesan and Hess, 1997). First of all, trust reduces the perceived risk level related to the opportunistic behavior of partners. Secondly, trust increases the confidence of partners that short-term inequalities will be solved for a long time. Finally, trust reduces the transaction cost in the exchange relationship. Consistent with this view, many studies have provided empirical evidence to show the contribution of trust to brand loyalty (Garbarino and Johnson, 1999; Chaudhuri and Holbrook, 2001; Sirdeshmukh et al., 2002; Ball et al., 2004; Chiou, 2004; Aydin et al., 2005; Flavián et al., 2006; Matzler et al., 2008; Cheng et al., 2012). Therefore, brand trust is an important prerequisite for customer loyalty to the brand.

Another concept of the trust-loyalty relationship assumes that trust mediates the positive impact of customer satisfaction on loyalty. Ravald and Grönroos (1996) explain this relationship, arguing that when consumers are satisfied, they begin to feel safe with suppliers, which leads to increased trust in suppliers and supports and encourages customer loyalty. Therefore, a satisfactory experience strengthens consumers' trust in the organization. A highly satisfying experience cannot only convince consumers that trust in the organization is good, but also enhance that trust (Singh and Sirdeshmukh, 2000). Increased trust, in turn, leads to a long-term commitment to a relationship (Morgan and Hunt, 1994; Doney and Cannon, 1997; Garbarino and Johnson, 1999) and thus affects consumer loyalty to the brand. A series of studies have provided strong support for this sequential relationship (Singh and Sirdeshmukh, 2000; Delgado-Ballester and Munuera-Alemán, 2001; Shankar et al., 2003; Flavián et al., 2006; Caceres and Paparoidamis, 2007; Matzler et al., 2008; Van Doorn et al., 2010). The results of these studies and the theoretical reasoning provided in the literature support the significant chain effects of customer satisfaction trust and loyalty.

Behavior Intention

Behavior intention, as a factor to predict consumer behavior, is regarded as the core element of relationship marketing. In addition, action intention is the main variable in many research fields. According to different research fields, it can be applied in various forms. The so-called action intention refers to the personal will and belief expressed by specific future behaviors after consumers form an attitude toward a certain object. Mainly reflected in price sensitivity of products/services, repurchase intention, WOM, etc. (Lounsbury and Polik, 1992). Frazier et al. (1989) argue that behavior intention is based on the relationship between customers and service personnel. Behavior intention refers to the knowledge generated after enjoying services, which is a stage in the decision-making process of consumers. It can also be called the evaluation process of satisfaction or dissatisfaction after enjoying the service. Ajzen (1991) claims that behavior intention is an intermediate variable between personal attitude and behavior, a subjective possibility when trust and attitude are behaviorized, and also a subjective state of individuals.

WOM is an essential variable for future actions (Kim et al., 2009). Previous studies have shown that the interaction between customers who do not merely share promotional information is an essential factor in customer decision-making (Feick and Price, 1987). WOM regarding products releases information related to the consumer experience through various means, the key determinant of good communication (Nie et al., 2019). WOM communication is also crucial for enterprises because customers evaluate the products and others' feelings before choosing them (Belanche et al., 2020). Consequently, customers' WOM is usually more attractive than other forms of communication (Dessart et al., 2018). Some authors (Siqueira et al., 2019) identified the positive effect of customer experience on WOM behavior. Chattopadhyay and Laborie (2005) found that if customers were satisfied with the service experience, they recommended it to their friends and intended to experience it

again. Recommendation or WOM communication has become one of the most effective marketing tools. Comments on social media can affect the financial performance of other brands (Pansari and Kumar, 2017).

Over the past decade, customer engagement has been a pioneering study of brand loyalty and customer purchases (Prentice and Loureiro, 2017). When a customer experiences a brand, a strong psychological connection is formed (Hapsari et al., 2016), leading to customers' repeated purchases or use of products of the brand. Customer engagement may establish a long-term relationship with the brand (Vivek et al., 2012). Previous studies have shown that the consumption experiences of customers have a significant impact on future repurchase behavior. Gounaris et al. (2007) highlighted that reuse intention is the core concept for maintaining the continuous relationship between brands and customers. In terms of reuse intention, the expected benefits come from experience mainly. Schivinski and Dabrowski (2014) also showed that customers' communication experience on-brand social media pages impacted brand purchase intention significantly. Experience has a positive effect on customer attitude, affecting customer satisfaction. Experienced customers tend to have better satisfaction and a more positive attitude than inexperienced customers (Cheng et al., 2012). Previous studies have confirmed the influence of experience on the relationship between customer satisfaction and customer reuse intention (Khalifa and Liu, 2007).

Zhou et al. (2009) in the study of online purchasing behavior show that the service quality of websites has a stronger impact on trust and satisfaction than design quality. Trust has an impact on repurchase intention. Chu et al. (2012) think that for retail customers, the exploratory research on service quality, satisfaction, trust, and store loyalty shows that service quality has a positive impact on customer satisfaction and trust, and customer satisfaction and trust have an impact on customer loyalty. Chen and Chen (2010) showed that service quality had a positive impact on trust, and trust has an intermediary effect on repurchase intention. Chou et al. (2011) proved that service quality had a positive impact on customer satisfaction and trust, and customer satisfaction and trust had a positive impact on the repurchase. The research on the golf driving range also shows that trust has a positive impact on repurchase intention (Yu et al., 2005). So many empirical studies show that trust affects repurchase intention. Based on the above research on brand trust and behavior intention, this study predicts the following:

H3a: Brand trust has a direct positive impact on WOM intention.

H3b: Brand trust has a direct positive impact on reuse intention.

The Mediating Effect of Customer Brand Trust

Trust, a key concept in long-term brand relationships (Morgan and Hunt, 1994; Garbarino and Johnson, 1999), has been retained in this research. In their three-dimensional conceptualization of

brand trust, Gerviez and Korchia (2003) consider that credibility, integrity, and benevolence relate to the paradigm of exchange. Credibility refers to an assessment of the partner's ability to meet the terms of the exchange, the expected performance, leading to functional expectations being achieved and needs satisfied. Integrity refers to the assignment of fair incentives to the partner relating to the fulfillment of its promises in terms of trade. These two facets are therefore mostly cognitive. Finally, benevolence focuses on sustainability and therefore the prospect of a less uncertain future, taking the consumer's interests into account and leading to conditions for a fair exchange. To summarize, this conceptualization of trust emphasizes not just its main characteristic of evaluation but also its sustainability over time.

Brand trust is defined as "the willingness of the average consumer to rely on the ability of the brand to perform its stated function" (Chaudhuri and Holbrook, 2001, p. 82). The importance of trust has already been illustrated in sustainable relationships between the seller and buyer (Sahin et al., 2011). It is the trust that makes customers intimate with a company (Morgan and Hunt, 1994). Trust is created when a company promises to provide quality products to consumers and successfully meets the promise (Ahmed et al., 2011).

Scholars have demonstrated that trust is a key determinant of behavioral intentions. Consumers who trust a brand are more likely to maintain their reuse intention and trust the brand's word of mouth. Many scholars have also reviewed the link between brand trust and behavioral intention (Aydin and Özer, 2005; Dehdashti et al., 2012), and they revealed that the most important antecedent of behavior intention was trust.

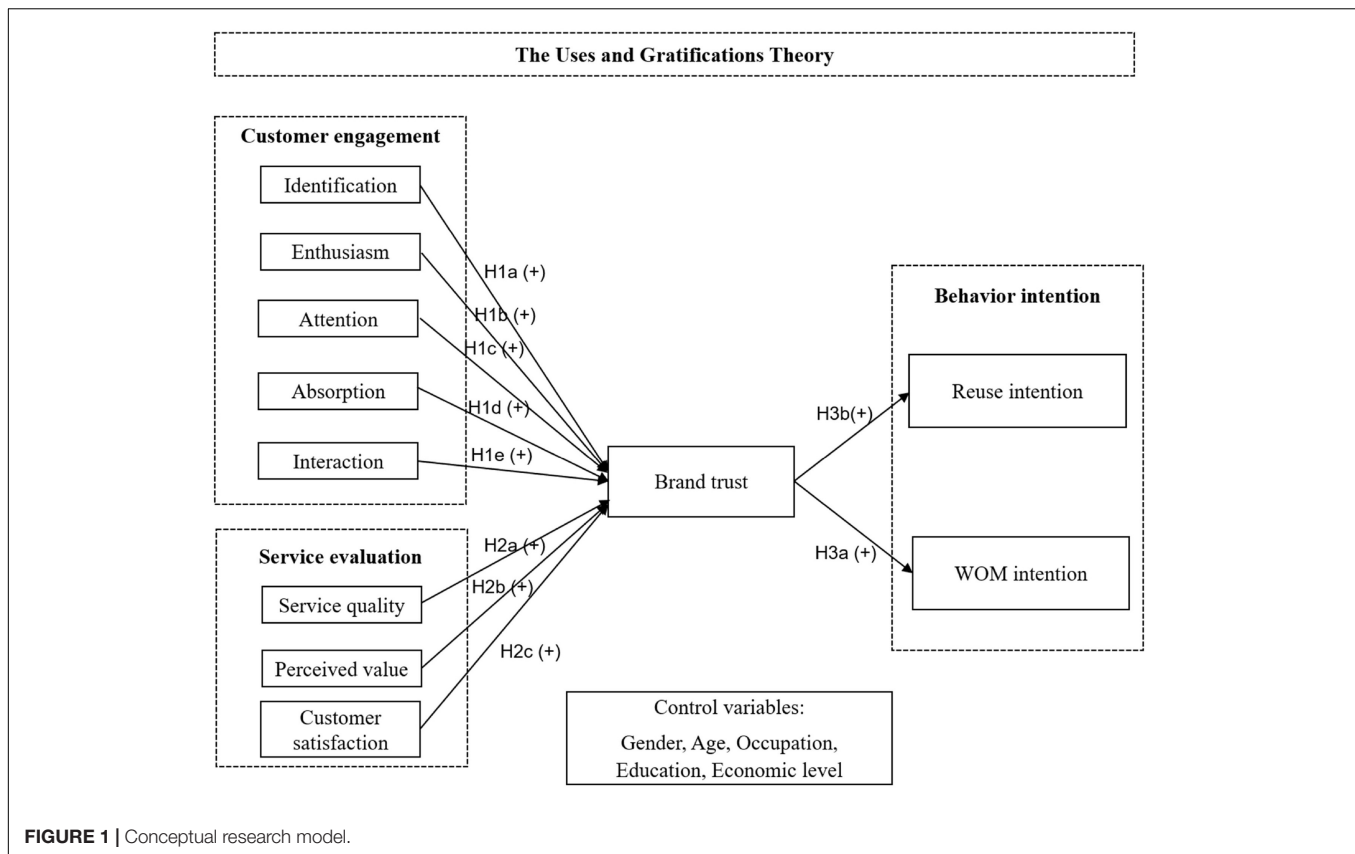
This study primarily focuses on the major determinants of behavioral intention. **Figure 1** illustrates the research framework for this study, showing the independent variables customer engagement and service evaluation, brand trust as a mediator variable, and behavior intention as the dependent variable. Hence, this study proposes the following hypothesis:

H4a: Brand trust plays a mediating role in the influence of customer engagement on behavior intention.

H4b: Brand trust plays a mediating role in the influence of service evaluation on behavior intention.

Control Variable

This study introduced demographic characteristics as the primary control variables to further improve the model construction and the scale's external validity. For example, the attention differences between men and women when choosing economy hotels and that young people are more likely to have access to choose different hotels than other groups. Customers with different occupations and economic levels have different evaluations of the hotel, which affects consumers' WOM intention and reuse intention. The higher the level of education, the stronger the dependence on the used economy hotel brand. Thus, gender, age, occupation, education, economic level in demographic characteristics were selected as control variables in this study.



MATERIALS AND METHODS

Theoretical Model

This study examines the impact of customer engagement and service evaluation on customers' behavior intention. It tests whether the components of customer engagement, identification, enthusiasm, attention, absorption, and interaction positively impact trust and whether the components of service evaluation, service quality, perceived value, and customer satisfaction positively impact trust. Moreover, it examines whether trust positively influenced customers' WOM intention and reuse intention. **Figure 1** presents the conceptual research model.

Instrument

Based on a large amount of domestic and international literature, the measurement of variables was based on the research results of domestic and international scholars. This study adopted some procedures to minimize the deviation of standard methods. First, the wording of items and questions should avoid ambiguity, be concise and straightforward, and ensure no unfamiliar terms and complex grammar. Second, the physical distance between the same construct measures is considered, not adjacent to the exact construction items.

The questionnaire was based on the Likert 7-point scale, with each measure ranging from "completely disagree" to "completely agree" on a scale of 1–7. To ensure content validity, the items used to measure the constructs were adapted from extensive

literature and modified to fit the study context. Measurement items for customer engagement were adapted from So et al. (2013), with 15 question items; measurement items for service quality were adapted from Oh and Kim (2017), with 6 items; measurement items for perceived value were adapted from Yang and Peterson (2004), with 6 items; measurement items for customer satisfaction were adapted from Kim et al. (2018), with 4 items; measurement items for trust were adapted from Chaudhuri and Holbrook (2001), with 3 items; measurement items for WOM intention were adapted from Seo et al. (2020), with 3 items. Reuse intention was measured using four items adapted from Park and Park (2017).

Data Collection

Before the official questionnaire was distributed, a small-scale pretest was conducted, and according to the results of the pretest, certain statements in the questionnaire were adjusted appropriately to form the official questionnaire.

The formal questionnaire was distributed from January to February 2021. The research data were collected by random sampling through online and offline surveys. Part of the data was collected directly near the economy hotel, and customers coming out of the hotel were randomly approached. Another part of the data was conducted through online crowdsourcing platform of China, functioning similarly to Amazon's Mechanical Turk. Each participant's Internet protocol address and demographic information were tracked and examined to ensure they

submitted only one response. Questionnaires were administered to 470 customers who had used economy hotels, and finally, 437 questionnaires were used by setting the corresponding questionnaire validity as the censoring criteria, except for 33 questionnaires that were not suitable for this study.

Table 1 summarizes the demographic characteristics of the participants. Among the valid data collected, 44.9% were male and 55.1% were female, and the majority (63.84%) of the participants were between 20 and 39 years of age. Most of the participants were employed (59.2%). Furthermore, 99.1% of the participants were generally educated to college level or above. And the majority (61.1%) of the participants were of medium economic level.

DATA ANALYSIS AND RESULTS

Reliability and Validity

It is necessary to test the measurement model and evaluate the structural model to verify the tool's reliability and validity. Confirmatory factor analysis and reliability tests were applied. The test followed a two-step method recommended by Anderson and Gerbing (1988).

The data were processed and analyzed using the software SPSS 22.0 and AMOS 24.0, and the structural equation modeling two-step method was used to test the model and hypotheses. First, the Harman one-way test was used to test for homoscedasticity. After unrotated factor analysis of the 40 items of the questionnaire, 11 factors with a characteristic root greater than 1 were obtained, and the first factor loading only accounted for 30.127% of the total loading, which was below the critical value level, indicating that this study was influenced by homoscedasticity within an acceptable range. The results of the reliability test showed that the overall Cronbach's alpha value was 0.924, the Cronbach's alpha value for each variable was higher than 0.920 (0.7), and the degree of the combination was greater than 0.860, which was higher than the minimum critical level of 0.6, so the scale had good reliability.

TABLE 1 | Demographics of the survey respondents ($N = 437$).

Item	Characteristic	Number of samples	Percentage
Gender	Male	196	44.9
	Female	241	55.1
Age	20–39	279	63.8
	40–59	157	36.0
	60 or older	1	0.2
Occupation	Institution and civil servant	43	9.8
	Enterprise staff	75	17.2
	Individual management	15	3.4
	Professional Staff	11	2.5
	Teacher	115	26.3
	Student	130	29.7
	Others	48	11.1
Education	High school and below	4	0.9
	College degree or above	433	99.1
Economic level	Below average	67	15.3
	Middle level	267	61.1
	Above average	103	23.6

Factor analysis was used to test the convergent validity, and the overall sample had a KMO test value of 0.921 and a spherical Bartlett's test chi-square value of 244459.242 ($p < 0.001$), which is suitable for factor analysis. Principal component analysis was used to test each construct, the maximum variance method was chosen for factor rotation, and the factor extraction method was eigenvalues greater than 1. The results showed that the factor loadings of the question items in the same construct

TABLE 2 | Results of confirmatory factor analysis.

Construct	Measurement item	Standard loading	AVE	CR	Cronbach's α
Identification	IDE1	0.959	0.842	0.941	0.972
	IDE2	0.961			
	IDE3	0.962			
Enthusiasm	ENT1	0.958	0.831	0.937	0.969
	ENT2	0.957			
	ENT3	0.954			
Attention	ATT1	0.953	0.821	0.932	0.966
	ATT2	0.953			
	ATT3	0.950			
Absorption	ABS1	0.963	0.845	0.942	0.974
	ABS2	0.963			
	ABS3	0.965			
Interaction	INT1	0.961	0.821	0.932	0.971
	INT2	0.950			
	INT3	0.967			
Service quality	QUA1	0.956	0.826	0.966	0.985
	QUA2	0.956			
	QUA3	0.962			
	QUA4	0.956			
	QUA5	0.959			
	QUA6	0.958			
Perceived value	VAL1	0.961	0.831	0.967	0.985
	VAL2	0.961			
	VAL3	0.957			
	VAL4	0.959			
	VAL5	0.958			
	VAL6	0.957			
Customer satisfaction	SAT1	0.965	0.848	0.957	0.982
	SAT2	0.968			
	SAT3	0.965			
	SAT4	0.965			
Brand trust	TRU1	0.790	0.697	0.873	0.871
	TRU2	0.806			
	TRU3	0.793			
Reuse intention	REU1	0.814	0.745	0.898	0.860
	REU2	0.832			
	REU3	0.816			
WOM intention	WOM1	0.825	0.743	0.897	0.860
	WOM2	0.821			
	WOM3	0.813			

IDE, Identification; ENT, Enthusiasm; ATT, Attention; ABS, Absorption; INT, Interaction; QUA, Service Quality; VAL, Perceived Value; SAT, Customer Satisfaction; TRU, Brand Trust; REU, Reuse Intention; WOM, Word-of-Mouth intention.

TABLE 3 | Correlations matrix.

Variable	Mean	Variance	Correlation matrix										
			1	2	3	4	5	6	7	8	9	10	11
IDE	5.190	2.12	1										
ENT	5.262	2.05	0.166	1									
ATT	5.081	1.99	0.197	0.012	1								
ABS	5.160	2.27	0.105	0.019	0.178	1							
INT	4.993	2.39	0.231	0.083	0.282	0.230	1						
QUA	5.050	2.19	0.134	0.022	0.258	0.032	0.108	1					
VAL	5.128	2.15	0.154	0.110	0.217	0.118	0.073	0.181	1				
SAT	5.331	2.38	0.126	0.016	0.096	0.195	0.194	0.144	0.172	1			
TRU	5.367	0.60	0.373	0.113	0.508	0.238	0.375	0.445	0.416	0.386	1		
WOM	5.362	0.56	0.357	0.213	0.469	0.374	0.352	0.427	0.412	0.459	0.810	1	
REU	5.376	0.55	0.277	0.182	0.436	0.368	0.376	0.385	0.380	0.422	0.850	0.919	1

IDE, Identification; ENT, Enthusiasm; ATT, Attention; ABS, Absorption; INT, Interaction; QUA, Service Quality; VAL, Perceived Value; SAT, Customer Satisfaction; TRU, Brand Trust; WOM, Word-of-Mouth intention; REU, Reuse Intention. Bold values are self-correlated, with a correlation coefficient of 1.

were greater than 0.5, indicating that the convergent validity of the scale was good. Convergent validity was discriminated by the CR value of composite reliability and the average variance extracted (AVE), and the results showed that the criteria of composite reliability greater than 0.7 and AVE value greater than 0.5 were passed; Discriminant validity is to compare the individual mean-variance extracted values of the two constructs with the correlation coefficient between the two constructs, if the mean-variance extracted values of both constructs are greater than the squared correlation coefficients of the two construct variables, it means that there is good discriminant validity between the constructs, and the results show that the discriminant validity meets the requirements, i.e., the correlation coefficient matrix values are less than the diagonal AVE values. The correlation analysis matrices between the dimensions are shown in **Tables 2, 3**.

After testing the validity and reliability of the measurement, this study tests the hypothesis proposed by AMOS 24.0. **Table 4** shows the model fitting index's actual and recommended values obtained after the original model is modified. These data prove that the model's appropriate index is better than the recommended threshold, showing that the model fits the data well.

The validation factor analysis of the model using AMOS 24.0 yielded the fit indices: $\chi^2/df = 1.304 < 3$, GFI = 0.909, RMSEA = 0.026 < 0.05, SRMR = 0.043 < 0.05, TLI = 0.990, CFI = 0.992, IFI = 0.992, all of which were greater than 0.9, and the absolute and relative fit indices are within the acceptable range. Therefore, the collected sample data can be analyzed by structural equation modeling.

Hypotheses Testing

Path modeling was performed to test H1a to H3b. The results show that customer engagement ($\beta = 0.130$, $p < 0.001$), and service evaluation ($\beta = 0.131$, $p < 0.001$) positively affected trust. Therefore, H1 and H2 are supported. This study believes that these findings can explain how customer engagement and service evaluation affect customers' behavior intention. Trust positively

affect WOM intention ($\beta = 0.451$, $p < 0.001$) and reuse intention ($\beta = 0.425$, $p < 0.001$). Thus, H3 is supported. Therefore, our conceptual model provides a reasonable explanation for the different customer behavior in intentions. The results are presented in **Table 5** and **Figure 2**.

This study used a bootstrapping method to test the mediating effect and found that brand trust plays a mediating role in customer engagement on behavior intention. **Table 6** shows that the indirect effect of brand trust on the relationship between customer engagement and behavior intention is significant with

TABLE 4 | Measures of the model fit.

Fit index	χ^2/df	RMSEA	SRMR	GFI	CFI	IFI	TLI
Recommended range	<3 ^a	<0.05 ^b	0.05	>0.90 ^a	>0.90 ^a	>0.90 ^a	>0.90 ^a
Model value	1.304	0.026	0.043	0.909	0.992	0.992	0.990

RMSEA, root mean square error of approximation; GFI, the goodness of fit index; CFI, comparative fit index; TLI, non-normed fit index.

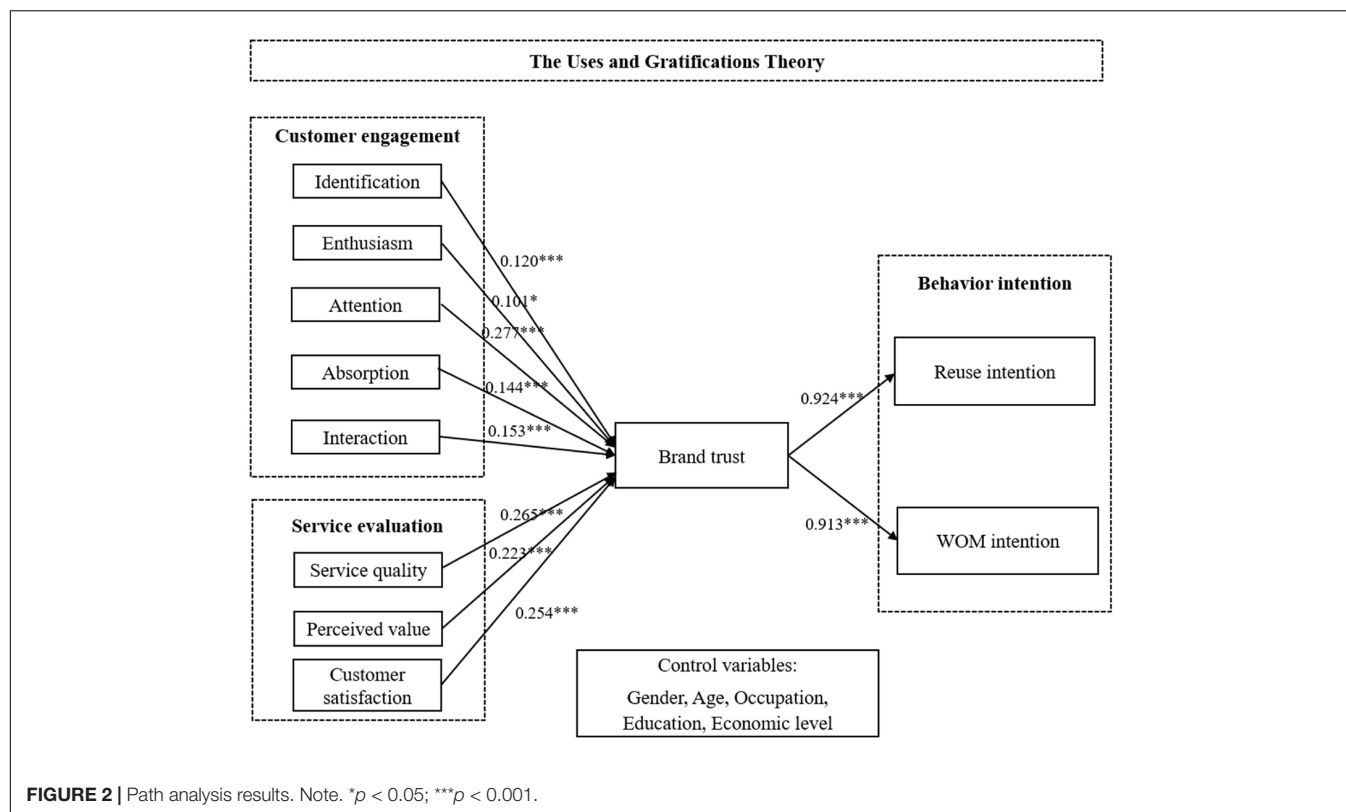
^aAccording to Bentler and Bonett (1980).

^bAccording to Browne and Cudeck (1989).

TABLE 5 | Structural model results.

Hypotheses	Structural path	S.E.	T-value	Results
H1a	Identification → dBrand trust	0.120***	3.349	Supported
H1b	Enthusiasm → aBrand trust	0.101*	2.960	Supported
H1c	Attention → Brand trust	0.277***	7.229	Supported
H1d	Absorption → Brand Trust	0.144***	4.090	Supported
H1e	Interaction → Brand trust	0.153***	4.174	Supported
H2a	Service quality → Brand trust	0.265***	7.344	Supported
H2b	Perceived value → Brand trust	0.223***	6.244	Supported
H2c	Customer satisfaction → Brand trust	0.254***	7.002	Supported
H3a	Brand trust → WOM intention	0.913***	17.125	Supported
H3b	Brand trust → rReuse intention	0.924***	17.084	Supported

* $p < 0.05$; *** $p < 0.001$.

**TABLE 6 |** Analysis of mediating effect.

Independent variable	Mediator variable	Dependent variable	Effect	S.E.	Confidence interval	p-value
Identification	Brand trust	WOM intention	0.110	0.037	[0.021, 0.098]	0.003**
Enthusiasm			0.092	0.034	[0.017, 0.085]	0.012*
Attention			0.253	0.040	[0.091, 0.171]	0.005**
Absorption			0.131	0.037	[0.025, 0.098]	0.006**
Interaction			0.140	0.038	[0.029, 0.097]	0.004**
Identification	Brand trust	Reuse intention	0.111	0.037	[0.020, 0.090]	0.004**
Enthusiasm			0.093	0.034	[0.015, 0.083]	0.011*
Attention			0.256	0.038	[0.090, 0.162]	0.004**
Absorption			0.133	0.036	[0.026, 0.096]	0.004**
Interaction			0.141	0.038	[0.028, 0.088]	0.004**
Service quality	Brand trust	WOM intention	0.242	0.035	[0.083, 0.147]	0.003**
Perceived value			0.204	0.034	[0.062, 0.132]	0.002**
Customer satisfaction			0.232	0.042	[0.063, 0.140]	0.005**
Service quality		Reuse intention	0.245	0.034	[0.076, 0.139]	0.004**
Perceived value			0.206	0.034	[0.059, 0.121]	0.003**
Customer satisfaction			0.235	0.041	[0.063, 0.131]	0.004**

95% Bootstrap confidence intervals for the indirect effect

* $p < 0.05$; ** $p < 0.01$.

a 95% bootstrap confidence interval, excluding 0. This finding shows that brand trust mediates the influence of customer engagement on behavior intention.

Control Variable Results

To improve the scale's external validity and ensure the scientificity of the verification results, gender, age, occupation, education,

economic level in demographic characteristics were selected as control variables in this study. According to the study results, age, occupation and economic level have no significant impact on latent variables because consumers of different ages and occupations and economic levels may have little difference in the choice of economy hotel brands. Gender has a considerable effect on reuse intention ($\beta = 0.096$, $p < 0.05$), but has no significant

effect on other latent variables. Generally speaking, men are more rational than women, so when choosing economy hotels, they tend to choose hotels that have been used and satisfied before. Women may be more emotional and like to try different hotels. Therefore, gender significantly impacts reuse intention. Finally, the education had a significant impact on WOM intention ($\beta = 0.136, p < 0.01$) and reuse intention ($\beta = 0.088, p < 0.05$) and had no significant impact on other latent variable. The education can explain consumers' dependence on the brand of economy hotel and has different effects on WOM intention and reuse intention. In the future, demographic characteristics should be considered as moderating variables to modify and improve this study's conclusions further.

DISCUSSION AND CONCLUSION

General Discussion

The hotel industry has been greatly affected by the New Crown epidemic. In this study, 437 hotel customers were selected to study the effects of customer engagement, service evaluation on brand trust and consumer behavioral intention, taking Chinese economy hotel companies as an example.

First, the findings show that customer engagement has a direct positive effect on brand trust, which is consistent with past literature (e.g., Hollebeek, 2011; Sashi, 2012; Vivek et al., 2012). Unlike previous studies, in this study, customer engagement was subdivided into identification, enthusiasm, attention, absorption and interaction, and the effects of these five dimensions on brand trust were investigated separately. The results show that identification, enthusiasm, attention, absorption, and interaction all have a direct positive effect on brand trust. Among them, the factor loadings of attention and interaction are higher, indicating that hotel companies are more able to gain consumers' trust in the brand by paying attention to them, and hotel companies are more able to gain consumers' trust in the brand when they have a certain level of interaction with them.

Secondly, the findings show that service quality, perceived value and customer satisfaction, all components of service evaluation, also have a direct and positive impact on brand trust. These results are consistent with existing studies in the literature, such as Liu (2020) who verified that dealer service quality has a positive effect on product brand trust. Zhong (2020) who verified that customer perceived value of AI products has a positive effect on product brand trust, and Li (2019) who verified that customer satisfaction has a positive effect on brand trust in luxury parent brands impact.

Thirdly, the results show that brand trust has a positive effect on consumer behavioral intention (reuse intention and WOM intention). This is consistent with previous studies (Yasin et al., 2020; Zhang et al., 2021).

Finally, unlike previous studies, this study set the mediating variable brand trust and explored the mediating effect of brand trust on the relationship between the five dimensions of customer engagement (identification, enthusiasm, attention, absorption, and interaction) and customer behavioral intentions (i.e., reuse and WOM). The results show that brand trust mediates the relationship between customer engagement (identification,

enthusiasm, attention, absorption, and interaction) and customer behavioral intention. Moreover, this study also explored the mediating effect of brand trust on the relationship between three dimensions of service evaluation (service quality, perceived value, and customer satisfaction) and customer behavioral intention (reuse and WOM).

Therefore, economy hotels can enhance customers' trust in the hotel by improving the service quality of the hotel, the perceived value of the hotel and customer satisfaction, which in turn increases customers' WOM intentions and reuse intentions. Economy hotels should take active measures, such as actively participating in public welfare and environmental protection activities, to enhance customers' perceptions of the company and increase consumers' interest in the company. In addition, they can also encourage customers to contact the company by initiating some discussions on the company's homepage and organizing offline parties among members to enhance consumers' participation in company interaction online and offline.

Theoretical Implications

With the rapid development of platform economy and social media, the interaction and cooperation between customers and enterprises are in full swing, customers become one of the main bodies of value co-creation (So et al., 2013), and highly compatible customers become the biggest hidden assets of enterprises. This idea urges service brands to adopt a customer engagement strategy to manage customer relationships more and more, which makes the concept of customer engagement become an important field of academic and practical circles in recent years. Despite this concern and the increasing assumption that it is closely related to the contact between potential and existing customers, the study of customer engagement from a psychological perspective is still in the initial stage of development. Although some researchers have emphasized the potential value of customer engagement (Patterson et al., 2006; Hollebeek and Brodie, 2009; Van Doorn et al., 2010; Brodie et al., 2011), empirical research on the components of customer engagement and how to measure this concept is very limited.

The marketing literature argues that customer engagement is a strategic sine qua non for establishing, maintaining, and strengthening positive long-term customer-brand relationships (Xie and Peng, 2010). However, up to now, there is no meaningful measurement mechanism that can be used to test this assertion empirically. This study provides a theoretically reasonable scale for marketing, which can be used by scholars to further expand their understanding of customer engagement. From a theoretical point of view, the Customer Participation Scale empirically studies the potentially related factors of customer participation, which provides a basis for building future knowledge of customer participation and expanding theoretical understanding of the concept of customer participation. For example, the most important factors affecting customer participation include attitude antecedents, such as brand attachment, brand commitment, and brand performance perception (Van Doorn et al., 2010). In addition, a conceptual model shows participation and interaction as antecedents of customer participation (Hollebeek and Brodie, 2009). Using the customer engagement

scale proposed in this study, future studies can now empirically test these potential connections.

Moreover, the basic contribution of this study is to provide a theoretical basis and empirical evidence to support the relationship between the emerging concept of customer engagement and the key elements in the development of customer behavior intention. Although previous studies have supported the contribution of purchase-related factors, such as service quality and customer satisfaction, in building a strong service brand (Clemes et al., 2010), the findings of this study prove empirically that customer engagement exceeds purchase on WOM intention and repurchase also have a strong influence, making incremental contributions to existing knowledge.

Management Implications

In addition to the theoretical contribution, this study also provides some practical enlightenment for the practice of brand management. The development and verification of customer engagement scale provide a valuable tool for the operation of economy hotels during the epidemic period, which can effectively measure the contact with customer groups and develop marketing strategies reasonably. Managers can use this scale to collect insightful information. For example, they can evaluate their brand's performance in competition by comparing their customers to the customers of competing hotel brands. Moreover, because the scale developed in this study is a result measure, economy hotel managers can use it to verify various relationship marketing initiatives. Such insight will help managers determine whether they need to modify or change their marketing plan to achieve the desired goals.

This study shows that these five dimensions of customer engagement are very important in representing customer engagement. This result shows that when trying to develop customer engagement, economy hotel managers can focus on improving each of the five dimensions of customer engagement, with special emphasis on attention and interaction, because of their high factor load. For example, to increase attention, managers need to provide information that their customer base finds relevant and interesting (Celsi and Olson, 1988). Interaction is also an important dimension of customer engagement. To increase customer interaction, hotels need to provide customer interaction opportunities and incentives to encourage customer participation, such as identification and reward programs (Sawhney et al., 2005). Generally speaking, these actions help customers immerse themselves in the interactive experience with the brand, thus promoting their interaction with the brand. Although customer engagement is manifested beyond service transactions, excellent service, customer exciting functions, and good brand image may enhance customer enthusiasm for the brand (Bhote, 1995). In establishing a strong customer brand identification, brand managers must create unique and clear logos expected by target customer groups, because logos allow sustainable product differentiation and help enhance customer brand identification (Baumgarth and Schmidt, 2010).

Although managers can disseminate hotel-related information through many channels (such as Ctrip and Public Comment), this study shows that high-participation customers of hotels

tend to participate in activities on hotel official websites, but are less likely to participate in activities on third-party websites. Given their ability to provide objective and enlightening product information, these third-party sites are often considered the first point of access to product information when customers need to make immediate purchase decisions. However, the information needs of active customers are based on their close connection with the brand, so they seek hotel information to satisfy their interest in the hotel. Therefore, the official website of the hotel provides participating customers with a more direct way to obtain information.

Limitations and Future Research

This study explores the effects of customer engagement and service evaluation on consumer trust and behavior intention.

The results of the study have some practical reference value for airlines to enhance the trust of enterprises and promote customers' behavior intention through customer engagement and service evaluation and have certain guiding significance for the marketing management of economy hotels. However, due to the limitation of time, money, and energy, this study inevitably has some limitations.

Firstly, using the survey as a data collection method may introduce measurement errors into research data. This measurement error may not only come from the scale used to measure the structure (Bennett et al., 2005), may also come from respondents' inability to accurately report their past experience with economy hotel brands. However, by following a systematic and rigorous scale development process to verify customer engagement metrics, and by carefully considering the choice of reliable metrics of other structures tested in other empirical studies, the measurement errors of the scale are minimized. In addition, a thorough examination of the reliability and validity of the measurement structure produces strong evidence that the measurement scale has good psychological measurement characteristics, so it shows that the measurement error is not the main problem of this study.

Secondly, in the whole study sample, comparing the demographic characteristics of the sample with those of the general population shows that the respondents are different in several demographic variables (such as age and occupation). Therefore, the sample may not fully represent the general population.

Thirdly, this study did not distinguish the role of research variables before, during and after COVID-19. The different period may have an impact on the study.

Several possible areas for future research on this research are put forward. First of all, because this study only carried out a sample survey of hotel customers, it is necessary to further test the scale and proposed model of customer engagement in other service environments such as health care, aviation, and banking in future research. This test will make the research results more universal in other service environments, and further, understand the degree to which the model explains the formation of customer behavior intention of service brands in different service environments.

Another possible area of future research involves negative customer participation. Consistent with the discussion of

customer engagement in the literature, this study investigates customer engagement from a positive perspective. However, some literature shows that customer engagement can also be expressed as negative prices, such as anti-brand activities (Van Doorn et al., 2010). Therefore, future research should explore various forms of negative customer engagement behaviors or expressions and how they affect the results of customer engagement.

Future research can also expand and test the proposed research model, including other factors that may represent the antecedents and outcomes of customer engagement. For example, in the qualitative stage of this study, five main factors affecting customer engagement activities are identified. These factors can be incorporated into the research model and tested in subsequent quantitative studies to determine their relationship with customer engagement. Similarly, the literature on customer engagement shows that customer engagement may influence aspects such as brand awareness, customer loyalty, customer assets, etc. (Van Doorn et al., 2010). To further improve consumers' WOM and repurchase behavior intention, future research can investigate the influence of customer engagement on these factors.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

XC was responsible for writing the manuscript. XL was responsible for data collection. YW was responsible for proofreading English. JZ was responsible for literature collation. All authors contributed to the article and approved the submitted version.

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The Depleting and Buffering Effects of Telecommuting on Wellbeing: Evidence From China During COVID-19

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Meta-analytical research has demonstrated the benefits brought by telecommuting to wellbeing. However, we argue that such a setup in the course of the coronavirus disease pandemic exerts negative effects. On the basis of conservation of resources theory, this study determined how telecommuting depletes wellbeing (defined by job satisfaction and emotional exhaustion) through obstructing psychological detachment from work. Moreover, we incorporated family interfering with work and family–work enrichment as moderators that can buffer the negative effect of telecommuting on psychological detachment from work. Time-lagged field research was conducted with 350 Chinese employees, and findings largely supported our theoretical hypotheses. The elevated level of telecommuting results in minimal psychological detachment from work, which then leads to low wellbeing. Meanwhile, the negative effect of the extent of telecommuting on psychological detachment from work is reduced by family interfering with work. These findings extend the literature on telecommuting and psychological detachment from work through revealing why teleworkers present negative feelings during the pandemic.

Keywords: telecommuting, psychological detachment from work, wellbeing, job satisfaction, emotional exhaustion, family interfering with work, family–work enrichment

INTRODUCTION

The coronavirus disease (COVID-19) pandemic has remarkably increased remote work, whose implications for employees and organizations thus require thorough understanding (Malankowski and Wrycza, 2020; Leroy et al., 2021; Shockley et al., 2021a; Zhang et al., 2021). In China, over 300 million workers relatively experienced telecommuting in March 2020. Meanwhile, the United States and Europe also experienced a multifold increase in remote work during the COVID-19 pandemic (Chong et al., 2020; Zhang et al., 2021). According to Allen et al. (2015), telecommuting refers to “a work practice that involves members of an organization substituting a portion of their typical work hours (ranging from a few hours per week to nearly full-time) to work away from a central workplace—typically principally from home—using technology to interact with others as needed to conduct work tasks.” The core argument behind telecommuting is that the boundaries between work and home became blurred for

many, and employees are confronted with the need to simultaneously fulfill both work and family roles (Shockley et al., 2021b).

Allen et al. (2015) reviewed the telecommuting literature and found that telecommuting is generally perceived as “good” for employees. In fact, meta-analytic evidence associates telecommuting with numerous indicators of enhanced wellbeing, including increased job satisfaction and decreased role stress (Gajendran and Harrison, 2007). On the contrary, other studies have revealed the negative implications of telecommuting for wellbeing (e.g., Cooper and Kurland, 2002; Golden and Veiga, 2005; Van der Elst et al., 2017; Wöhrmann and Ebner, 2021). For instance, Van der Elst et al. (2017) demonstrated that the extent of telecommuting is negatively related to wellbeing *via* the lack of social support from colleagues. Therefore, previous findings on the effect of telecommuting on wellbeing are rather inconsistent; the impact of telecommuting in particular contexts should be further explored (Allen et al., 2015). The COVID-19 pandemic has required several employees to work remotely, but evidence indicates that such employees may face particular constraints (Zhang et al., 2021), implying the significance of understanding the negative consequence of telecommuting. From a recent survey, employees under remote work during COVID-19 showed a decline in attitude after a work week (Zhang et al., 2021). However, few telecommuting studies have identified how telecommuting depletes the wellbeing of employees during the COVID-19 pandemic (Wöhrmann and Ebner, 2021). Furthermore, prior telecommuting studies have failed to investigate how to buffer against the depletion process. The limited research on the negative effect of telecommuting constrains theory and practice.

Our study aims to fill these gaps in our knowledge of telecommuting’s impact on wellbeing by using two widely accepted constructs of job satisfaction and emotional exhaustion (Gajendran and Harrison, 2007; Allen et al., 2015). First, on the basis of conservation of resources (COR) theory (Hobfoll, 1989), we construct a model linking telecommuting with changes in the wellbeing of employees, contending that telecommuting declines the wellbeing of employees because they hardly feel psychological detachment from work during their free time. As a result, the literature on telecommuting is expanded, considering that psychological detachment from work is regarded

as a key factor to the wellbeing-depleting process of telecommuters. Second, we offer a more refined exposition of COR theory, stressing that resources must be invested by employees to recover from losses (Hobfoll et al., 2018). In doing so, the mechanisms of resource investment with regard to family aspects, such as family interfering with work (Delanoeije et al., 2019) and family–work enrichment (Heskiau and McCarthy, 2021), are regarded as the buffering mechanisms in our theoretical model. Hence, the predictors of psychological detachment from work from prior research, which concentrated only on job stressors or demands, are broadened (Sonnentag and Fritz, 2007; Sonnentag, 2018). Lastly, the theory is substantiated through analysis of the connection between psychological detachment from work and wellbeing in the aspect of telecommuting. This analysis proves that as a vital recovery experience, psychological detachment from work promotes the wellbeing of telecommuters. **Figure 1** depicts our hypothesized model.

THEORY AND HYPOTHESES

Extent of Telecommuting and Psychological Detachment

Scholars classify employees into telecommuters and non-telecommuters by using a binary “yes or no” variable in the conceptualization and measurement of telecommuting, but they also indicate that research should consider the telecommuting degree of an individual (Allen et al., 2015; Golden and Eddleston, 2020). The binary variable disregards the variation in the way telecommuters work remotely and the differences among telecommuters themselves (Golden et al., 2008; Golden and Eddleston, 2020). The telecommuting experiences of individuals during the COVID-19 pandemic vary between occasional telecommuting and regular telecommuting (i.e., multiple days per week; Golden and Veiga, 2005); thus, the influences on their wellbeing differ. In accordance with earlier literature on telecommuting (Golden and Veiga, 2005; Golden et al., 2006, 2008; Allen et al., 2015; Golden and Gajendran, 2019; Golden and Eddleston, 2020), the extent of telecommuting and its effects on employees are focused on in the current study.

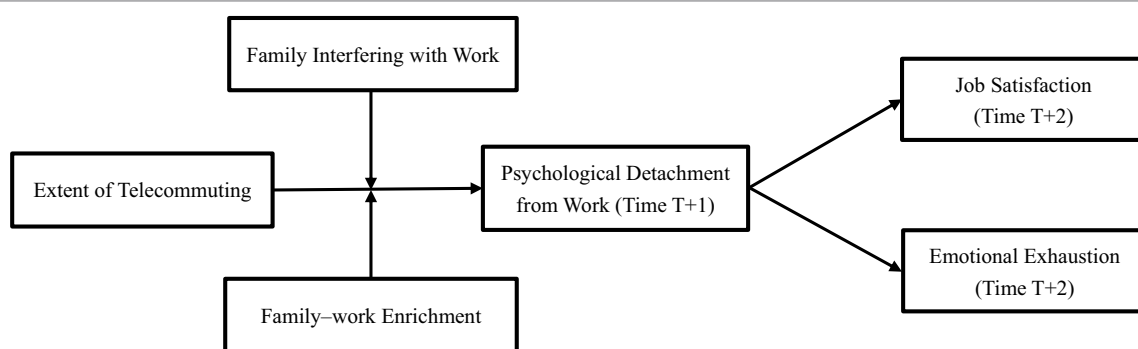


FIGURE 1 | Hypothesized model (For simplicity, control variables are not included in this figure).

On the basis of COR theory (Hobfoll, 1989), the extent of telecommuting is predicted to influence psychological detachment from work negatively. The theory indicates that individuals aim at protecting their present resources, obtaining new ones, and inhibiting their loss (Hobfoll, 1989). The conservation and cultivation of resources lead to positive wellbeing (Gilbert et al., 2018), but their loss results in psychological distress, anxiety, and depression (Kessler et al., 1988; Halbesleben et al., 2014). During the transition to remote work, workers may lose resources at work, such as coworker support, and in life, such as social isolation and services, simultaneously (Wanberg et al., 2020).

Accordingly, the boundaries between work and home are blurred by telecommuting, thus, the teleworking days of employees are considerably affected by work-to-home transitions (namely, work disruptions to address home issues during work time; Delanoeije et al., 2019). This condition causes job and challenge stressors, including excessive workload and time pressure. Consequently, they likely handle exhausting circumstances by engaging considerably in home-to-work transitions (namely, home disruptions to address work issues after work time; Delanoeije et al., 2019), doing minimal physical exercise, or decreasing sleeping hours (Sonnentag, 2018). Large-scale cohort research has verified the lack of physical activity and quality sleep among individuals having jobs with massive workload and high strain (Nixon et al., 2011; Stults-Kolehmainen et al., 2014; Oshio et al., 2016). Their recovery experience is likely influenced by the decrease in recovery activity and process (Sonnetttag, 2018). Sonnetttag (2018) and Sonnetttag et al. (2008) recommended that a significant recovery experience is psychological detachment from work, which indicates “*an individual’s sense of being away from the work situation*” (Etzion et al., 1998) and implies not only refraining from performing job-related tasks, but also mentally disconnecting from the job during nonwork time (Sonnetttag et al., 2008). Excessive work demands, including time pressure, decrease psychological detachment in the long run (Kinnunen and Feldt, 2013). Therefore, we can assume that telecommuting leads to difficulty in psychological detachment from work.

Hypothesis 1: The extent of telecommuting will be negatively related to psychological detachment from work.

Mediating Role of Psychological Detachment

The negative relation between telecommuting and wellbeing has been tackled in some research (e.g., Golden and Veiga, 2005; Van der Elst et al., 2017; Wöhrmann and Ebner, 2021), but they did not pay much attention to the viable mechanisms for such relation. For instance, Golden and Veiga (2005) indicated that the extent of telecommuting and job satisfaction have a curvilinear connection and that job satisfaction stabilizes as the extent of telecommuting intensifies. However, the mediating mechanisms between them are not clear; as suggested by Golden and Veiga (2005), future research could further unravel the complexities inherent in this work. Therefore, the factors behind the poor wellbeing of telecommuters must be examined to

fully comprehend the connection between telecommuting and wellbeing.

With reference to the studies of Lennard et al. (2019), Chawla et al. (2020), and Zhong et al. (2021) emotional exhaustion (i.e., personal ill-being) and job satisfaction (i.e., work-related wellbeing), which are the most considered wellbeing types, are evaluated in the current study. These types are the basic indices of wellbeing used in theoretical models of telecommuting in considerable research (e.g., Golden and Veiga, 2005; Golden, 2006a,b; Gajendran and Harrison, 2007; Sardeshmukh et al., 2012).

Based on empirical studies, good wellbeing is realized with psychological detachment from work after working hours (Hülshager et al., 2014; Wendsche and Lohmann-Haislah, 2017; Bennett et al., 2018; Sonnetttag, 2018). A meta-analysis has also demonstrated that detachment from work and self-rated mental state are positively correlated, leading to decreased exhaustion, enhanced life satisfaction, and improved wellbeing (Wendsche and Lohmann-Haislah, 2017). Detachment from work is an effective recovery approach as it helps in replenishing resources through mentally separating employees from work (Wendsche and Lohmann-Haislah, 2017). From the perspective of telecommuting, psychological detachment from work is assumed to decrease the degree of emotional exhaustion and increase the extent of job satisfaction through reducing work-related stress after working and restoring lost resources while working (Sonnetttag and Fritz, 2007; Sitaloppi et al., 2011). According to a recent study, as a valuable recovery experience, psychological detachment from work favorably influences the wellbeing of employees for the following workday (Chawla et al., 2020).

On the basis of Hypothesis 1, which indicates that the extent of telecommuting exerts a negative effect on psychological detachment from work, we assume that psychological detachment from work mediates the relationship between the extent of telecommuting and the wellbeing of employees (i.e., emotional exhaustion and job satisfaction).

Hypothesis 2: The extent of telecommuting presents indirect effects on (a) emotional exhaustion and (b) job satisfaction *via* psychological detachment from work.

Moderating Effect of Family Interfering With Work

In China, numerous employees were unexpectedly required to work from home, although they were not willing or were not given the opportunity to telecommute in the past (Chong et al., 2020; Zhang et al., 2021). For such employees who were forced to work remotely, the boundaries between work and family became hazy (Shockley et al., 2021b). That is, they were considerably affected by family life through family interfering with work (Duxbury et al., 1992; Carlson et al., 2000) and family-work enrichment (Lin et al., 2020; Heskiä and McCarthy, 2021; Wu et al., 2021).

Family interfering with work is defined as “*interruptions of work activities to deal with family demands*” (Delanoeije

et al., 2019), which can be regarded as a key to work–family conflict (Carlson et al., 2000). Golden et al. (2006) determined that extensive telecommuting leads to increased family–work conflict. The work time of telecommuters may be remarkably intervened by family activities. Family interfering with work is expected to buffer the negative effect of telecommuting on psychological detachment from work. While performing family activities, including cooking and supervising children, during work time, employees likely transit from playing work roles to playing family roles. Consequently, such employees likely detach mentally from work-related responsibilities after working hours. By contrast, telecommuters who are not required to address family needs may still be dominated by work rather than doing family activities even after work time. Psychological detachment from work may be difficult for them.

Hypothesis 3: Family interfering with work moderates the negative relationship between the extent of telecommuting and psychological detachment from work; thus, such a negative relationship weakens as the family interfering with work intensifies.

Moderating Effect of Family–Work Enrichment

Family–work enrichment is viewed as “the degree to which developmental, affective, social capital, and efficiency gains in family domain enhance employee conditions in the work domain” (Lin et al., 2020). The negative effect of telecommuting on psychological detachment from work is expected to be buffered by family–work enrichment. COR theory states that lost resources can be restored by resources from other fields (Hobfoll, 2001). On this basis, constructive encounters with the family can be beneficial to the work of individuals, resulting in their efficiency at work (Lin et al., 2020); hence, telecommuters can accomplish their work responsibilities effectively and achieve psychological detachment from work after working hours. Family–work enrichment also promotes optimistic mood and job satisfaction (Carlson et al., 2011), thereby increasing resource recovery experience, such as psychological detachment from work. Thus, we establish the following hypothesis:

Hypothesis 4: Family–work enrichment moderates the negative relationship between the extent of telecommuting and psychological detachment from work; consequently, such a negative relationship declines when the family–work enrichment rises.

MATERIALS AND METHODS

Contextual Background, Procedure, and Participants

We used snowball sampling approach (Lin et al., 2020) to recruit participants across different industries, occupations, organizations, and locations in China. The data collection

process commenced in January 2021 and ended in April 2021. We asked 5 MBA students in a large university in China to help invite participants to take part in our study. MBA students also asked their friends to help further advertise the study and invite participants. Employees who were forced to telecommute as a result of COVID-19 were eligible for participating in our study. MBA students and their friends helped distribute surveys by sending electronic questionnaires to corresponding respondents.

Data were collected at three time points, with an interval of 1 month on average, to alleviate common method bias concerns. During Time 1 (T1), the weekly work and telework hours, family interfering with work, and family–work enrichment of each respondent were measured. Control variables, such as their gender, age, and educational achievement, were also determined. During Time 2 (T2), 1 month after T1, their psychological detachment from work, professional isolation, and employee trust were evaluated. During Time 3 (T3), 2 months after T1, their job satisfaction and emotional exhaustion were assessed. An exclusive telephone number was used to match the sample.

At T1, we gathered 765 data from the respondents. Among them, $N=167$ (21.8%) were eliminated due to failure in quality checks or lack of variance. A sample of $N=598$ (78.2%) remained and were requested for T2. At T2 (77.6%), 464 valid respondents were identified and invited for T3. At T3, 350 valid respondents were noted, indicating an effective response rate of 75.4%. Thus, a final sample of $N=350$ was generated.

Among the participants, 67.7% were females, 83.4% had been working at their respective companies for more than 3 years. Their age was distributed as follows: 20–25 years: 3.7% ($N=13$); 26–30 years: 20.6% ($N=72$); 31–40 years: 50.9% ($N=178$); 41–50 years: 20.3% ($N=71$); 51–60 years: 4.6% ($N=16$). On average, their weekly work hours were 45.22 ($SD=8.92$) and telework hours were 7.76 ($SD=10.98$). They came from diverse industries, such as manufacturing (28%), Internet or financial sector (19.1%), civil service (9.1%), education or culture (8.3%), and specialized fields of law or research (2.6%).

Measures

The measures for this study were administered in Chinese. In accordance with Brislin's (1970) procedure, the items were translated into Chinese by the first author and back-translated into English by the second author. The original and back-translated versions were thoroughly reviewed by the authors. To guarantee conceptual similarity, the translated version was amended when discrepancies were identified. Except as otherwise specified, a five-point Likert scale (1=strongly disagree to 5=strongly agree) was used for all items.

Extent of Telecommuting

The measure proposed by Golden and Veiga (2005) and adopted in numerous studies (e.g., Golden et al., 2006, 2008; Golden and Eddleston, 2020) was used to evaluate the extent

of telecommuting. The regular work schedule and the hours spent on telecommuting during regular work schedule within a typical work week of the respondents were determined. The extent of telecommuting was measured by dividing telecommuting hours by regular work hours. Responses ranged from 0 to 100%, with a mean of 17%.

Psychological Detachment From Work

Sonnentag and Fritz (2007) developed a four-item scale for measuring psychological detachment from work, which was employed in the current study. Other studies (e.g., Hülshager et al., 2014; Haun et al., 2018; Van Laethem et al., 2018) have also adopted this scale. Among the items is “In my free time after work, I forget about the work today.” The reliability was $\alpha=0.921$.

Job Satisfaction

A three-item scale established by Hackman et al. (1980) and applied in several studies (e.g., Froese et al., 2019) was used for measuring job satisfaction. Among the items is “I am fairly satisfied with my job.” The reliability was $\alpha=0.926$.

Emotional Exhaustion

Teuchmann et al. (1999) developed a two-item scale for measuring emotional exhaustion, which has been used in studies (e.g., Chong et al., 2020). This scale was applied in the current study. The items are “To what extent do you feel emotionally drained by work?” and “How much do you feel burned out from work?” Respondents may choose from 1 to 5, where 1=almost never and 5=almost always, as a response. The reliability was $\alpha=0.84$.

Family Interfering With Work

A four-item subscale, family interfering with work, from the work–family conflict scale by Carlson et al. (2000) was used to measure family interfering with work. Among the items is “Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.” The reliability was $\alpha=0.924$.

Family–Work Enrichment

Family–work enrichment was assessed through a nine-item scale, which was proposed by Carlson et al. (2006) and has been employed by studies (e.g., Wu et al., 2021). The scale

comprises three factors, namely, *family to work development* (3 items), *family to work affect* (3 items), and *family to work efficiency* (3 items). The items include “My involvement in my family increases my knowledge and this helps me be a better worker (family to work development),” “My involvement in my family puts me in a good mood and this helps me be a better worker (family to work affect),” and “My involvement in my family requires me to avoid wasting time at work and this helps me be a better worker (family to work efficiency).” The reliability for the three items was $\alpha=0.936$, 0.915, and 0.826, respectively.

Control Variables

The demographic characteristics of teleworkers, such as *gender* (male=1, female=2), *age*, and *education*, and work-related variables, namely, *job tenure*, *job type*, *company type*, and *hours worked*, were regarded as control variables, considering that they reflect individual and work differences, which could influence the wellbeing of teleworkers (Allen et al., 2015; Golden and Eddleston, 2020; Trougakos et al., 2020).

To ensure that the results are robust to the inclusion of potential confounders, we controlled additional variables, including *professional isolation* and *employee trust*, which have been proven critical mediators between telecommuting and outcomes (Cooper and Kurland, 2002; Golden et al., 2008). Professional isolation refers to “a state of mind or belief that one is out of touch with others in the workplace” (Golden et al., 2008). The level of professional isolation was determined using a seven-item measure introduced by Golden et al. (2008). A sample item is “I feel left out on activities and meetings that could enhance my career during telecommuting.” The reliability was $\alpha=0.92$. Meanwhile, employee trust was measured via a three-item scale proposed by Brower et al. (2000). Among the items is “I trust the organization I work for.” The reliability was $\alpha=0.859$.

RESULTS

Mplus Version 8.3 was utilized for data analysis. Before the analysis, the measurement model was assessed through confirmatory factor analysis. The model comprised seven factors, namely, psychological detachment from work, job satisfaction, emotional exhaustion, family interfering with work, and the three factors of family–work enrichment. **Table 1** verifies the

TABLE 1 | Confirmatory factor analysis.

Factor model	# of factors	χ^2	df	χ^2/df	RMSEA	CFI	TLI	SRMR
Full measurement model	7	388.623	188	2.067	0.055	0.97	0.963	0.038
All family–work enrichment collapsed	5	988.787	199	4.969	0.106	0.88	0.861	0.047
Job satisfaction and emotional exhaustion collapsed*	6	586.481	194	3.023	0.076	0.94	0.929	0.049
Job satisfaction and family–work enrichment collapsed*	4	1687.422	203	8.312	0.145	0.775	0.744	0.084
Job satisfaction and psychological detachment collapsed*	6	1518.335	194	7.826	0.140	0.799	0.761	0.117
All collapsed to one factor	1	4195.67	209	16.14	0.233	0.395	0.331	0.180

N=350. *Variables were selected in consideration of their relatively high correlations.

TABLE 2 | Means, standard deviations, and correlations of study variables.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender (T1)	1.68	0.47	1													
2. Age (T1)	3.01	0.86	-0.13*	1												
3. Education (T1)	2.28	1.13	0.1	0.21**	1											
4. Job tenure (T1)	4.28	1.67	-0.07	0.49**	0.01	1										
5. Job type (T1)	2.44	1.63	-0.05	0.17**	0.27**	0.12*	1									
6. Company type (T1)	4.2	1.8	-0.02	0.16**	0.06	0.13*	0.24**	1								
7. Hours worked (T1)	45.22	8.92	-0.15**	0.11*	0.09	0.02	0.11*	-0.01	1							
8. Professional isolation (T2)	2.63	0.91	-0.01	-0.04	0.01	-0.001	0.04	0.001	-0.04	1						
9. Employee trust (T2)	4.05	0.7	-0.04	0.21**	0.14*	0.17**	0.23**	0.1	0.03	-0.08	1					
10. Extent of telecommuting (T1)	0.17	0.23	-0.05	-0.01	-0.01	-0.06	-0.07	-0.1	-0.004	-0.001	-0.03	1				
11. Family interfering with work (T1)	2.36	0.94	-0.004	-0.14*	-0.13*	-0.05	-0.01	-0.02	0.02	0.06	-0.14**	0.002	1			
12. Family-work enrichment (T1)	3.92	0.73	0.06	0.19**	0.14*	0.17**	0.22**	0.14*	-0.02	-0.04	0.51**	-0.11*	-0.12*	1		
13. Psychological detachment (T2)	3.11	1.02	0.03	-0.08	-0.01	-0.04	0.04	-0.01	-0.03	-0.07	0.05	-0.15**	0.09	0.06	1	
14. Job satisfaction (T3)	3.92	0.73	0.01	0.25**	0.15**	0.22**	0.17**	0.15**	0.08	-0.03	0.75**	-0.02	-0.22**	0.52**	0.15**	1
15. Emotional exhaustion (T3)	2.68	1.06	0.05	-0.23**	-0.07	-0.13*	-0.1	-0.11*	-0.02	-0.22**	-0.48**	-0.02	0.18**	-0.31**	-0.11*	-0.49**

N = 350. SD = Standard deviation; Gender is coded 1 = male, 2 = female. T1 = Data collected at Time 1; T2 = Data collected at Time 2; T3 = Data collected at Time 3. * $p \leq 0.05$; ** $p \leq 0.01$ (two-tailed).

acceptable fit ($\chi^2 = 388.623$, $df = 188$, $RMSEA = 0.055$, $CFI = 0.97$, $TLI = 0.963$, $SRMR = 0.038$, $p < 0.01$) and better fit of the full measurement model in comparison with a one-factor model ($\chi^2 = 4195.67$, $df = 209$, $RMSEA = 0.233$, $CFI = 0.395$, $TLI = 0.331$, $SRMR = 0.180$, $p < 0.01$) or any alternative models when any pair of the multilevel variables was loaded on one factor. Therefore, our results were insignificantly affected by common method variance. The descriptive statistics and correlations of study variables are shown in Table 2.

The hypotheses were tested through multiple regression analyses, and the results are indicated in Table 3. Hypothesis 1 stated that the extent of telecommuting negatively influences psychological detachment from work. A model with psychological detachment from work regressed on only control variables was estimated first (Model 1). To test Hypothesis 1, the extent of telecommuting was incorporated into the previous model. The results of this model (Model 2) demonstrated the statistical significance of the coefficient for the effect ($b = -0.639$, $p \leq 0.01$). Empirical verification for Hypothesis 1 was therefore achieved.

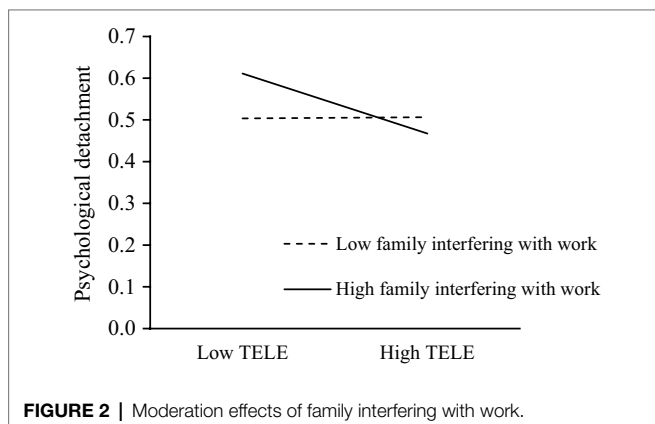
In Hypothesis 2a, psychological detachment from work was proposed to mediate the positive relationship between the extent of telecommuting and emotional exhaustion. From Table 3, the extent of telecommuting and psychological detachment from work were negatively correlated (Model 2, $b = -0.639$, $p \leq 0.01$). Likewise, psychological detachment from work and emotional exhaustion showed a negative correlation (Model 11, $b = -0.094$, $p \leq 0.05$). Moreover, no zero was included in the 95% confidence intervals of the indirect consequence of the extent of telecommuting on emotional exhaustion via psychological detachment from work (estimate = 0.086, 95% CI [0.0049, 0.2097]). Hypothesis 2a thus received empirical support. In Hypothesis 2b, psychological detachment from work was suggested to mediate the negative relationship between the extent of telecommuting and job satisfaction. Table 3 presents that telecommuting degree and psychological detachment from work were negatively correlated (Model 2, $b = -0.639$, $p \leq 0.01$), whereas psychological detachment from work and job satisfaction were positively correlated (Model 8, $b = 0.039$, $p \leq 0.01$). Similar to the result for Hypothesis 2a, no zero was included in the 95% confidence intervals of the indirect consequence of the extent of telecommuting on job satisfaction via psychological detachment from work (estimate = -0.077, 95% CI [-0.1775, -0.0107]). Therefore, Hypothesis 2b gained empirical support.

In Hypothesis 3, we argued that the connection between the extent of telecommuting and psychological detachment from work at high levels of family interfering with work is less negative than that at low levels. Table 3 demonstrates that the coefficient for the interaction effect became negative and significant ($b = -0.773$, $p \leq 0.01$) after the interaction term of the extent of telecommuting and family interfering with work was added to Model 3. This result indicated the significant negative effect of family interfering with work on the scale of telecommuting-psychological detachment. Then, we plotted the interaction between telecommuting and family interfering with work in Figure 2 in accordance

TABLE 3 | Hierarchical regression results.

Variable	Psychological detachment					Job satisfaction			Emotional exhaustion		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Intercept	3.335**	3.199**	3.114**	3.525**	3.532**	0.027	0.015	−0.312	5.201**	5.253**	5.584**
Gender	0.045	0.026	0.038	0.021	0.021	0.081	0.082	0.079	0.04	0.035	0.038
Age	−0.102	−0.083	−0.079	−0.098	−0.098	0.043	0.043	0.051	−0.172*	−0.171*	−0.18**
Education	−0.01	0.001	0.006	−0.01	−0.01	0.022	0.022	0.022	0.011	0.011	0.011
Job tenure	−0.005	−0.011	−0.008	−0.011	−0.011	0.032	0.032	0.033	0.009	0.008	0.007
Job type	0.032	0.024	0.026	0.026	0.026	−0.017	−0.017	−0.019	0.013	0.012	0.014
Company type	−0.008	−0.015	−0.013	−0.016	−0.016	0.028	0.029*	0.03*	−0.032	−0.034	−0.036
Hours worked	−0.003	−0.003	−0.001	−0.003	−0.003	0.004	0.004	0.005	0.002	0.002	0.002
Professional isolation	−0.078	−0.082	−0.081	−0.077	−0.077	0.027	0.027	0.034	0.217**	0.217**	0.21**
Employee trust	0.083	0.099	0.107	0.061	0.06	0.764**	0.764**	0.756**	−0.667**	−0.667**	−0.66**
TELE		−0.639**	−0.692**	−0.627**	−0.632**		0.04	0.099		−0.17	−0.23
Family interfering with work		0.106	0.101								
Family–work enrichment				0.042	0.043						
TELE × Family interfering with work			−0.773**								
TELE × Family–work enrichment				−0.025							
Psychological detachment								0.093**			−0.094*
R ²	0.018	0.047*	0.071**	0.039	0.039	0.591**	0.591**	0.607**	0.288**	0.29**	0.298**

N = 350. TELE = Extent of telecommuting. TELE, family interfering with work, and family–work enrichment were centered before the interaction. Unstandardized regression coefficients are reported. * $p \leq 0.05$; ** $p \leq 0.01$ (two-tailed).



with two conditional values: the standard deviation above and below the mean. On the basis of simple slope analyses, the negative relation between telecommuting and psychological detachment was lower (simple slope = -0.357 , $SE = 0.09$, $p \leq 0.01$) when family interfering with work was high (+1 SD) than when family interfering with work was low (−1 SD; simple slope = 0.007 , $SE = 0.081$, *n.s.*), thereby supporting Hypothesis 3.

Hypothesis 4 postulated that family–work enrichment moderates the association between the extent of telecommuting and psychological detachment from work. As presented in **Table 3**, the coefficient for the interaction effect was statistically insignificant ($b = -0.025$, *n.s.*) after the interaction term between the extent of telecommuting and family–work enrichment was integrated into Model 5. Consequently, Hypothesis 4 was unsupported.

DISCUSSION

Our objective in this study was to clarify how and when telecommuting decreases, the wellbeing of employees on the basis of COR theory. Results from a sample of employees in China during COVID-19 provided strong support for our research model. One finding was that extensive telecommuting and declined wellbeing (*via* increased emotional exhaustion and decreased job satisfaction) through reduced psychological detachment from work were indirectly related. Moreover, telecommuting and psychological detachment from work exhibited a weaker correlation given higher family interfering with work. These findings contribute to telecommuting research and practices in the time of COVID-19 pandemic.

Theoretical Implications

First, our study adds to the telecommuting literature through identifying psychological detachment from work as a key mediator of the relationship between the extent of telecommuting and the wellbeing of employees. Specifically, our study provides evidence on why telecommuting depletes the wellbeing of employees. Prior research on telecommuting typically focused on boundaryless working hours, relationship with coworkers, and social support from colleagues (Van der Elst et al., 2017; Wöhrmann and Ebner, 2021) as mediators of the negative relationship between the extent of telecommuting and the wellbeing of employees. Less attention, however, has been paid to the deprivation of

recovery-enhancing process as a potential factor of lost wellbeing of telecommuters. Consistent with the recent theory that resource loss has a spiraling nature because resource loss is more powerful than resource gain (Hobfoll et al., 2018), we draw insights from COR theory to explain how telecommuting can deprive recovery process, such as psychological detachment from work during non-work time, which in turn creates resource loss spiral whereby the lost wellbeing gain in both impact and momentum. Our results demonstrate that telecommuting likely leads to negative implications for wellbeing because of the loss of psychological detachment from work during non-work time. This finding is in line with the suggestion of Sonnentag (2018) that psychological detachment from work, as an important recovery experience, is a key indicator of good wellbeing.

Second, prior research on telecommuting typically concentrated on how job factors (e.g., task interdependence and job discretion; Golden and Veiga, 2005) and organizational factors (e.g., perceived organizational telework task support and group belongingness; Chong et al., 2020; Bennett et al., 2021) influence the relations between telecommuting and outcomes. However, less attention has been paid to family factors. As mentioned by Shockley et al. (2021b), forced remote workers were confronted with the immediate and ongoing need to simultaneously fulfill both work and family roles. Therefore, on the basis of COR theory, we contribute to broadening the understanding of how the depleting effects of telecommuting on wellbeing can be relieved by family through showing the moderating effects of family interfering with work and family-work enrichment. Our findings demonstrate that psychological detachment from work is most likely to develop when complementarity is created by the match of low extent of telecommuting with high family interfering with work. This finding is in line with the self-expansion approach (Mattingly and Lewandowski, 2013), which indicates that new activities (in this case, telecommuting) support the development of people's resources through their engagement with the new activities. This theory can explain an intraindividual expansion driven by an external condition, such as working from home (Toscano and Zappalà, 2021). Although not initially postulated by this study, according to this theory, the moderating effect of family interfering with work on the relationship between the extent of telecommuting and psychological detachment from work can be explained by the energizing effect and mutual exchange of resources that occur between close people, leading to self-expansion. In the case of employees who work from home, interference from family, such as attending to the needs of their children, and engaging in arguments with their spouse, may motivate the employees to seek self-expansion and become considerably active to fulfill both work and family roles (Toscano and Zappalà, 2021). This self-expansion may lead employees to increased fulfillment in their work and result even in enhanced psychological detachment from work during non-work time.

However, the moderating effect of family-work enrichment on the connection between telecommuting degree and psychological detachment from work hypothesized in this study is not supported. Lin et al. (2020) found that employees who

place importance on their family role regard positive family events as beneficial. Accordingly, we assume that the moderating role of family-work enrichment may be influenced by the preferences of employees. An individual with a home protection preference may considerably benefit from family-work enrichment and likely develop psychological detachment from work. On the contrary, an individual with a work protection preference may view family-work enrichment as minimally beneficial to psychological detachment from work. This issue requires further exploration.

Third, we contribute to the literature on psychological detachment from work by substantiating that telecommuting degree and psychological detachment from work are negatively correlated. Previous research on the antecedents of psychological detachment from work focused on work characteristics, including job demands and heavy work investment (Sonnentag and Fritz, 2007; Wendsche and Lohmann-Haislah, 2017; Sonnentag, 2018). On the contrary, we combine telecommuting and family factors to demonstrate the difficulty faced by telecommuters with regard to psychological detachment from work. We illustrate the negative effect of telecommuting on psychological detachment from work, as well as the buffering effects of family interfering with work and family-work enrichment. In contrast to the notion that psychological detachment from work is solely determined by work factors (Sonnentag et al., 2012; Sonnentag and Fritz, 2015), our research indicates that it is a vital recovery experience providing an interactive outcome between work and family.

Lastly, the positive connection between psychological detachment from work and self-rated wellbeing (i.e., decreased emotional exhaustion and increased job satisfaction) in the telecommuting context demonstrated in this study adds to the (psychological) detachment literature. This finding aligns with that of previous research (e.g., Wendsche and Lohmann-Haislah, 2017; Sonnentag, 2018), which exhibited that detachment positively influences the wellbeing of employees in non-telecommuting contexts. Nonetheless, to our best knowledge, such a relation has not been tackled extensively and not been tested empirically in the telecommuting context. Through illustrating certain significant effects within the context of telecommuting, we present the first evidence that not only the employees who work in an office environment are affected but also the employees who work from home.

Practical Implications

Our research provides valuable practical implications. First, our study advises that telecommuters and their managers should exercise caution when telecommuting extensively, particularly when telecommuters were previously unwilling or never offered the opportunity to telecommute, because this arrangement may potentially decline their wellbeing in the course of the COVID-19 pandemic. Second, managers should encourage telecommuters to take measures to help themselves apply psychological detachment from work after working hours; such measures include improvements in physical exercise, sleep quality, and sleep quantity, which have been regarded as effective recovery activities (Sonnentag, 2018). Lastly, family interfering with work remarkably benefits recovery when facing a high level of telecommuting.

Thus, we encourage telecommuters to take the initiative to master the rhythm of work and have a rest after working for a while instead of focusing on thinking and working for long periods of time to preserve energy and prevent exhaustion.

Limitations and Future Research Directions

The findings from this study must be applied in consideration of the following limitations. First, with respect to methodology, all the study variables were collected from the same source. Though we incorporated three measurement points into our design, this does raise possible concerns about common method variance. Thus, we recommend future research to explore our findings experimentally or use other kinds of measurements, such as objective measures (e.g., extent of telecommuting based on official records). Second, given the limited perspective of COR theory, future research could make further developments on the basis of the understanding of the depleting and buffering effects of telecommuting on wellbeing. For example, the environmental circumstances and personality differences of employees might be investigated, considering that these aspects influence their nature and degree of resource depletion (Golden, 2006a). Third, only employees from Chinese companies were included in our study sample. Consequently, the findings may not apply to employees in other countries. Thus, future research should examine the theoretical model by using samples from western countries or individualistic societies. Moreover, given that the average of telecommuting hours (7.76) in this study is low, the generalizability of our findings may also be limited. Future research should replicate our findings using the samples of extensive versus occasional telecommuting to ensure the applicability of our results.

CONCLUSION

Interests in telecommuting, as a presumed concept, have dramatically increased in the recent years, especially amid the COVID-19 pandemic (Cooke et al., 2020; Malankowski

and Wrycza, 2020; Zhang et al., 2021). Telecommuting models have deviated from the predictors of the performance and wellbeing of remote workers (e.g., Shockley et al., 2021a). Our study aims to add to and not negate previous research. Gajendran and Harrison (2007) proposed the concept of “telecommuting paradox”; that is, telecommuting results in mutually incompatible consequences for employees. If telecommuting increases autonomy and decreases work–family conflict, then it may lead to enhanced job-related attitudes, improved performance, and reduced stress. However, while telecommuting, work relationships might be affected, and career advancement might be obstructed. Therefore, the effect of telecommuting must be explored within a specific context. In this study, we stress that employees who were forced to telecommute as a result of COVID-19 likely experienced negative feelings. This study aims not only to challenge previous views but also to encourage future research to explore other theories on telecommuting.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JC designed the main idea, collected and analysed the data. CZ wrote the manuscript and modified the research design. All authors contributed to the article and approved the submitted version.

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Motivation of Teleworkers and Non-teleworkers in Times of COVID-19 in Spain: An Exploratory Study Using Non-parametric Analysis and Classification and Regression Trees

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With the outbreak of COVID-19 in spring 2020, small, medium, and large companies were forced to cope with the unexpected circumstances. Faced by this health emergency, it was necessary to ensure that staff remained motivated and that they could continue to carry out their duties despite the obstacles. The main goal of this exploratory research was to characterize employees who teleworked and who did not, and their motivation during the lockdown. A total of 11,779 workers from different-sized companies in various sectors answered an *ad hoc* questionnaire. By using non-parametric comparisons and Classification and Regression Trees (CRTs), the results show differences in both the assessment of strategies put into practice by the companies and the level of motivation of teleworkers and non-teleworkers, with the latter being more highly motivated. Nonetheless, teleworkers assessed their companies' strategies and the role of their managers and colleagues more positively. This research helps to understand how different sectors have dealt with the crisis, according to the degree of teleworking implemented in each sector, and to what extent the motivation of the employees has been affected. The analysis of the large amount of data obtained confirms the importance of the role of managers in sustaining the motivation of their subordinates in times of crisis. In this sense, it is necessary to develop managers' competencies in order to develop and maintain relations of trust and support with their coworkers. On the other hand, it is necessary to foster employees' sense of meaningfulness and responsibility at work in order to keep them motivated.

Keywords: teleworking, COVID-19 outbreak, employees' motivation, classification and regression trees, non-parametric analysis

INTRODUCTION

On 11 March 2020, the World Health Organization (WHO, 2020) declared COVID-19 a pandemic as a result of the morbidity and mortality rates. With regard to its severe economic repercussions, Jackson et al. (2020) point out:

The economic fallout from the pandemic raises the risks of a global economic recession with levels of unemployment not experienced since the Great Depression of the 1930s. The human costs in terms of lives lost will permanently affect global economic growth in addition to the cost of rising levels of poverty, lives upended, careers derailed, and increased social unrest. Global trade could also fall by 18%, depending on the depth and extent of the global economic downturn, exacting an especially heavy economic toll on trade-dependent developing and emerging economies (p.1).

At the European level, during this period, a set of measures aimed at safeguarding jobs and organizations was developed. It was based on the Pan-European Guarantee Fund established by the European Investment Bank, which set aside €200 billion to support companies (particularly SMEs). Furthermore, the member states have received help from the EU in order to implement short-time work schemes and protect jobs during the pandemic (Ahrendt et al., 2021).

One of the most widely used measures was the introduction of telework (working from home). Nevertheless, not all organizations and sectors dealt with this situation of uncertainty in the same way (KPMG, 2020). Thus, as indicated by the research carried out by the Bank of Spain (Hernández de Cos, 2020) and based on the data provided by the Spanish Ministry of Inclusion, Social Security and Migration, in spring 2020 the accommodation, food, and beverage, and leisure sectors that the ones affected by the greatest number of temporary redundancy schemes (*Expediente de Regulación Temporal de Empleo—ERTE*). One of the reasons could be the poor feasibility of teleworking. In contrast, the education, health, and commerce sectors showed significantly lower levels.

Although teleworking had gradually increased over the years anyway (Eurostat, 2018), the pandemic undoubtedly accelerated its implementation [International Labor Organization (ILO), 2020]. The state of emergency meant that the percentage of European employees who teleworked ranged from 15% to 40%. This percentage reached 60% in Finland, 50% in Luxembourg, Netherlands, Belgium, and Denmark, and over 40% in Ireland, Austria, Italy, and Sweden (Ahrendt et al., 2020). In Spain, although there were differences between the autonomous communities, the percentage of employees teleworking reached 14%. Although this was below the European average, it should be noted that this still amounted to a 74.2% increase compared to pre-COVID figures (Adecco Group Institute, 2021). On the other hand, as made clear by the Royal Decrees 8/2020 (Spanish Government, 2020a) and 15/2020 (Spanish Government, 2020b), this state of affairs could not be properly considered teleworking *per*

se: it was a consequence of the COVID-19 containment measures and the time they that they remained in force.

Hatayama et al. (2020) and International Labor Organization (ILO), 2020 point out that, during this period, the two factors determining whether employees were able to work from home were, on the one hand, broadband Internet access, and on the other, whether they had a computer at home. Hence, the International Labor Organization (ILO), 2020 concludes that

in the countries where a large proportion of jobs are in sectors such as ICT, professional services, finance and insurance, and public administration sectors can mobilize a greater proportion of the workforce to work from home, whereas countries with a heavy reliance on sectors such as manufacturing, agriculture, construction, and tourism are less able to do so (p. 3).

In the next section, we present how the companies dealt with the pandemic and how were the working regulations in Spain. Secondly, we describe different studies on the impact of teleworking on work motivation during the lockdown. Results on these studies were not conclusive, therefore our main objective is to add more empirical evidence on this relationship.

Subsequently, the method and results are presented, organized on descriptive analysis, motivation classification trees (attending the global sample and teleworkers and non-teleworkers subsamples). Finally, we include the discussion and main conclusions derived from our research.

THEORETICAL BACKGROUND

Organizations tried to adapt to the new situation by taking measures that affected conditions of employment. Some of them included the suspension of contracts or the reduction of working hours. Other measures implied changes in management and job organization derived from the implementation of teleworking. Finally, companies introduced internal and external communication processes that serve to provide emotional support, and pass on work recommendations, prevention regulations, and business decisions (De Diego, 2020). However, research conducted with 470 full and part-time American employees revealed that only 43% believed that their organization had a plan to deal with a crisis of this nature (McQuivey, 2020) and that this uncertainty affected their motivation (Anwar et al., 2021).

In Spain, the Ministry of Work and Social Economy (2020) ruled that companies could deal with the pandemic by temporarily suspending their business activity. In some cases, when this was not possible, organizations were required to comply with Spanish Government (1995) on the prevention of occupational risks, and inform employees of the risks they were facing at work in relation to COVID-19, and the new working conditions aimed at coping with these risks. Specifically, the new working conditions revolved around the management and organization of new work arrangements (such as teleworking) and the health and prevention measures

put in place. All these measures had the potential to affect working hours, the number of employees coworking in the same place at the same time, rules on hygiene, and so on. But according to the Spanish Ministry of Work and Social Economy (2020), they could have no effect on workers' rights, such as salaries, compensation, or increased costs incurred by the employees' need for new technological resources to do their jobs.

The results obtained for the impact on work motivation of the measures adopted by organizations during the lockdown are not conclusive. In the case of teleworking some authors affirm that it has resulted in an increase in employees' motivation and improved performance (Gutiérrez Durán and Solano Araya, 2020). Other studies have analyzed how technology and the way employees manage it has an impact on their motivation. In this sense, Sapta et al. (2021) found that the adequacy of the technology had a positive effect on employees' motivation. On the other hand, Panisoara et al. (2020) point out the importance of the employees' perception of self-efficacy in relation to technological knowledge. It motivated them to continue working in the conditions imposed by the COVID-19 regulations. Nevertheless, other studies have obtained contrary results. For example, Hitka et al. (2021) conclude that the impact of COVID-19 negatively affected workers' motivation in micro and small enterprises, and Sarfraz et al. (2021) affirm that these lower levels of motivation are derived from the sense of professional isolation associated with teleworking.

During this period, although it was impossible to continue working together physically, the new technologies made it possible to maintain communication between colleagues, middle and senior managers as regards preventive measures, policies, and work procedures. As indicated by Kim et al. (2021) when middle managers perceive negative coping strategies (such as impression management and *laissez-faire* leadership) among their superiors, this increases their sense of uncertainty, which in turn may lead to lower levels of motivation. However, the scientific literature has not analyzed the impact on employees of how their colleagues have coped with the pandemic. In our opinion, this is a vicarious learning process that makes it absolutely relevant (Bandura, 1977) and we consider that it is easier for employees to implement coping strategies that have proved effective among peers and colleagues.

The main goal of this exploratory research was to characterize employees who teleworked and who did not, and their motivation during the lockdown. Firstly, we analyzed and compared the profiles of these employees based on their sociodemographic variables (gender, age, and tenure), position (managers, middle managers, and employees), business sector, and size of the company. For this objective, the research questions were as follows:

RQ1: Are there differences between teleworkers and non-teleworkers regarding on sociodemographic variables (gender, age, and tenure), position (managers, middle managers, and employees), business sector, and size of the company?

RQ2: How did teleworkers assess their working conditions during the lockdown?

Secondly, we analyzed employees' perceptions of the processes and procedures introduced during the first lockdown period by organizations, and the factors that helped to obtain the highest levels of motivation among teleworkers and non-teleworkers. Bearing in mind the nature of previous studies, the research questions in this study were as follows:

RQ3: How did employees value the set of processes and procedures developed by their employers during the lockdown, comparing those who worked from home and those who did not?

RQ4: How did employees assess the strategies used by colleagues, middle managers, and senior managers to cope with the pandemic, comparing those who worked from home and those who did not?

RQ5: Are there any differences between the factors that helped to motivate teleworkers and non-teleworkers during the lockdown?

The novelty of this research resides in two aspects: (a) it aimed to provide an understanding of how different sectors dealt with the crisis (b) it aimed to compare teleworkers—these being employees who had not previously worked from home but were obliged to do so by the state of emergency—with non-teleworkers.

MATERIALS AND METHODS

Participants

A total sample of 11,779 employees, managers, and middle managers from 38 organizations, clients of a leading Spanish consulting firm, answered the questionnaire. **Table 1** shows a description of the sample in terms of individual sociodemographic variables (gender, age, tenure, and position) and organizational variables (sector and enterprise size). Additionally, participants indicated whether they had previous experience in teleworking and whether they had to telework during the first months of the pandemic.

As can be seen in **Table 1**, there are significant gaps, especially as regards variables, such as gender, age, and tenure, because some organizations refused to gather this data for confidentiality reasons.

Most of the participants worked in the service sector in organizations with more than 500 employees. They had mostly been working in their companies for between 5 and 10 years and 25% held a managerial position (managers or middle managers). The majority were women aged between 26 and 45 years old.

TABLE 1 | Sociodemographic variables.

Indicator	Categories	N	%	Valid %
Actual teleworking	Yes	7,559	64.2%	64.2%
Previous teleworking	No	4,220	35.8%	35.8%
experience	Yes	1,551	13.2%	15.8%
Gender	No	8,253	70.1%	84.2%
	Missing	1,975	16.8%	
	Women	3,470	29.5%	58.55%
	Men	2,457	20.9%	41.45%
	Missing	5,852	49.7%	
Age	Under 25	158	1.3%	3.3%
	25–45	2,846	24.2%	59.3%
	46–55	1,357	11.5%	28.3%
	Over 55	437	3.7%	9.1%
	Missing	6,981	59.3%	
Tenure	<1 year	432	3.7%	13.6%
	1–5 years	1,217	10.3%	38.4%
	6–10 years	370	3.1%	11.7%
	More than 10 years	1,153	9.8%	36.3%
	Missing	8,607	73.1%	
Position	Managers	225	1.9%	2.1%
	Middle managers	2,404	20.4%	22.9%
	Employees	7,865	66.8%	74.9%
	Missing	1,285	10.9%	
Sector	Industry	3,026	25.7%	25.7%
	Distr. and consumption	2,320	19.7%	19.7%
	Services	3,538	30.0%	30.0%
	Education, public administration, and health	2,895	24.6%	24.6%
Size	Under 250	940	8%	8%
	250–500	2,743	23.3%	23.3%
	Over 500	8,096	68.7%	68.7%

As regards teleworking, the majority did so during the lockdown but only 13.2% had previous experience of this work format.

Procedure

In an extraordinary meeting held on 14 March 2020, the Spanish cabinet declared a state of emergency and decreed the lockdown, prioritizing remote work and suspending face-to-face educational activities. For that reason, the questionnaire was distributed online during the quarantine. The consulting firm contacted with the managers from the client's companies to ask for their participation. Companies who accepted to participate send the questionnaire and the informed consent to their employees, and they answered by means of an external link (to assure confidentiality and anonymity).

Instrument

An *ad hoc* questionnaire was developed with 16 items that analyzed the various aspects under study.

Organizational Measures Adopted

Following the instructions of the Ministry of Work and Social Economy (2020), Spanish organizations introduced a set of measures to cope with the pandemic: management of internal and external communication, work management, health and prevention measures, and working conditions and salaries. Participants assessed these measures on a five-point Likert

scale, with 1 being “very negative” and 5 “very positive.” Cronbach's alpha indicated good internal consistency of the scale ($\alpha=0.87$).

Coping

Employees' perceptions of how senior and middle managers and their colleagues dealt with the situation generated by the lockdown were evaluated. This assessment included three Likert-type items, with 1 being “very negative” and 5 “very positive.” Cronbach's alpha indicated good internal consistency of the scale ($\alpha=0.87$).

Teleworking Conditions and Results

Employees' perceptions of the following conditions were evaluated: technological resources available when working from home, access to information, supervision of teleworking by managers, colleagues' attitude and efficiency, and their own time management and overall satisfaction, and the results obtained (productivity, quality, and effectiveness). It consisted of seven Likert-type items, with 1 being “very negative” and 5 “very positive.” Only employees who had teleworked during the pandemic lockdown of spring 2020 answered these items. Cronbach's alpha indicated good internal consistency of the scale ($\alpha=0.84$).

Motivation

Motivation was measured with a single-item “*Understanding by motivation the degree of energy, effort, and enthusiasm that a person is willing to put in into his/her work, what is your current motivation?*” It used a five-point Likert scale ranging from 1 (very low) to 5 (very high).

Additionally, we collected indicators related to sociodemographic variables (gender, age, and tenure), position (managers, middle managers, and employees), business sector, and size of the company.

Data Analysis

First, the distribution of teleworkers and non-teleworkers by sociodemographic variables was analyzed using the contingency coefficient. Secondly, descriptive statistics were calculated for the two groups and for the global sample. Non-parametric analyses were used to explore differences between these two groups of employees (*U* Mann–Whitney) on sociodemographic and organizational variables, (RQ1), employees' perceptions of the set of processes and procedures developed by their employers during the lockdown (RQ3), and the strategies used by colleagues, middle managers, and senior managers to cope with the pandemic (RQ4). Thirdly, a comparison of the assessment of teleworking conditions according to sociodemographic and organizational variables was run (*U* Mann–Whitney; RQ2).

Finally, Classification and Regression Trees (CART) using SPSS 25 were performed to identify which variables, when considered simultaneously, better predicted the participants' level of motivation (RQ5). We used CART as a statistical approach because it is preferable to other parametric approaches for identifying homogenous subgroups. Additionally, it has

greater resistance to the effects of multicollinearity, outliers, and missing data, and it is useful for detecting higher-order interactions among predictors before determining which variables should be included in the model (Merkle and Shaffer, 2011).

We obtained the trees with the complete sample and subsequently split it into two groups—teleworkers and non-teleworkers. To avoid overestimation, the level of pruning was fixed at a standard deviation of one. Additionally, the minimum size for the parent node was fixed at 100 for the global sample and 50 for the subsamples, and at 50 and 10, respectively, for the child nodes.

In order to generate the decision tree that would allow the analysis of the predictive variables of motivation, this variable was re-categorized into two groups: employees who had scores below the median, amounting to a score of four out of five ($n = 7,749$, 66.3%), and those above it ($n = 3,944$, 33.7%). We used an Ntiles procedure in SPSS, which automatically split the sample into two groups based on percentile 50. Thus, participants with scores equal to or less than 4 were placed in the first group and those with scores of five in the second group.

The predictive variables included in the analyses were as follows: participants' perception of organizational measures adopted, coping, teleworking conditions and results (only in the global tree and in the teleworkers' tree), gender, age, tenure, position, sector, and company size.

RESULTS

Descriptive Statistics

Firstly, we analyzed differences in terms of the proportion of teleworking employees according to sociodemographic and organizational variables (Table 2). The companies with the highest percentage of teleworkers were those with fewer than 250 employees and operating in the education, public administration, and health sectors.

In relation to individual variables, the highest percentages of teleworkers were found among managers, employees over

46 years old, employees with more than 10-year experience in the same company, and men.

Table 3 shows the statistics related to the global sample, the teleworker and non-teleworker subsamples, and the statistical contrasts between these groups. In general terms, teleworkers had a better perception of the organizational measures taken to deal with the pandemic situation with the exception of the strategies that focused on communication with clients, which non-teleworkers rated more positively.

Teleworkers also gave higher ratings than non-teleworkers when evaluating the coping strategies of their top managers, middle managers, and colleagues. However, motivation levels were slightly—but significantly—higher among non-teleworkers.

As regards teleworking conditions (Table 4), all scores were above 3.75, indicating a good perception in all cases.

TABLE 2 | Percentage of teleworking employees by sociodemographic and organizational variables.

Indicator	Categories	% of teleworkers	Contingency coefficient
Enterprise size	Under 250	86.7%	0.184**
	250–500	73.1%	
	Over 500	58.5%	
Sector	Industry	71.6%	0.32**
	Distr. and consumption	35.2%	
	Services	61.9%	
	Education, PA, and health	82.4%	
Position	Managers	93.8%	0.102**
	Middle managers	58.9%	
	Employees	63.5%	
Age	Under 25	42.4%	0.115**
	25–45	66.4%	
	46–55	72.4%	
	Over 55	70.7%	
Tenure	<1 year	43.5%	0.077**
	1–5 years	42.3%	
	6–10 years	43.2%	
	More than 10 years	50.7%	
Gender	Women	67.4%	0.052**
	Men	72.3%	

** $p < 0.001$.

TABLE 3 | Descriptive statistics and comparisons between teleworkers and non-teleworkers.

Indicators	Global sample			Teleworkers		Non-teleworkers		Contrast
	N	Mean	SD	Mean	SD	Mean	SD	
Organizational measures adopted								
Internal communication about the situation	11,454	3.77	0.984	3.8	0.95	3.73	1.04	0.01
Management and work organization measures	11,690	3.71	1.040	3.77	1.01	3.60	1.08	<0.001
Health and prevention measures	11,650	3.74	1.060	3.84	1.00	3.57	1.14	<0.001
Communication with clients	10,442	3.79	0.901	3.77	0.90	3.83	0.90	0.004
Labor and salary measures	10,827	3.75	1.118	3.78	1.11	3.68	1.13	<0.001
Coping								
Top managers	11,669	3.72	1.077	3.76	1.05	3.66	1.12	<0.001
Middle managers	11,650	3.94	1.016	3.98	0.99	3.87	1.06	<0.001
Employees	11,656	4.31	0.780	4.35	0.75	4.25	0.834	<0.001
Motivation	11,693	4	0.953	3.99	0.932	4.00	0.99	<0.001

The lowest score was given to personal time management and the highest to the attitude/efficiency of coworkers while teleworking. Overall satisfaction with the situation was near to 4, indicating medium-high levels.

Finally, a comparison of the assessment of teleworking conditions by sociodemographic and organizational variables were run (Table 5).

Size

In general terms, differences were only observed in access to information for teleworking, the role of supervisors, employees' time management, and aspects related to work productivity, quality, and effectiveness. Specifically, employees of companies with fewer than 250 employees were the ones who most highly rated access to information. In the case of companies with 250–500 employees, they perceived the role played by their supervisors more negatively than the rest, but they considered they managed their time better. Finally, in those companies with more than 500 employees, work productivity, quality, and effectiveness were valued more negatively. There were no significant differences in the global assessment of the teleworking experience.

Sector

The most positive evaluations of teleworking came from employees in the industrial, distribution and consumption, and service sectors, with small significant differences between them. Conversely, the worst evaluations were those of education, public administration, and health employees. A discrepancy in this trend was only observed in the case of the assessment of the attitude of colleagues, where industry and the education, administration, and health sectors once again obtained the worst scores. Regarding general satisfaction with teleworking, employees in the service and industrial sectors were the most satisfied (without significant differences between them), followed by those working in distribution and consumption, education, and administration, and with health workers in last place.

Position

Significant differences were observed in technological resources, access to information for teleworking, and the role of supervisors, where the lower the hierarchical scale the poorer the evaluation. In the case of the attitude of colleagues, middle managers gave this variable a significantly more negative rating than employees.

Age

The age groups did not differ in their assessment of technological resources, supervisors' role, work productivity, quality and effectiveness, and their general satisfaction with the teleworking experience. Regarding access to information, those under 45 had a more positive perception than other employees. On the other hand, when it comes to managing personal time, the two outermost age groups (under 25 s and over 55 s) gave more positive evaluations than the rest of the employees.

Tenure

People with the longest tenure (more than 10 years) were the ones who least valued all aspects related to teleworking and indicated the lowest levels of satisfaction with teleworking. Few significant differences were observed between the rest of the groups, although those who had been in a company for <1 year rated access to teleworking information higher than those who had been in a company for between 1 and 5 years, and valued the role of the supervisor better than other employees.

Gender

Significant differences were only observed in relation to the attitude of their colleagues, with women being the ones who valued this variable more favorably.

Motivation Classification Trees

Global Sample

The results indicate that the predictive variables of motivation were managers' performance when coping with the situation (coherence, credibility, etc.), the perception of the internal communication of the situation, and the results obtained from teleworking in terms of productivity, quality, and effectiveness (Figure 1).

Terminal node 1 included a higher percentage of people with motivation scores below the median than those in node 0, amounting to 75.9% of the total node. This group included people who valued the performance of managers with scores equal to or less than 4 out of 5.

At the other extreme were terminal nodes 4 and 6, in which the percentages of people with scores above the median amounted to 68.5% and 61.8%, well above the initial 33.7%.

TABLE 4 | Descriptive statistics for teleworking conditions (only teleworkers subsample).

Indicators	Teleworkers		
	N	Mean	SD
Technological means available to work from home	7,469	3.80	1.047
Access to information	7,474	4.07	0.912
The way supervisors coped with the situation	7,470	3.96	0.984
The attitude/efficiency of peers	7,277	4.31	0.766
Individual time management	7,521	3.75	1.042
Work productivity, quality, and effectiveness	7,513	4.04	0.869
Overall satisfaction with teleworking	7,477	3.98	0.944

TABLE 5 | Comparisons of the scores on teleworking by sociodemographic variables (teleworkers subsample).

		Technological means		Access to information		Supervisors' role		Attitude of peers		Time management		Productivity, quality, and effectiveness		Overall satisfaction	
		Mean	Contrast	Mean	Contrast	Mean	Contrast	Mean	Contrast	Mean	Contrast	Mean	Contrast	Mean	Contrast
Ent. size	Under 250	3.86	2.555	4.18	14.061	4.02	20.612	4.31	2.596	3.69	9.071	4.09	7.511	4.02	4.502
	250–500	3.78	$p = 0.279$	4.03	$p = 0.001$	3.87	$p < 0.001$	4.33	$p = 0.273$	3.80	$p = 0.011$	4.07	$p = 0.023$	4.01	$p = 0.105$
	Over 500	3.81		4.08		4.00		4.31		3.74		4.02		3.97	
Sector	Industry	3.98	223.082	4.16	81.169	4.01	27.939	4.28	18.815	3.94	441.856	4.12	179.604	4.10	228.608
	Distr. and consumption	3.95	$p < 0.001$	4.16	$p < 0.001$	4.02	$p < 0.001$	4.33	$p < 0.001$	3.87	$p < 0.001$	4.08	$p < 0.001$	4.00	$p < 0.001$
	Services	3.86		4.09		3.99		4.37		3.94		4.13		4.13	
Position	Education, PA, and health	3.55		3.95		3.89		4.29		3.36		3.84		3.75	
	Managers	4.19	64.532	4.40	47.009	4.32	39.342	4.32	8.232	3.66	1.816	4.06	0.156	4.03	1.929
	Middle managers	3.91	$p < 0.001$	4.12	$p < 0.001$	4.04	$p < 0.001$	4.27	$p = 0.016$	3.71	$p = 0.403$	4.03	$p = 0.925$	4.02	$p = 0.381$
Age	Employees	3.73		4.01		3.92		4.32		3.74		4.02		3.97	
	Under 25	3.78	0.584	4.15	24.027	4.09	3.5	4.44	6.711	3.99	13.013	4.00	0.471	3.90	0.233
	25–45	3.75	$p = 0.900$	4.14	$p < 0.001$	3.98	$p = 0.321$	4.33	$p = 0.082$	3.61	$p = 0.005$	3.99	$p = 0.925$	3.91	$p = 0.972$
Tenure	46–55	3.78		4.05		3.97		4.32		3.66		4.01		3.95	
	Over 55	3.74		3.95		3.97		4.30		3.80		4.00		3.97	
	<1 year	4.07	24.796	4.40	36.108	4.31	33.823	4.49	22.462	3.98	12.865	4.21	22.279	4.14	10.613
Gender	1–5 years	3.93	$p < 0.001$	4.20	$p < 0.001$	4.07	$p < 0.001$	4.34	$p < 0.001$	3.83	$p = 0.005$	4.15	$p < 0.001$	4.05	$p = 0.014$
	6–10 years	4.06		4.22		4.03		4.40		3.89		4.20		4.19	
	More than 10 years	3.73		4.02		3.92		4.24		3.73		3.99		3.99	
Gender	Women	3.77	2015204.5	4.10	1989487.0	4.00	1985749.5	4.35	1749876.0	3.67	2022061.0	4.02	2009720.5	3.96	2032041.5
	Men	3.79	$p = 0.488$	4.05	$p = 0.093$	3.95	$p = 0.095$	4.30	$p = 0.016$	3.71	$p = 0.325$	3.99	$p = 0.172$	3.97	$p = 0.495$

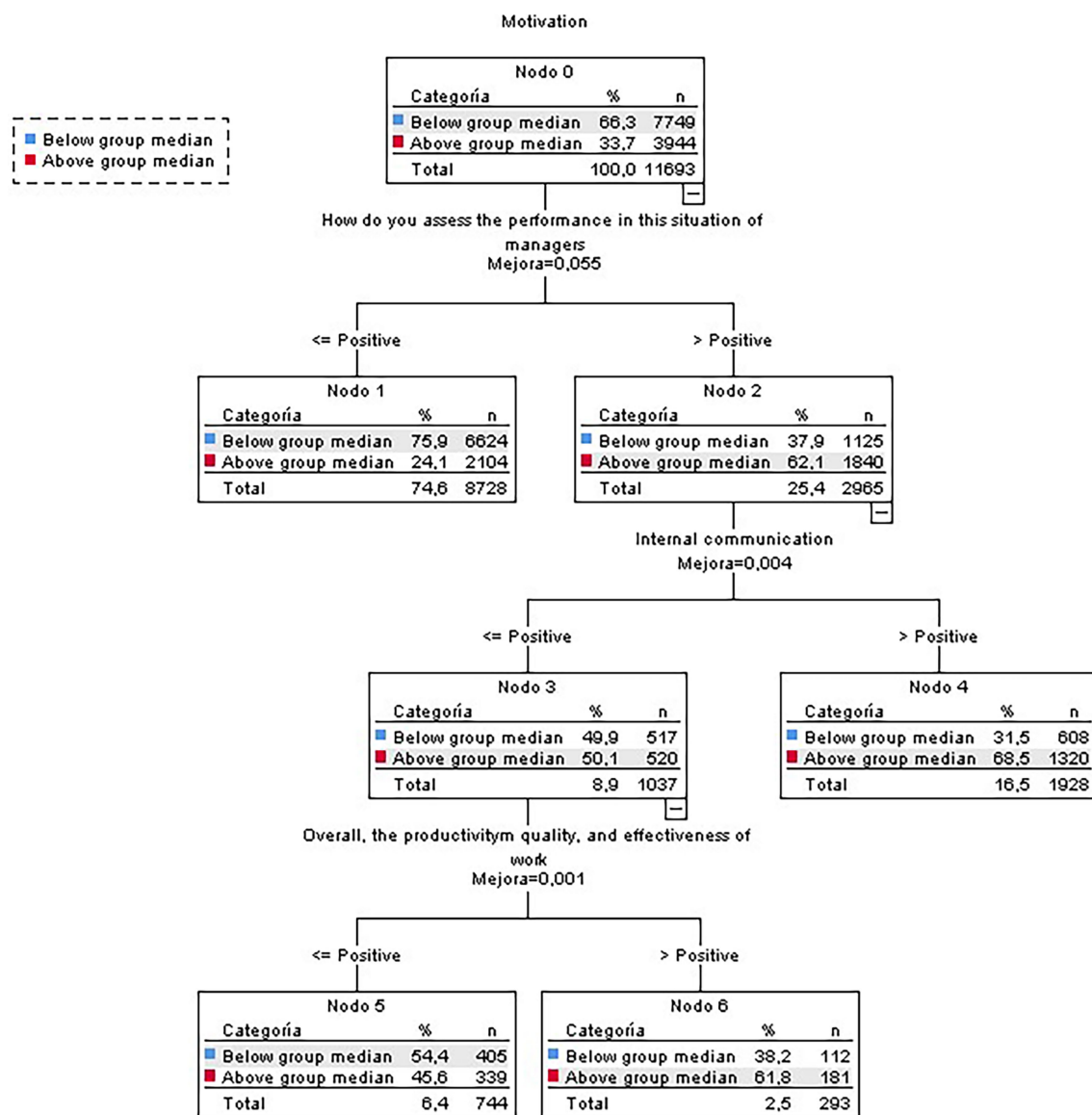


FIGURE 1 | Classification tree for motivation (global sample).

Terminal node 4 included people who highly valued managers' performance and the management of internal communication of the situation (with scores of 5). For its part, terminal node 6 included people who highly valued managers' performance, although they gave scores of 4 or less to internal communication management. In addition, these participants also valued very positively (with scores of 5) the results obtained during teleworking in terms of productivity, quality, and effectiveness (this branch only includes employees who were teleworking).

The tree obtained had a global correct classification percentage of 72.9%, although it was found more suitable to classify participants with scores below the median (90.7%) rather than those above it (38.1%). It should be noted that none of the sociodemographic variables had enough discriminative power to appear in the classification tree.

Teleworker's Subsample

The tree for the teleworkers subsample was similar to the one for the general sample, but the variable "internal communication" was split out (Figure 2). The most highly motivated teleworkers were those who considered that their managers performed very well when coping with the situation and were satisfied with the results they achieved. On the other hand, those employees below the group median on motivation were those who considered their managers' performance average or worse.

The tree obtained had an overall correct classification percentage of 72.9% (participants classified in their motivational group—below/above median—correctly by the classification model), although it was found more suitable to classify participants with scores below the median (94.1%) rather than those above it (29%).

Non-teleworkers' Subsample

To obtain the classification tree for the non-teleworkers' subsamples, all items related to teleworking conditions were excluded. The tree for the non-teleworkers' subsample was the simplest obtained (Figure 3). In this case, the most highly motivated non-teleworkers were those who considered that their managers performed well when coping with the situation. Contrariwise, those employees below the group median for motivation were those who considered their managers' performance average or worse.

The tree obtained had an overall correct classification percentage of 73.6%, although it was found more suitable to classify participants with scores below the median (88%) rather than those above it (47.8%).

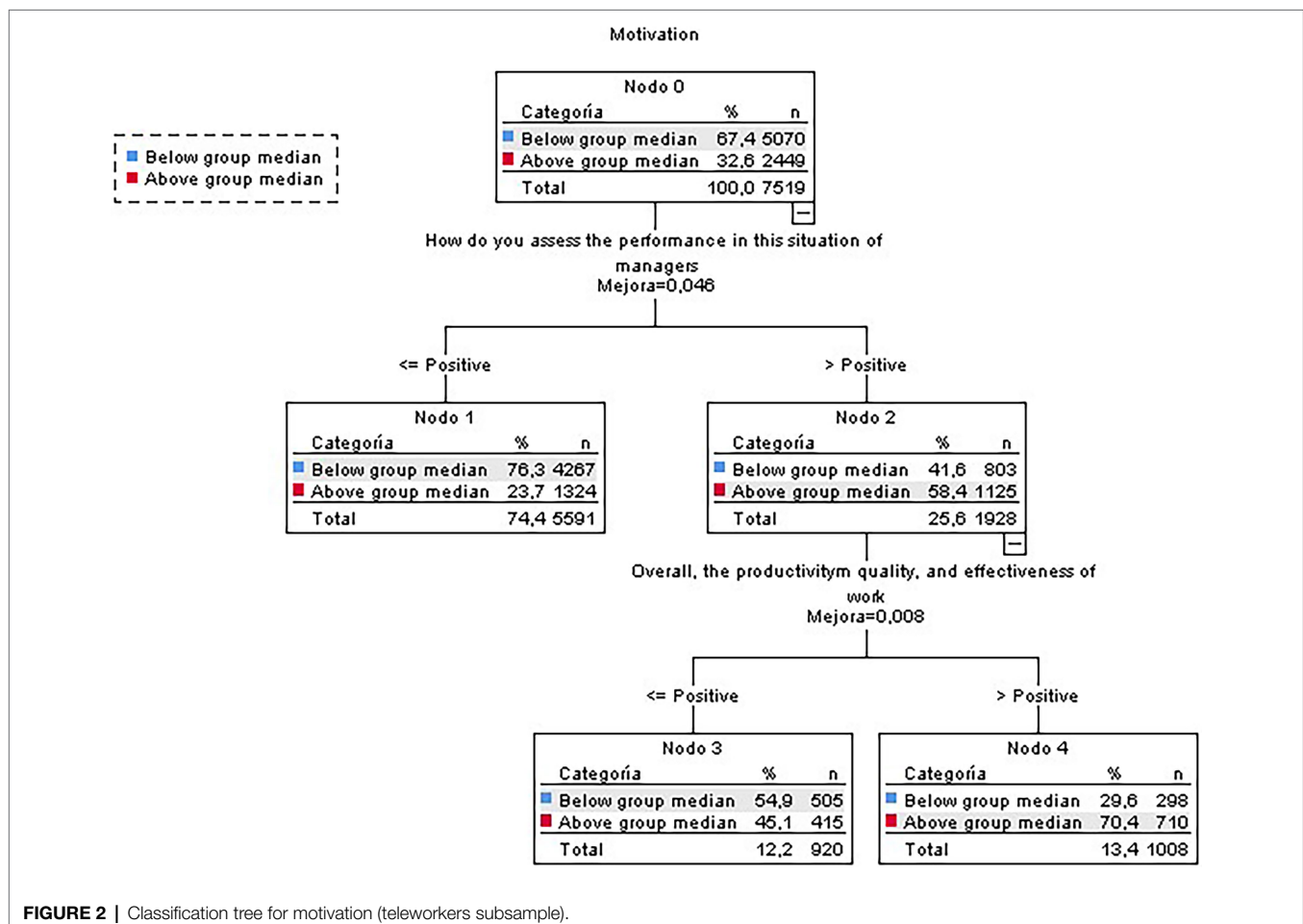
DISCUSSION AND CONCLUSIONS

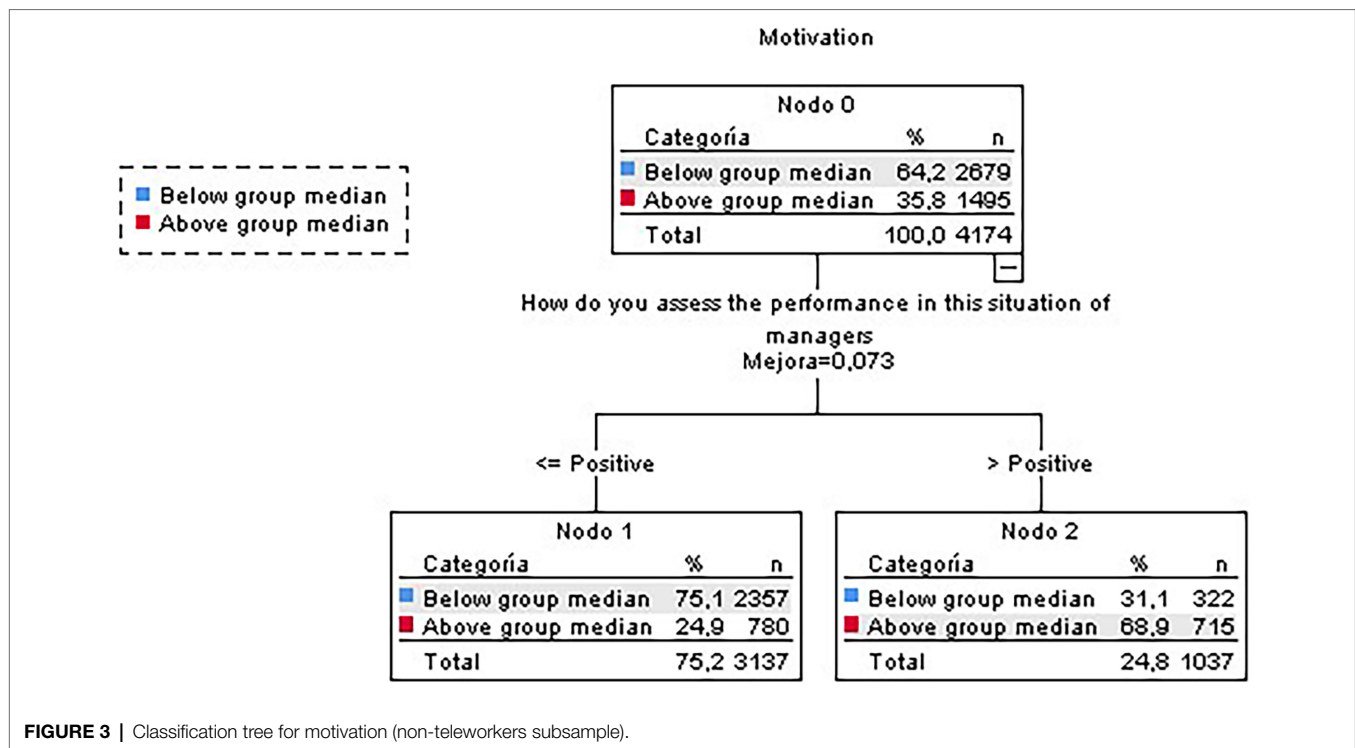
The main goal of this exploratory research was to characterize employees who teleworked and who did not, and their motivation during the lockdown. A comparative analysis was carried out of data from more than 11,000 participants, working in 38 Spanish different-sized companies from various sectors. The sample provided a good approximation of the state of affairs

that many organizations had to cope with at the beginning of the pandemic.

As expected, most of the participants teleworked, although only a small percentage had had previous experience with this work format. Our figures are slightly higher than those provided by Ahrendt et al. (2020), which indicated that in the June–July 2020 period, 52% of the Spanish population was teleworking. This abrupt shift to telework required an effort from both the workers and the organizations. The workers, most of whom had no previous experience with teleworking, proactively put their private context, own resources, and skills to respond to the new and unknown job demands. The organizations had to establish, urgently and reactively, work management measures.

Regarding demographic and organizational data (RQ1), the highest percentages of teleworkers were found among managers, employees aged over 46, employees with more than 10 years' experience in the same company, and men. These results partially coincide in terms of age, given that already in 2019 the highest percentage of teleworkers appeared in the over-55 age group (INE, 2020). We can assume that most managers are in this age group, that in turn they will hold higher positions in their companies, and that they tend to be men—only 34% of managers in Spain are women and only 23% of women managers are CEOs (Grant Thornton, 2021). The characteristic profile





of the teleworker described in our study corresponds to a middle-aged man with managerial responsibility. This profile usually has the necessary resources to carry out their task remotely, although they may not have the necessary digital skills. For this reason, organizations had to worry, not only about providing the necessary software for work, but also about equipping them with digital skills to manage work teams effectively.

In addition, organizations should pay special attention to women, given that, as pointed out by Grubanov-Boskovic et al. (2022) “as the COVID-19 pandemic unfolded, its adverse implications for gender equality started penetrating not only the dimension of paid work, but also the area of unpaid (domestic and childcare) work” (Grubanov-Boskovic et al., 2022, p. 2). It should be added how women have experienced this period in a particularly negative way, in relation to the imbalance produced by their work and personal obligations, and the effects on their mental health (Esteban-Gonzalo et al., 2020; Romeo et al., 2021).

The sector with the highest percentage of teleworking employees was education, public administration, and health, in companies with fewer than 250 employees, a finding that coincides with data on the percentage of workers who worked from home in 2019, prior to the pandemic (Hernández de Cos, 2020). It is important to consider that the sectors of education and public administration were those with the better conditions to deal with the situation of teleworking, even though their employees needed to use their own technological resources. Contrarily, healthcare sector was the one with the highest levels of frontline employees, but in addition, they had a high percentage of virtual work, allowed by different

technological tools as virtual care technologies or wearable devices (Hurley and Popescu, 2021; Maxwell and Grupac, 2021; Walters and Kalinova, 2021).

To answer RQ2, the employees' assessment of their remote working conditions was analyzed. Overall, the telework experience was valued as positive, with the best-considered variables being access to information needed for work, their colleagues' attitude and efficiency, and work productivity, quality, and effectiveness. The assessment of access to information is confronted with the availability of technological means, which on many occasions were not provided by the companies, at least initially. In addition, it is relevant to note that the limits between work time and personal time were broken during the pandemic (Romeo et al., 2021). Therefore, the participants indicated their own time management as one of the worst valued aspects. Finally, their perception in relation to the positive results obtained may be due to a process of cognitive dissonance reduction (Festinger, 1962) derived from the effort made to achieve them.

When comparing results by sociodemographic and organizational variables, the greatest differences in the assessment of teleworking conditions was found by sectors. The employees who teleworked in the distribution and consumption sector, characterized by being the sector with the lowest percentage of teleworkers in our sample, were the ones who best valued the working conditions in which they teleworked. Despite this, their overall satisfaction was somewhat lower than that of employees in other sectors, except for education, public administration, and health. The latter sectors contained the highest percentage of teleworking employees, and in turn, those who worst valued the telework situation and their general

satisfaction with this format. In addition, they agreed with employees in the industrial sector in assessing more negatively their colleagues' attitude and efficiency while teleworking.

The results obtained in the fields of education, public administration, and health partially contradict previous studies carried out in Spain, where one of the main complaints voiced by teachers, both at basic educational levels (Trujillo Sáez et al., 2020) and in higher education (Romeo et al., 2021; Tasso et al., 2021), was the lack of technical resources, information, and institutional support. Contrarily, other studies have pointed out that teachers perceived benefits on the use of new technologies and instruments for education, even though they stated that the educational system was not prepared for that sudden change (Obrad and Circa, 2021). Nevertheless, in the case of Dutch public servants, our results are in the line of the results of De Vries et al. (2016). The authors evidenced negative effects from teleworking, including greater professional isolation and less organizational commitment on the days that they worked entirely from home.

Thirdly, the participants' perception of the measures taken by their companies to cope with the pandemic was analyzed (RQ3). In general, the ratings were medium-high. All the measures were slightly better valued by teleworkers than non-teleworkers, with the exception of communication with clients, which was valued more positively by the latter. Health and prevention measures were another aspect given consideration. They were best valued among teleworkers, while they were the worst valued by non-teleworkers. This result ties in with the findings of the study of Rozentale et al. (2021) who pointed these organizational measures are one of the most important motivation tools by employees as the different sectors in Latvia, during the lockdown, and with the research carried out by the International Labor Organization [International Labor Organization (ILO), 2020] according to which:

Frontline workers, such as health care and emergency workers, but also those involved in the production of essential goods, in delivery and transportation, or in ensuring the security and safety of the population are facing many stressful situations at work as a result of the COVID-19 pandemic. Increased workloads, longer working hours, and reduced rest periods are a concern for most of them. In addition, they may be worried about getting infected at work and passing the virus to family, friends, and others at work, in particular if appropriate protective measures are not in place (p. 6).

In relation to how different groups coped with the new situation within the organization (managers, middle managers, and colleagues), they were all once again best valued by the teleworkers (RQ4). This result is related to our results in relation to the employees' assessment about their colleagues' attitude and efficiency. Again, it could be indicative of a mechanism to reduce cognitive dissonance, and it is related to the importance attributed to social support, which acts as a buffer against the situation of isolation caused by the pandemic. However, both teleworkers and non-teleworkers more highly rated their peers

than their managers and middle managers. In this sense, a decrease in satisfaction is observed with increasing hierarchical distance. In addition, the perceptions of the employees who did not telework about their managers were worse than those of the employees who were teleworking. As almost all the managers teleworked, this result would be explained by a lack of equity as a result of social comparison processes (Festinger, 1954). The employees would attribute that the conditions of their managers were highly advantageous in terms of health and safety, both for them and for their families.

This result is linked to the decision trees developed to explain motivation (RQ5). Here, for both teleworkers and non-teleworkers, the variable that explained motivation was the ability of managers to cope with the situation. In this sense, our results are in line with Walker (2021) who evidenced more significant relationships between employee motivation and managers who provided helpful management and work organizational measures during COVID-19. Furthermore, in the case of teleworkers, the variable related to the results obtained doing this type of work is included.

Additionally, according to the ILO report (2020), these findings can be explained by the fact that workers may have been reluctant to ask for support or raise occupational safety and health concerns, or they may have adopted unhealthy working practices with the aim of pleasing managers and supervisors (for example, long working hours, increased workload). They may have also avoided taking time off work if they were sick, with the ensuing risk of infecting coworkers. This problem was more serious for those workers on short-term contracts or who had been hired under freelancing arrangements [International Labor Organization (ILO), 2020].

Finally, the employees who did not telework claimed they felt more highly motivated, even though their evaluation of the measures taken by the organization and their colleagues and superiors was more negative than that of teleworkers. However, it is worth bearing in mind that, although the difference is statistically significant, it only comes to one-tenth. Our results can be explained by the findings of Sarfraz et al. (2021). These authors found that even though professional isolation was an antecedent of lower levels of motivation among teleworkers, this relationship was moderated by access to communication-enhancing technology. In our sample, the lowest rated aspect of teleworking conditions was the availability of technological resources for working from home. In this sense, when employees felt that they did not have suitable technology to work from home, their levels of motivation decreased in comparison to non-teleworkers.

Hitka et al. (2021) found decreasing levels of motivation when comparing data before and during the pandemic in micro and small enterprises, with the decline being the result of perceptions of inequality, job insecurity, and difficulties in internal communication processes. In this research, non-teleworkers' perceptions of these variables were worse than teleworkers', but contrary to what might be expected, the former rated communication with clients (external communication) higher than teleworkers did.

To sum up, this research confirms that the situation resulting from the pandemic has forced many employees to telework, especially managers. Despite having no previous experience of working from home, they valued very positively both the measures adopted by their organizations and how other workers and managers dealt with the situation. It is important to bear in mind that, in part, these results may be due to an attempt to reduce the cognitive dissonance caused by the overexertion they had to make to cope with the situation. Contrary to expectations, employees who teleworked, despite giving these variables better ratings, displayed lower levels of motivation than those who did not telework. And as can be seen in the decision trees, their motivation was much more heavily conditioned by their perceptions of the productivity, quality, and effectiveness of their work.

The large amount of data obtained from this research offers a picture of the situation experienced by teleworkers and non-teleworkers during the pandemic in spring 2020. This data brings to light the importance of the role of managers in sustaining the motivation of their subordinates in times of crisis. Furthermore, our results permit the characterization of those employees with the highest levels of motivation in comparison with employees with medium or low levels. This has practical implications that could be useful for managers. In this sense, managers must be provided with the tools needed to cope with these situations and given communication strategies that enable them to keep in touch with those in their charge, thereby maintaining an atmosphere of trust and support. Likewise, employees must be informed of and able to value the results they obtain during emergency situations, especially those working from home, who, on occasions, may lose sight of the value of their work in detriment to their sense of importance and responsibility.

Limitations and Future Research

Despite its contributions, this study is not without limitations. First of all, a single-item was used to measure the different aspects evaluated. Nevertheless, the research carried out by Ang and Eisend (2018), which examined 189 studies from eight previous meta-analyses, showed that when single-item measures are used, the results are the same as in those that use multiple items. Similarly, the study done by Bergkvist and Rossiter (2007) was one of the first to show empirically that one construct could predict another through a single or multiple items, and Rossiter (2002, 2011) developed the theory that it is not necessary to measure all constructs with multiple items, even for academic research. Additionally, Bean and Roszkowski (1995); Dillman et al. (1993), and Roszkowski and Bean (1990) found that the fewer questions a questionnaire had, the more likely participants were to respond willingly, with briefer questionnaires precluding boredom and fatigue among the respondents, and therefore improving the response rate.

Secondly, participants responded voluntarily in this research, and for that reason it could exist a selection bias that could explain the higher scores obtained, especially in motivation. Additionally, to avoid the identification of individual subjects, not all demographic data was collected in some organizations. This is the reason for the large amount of missing data, specially related to gender, age, and tenure, and the consequence may well have been that it was not sufficiently present in the classification

trees to of significance when explaining motivation. Besides, sector categories were too broad and included in the same group sector that could have differential functioning, especially in the case of education, public administration, and health, which have been included into the same category. Nevertheless, the valid data was relevant enough to obtain significant results.

Thirdly, the instrument used was a self-administered questionnaire, which can facilitate common method variance (Podsakoff et al., 2003). The exploratory research design was aimed at obtaining massive data at a complicated time for the participating organizations, and for teleworkers and other employees. For this reason, the instrument had to be constructed in a way that facilitated responses but at the same time offered organizational decision-makers relevant information and keys for intervention. In this sense, to describe the measures implemented by the organization, broad terms referring to management systems were used. This fact did not allow to specify the actions on which the employee focuses when assess them. The use of mixed methods should be considered for future research in order to carry out a deeper assessment of the conditions affecting motivation in times of crisis.

Fourthly, we used a sectional design. For that reason, our results, obtained by means of decision trees, cannot explain causality. Future research should include at least two measures to have a deeper insight into causality evidence.

Fifthly, in relation with the classification trees, our results were good predictors of having low or medium levels of motivation, but not so good for the highest levels. In this sense, it is necessary to consider other variables to explain better how employees reach higher levels of motivation in times of COVID. Nevertheless, these results have practical implications, as they give managers keys for the improvement of motivation.

Finally, it should be taken into account that the data collected refer to the state of emergency at the beginning of the pandemic in spring 2020 and that it cannot be generalized to other later times or situations. Future research is needed to explore the conditions that influence the motivation of teleworkers and non-teleworkers, in sectors different from those analyzed in this research, and with a more specific segmentation of all the sectors.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for this current study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. The study which produced the data on which this study is based was reviewed and approved by E-Motiva Consulting. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MR and MY-B contributed to theory development, research design, data analyses, and the discussion. LB contributed to the data analysis. All authors contributed to the article and approved the submitted version.

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Is a Match Better Than No Match? On the Interaction of Demands and Support During Technological Change

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Progressing digitalization and technological changes triggered by COVID-19 lockdowns means for organizations that new technologies need to be implemented in shorter time periods. The implementation of new technologies in the workplace poses various change demands on employees. Organizations try to counteract these effects by providing change support in the form of for example training or participation options. However, to date, it is unclear how change demands develop a detrimental effect and whether change support can buffer this relation due to which working mechanisms, and whether the effectiveness of support measures can be increased by matching them to specific change demands. Based on the integrative framework of social support theory, which draws on the job demands-resources model and self-determination theory, we hypothesize that change demands can be most effectively addressed through matching change support. In three consecutive experimental vignette studies ($N_1 = 89$, $N_2 = 134$, $N_3 = 138$) of dependently employed samples, we analyzed the interaction of change demands and change support on attitude to change, satisfaction with the change process, and behavioral intention to use by manipulating the degree of demand (high vs. low) and provided support (high vs. low) and by conducting moderated mediation analyses, and integrated the results meta-analytically. The results show that change demands have a detrimental effect on technology implementation outcomes. In one of the three studies we confirmed a moderating effect of change support. The relation was mediated by perceived frustration, but the mediating effect of psychological need satisfaction was inconclusive. Based on our results, we discuss that the research on matching support requires the evaluation of the personal relevance of the support receiver to increase the chance of achieving a match.

Keywords: change demands, change support, social support theory, matching hypothesis, psychological need satisfaction, frustration

INTRODUCTION

Progressing digitalization and technological change triggered by COVID-19 lockdowns have increased the pace of technological change (Cascio and Montealegre, 2016; Dwivedi et al., 2020). Technological change represents one of many occasions for organizational change (Senior and Swailes, 2010), which is initiated when a new technology or a technology update is introduced at an employee's workplace (Cascio and Montealegre, 2016). Organizational change in general

(e.g., task and role change) can be demanding for employees and can affect employee well-being (Day et al., 2017), their attitudes and attachment to the organization (Sung et al., 2017). Many forms of support are recommended during technological change, and this study examines how to most effectively design change support as a means of addressing change demands.

The implementation of new technologies in the workplace temporarily disrupts work and often proves demanding to employees, even if the implemented technology is well-developed (Demerouti, 2020). Change demands can result from work design changes that can occur when employees, for example, have to take up new tasks for which they do not have the required skills, when their level of job autonomy shifts, when their working routines change (Demerouti, 2020; Parker and Grote, 2020), or because the implemented technology requires intensive customization (Momoh et al., 2010). Overwhelming change demands can result in resistance to change in employees (Oreg et al., 2018), expressed for example in the refusal to use the new technology.

Organizations intend to help their employees to face these change demands by providing change support, for example by offering training, options to participate in the change process, technical support, or additional resources (Oreg et al., 2011; Iden and Eikebrokk, 2013; Reitsma and Hilletoft, 2018). These support strategies have been meta-analytically shown to directly affect technology implementation success with a medium-sized positive effect (Schlicher and Maier, 2019a). Yet, whether change support also interact with demands and buffer their detrimental effect when designed accordingly, and if this interaction could potentially increase the effect of change support interventions, is less well-researched. This knowledge is of high practical value as it could be used to design more effective change management support measures.

From the theoretical perspective, we are going to elaborate on one of the most central assumptions of social support theory, the matching principle. Jolly et al. (2021) published a comprehensive review article on social support theory criticizing that its model assumptions on support-demand matches lack systematic research and empirical confirmation. Previous research did not yield conclusive results on the moderating role of support (e.g., Viswesvaran et al., 1999; Mathieu et al., 2019), but it was mostly conducted as field research in which support was not specifically designed to match a particular demand. In the context of technological change, providing support is recommended, yet previous research has not systematically analyzed whether particular support interventions were designed as a means to counteract demands of technological change (Schlicher and Maier, 2019a), or whether an interaction could increase the effectivity of support interventions.

Therefore, we pursue the research question of how change demands have a detrimental effect on technology implementation outcomes, and whether change support can buffer this effect, especially when it is designed according to the matching principle of social support theory. Furthermore, we analyze which mechanisms mediate the relation between change demands and change support on technology implementation outcomes, because this knowledge also helps to design more effective measures to support change.

To understand demands during technological change in particular and the counteracting effect of change support, we applied the integrative framework introduced by Jolly et al. (2021) which relates to Job Demands-Resources Theory (JD-R; Bakker and Demerouti, 2007) and Self-Determination Theory (SDT; Deci and Ryan, 2000; Deci et al., 2017) to explain the joint effect of social support and demands on work outcomes with intrapersonal processes. We applied an experimental research approach, as proposed by Jolly et al. (2021) to allow for causal inferences to be drawn in a controlled research environment, and conducted three consecutive vignette studies. Although experimental vignette methodology is often criticized for its low external validity due to its hypothetical nature (Aguinis and Bradley, 2014), it has the advantage of testing research questions that are not readily observable in practice and manipulating antecedent conditions to infer causal relationships in a parsimonious manner.

We contribute to the literature by first increasing the understanding of the nature of change demands. As of today, there has been less research on change demands as compared to change support (e.g., Smollan, 2015). Second, we elaborate how change support interacts with change demands, and provide clarity on this key model assumption of social support theory. In practice, many change support interventions might be too general to have an effect on a specific change demand (e.g., the provision of management support for the general implementation of the new technology when handling the new technology requires specific training). Third, we analyze the mechanisms by which change demands develop detrimental effects and how change support can buffer this relation in order to be able to design more efficient change support interventions. Fourth, by applying an experimental research design, we were able to systematically manipulate and observe the consequences of the interaction of change demands and change support, thereby being able to analyze the causal relationship of the two. In doing so, we further enhance the understanding of change management processes.

INTERACTION OF CHANGE DEMANDS AND CHANGE SUPPORT

We followed the above outlined research questions by first describing change demands that can occur during technological change and analyzing the effects of change demands on technology implementation outcomes (see section “Shifting the Research Focus to Change Demands”), then by explaining support according to social support theory and paths of interaction between demands and support on these outcomes (see section “Easing the Effect of Change Demands by Providing Change Support”), and third by analyzing the mechanisms of these relations (see section “Explaining the Mechanisms of Change Demands”).

Shifting the Research Focus to Change Demands

The nature of demands is explained by the JD-R (Bakker and Demerouti, 2007), which states that job demands (defined as

facets of the job that require physical or psychological effort and are costly to the individual) are ever-present in every workplace and negatively affect well-being and performance through perceived strain. As a variant of job demands, change demands represent specific job demands that occur during the change process.

Various demands can occur during technological change. Although the result of implementing a new technology should be beneficial to the employee (e.g., process optimization, reduction in system disruptions) and free up resources, the process of making the transition can be demanding. Change demands can result from the requirement to adapt to the alteration of work processes (Momoh et al., 2010; Ali et al., 2016; Demerouti, 2020) or a temporarily increased workload during implementation (Smollan, 2015; Carlson et al., 2017). Change demands can also result from the alteration of job contents (Ali et al., 2016). Examples of job content change are the introduction of tasks or technology features that require the employee to develop new skills to perform the task and handle the technology (Oberländer et al., 2020; Paruzel et al., 2020), or the uptake of new work roles that the employee did not have to play beforehand (Smollan, 2015). Also, work design characteristics such as the perceived level of autonomy of a job might alter (Parker and Grote, 2020). Furthermore, change demands can result from the technology itself, for example when the technology lacks quality, employees perceive a lack of control over the technology, or the technology allows for less effective communication but increased external monitoring (Momoh et al., 2010; Day et al., 2012).

In addition to the above descriptive differentiation of demands, change demands can also be differentiated dimensionally, and this knowledge may be used for optional support matching. With reference to social support theory, Cutrona (1990) clustered stressful events to describe optimal support matching. One dimension is the controllability of the situation, which technological change offers at both extremes. Some demands can be controlled by employees, such as learning the new technology functions, and require instrumental support. Other demands feel uncontrollable to workers, e.g., job design and work role changes, and are best managed with emotional support. Thereby, change demands can be rather instrumental (i.e., physical) in nature, especially when the technology implementation leads to tasks that require new skills in order to successfully perform them; alternatively, change demands can be emotional (i.e., affective) in nature, when employees feel insecure while up taking new work roles or having to work with new colleagues (e.g., House, 1981; de Jonge et al., 2008).

Another aspect of why change demand may have a differential effect on technology implementation outcomes could be the amplitude to which they occur. Depending on the scope of technological change (e.g., Street and Gallupe, 2009), that is, how extensive the task and role changes are as a result of the technology introduced and how many different demands are placed on employees, change can occur at different amplitudes. Ample technology implementation projects that largely affect how work is conducted and how work teams interact can lead to diffuse change demands for employees (e.g., new tasks and roles, increased workload, adapting to the new technology, letting

go of old work routines, working with new colleagues, technical problems with the new technology; Smollan, 2015). More closely circumscribed technology implementation projects can lead to specific change demands, for example the alteration of work tasks might lead to new skill requirements or the alteration of new work roles (Smollan, 2015; Paruzel et al., 2020).

Change demands can lead to the failure of technology implementation processes. The failure or success of a technology implementation process can be measured in change-specific outcomes such as attitude to change (Oreg, 2006), satisfaction with the implementation process, and behavioral intention to use the new technology (Davis et al., 1989). Attitude to change describes an employee's mindset about the change process in three dimensions: affective (e.g., strain or joy experienced during the change), cognitive (e.g., evaluation of the change's risks or chances), and behavioral attitude to change (e.g., intention to hinder or promote the change) (Oreg, 2006). Positive attitude to change is often viewed as a prerequisite of a multitude of other change supportive behaviors (e.g., Rafferty et al., 2013), but can also lead to counterproductive change behaviors when negatively affected by high change demands (Oreg et al., 2018). Satisfaction with the change process represents a concretization of the general construct job satisfaction (Cammann et al., 1983). When high demands occur during the change process, the satisfaction with the conduction of the change process decreases. Behavioral intention to use is a construct of the technology acceptance model that describes whether employees are motivated to use the implemented technology (Davis et al., 1989; Venkatesh and Bala, 2008). Behavioral intention to use is predicted by an evaluation of the technology (perceived ease of use, usefulness), but also by external variables such as facilitating conditions of the change context (Venkatesh et al., 2012). When the technology itself or the facilitating conditions of the change process are perceived as low in quality, behavioral intention to use the technology decreases (e.g., Rajan and Baral, 2015). Behavioral intention to use must be distinguished from actual usage. While actual usage measures how often the new technology is used and can easily be affected, for example, by the organization's commitment to use the new technology, behavioral intention to use measures the motivation to use the new technology. Although the use of a new technology may be mandatory, internal willingness to use depends on aspects of the technology and the implementation process. Yet, research on the effects of change demands is sparse (e.g., Smollan, 2015) and has not been systematically investigated in the context of technological change. We assume that change demands in general will negatively affect the three technology implementation outcomes.

Hypothesis 1: Change demands negatively affect (a) positive attitude to change, (b) satisfaction with the change process, and (c) behavioral intention to use.

Easing the Effect of Change Demands by Providing Change Support

Organizations are often aware that technological change can prove challenging to employees and therefore provide support (Iden and Eikebrokk, 2013; Reitsma and Hilletoft, 2018).

Applying Jolly et al.'s (2021) definition of social support, change support takes the *form* of behaviors performed by members of the organization as the *source* of support and is measured through the perception of support received by employees. JD-R groups change support as a job resource (Demerouti, 2020) that is defined as facet of the job that reduces job demands, stimulates growth, and helps achieve work goals (Bakker and Demerouti, 2007).

In accordance with change demands, change support can take varying *forms*, too. During technological change, organizations have a multitude of possible support interventions at their disposal: training, technical support, information on the upcoming change, support from management, and options to participate, among others (for an overview: Oreg et al., 2011; Iden and Eikebrokk, 2013; Reitsma and Hilletoft, 2018; Schlicher and Maier, 2019a). Social support theory (House, 1981) states that four kinds of support can be distinguished. Instrumental support represents the provision of resources required to solve a problem (e.g., money), informational support represents the provision of knowledge to help oneself (e.g., information on an open job position), emotional support represents the provision of care and sympathy, and appraisal support represents the provision of feedback from others (Smollan, 2017). Meta-analysis showed that workplace and change support is effective in increasing positive and lowering negative attitudes and behaviors (Mathieu et al., 2019; Schlicher and Maier, 2019a).

Job Demands-Resources Theory states that demands and resources not only directly impact work and change-specific outcomes, but also interact to affect outcomes. The relation of support with demands is that it positively affects outcomes (such as strain) directly, but also buffers the relation of demands (such as stress) and these outcomes (Viswesvaran et al., 1999). Field research that examined the interaction between change support (management support, training, and participation) and change demands during technological change found no interaction effect, but the reason may be that demands were considered low and that organizations have not paid enough attention to matching support with specific demands (Schlicher and Maier, 2019b). Therefore, we choose an experimental research setting, where the matching design of change support and change demands is controlled, and assume that the effect of change demands will be moderated by change support.

Hypothesis 2: Change support moderates the negative relationship of change demands and (a) attitude to change, (b) behavioral intention to use the system, and (c) satisfaction with the change process.

Explaining the Mechanisms of Change Demands

Change demands have a detrimental effect on outcomes of change (e.g., Oreg et al., 2011, 2018). However, it is not yet clear which mechanisms underlie this relation. A theory that allows for the derivation of assumptions about how change demands and change support jointly affect outcomes by describing intrapersonal processes is SDT (Deci and Ryan, 2000; Deci et al., 2017). The integration of social support theory, JD-R, and SDT

further fosters a deeper understanding of the social support processes of work (Jolly et al., 2021) to develop support according to intrapersonal effects of demands on employees.

The SDT is a motivational theory proposing that three basic psychological needs must be fulfilled in order for motivation, performance, and well-being to occur. In the context of work, this means that employees must feel competent to have their need for competence fulfilled, employees must feel part of a group to have their need for relatedness fulfilled, and employees need to perceive having freedom of choice to have their need for autonomy fulfilled (Deci and Ryan, 2000; Deci et al., 2017). High change demands can lead to a frustration of psychological needs (van den Broeck et al., 2016) and stress (Olafsen et al., 2017). For example, changes in work tasks and work ambiguities were associated with burnout via need thwarting (Gillet et al., 2015), workplace bullying led to burnout and lowered engagement via need dissatisfaction (Trépanier et al., 2013), and job insecurity was associated with emotional exhaustion via need frustration (Vander Elst et al., 2012). During technological change, a change in work tasks and skill requirements can lead to dissatisfaction of the need for competence, work design changes can lead to dissatisfaction of the need for autonomy, and when employees have to work together in new work groups, they can perceive that their need for relatedness is dissatisfied (Schlicher and Maier, 2019b). The provision of support intends to accompany change in a way that fosters the experience of need fulfillment at work (van den Broeck et al., 2016). For example, organizational resources such as perceived justice were found to reduce need thwarting (Gillet et al., 2015), and fostering an understanding of the rationale of the change, feeling acknowledged, and having a choice during change can lead to acceptance of change (Gagné et al., 2000). SDT does not explicitly predict an interaction of demands and support on need fulfillment, and Jolly et al. (2021) integrated JD-R and SDT on the motivational path. However, as van den Broeck et al. (2016) noted, research on need dissatisfaction is underrepresented and requires integration with related theories. We therefore propose that experiences of need dissatisfaction explain the experiences of strain and frustration following the occurrence of demands. As predicted in JD-R, support should buffer the effect of demands on strain, which is mediated by need dissatisfaction. In line, psychological need satisfaction (and subsequently its dissatisfaction) is associated with performance, satisfaction, and commitment (van den Broeck et al., 2016).

The lack of satisfaction of the three psychological needs can explain observations of frustration during technological change (e.g., Castillo et al., 2018; Gray et al., 2020). Frustration refers to affective reactions to inhibiting work conditions (Peters et al., 1980). Trépanier et al. (2015) found that need frustration following the occurrence of job demands led to psychological distress in employees, but the provision of job resources decreased need frustration. The affective state of frustration following the lack of need satisfaction might explain why technology implementation outcomes are negatively affected.

Hypothesis 3: The relationship of change demands and (a) attitude to change, (b) satisfaction with the change

process, and (c) behavioral intention to use will be serially mediated by need satisfaction and frustration. Change support moderates the mediation process.

Model assumptions are summarized in **Figure 1**.

MATERIALS AND METHODS OF STUDY 1

General Methodological Approach to the Three Studies

To test the model's assumptions, we applied an experimental between-subjects vignette study design in three consecutive studies and integrated their results meta-analytically. We chose this approach because it allowed us to systematically test the assumptions of the model in a parsimonious design and controlled environment, to derive causal conclusions, and because the subject of the study is not easily observed in practice, as change managers are not yet advised to follow the matching principle when designing interventions to support change. We maintained this approach in all three studies, because the replication crisis in psychology has highlighted the importance of conducting several studies in comparable research settings to reach conclusions on true effects (Maxwell et al., 2015; Shrout and Rodgers, 2018). We applied paper people vignettes, in which study participants are typically presented with written scenario texts of a hypothetical situation and asked to indicate their attitudes, affects and behavioral intentions. This type of vignettes is appropriate for the assessment of explicit processes and responses that study participants can reflect about (Aguinis and Bradley, 2014), as is the case with responses to change. This type of experimental manipulation is widely used in research concerned with an in-depth analysis of a working mechanism in question, as was the purpose of this study (e.g., Keck and Babcock, 2018; Abraham et al., 2019). The experimental vignette methodology increases internal validity by systematically manipulating the independent variables of change demands and change support, but has been criticized for its lower external validity. We increased the external validity of the vignettes by describing the scenario as realistically as possible for study participants, providing contextual information for immersion,

and relying on reports of technological changes in practice to describe task changes. We also increased external validity by recruiting study participants who could more easily empathize with the situation described because they were dependently employed and had personal experience with change (Aguinis and Bradley, 2014). The length of the vignette text was similar in each of the studies to exclude method effects. In each study, we manipulated the degree of demand experienced (high vs. low) and support provided (high vs. low) in three scenarios (we will explain the manipulations for each study in its respective section). Study participants were randomly assigned to the experimental groups. The studies were conducted online on the platform Qualtrics. The ethical committee of the university approved the study designs prior to conduction (Study 1 #2020-058, and Studies 2 and 3 #2020-167).

We will present the three studies in the order in which they were conducted. The approach is summarized in **Figure 2**. First, we conducted Study 1, in which we analyzed the interaction of high-amplitude change demands with different types of change support. After interpreting the results of Study 1, we derived another hypothesis based on a theoretical extension of social support theory and refined the design of Study 2 and 3 by testing a single change demand with corresponding change support in each case. Accordingly, we will present Study 1 in its entirety before presenting Studies 2 and 3. In Study 1, we analyzed whether the mixed effects of technology implementation (workplace changes to tasks, routines, and social interactions) can be buffered by mixed acts of support (training, participation options, information, and management support).

Research Sample of Study 1

Prior to participant recruitment, we calculated the required sample size with G*Power (Faul et al., 2007). For the first study, the estimation of the required sample size was based on the parameters of a field study that recruited participants with similar demographics on a related topic (Schlicher and Maier, 2019b). The *a priori* F-test (ANOVA, main effects and interactions) results showed that between $N = 34$ (attitude to change, $r_{\text{mean}} = 0.45$), $N = 75$ (process satisfaction, $r_{\text{mean}} = 0.31$) and $N = 971$ (behavioral use intention, $r_{\text{mean}} = 0.09$) participants needed to be recruited in order to detect an effect of demand or support on the outcomes.

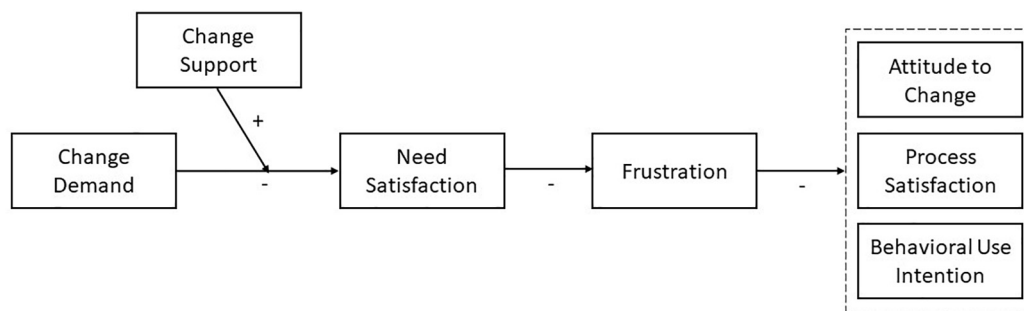


FIGURE 1 | Model assumption.

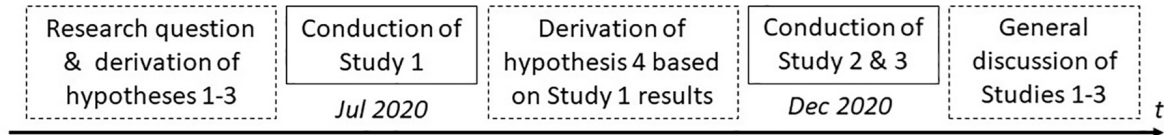


FIGURE 2 | Timeline of Studies 1–3 conduction.

Study participants were recruited via social media in 2020 in Germany and were offered to take part in a prize draw of a 4×10 € shopping voucher. In total, $N = 168$ answered the call. To be included into the analysis, participants needed to give their approval for anonymous data storage and analysis, the survey needed to be filled out completely, and at least two out of three attention checks needed to be answered correctly. Participants needed to work at least 20 h per week in order to be assumed to know work processes in organizations well and be able to fully immerse in the description of the fictitious change situation of the study's manipulation to increase external validity. They had to be dependently employed, for we expected that self-employed and corporate management would be in charge of designing change processes and therefore answer research questions from a different perspective than intended (see also: discrepancy of evaluations between provided vs. received support; Jolly et al., 2021). In order to detect low attention while reading research items, we excluded participants who were three times quicker (3 SD s) than the median of total processing duration and time reading the vignette text (Leiner, 2019). After applying the inclusion criteria, $N = 89$ participants were included in the final sample.

Study participants were on average 34.07 years old ($SD = 11.65$; range: 20–59 years), 33.3% male. On average, they worked 35.32 h per week ($SD = 7.21$; range: 18–45 h), in a dependently employed (85.7%), marginally employed (1.2%), or part-time employment position alongside studies or training (13.1%). The majority of participants had a university degree (39.2%) or vocational training (22.6%). Most participants held no leadership responsibilities (70.2%), while 25% had leadership responsibilities for teams or projects, and 4.8% on some higher hierarchy level. Most participants worked in health services (26.2%), commercial services (15.7%), or administrative services (14.5%). Additionally, 81% of the participants had experienced technology implementation in their workplace; on average, they judged the implementation as slightly good (6.24, $SD = 2.24$; range 1–10). Study participants evaluated themselves as average tech-savvy (5.15, $SD = 2.67$, range 0–10).

Procedure and Manipulation of Study 1

First, study participants were informed of the study's outline and their data privacy rights. Second, the correctness of filtering factors (required minimum working hours of 20 h per week) had to be confirmed. Third, vignette texts and questionnaires were presented, followed by demographic information. Lastly, information concerning compensation for participation was provided.

For the means of manipulation, participants were asked to read a scenario text concerning the implementation of a new technology in the workplace, and subsequently answer questions how they would react if they had experienced this change. The scenario text began with an explanation of the context of the hypothetical situation. This approach was the same for all studies and manipulations and included the name of the company, an explanation of the work tasks that are being changed, and the progress of technology implementation. Participants were asked to imagine they worked as an accountant for the fictitious company portrayed in the text. The participants were told that the fictitious company is in the process of changing a number of aspects in their imagined workplace due to the implementation of a new computer system. The study manipulation was then twofold. First, participants were informed whether the technology implementation would lead to more or less ample changes to their daily work. The scenario described that tasks and routines would change due to the technology implementation. In the high demands condition, participants were informed that the technology will require them to do their tasks differently and how much daily work routines will change. In the low demands condition, participants were informed that many tasks will remain unchanged by the introduction of the technology and that there will be little change in work routines. Second, participants were informed whether or not they received a form of organizational support to counteract the change demands. In the high support condition, participants could benefit from different support interventions (training, options to participate, support from management, and information on the change). In the low support condition, participants were informed that they have not received these support options, because no budget was allocated or management did not have enough time to address the concerns. Vignette texts and a table indicating the respective manipulations are available for inspection in the **Supplementary Material File**.

Measures

Items were presented in German on a seven-point Likert-scale, if not stated otherwise. Scales for which there was no German translation available were translated following collaborative and iterative translations guidelines (Douglas and Craig, 2007). Items per scale as well as mediator and outcome variables per page were presented in randomized order.

We tested for the successful manipulation of change demands by applying three items of the individual job impact scale (exemplary statement: "The work processes and procedures I use have changed," on a five-point Likert scale; Caldwell et al., 2004).

The successful manipulation of change support was secured by assessing whether study participants recognized the availability of support (e.g., “Overall, I feel appropriately involved in the rollout of the new program.”) and whether the presentation of support options led to the perception of perceived organizational support at work (three items, e.g., “My organization cares about my opinions”; Eisenberger et al., 1997).

Two mediator variables were assessed: psychological need satisfaction, and perceived frustration associated with the change. Need satisfaction was assessed with 18 items of a German translation (Martinek, 2014) of the Work-related Basic Need Satisfaction scale (e.g., “I really master my tasks at my job” on a five-point Likert scale; van den Broeck et al., 2010). Frustration was assessed with three items of the organizational frustration scale (Peters et al., 1980) that was adapted to measure frustration in the workplace (Gray et al., 2020). An exemplary item is “Doing this work during the change is a very frustrating experience.” Study participants were instructed to immerse themselves again in the work situation described in the vignettes and respond how they would react in that situation before each of the need satisfaction, frustration, and outcome scales were presented.

Three outcome variables were assessed: attitude to change, satisfaction with the change process (in the following called process satisfaction), and behavioral intention to use the new technology. Attitude to change was assessed with 15 items by Oreg (2006). Item formulation was changed to the present tense (e.g., “I think that it’s a negative thing that we are going through this change.”). Process satisfaction was assessed with three items of the Michigan Organizational Assessment Questionnaire Job Satisfaction Subscale (Cammann et al., 1983) that were linguistically formulated to fit the change process (e.g., “All in

all I am satisfied with the technology implementation process.”). Behavioral intention to use was assessed with three German five-point Likert scale items (Kohnke and Müller, 2010) based on assumptions of the technology acceptance model (Davis et al., 1989) and on item formulations by Taylor and Todd (1995) and Amoako-Gyampah and Salam (2004) (e.g., “I am motivated to use the new technology”).

Data Analysis

Data analysis was conducted in SPSS version 27. For the coding of the manipulation variables, 0 was chosen for low demand and low support groups, and 1 was chosen for high demand and high support groups. *T*-tests were calculated to estimate the mean difference between the high and low manipulation groups. For hypothesis testing, we followed recommendations by Hayes (2018), applying Model 1 for moderation analyses and Model 85 for conditional model analyses. Finally, we integrated the results of the three studies meta-analytically, following recommendations of Cheung (2015). Meta-analysis was performed in R using the metaSEM package (see Cheung, 2015).

RESULTS AND DISCUSSION OF STUDY 1

Manipulation Check and Descriptive Statistics

The manipulation of change demands was successful [$t(82) = 9.51, p < 0.001, d = 0.93$]. The manipulation of change support was also successful. The mean difference for availability of support [$t(82) = 20.80, p < 0.001, d = 0.66$]

TABLE 1 | Means and standard deviations of study variables.

			Need satisfaction	Frustration	Attitude to change	Process satisfaction	Behavioral use intention
			<i>M (SD)</i>				
Study 1	High demand	<i>N</i> = 44	3.26 (0.68)	4.35 (1.49)	4.55 (1.04)	4.13 (1.54)	3.84 (0.85)
	Low demand	<i>N</i> = 40	3.40 (0.60)	3.23 (1.46)	5.27 (1.04)	4.76 (1.55)	4.12 (0.78)
	Cohen's <i>d</i>		0.65	1.47	1.04	1.55	0.82
	High support	<i>N</i> = 43	3.62 (0.51)	3.12 (1.26)	5.45 (0.87)	5.38 (1.19)	4.14 (0.73)
	Low support	<i>N</i> = 41	3.02 (0.63)	4.55 (1.54)	4.31 (1.01)	3.43 (1.27)	3.80 (0.89)
	Cohen's <i>d</i>		0.57	1.41	0.94	1.23	0.81
Study 2	High demand	<i>N</i> = 68	3.13 (0.64)	4.70 (1.31)	4.48 (1.19)	4.10 (1.68)	3.97 (0.83)
	Low demand	<i>N</i> = 66	3.59 (0.43)	2.75 (1.24)	5.63 (0.77)	5.34 (1.04)	4.33 (0.61)
	Cohen's <i>d</i>		0.55	1.27	1.01	1.40	0.73
	High support	<i>N</i> = 69	3.47 (0.47)	3.58 (1.49)	5.32 (0.94)	5.21 (1.12)	4.28 (0.70)
	Low support	<i>N</i> = 65	3.23 (0.68)	3.91 (1.71)	4.75 (1.29)	4.18 (1.72)	4.02 (0.79)
	Cohen's <i>d</i>		0.58	1.60	1.13	1.44	0.74
Study 3	High demand	<i>N</i> = 69	3.23 (0.53)	4.31 (1.14)	4.64 (0.97)	4.42 (1.41)	4.15 (0.75)
	Low demand	<i>N</i> = 69	3.49 (0.50)	2.96 (1.13)	5.26 (1.02)	4.99 (1.33)	4.15 (0.70)
	Cohen's <i>d</i>		0.51	1.13	0.99	1.37	0.72
	High support	<i>N</i> = 69	3.51 (0.49)	3.34 (1.26)	5.29 (0.88)	5.41 (1.01)	4.36 (0.65)
	Low support	<i>N</i> = 69	3.21 (0.53)	3.93 (1.31)	4.61 (1.08)	4.00 (1.38)	3.93 (0.72)
	Cohen's <i>d</i>		0.51	1.29	0.98	1.21	0.69

Studies 1–3, N per experimental manipulation condition.

as well as perceived organizational support was significant [$t(82) = 17.71, p < 0.001, d = 1.00$].

The mean differences and standard deviations of study variables of the three studies are portrayed in **Table 1**. Overall, mean differences per manipulation show in the intended direction. **Table 2** shows the correlations of study variables. As expected, change demands affected study variables negatively whereas change support affected study variables positively. The reliability of the measures is also portrayed in **Table 2**.

Interaction of Change Demands and Change Supports

The results of the analyses of Hypotheses 1 and 2 are portrayed in **Table 3**. In Study 1, mixed demands of task and role changes following technology implementation were investigated. The results show that mixed change demands significantly lowered attitude to change ($b = -0.75, p = 0.01$), but not process satisfaction ($b = -0.41, p = 0.29$) or behavioral intention to use ($b = -0.18, p = 0.47$). Mixed change support, manipulated as giving four different kinds of support following (House, 1981), did not significantly moderate the relation of change demands and outcomes, yet change support significantly improved attitude to change ($b = 1.07, p < 0.001$) and process satisfaction ($b = 2.11, p < 0.001$). Therefore, for Study 1, Hypothesis 1 can only be supported for attitude to change, and Hypothesis 2 cannot be supported.

Mechanisms of the Effect of Change Demands

In Hypothesis 3, we assumed that the effect of change demands on outcomes was mediated through a serial mediation of psychological need satisfaction and frustration that is moderated through change support. In Study 1 (**Table 4**), change demands did not significantly negatively affect need satisfaction ($b = -0.18, p = 0.31$), yet need satisfaction significantly affected frustration ($b = -0.72, p = 0.00$) and frustration significantly affected attitude

to change ($b = -0.22, p < 0.011$) and process satisfaction ($b = -0.25, p = 0.01$), but not behavioral intention to use ($b = -0.12, p = 0.06$). Change support did not moderate any of the relations, yet was significantly positively related with need satisfaction ($b = 0.54, p = 0.00$) and process satisfaction ($b = 1.44, p < 0.001$). The direct effect was not significant for each of the outcomes, nor was the mediation via need satisfaction. Yet, the indirect effect of mediation by frustration was significant for attitude to change (95% CI = $[-0.54; -0.05]$ and $[-0.41; -0.02]$) and process satisfaction (95% CI = $[-0.63; -0.04]$ and $[-0.47; -0.01]$). Therefore, Hypothesis 3 cannot be supported for Study 1.

Discussion of Study 1

Change demands negatively affect attitude to change, but not satisfaction with the change process or the behavioral intention to use the technology. Change support does not moderate the effect of change demands. Yet, change support has a significant direct effect on attitude to change and satisfaction with the change process. The relation was mediated through perceived frustration, but not need satisfaction. The general provision of change support as mixed change intervention might have been too unspecific to affect the described high amplitude, mixed demands in the vignette scenario.

A theoretical extension of the social support theory has not been considered so far, the matching hypothesis of social support theory. We will further elaborate whether a stronger match of specific change demands and change support following principles of social support theory (House, 1981; Cohen and Wills, 1985), focusing on specific demands and matching support, will lead to an interaction and in effect to stronger effects of the provision of change support interventions, and test its assumptions in Studies 2 and 3.

MATCH OF CHANGE DEMANDS AND CHANGE SUPPORT

Social support theory (House, 1981), especially its matching hypothesis (Viswesvaran et al., 1999) and the triple match principle (de Jonge and Dormann, 2006), concretize the assumptions of JD-R by describing under which conditions an interaction of change demands and change support occurs. The matching hypothesis (Cohen and Wills, 1985) predicts that not every act of support eases any kind of strain, but support has to be similar in content to the demand to either buffer the detrimental effect of the demand or develop a direct positive effect (e.g., instrumental support match only with instrumental demands). According to the optimal support matching model (Cutrona, 1990), controllable instrumental demands must also be matched with instrumental support and uncontrollable emotional demands must be matched with emotional support. The triple match principle (de Jonge and Dormann, 2006) of the Demand-Induced Strain Compensation model (DISC; de Jonge et al., 2008), a more recent job stress theory that assumes health restrictions fostered by job demands can best be reduced by matching resources, even goes one step further. The principle states that not only must demands and support

TABLE 2 | Correlation matrix of Study 1.

	1	2	3	4	5	6	7
(1) Demand (0 = low, 1 = high)	0.84						
(2) Support (0 = low, 1 = high)	-0.02	0.96/0.87					
(3) Need satisfaction	-0.08	0.38**	0.87				
(4) Frustration	0.32**	-0.42**	-0.48**	0.66			
(5) Attitude to change	-0.24**	0.43**	0.65**	-0.65**	0.90		
(6) Process satisfaction	-0.19	0.58**	0.59**	-0.58**	0.78**	0.76	
(7) Behavioral use intention	-0.13	0.20*	0.49**	-0.36**	0.57**	-0.55**	0.84

N = 84. Reliability estimates in Cronbach's alpha on the diagonal.

* $p < 0.05$, ** $p < 0.01$.

TABLE 3 | Moderation analysis of Studies 1–3.

	Predictor	(1) DV: Attitude to change			(2) DV: Process satisfaction			(3) DV: Behavioral use intention		
		<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Study 1	Constant	4.71 (0.20)	23.26	<0.001	3.65 (0.28)	13.18	<0.001	3.90 (0.19)	20.98	<0.001
	Demand	−0.75 (0.28)	−2.72	0.01	−0.41 (0.38)	−1.08	0.29	−0.18 (0.25)	−0.72	0.47
	Support	1.07 (0.28)	3.83	<0.001	2.11 (0.38)	5.53	<0.001	0.43 (0.26)	1.65	0.10
	Demand x Support	0.12 (0.39)	0.30	0.77	−0.34 (0.53)	−0.65	0.62	−0.17 (0.35)	−0.47	0.64
		$R^2 = 0.38$, $MSE = 0.78$ $F(3, 80) = 16.14$, $p < 0.001$			$R^2 = 0.43$, $MSE = 1.46$ $F(3, 80) = 20.01$, $p < 0.001$			$R^2 = 0.07$, $MSE = 0.66$ $F(3, 80) = 2.09$, $p = 0.11$		
Study 2	Constant	5.55 (0.16)	33.87	<0.001	5.09 (0.22)	23.00	<0.001	4.27 (0.13)	34.03	<0.001
	Demand	−1.61 (0.23)	−6.91	<0.001	−1.85 (0.32)	−5.87	<0.001	−0.52 (0.18)	−2.92	0.00
	Support	0.17 (0.23)	0.72	0.47	0.50 (0.31)	1.58	0.12	0.12 (0.18)	0.68	0.50
	Demand x Support	0.86 (0.33)	2.63	0.01	1.14 (0.44)	2.58	0.01	0.30 (0.25)	1.18	0.24
		$R^2 = 0.35$, $MSE = 0.89$ $F(3, 130) = 23.66$, $p < 0.001$			$R^2 = 0.32$, $MSE = 1.62$ $F(3, 130) = 20.66$, $p < 0.001$			$R^2 = 0.10$, $MSE = 0.52$ $F(3, 130) = 4.86$, $p = 0.00$		
Study 3	Constant	4.85 (0.16)	30.68	<0.001	4.25 (0.20)	21.39	<0.001	3.82 (0.12)	33.98	<0.001
	Demand	−0.50 (0.23)	−2.24	0.03	−0.51 (0.28)	−1.81	0.07	0.23 (0.17)	1.39	0.17
	Support	0.82 (0.23)	3.64	0.00	1.51 (0.28)	5.33	<0.001	0.66 (0.17)	4.01	<0.001
	Demand x Support	−0.25 (0.32)	−0.79	0.43	−0.17 (0.40)	−0.42	0.68	−0.46 (0.23)	−1.98	0.049
		$R^2 = 0.21$, $MSE = 0.88$ $F(3, 134) = 11.61$, $p < 0.001$			$R^2 = 0.31$, $MSE = 1.38$ $F(3, 134) = 19.70$, $p < 0.001$			$R^2 = 0.12$, $MSE = 0.47$ $F(3, 134) = 5.84$, $p < 0.001$		

Study 1: $N = 84$; manipulation: mixed demands of task and role changes, mixed support of four kinds following House (1981). Study 2: $N = 134$; manipulation: work task changes as demand, training as support. Study 3: $N = 138$; manipulation: work role changes as demand, participation as support.

dimensionally match, but the interaction is threefold between demands, support, and outcomes (i.e., an affective demand such as strain is best buffered by an affective resource such as emotional support when the outcome is also affective in content such as well-being). Thus, it remains to be tested whether matching the content of the change support to the specific change demand reduces the effect of the change demand more strongly than without matching.

Empirical examination shows mixed results on the assumptions of the interaction between demands and support made by JD-R, matching hypothesis and the triple match-principle. Assumptions of JD-R that job demands and job resources interact to affect job outcomes have been supported empirically by Bakker et al. (2010). Viswesvaran et al. (1999) found meta-analytical support for the buffering effect of social support on the demand-outcome relation with a small but significant moderator effect. Still, the authors also found support for an individual direct effect of demands and support on outcomes. The evidence for the triple match principle is mixed as well. Research (Chrisopoulos et al., 2010; van de Ven et al., 2014; Balk et al., 2020) has shown that the likelihood of finding an interaction effect for different outcomes increases significantly when not just a dual match (as in matching hypothesis) but also a triple match occurs. Yet, the researchers also observed many cases in which no interaction or only a dual interaction occurred. Therefore, the specific conditions under which an interaction can occur, as also stated by Jolly et al. (2021), requires further investigation.

An interaction in accordance with matching hypothesis or triple match principle is more likely to occur when change

support is designed to counteract specific change demands, therefore affecting specific change-related outcomes. When technology implementation produces a high amplitude of demands, support might also have to take multiple forms to counteract each demand. When demands are rather instrumental (i.e., new skill requirements after alteration of work tasks), the support intervention also needs to be instrumental in nature (i.e., training option for new work tasks). This should then be most effective for behavioral outcomes such as behavioral intention to use. When the demand is rather emotional in nature (i.e., uncertainty due to altered work roles and collaboration), the support intervention also has to be emotional in nature (i.e., participation option to regain some control of the change process and design one's new work role). This should most effectively influence affective outcomes such as process satisfaction. Concerning the interaction of change demands and change support, we propose that high change support can reduce the negative effect of high change demands on outcomes, especially when the match is not just dual between demand and support, but also triple with its outcome, as the results of the same dimension should be more affected. When change demands are low and matching change support is also low, no overly negative or positive effects on outcomes are expected, but neutral ones. When change demands are low, but still high change support is presented, we expect that change support will still be viewed positively by employees as it signals interest of the organization, as long as the support is not perceived as forced upon the employee and intrusive (Deelstra et al., 2003; Gray et al., 2020). In either case, we assume that high change support can buffer the negative effect of high change demands on outcomes. We only

TABLE 4 | Regression coefficients, standard errors, and model summary information of the moderated mediation model – Study 1.

Antecedent	Consequent														
	(M1) Need satisfaction			(M2) Frustration			(Y1) Attitude to change			(Y2) Process satisfaction			(Y3) Behavioral use intention		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Constant	3.12 (0.13)	23.58	<0.001	6.09 (0.81)	7.56	<0.001	3.43 (0.59)	5.81	<0.001	2.33 (0.90)	2.59	0.01	2.63 (0.61)	4.35	<0.001
(X) Demand	−0.18 (0.18)	−1.01	0.31	1.18 (0.39)	3.00	0.00	−0.34 (0.23)	−1.47	0.15	0.05 (0.35)	0.14	0.89	0.08 (0.24)	0.33	0.74
(W) Support	0.54 (0.18)	2.94	0.00	−0.77 (0.42)	−1.86	0.07	0.45 (0.24)	1.90	0.06	1.44 (0.36)	3.99	<0.001	−0.02 (0.24)	−0.06	0.95
Demand x Support	0.11 (0.25)	0.44	0.66	−0.37 (0.55)	−0.67	0.50	−0.06 (0.31)	−0.19	0.85	−0.53 (0.46)	−1.14	0.26	−0.28 (0.31)	−0.90	0.37
(M1) Need Satisfaction	–	–	–	−0.72 (0.24)	−3.00	0.00	0.68 (0.14)	4.77	<0.001	0.73 (0.21)	3.37	0.00	0.56 (0.15)	3.81	<0.001
(M2) Frustration	–	–	–	–	–	–	−0.22 (0.06)	−3.49	< 0.001	−0.25 (0.10)	−2.59	0.01	−0.12 (0.06)	−1.89	0.06
	$R^2 = 0.23$			$R^2 = 0.40$			$R^2 = 0.62$			$R^2 = 0.57$			$R^2 = 0.30$		
	$F(3,80) = 7.90, p < 0.001$			$F(4,79) = 13.16, p < 0.001$			$F(5,78) = 25.72, p < 0.001$			$F(5,78) = 20.92, p < 0.001$			$F(5,78) = 6.65, p < 0.001$		
Direct effect (95% CI)	W = 0						[−0.80; 0.12]			[−0.65; 0.75]			[−0.39; 0.55]		
	W = 1						[−0.83; 0.04]			[−0.114; 0.18]			[−0.65; 0.24]		
Ind. effect M1 (95% CI)	W = 0						[−0.41; 0.15]			[−0.49; 0.15]			[−0.34; 0.12]		
	W = 1						[−0.29; 0.17]			[−0.33; 0.19]			[−0.23; 0.14]		
Ind. effect M2 (95% CI)	W = 0						[−0.54; −0.05]			[−0.63; −0.04]			[−0.35; 0.02]		
	W = 1						[−0.41; −0.02]			[−0.47; −0.01]			[−0.29; 0.01]		
Ind. effect M1 + M2 (95% CI)	W = 0						[−0.13; 0.03]			[−0.15; 0.03]			[−0.09; 0.02]		
	W = 1						[−0.07; 0.04]			[−0.08; 0.05]			[−0.05; 0.03]		

N = 84. Manipulation: mixed demands of task and role changes, mixed support of four kinds following House (1981).

test for matching of change demand and change support with a parsimonious design (as opposed to a test of mismatch) because we expect matching to lead to larger buffer effects than providing mixed support for mixed demands, as tested in Study 1.

Hypothesis 4: An interaction is more likely to occur when change demands, change support, and outcomes match.

MATERIALS AND METHODS OF STUDY 2 AND STUDY 3

Study 2

In Study 2, we analyzed whether a specific instrumental change demand (skill loss after technology implementation) can be buffered by the provision of specific instrumental change support (provision of training).

Research Sample

For the second and third studies, we calculated the required sample size with G*Power (Faul et al., 2007) from the estimates of the first study. The field study and the first vignette study resulted in comparable estimates. The *a priori* F-test (ANOVA, main effects and interactions) results showed that between $N = 63$ (attitude to change, $r_{\text{mean}} = 0.34$), $N = 63$ (process satisfaction, $r_{\text{mean}} = 0.34$) and $N = 467$ (behavioral use intention, $r_{\text{mean}} = 0.13$) participants needed to be recruited. Because Maxwell et al. (2015) noted that larger samples sizes are required for replication studies, we increased the sample size accordingly.

For Study 2, participants were recruited in 2020 via the crowdsourcing platform Prolific, and paid 3.50 € for an estimated participation time of 20 min. Participants had to speak fluent German and be resident in Germany. Overall, populations recruited via Prolific show a high response quality (Peer et al., 2017) and a similarity in demographics and responses to conservatively recruited study pools (Behrend et al., 2011; Walter et al., 2019). Several steps to increase sample quality were undertaken. First, Prolific allows for a prescreening of study participants to only include participants that match the intended sample (e.g., working at least 20 h per week) (Palan and Schitter, 2018). Second, several attention checks were administered to check for inattentive participants or fraudulent behavior (Newman et al., 2021), which almost all participants answered correctly. In total, $N = 154$ were recruited for Study 2. After applying the same exclusion criteria as reported for the first study, $N = 134$ were included in the final sample.

Participants were on average 30.31 years old ($SD = 7.9$; range: 18–61 years), 61.9% male. On average, they worked 37.6 h per week ($SD = 6.32$; range: 20–60 h), in a dependently employed (88.1%), marginally employed (3.0%), or part-time employment position alongside studies or training (9.0%). The majority of participants had a university degree (56.7%) or vocational training (17.1%). Most participants held no leadership responsibilities (61.2%), while 36.6% had leadership responsibilities for teams or projects, and 2.2% on some higher hierarchy level. Most participants worked in the natural sciences or informatics (20.9%), health services (20.1%), or commercial

services (17.9%). Additionally, 84.3% of the participants had experienced technology implementation in their workplace; on average, they judged the implementation as slightly good (3.73, $SD = 0.86$, range 2–5). Participants evaluated themselves as tech-savvy (4.19, $SD = 0.91$, range 1–5).

Procedure and Manipulation

Each of the three studies followed a similar study design. In Study 2, the vignette description was set in the same organizational context. For the manipulation of change demand, we described how specific tasks would change so that study participants would no longer have (high demand) or still have (low demand) the necessary skills required to complete the job. For the manipulation of change support, we described that the employees could take part (high support) or could not take part due to budget constraints (low support) in a training program that would teach them the new skills required for their job.

Measures

Each of the three studies assessed the same set of items to ensure the comparability of the study results (Shrout and Rodgers, 2018). Please refer to the description of Study 1.

Study 3

In Study 3, we analyzed whether a specific emotional change demand (work role changes after technology implementation) can be buffered by the provision of a specific emotional change support (provision of participation options).

Research Sample

We applied the same recruitment strategy as in Study 2. In total, $N = 146$ participants were recruited. After applying the same exclusion criteria as reported for the first study, $N = 138$ participants were included in the final sample.

Participants were on average 30.6 years old ($SD = 8.09$; range: 18–64 years), 70.3% male. On average, they worked 37.12 h per week ($SD = 7.86$; range: 20–63 h), in a dependently employed (92%), marginally employed (0.7%), or part-time employment position alongside studies or training (7.2%). The majority of participants had a university degree (63.8%) or vocational training (11.6%). Most participants held no leadership responsibilities (60.1%), while 35.5% had leadership responsibilities for teams or projects, and 4.3% on some higher hierarchy level. Most participants worked in the natural sciences or informatics (31.2%), commercial services (18.1%), or administrative services (14.5%). Additionally, 90.6% of the participants had experienced technology implementation in their workplace; on average, they judged the implementation as slightly good (3.76, $SD = 0.89$; range 2–5). Participants evaluated themselves as tech-savvy (4.34, $SD = 0.77$, range 2–5).

Procedure and Manipulation

In Study 3, we applied a similar manipulation as in Studies 1 and 2. For the manipulation of change demand, we described how specific work routines change following the technology implementation and alter the job role the participant holds in the fictitious organization strongly (high demand) or slightly (low

demand). For the manipulation of change support, we described that the employees could participate (high support) or could not participate (low support) in the redesign of their job roles and formulate ideas and concerns.

Measures

We applied the same set of measures as used in Studies 1 and 2.

RESULTS AND DISCUSSION OF STUDY 2 AND STUDY 3

Manipulation Check and Descriptive Statistics

The manipulation of change demands was successful [Study 2: $t(132) = 15.72, p < 0.001, d = 0.73$; Study 3: $t(136) = 15.77, p < 0.001, d = 0.74$]. The manipulation of change support was also successful. The mean difference for availability of support [Study 2: $t(132) = 6.57, p < 0.001, d = 1.13$; Study 3: $t(136) = 13.23, p < 0.001, d = 0.97$] as well as perceived organizational support was significant [Study 2: $t(132) = 5.87, p < 0.001, d = 1.28$; Study 3: $t(136) = 17.14, p < 0.001, d = 1.01$].

Mean differences, standard deviations, and correlations of study variables are portrayed in **Tables 1, 5**. Overall, estimates show in the intended direction.

Interaction of Change Demands and Change Supports

The results of the analyses of Hypotheses 1 and 2 are portrayed in **Table 3**. For Study 2, a specific instrumental change demand was manipulated by a description that the technology implementation would lead to a change in task and skill requirements. The results show that the specific instrumental change demand significantly decreased attitude to change ($b = -1.61, p < 0.001$), process satisfaction ($b = -1.85, p < 0.001$), and behavioral intention to use ($b = -0.52, p = 0.00$). The specific instrumental change support, described as the provision of training to compensate skill loss, significantly moderated the relation of change demands and attitude to change ($b = 0.86, p = 0.01$) and process satisfaction ($b = 1.14, p = 0.01$), but

not behavioral intention to use ($b = 0.30, p = 0.24$). Therefore, Hypothesis 1 can be supported for all three outcomes, and Hypothesis 2 can be supported for attitude to change and process satisfaction. Hypothesis 4, assuming a stronger relation between matching demand, support, and outcome, cannot be confirmed because there was no interaction with the behavioral outcome behavioral intention to use. However, a dual match between demand and support was confirmed.

For Study 3, a specific emotional change demand was manipulated (a job role change triggered by the technology implementation). The results show that the specific emotional change demand significantly decreased attitude to change ($b = -0.50, p = 0.03$), but not process satisfaction ($b = -0.51, p = 0.07$) and behavioral intention to use ($b = 0.23, p = 0.17$). The specific emotional change support, described as the provision of participation options, did not moderate the relation of change demand and outcomes. However, this change support had a significant direct relation with attitude to change ($b = 0.82, p = 0.00$), process satisfaction ($b = 1.51, p < 0.001$), and behavioral intention to use ($b = 0.66, p < 0.001$). Therefore, Hypothesis 1 can be confirmed for attitude to change, whereas Hypotheses 2 and 4 cannot be confirmed.

Mechanisms of the Effect of Change Demands

In Study 2 (**Table 6**), change demands significantly negatively affected need satisfaction ($b = -0.67, p < 0.001$), and need satisfaction significantly negatively affected frustration ($b = -1.10, p < 0.001$). Frustration, in turn, significantly negatively affected attitude to change ($b = -0.30, p < 0.001$), process satisfaction ($b = -0.33, p < 0.001$), but not behavioral use intention ($b = -0.09, p = 0.10$). Change support significantly moderated the relation of change demands with need satisfaction ($b = 0.40, p = 0.03$), but was not directly significantly related to any of the outcomes. The direct effect was not significant for any of the outcomes. Yet, the indirect effect of mediation via need satisfaction, frustration, or both was significant for attitude to change and process satisfaction; mediation via only need satisfaction was significant for behavioral use intention. Hypothesis 3 can be supported for Study 2. Change support

TABLE 5 | Correlation matrix of Study 2 and Study 3.

	1	2	3	4	5	6	7
(1) Demand (0 = low, 1 = high)	0.85/0.89	0.01	-0.24**	0.51**	-0.30**	-0.21*	0.00
(2) Support (0 = low, 1 = high)	0.03	0.83/0.91	0.28**	-0.22**	0.33**	0.51**	0.30**
(3) Need satisfaction	-0.39**	0.20*	0.89/0.86	-0.47**	0.54**	0.55**	0.41**
(4) Frustration	0.61**	-0.10	-0.59**	0.86/0.76	-0.62**	-0.52**	-0.32**
(5) Attitude to change	-0.50**	0.25**	0.64**	-0.70**	0.93/0.91	0.73**	0.57**
(6) Process satisfaction	-0.41**	0.34**	0.65**	-0.63**	0.79**	0.86/0.81	0.56**
(7) Behavioral use intention	-0.24**	0.17*	0.49**	-0.39**	0.69**	0.61**	0.81/0.81

Correlations of Study 2 ($N = 134$) are presented below the diagonal, correlations of Study 3 ($N = 138$) are presented above the diagonal. Reliability estimates in Cronbach's alpha on the diagonal.

* $p < 0.05$, ** $p < 0.01$.

TABLE 6 | Regression coefficients, standard errors, and model summary information of the moderated mediation model – Study 2.

Antecedent	Consequent														
	(M1) Need satisfaction			(M2) Frustration			(Y1) Attitude to change			(Y2) Process satisfaction			(Y3) Behavioral use intention		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Constant	3.56 (0.09)	38.79	<0.001	6.74 (0.70)	9.73	<0.001	4.36 (0.60)	7.24	<0.001	2.74 (0.83)	3.30	0.00	3.12 (0.55)	5.73	<0.001
(X) Demand	−0.67 (0.13)	−5.11	<0.001	1.49 (0.31)	4.88	<0.001	−0.55 (0.22)	−2.52	0.01	−0.51 (0.30)	−1.69	0.09	−0.06 (0.20)	−0.32	0.75
(W) Support	0.05 (0.13)	0.39	0.70	−0.08 (0.28)	−0.28	0.79	0.10 (0.18)	0.54	0.59	0.41 (0.25)	1.61	0.11	0.09 (0.17)	0.54	0.59
Demand x Support	0.40 (0.18)	2.21	0.03	−0.07 (0.40)	−0.17	0.86	0.47 (0.26)	1.80	0.07	0.60 (0.36)	1.66	0.10	0.09 (0.24)	0.39	0.70
(M1) Need Satisfaction	–	–	–	−1.10 (0.19)	−5.90	<0.001	0.58 (0.14)	4.14	<0.001	0.92 (0.19)	4.80	<0.001	0.39 (0.13)	3.12	0.00
(M2) Frustration	–	–	–	–	–	–	−0.30 (0.06)	−5.23	<0.001	−0.33 (0.08)	−4.07	<0.001	−0.09 (0.05)	−1.68	0.10
	$R^2 = 0.22$			$R^2 = 0.52$			$R^2 = 0.61$			$R^2 = 0.57$			$R^2 = 0.23$		
	$F(3,130) = 12.48, p < 0.001$			$F(4,129) = 35.37, p < 0.001$			$F(5,128) = 39.28, p < 0.001$			$F(5,128) = 33.80, p < 0.001$			$F(5,128) = 7.79, p < 0.001$		
Direct effect (95% CI)	W = 0						[−1.00; −0.12]			[−1.11; 0.09]			[−0.46; 0.33]		
	W = 1						[−0.48; 0.31]			[−0.46; 0.63]			[−0.33; 0.39]		
Ind. effect M1 (95% CI)	W = 0						[−0.72; −0.14]			[−1.03; −0.25]			[−0.56; −0.04]		
	W = 1						[−0.30; −0.03]			[−0.48; −0.05]			[−0.25; −0.01]		
Ind. effect M2 (95% CI)	W = 0						[−0.75; −0.23]			[−0.93; −0.18]			[−0.32; 0.01]		
	W = 1						[−0.75; −0.19]			[−0.93; −0.16]			[−0.32; 0.01]		
Ind. effect M1 + M2 (95% CI)	W = 0						[−0.38; −0.10]			[−0.44; −0.09]			[−0.14; 0.01]		
	W = 1						[−0.21; −0.01]			[−0.24; −0.02]			[−0.08; 0.00]		

N = 134. Manipulation: work task changes as demand, training as support.

TABLE 7 | Regression coefficients, standard errors, and model summary information of the moderated mediation model – Study 3.

Antecedent	Consequent														
	(M1) Need satisfaction			(M2) Frustration			(Y1) Attitude to change			(Y2) Process satisfaction			(Y3) Behavioral use intention		
	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>b</i> (SE)	<i>t</i>	<i>p</i>
Constant	3.28 (0.08)	39.50	<0.001	5.98 (0.62)	9.70	<0.001	4.24 (0.60)	7.13	<0.001	2.56 (0.79)	3.25	0.00	3.03 (0.49)	6.14	<0.001
(X) Demand	−0.14 (0.12)	−1.20	0.23	1.26 (0.25)	5.09	<0.001	0.07 (0.20)	0.37	0.71	0.04 (0.27)	0.16	0.87	0.48 (0.17)	2.90	0.00
(W) Support	0.42 (0.12)	3.52	<0.001	−0.23 (0.26)	−0.91	0.37	0.38 (0.19)	2.00	0.047	0.98 (0.25)	3.87	<0.001	0.42 (0.16)	2.65	0.01
Demand x Support	−0.25 (0.17)	−1.41	0.16	−0.24 (0.35)	−0.69	0.49	−0.14 (0.26)	−0.54	0.59	0.01 (0.34)	0.04	0.97	−0.38 (0.22)	−1.76	0.08
(M1) Need Satisfaction	–	–	–	−0.83 (0.18)	−4.61	<0.001	0.55 (0.14)	3.81	<0.001	0.83 (0.19)	4.37	<0.001	0.38 (0.12)	3.23	0.00
(M2) Frustration	–	–	–	–	–	–	−0.36 (0.06)	−5.66	<0.001	−0.32 (0.09)	−3.74	<0.001	−0.14 (0.05)	−2.68	0.01
	$R^2 = 0.15$			$R^2 = 0.41$			$R^2 = 0.49$			$R^2 = 0.50$			$R^2 = 0.27$		
	$F(3,134) = 8.03, p < 0.001$			$F(4,133) = 23.25, p < 0.001$			$F(5,132) = 25.15, p < 0.001$			$F(5,132) = 26.74, p < 0.001$			$F(5,132) = 9.76, p < 0.001$		
Direct effect (95% CI)	W = 0						[−0.32; 0.47]			[−0.48; 0.57]			[0.15; 0.81]		
	W = 1						[−0.46; 0.33]			[−0.47; 0.58]			[−0.23; 0.43]		
Ind. effect M1 (95% CI)	W = 0						[−0.23; 0.06]			[−0.33; 0.09]			[−0.15; 0.05]		
	W = 1						[−0.37; −0.07]			[−0.55; −0.12]			[−0.27; −0.05]		
Ind. effect M2 (95% CI)	W = 0						[−0.76; −0.23]			[−0.73; −0.14]			[−0.35; −0.05]		
	W = 1						[−0.63; −0.17]			[−0.60; −0.11]			[−0.31; −0.04]		
Ind. effect M1 + M2 (95% CI)	W = 0						[−0.13; 0.03]			[−0.12; 0.03]			[−0.06; 0.01]		
	W = 1						[−0.23; −0.03]			[−0.22; −0.03]			[−0.11; −0.01]		

N = 138. Manipulation: work role changes as demand, participation as support.

moderate the relationship of change demands with outcomes through the mediation of need satisfaction and frustration.

In Study 3 (Table 7), change demands did not significantly negatively affect need satisfaction ($b = -0.14$, $p = 0.23$), yet need satisfaction affected frustration significantly ($b = -0.83$, $p < 0.001$) and frustration significantly affected attitude to change ($b = -0.36$, $p < 0.001$), process satisfaction ($b = -0.32$, $p < 0.001$), and behavioral use intention ($b = -0.14$, $p = 0.01$). Change support did not moderate any of the relations, yet was significantly positively related with need satisfaction ($b = 0.42$, $p < 0.001$), attitude to change ($b = 0.38$, $p = 0.047$), process satisfaction ($b = 0.98$, $p < 0.001$), and behavioral use intention ($b = 0.42$, $p = 0.01$). The direct effect was not significant for any of the outcomes. The indirect effect via need satisfaction, frustration, and both was significant for all of the outcomes. Therefore, Hypothesis 3 cannot be supported for Study 3. In accordance with Study 1, but in contrast to Study 2, change support did not moderate the relation of change demands with outcomes, yet developed an independent significant effect. As in Study 2, the relation was mediated through need satisfaction and frustration.

Discussion of Study 2 and Study 3

In Study 2 and Study 3, we analyzed whether change demands and change support following principles of the matching hypothesis would lead to an interaction effect and increase in effect sizes. In both studies, change demands decreased technology implementation outcomes. In Study 2, we found an interaction effect for attitude to change and process satisfaction, and in Study 3, we found an interaction effect for behavioral use intention. Therefore, when the match between change demands and change support is increased, an interaction effect is more likely to occur. The relation was mediated through perceived frustration, but results for need satisfaction were inconclusive.

META-ANALYTIC INTEGRATION OF STUDY RESULTS

To additionally strengthen the estimation of the true effect, and as another remedy to the replication crisis (Maxwell et al., 2015), we integrated the correlation coefficients of the three studies meta-analytically. We applied random-effects three-level meta-analysis (Cheung, 2015). Across the three studies, change demands affected attitude to change significantly with a large effect ($r = -0.43$, $p < 0.001$, 95% LBCI = $[-0.55; -0.29]$; Bosco et al., 2015). Although the relation was weaker when change support was provided (high support: $r = -0.41$, $p < 0.001$ vs. low support: $r = -0.45$, $p < 0.001$), the moderation analysis showed a non-significant effect [$\chi^2(df = 1) = 0.16$, $p = 0.69$]. Change demands significantly affected process satisfaction with a medium sized effect ($r = -0.34$, $p < 0.001$, 95% LBCI = $[-0.46; -0.20]$). Change support did not moderate the relation [$\chi^2(df = 1) = 0.03$, $p = 0.87$]. Change demands significantly affected behavioral intention to use with a small effect ($r = -0.14$, $p < 0.05$, 95% LBCI = $[-0.30; -0.01]$). Again, change support did not moderate the relation [$\chi^2(df = 1) = 0.50$, $p = 0.48$]. For the

meta-analytic integration, we found an overall negative effect of demands, but no interaction effect of change support.

GENERAL DISCUSSION

The aim of the present research was to analyze the effect of change demands and its interrelation with change support on working mechanisms and outcomes in a technological change context, to be able to make recommendations for designing more effective interventions to support change and to provide theoretical clarity on the matching principle of social support theory. We applied the integrative framework of social support theory introduced by Jolly et al. (2021) which relates to JD-R (Bakker and Demerouti, 2007) and SDT (Deci and Ryan, 2000; Deci et al., 2017) to explain the joint effect of social support and demands on change-related outcomes with intrapersonal processes. In an experimental research setting in three consecutive studies and meta-analytic integration of research findings, and as proposed by JD-R model, we found evidence that change demands negatively impact the outcomes positive attitude to change, satisfaction with the change process, and behavioral intention to use the implemented technology, which expands the scarce knowledge about demands. This was true for change demands of varying amplitude and dimension (i.e., instrumental and emotional).

Concerning the interaction with change support, we found two kinds of effects. First, no interaction effect occurred between change demands and change support, but change demands and change support each developed an individual direct effect on outcomes. In these cases (Studies 1 and 3), social support did not compensate for the detrimental effects of change demands, but still added a positive effect because change support in itself provided resources. Second, an interaction effect between change demands and change support occurred (Study 2). In this case, change support did not have an individual direct effect on change outcomes, but fully moderated the relation of change demands and outcomes, as change support provided the resources required to counteract the change demands. This result is representative of the findings of the systematic reviews by Viswesvaran et al. (1999) and Jolly et al. (2021) on social support where in a third of the primary studies a moderating effect of social support was not confirmed, yet a direct positive effect of social support was observed. In accordance with JD-R, both the direct positive effect and interaction effect of change support could be expected. When considering assumptions on dual matches between demands and support, we see that an interaction effect between demand and support occurred in Study 2 where a specific instrumental demand (skill loss) was matched to a specific instrumental support (training). We did not find support for a triple match, either because the interaction with the matching outcomes was not significant (Study 2), or because the interaction of demand and support was not significant to begin with (Studies 1 and 3). The reason that an interaction effect was found in Study 2, but not in Studies 1 and 3, could be that employees are most able to use a matching support resource when the stressful event feels controllable and there is a lack of instrumental resources, as was the case in Study 2 with the skill

loss-training scenario. In the case of more diffuse (Study 1 – ample changes) or emotionally demanding and uncontrollable stressful events (Study 3 – role change), non-specific acts of (emotional) support are also valuable to employees. Still, whether a direct positive or interaction effect of change support occurs must result from another determinant.

We propose that, for an interaction to occur, the affected employee has to be aware of the match of demand and resource (dual) or demand, resource, and outcome (triple) and attribute personal relevance to the match. With this awareness, employees will pay higher attention to the match. This match is already more likely to be perceived when demand, resource, and outcome match dimensionally, as assumed in theory (Cohen and Wills, 1985; de Jonge and Dormann, 2006). In practice, an instrumental resource such as technical support from the IT helpdesk might still not be the correct response to the instrumental demand of new skill requirements following work task changes when the behavior of efficient performance with the technology requires the employee to have explicit knowledge and training. The relevance of awareness has already been recognized in other work contexts: Garg et al. (2020) were able to explain the differential effects of Human Resources practices by establishing the construct “HR salience” that was defined as the personal relevance an employee gives an HR practice. HR salience was determined by the characteristics of the HR practice as well as the individual preferences of the employee. Also, psychological distance of construal-level theory (Trope and Liberman, 2010) describes how concrete or abstract an event is perceived. Study 2 represents the highest salience or concreteness of change demands and change support, as the demand for new skill requirements and the training support had a stronger match than the combinations in the other two studies, where mixed demands were matched with mixed support (Study 1) or demands of role changes were matched to a participation option to design the role (Study 3); in order for an interaction to occur here, the employee would have had to have been explicitly told that the support offered was to counteract the specific demand.

We assumed that the effect of change demands on outcomes would be mediated by a lack of satisfaction of psychological needs of SDT that lead to a perception of frustration and in effect decrease positive attitude to change, process satisfaction, and behavioral intention to use, however, the impact of which is mitigated by the provision of change support in accordance with the principles of JD-R, dual and triple match. Mediation analysis of the three studies showed that only for Study 2 was full mediation observed, that is, experiencing the change demand of new competency requirements leads to dissatisfaction of psychological needs, which leads to feeling of frustration, which in turn negatively affects positive change attitude, process satisfaction, and behavioral intention to use. For Studies 1 and 3, the effect of change demands and change support was mediated by a perception of frustration only. Yet, change support had a positive direct effect on need satisfaction in Studies 1 and 3, and significantly moderated the effect of change demands with need satisfaction in Study 2. Therefore, whether the detrimental effect of change demands indeed results from a lack of satisfaction of psychological needs in the workplace is inconclusive. However, we found evidence that the detrimental effect of change demands

results from the affective perception of the change process as being frustrating.

Theoretical Implications and Future Research

To date, little research effort was put into the analysis of change demands as compared to the analysis of change support (Smollan, 2015). We contribute to the field by systematically analyzing the effect of different change demands on technology implementation outcomes and interactions with change support in order to design better change interventions in the future, and to increase our understanding of social support matches theoretically (Jolly et al., 2021). We found that different change demands can have different effects on outcomes. Yet, what is required to further progress the understanding of change demands is qualitative research on which specific change demands can occur during each phase of the different kinds and scopes of organizational change (Street and Gallupe, 2009; Senior and Swales, 2010). In-depth knowledge of demands would then bring about the opportunity to design change support interventions that specifically match these demands.

Concerning the match of change demands and change support, we contribute to the literature by illuminating the factors that determine whether a match occurs and whether a match of demands and support is of higher practical value than no match. Variables that determine whether a match is perceived should be brought into the research focus to extend beyond the theoretical recommendation that demand, support, and outcome should match dimensionally (Cohen and Wills, 1985; de Jonge and Dormann, 2006). To date, the evaluation of match is made by the researcher, yet the affected employees determine whether they perceive a fit and personal relevance between the demand and support intervention (Garg et al., 2020). Possible research paths are the development of measures that ask respondents whether a match between demand and support was perceived or whether the match had personal relevance to their respective work context, or to design support interventions based on the reports of employees as to which demands they perceive in their workplace.

Concerning the question of whether the effectivity of change support interventions can be enhanced when they match more closely their respective change demand, our results show that whether there is an interaction or not, the efficacy is comparable in magnitude. The explained variance of outcome variables was comparable in the three studies, whether change support had a direct effect or an interaction effect. Yet, intervention research in the field researching a support intervention that was designed to counteract specific change demands should evaluate whether its effect size can be enhanced above the effect sizes observed in this study.

Concerning working mechanisms, we found that the relation of change demands and outcomes was mediated by the affective reaction frustration, but that change demands (not in every scenario) decreased the satisfaction of psychological needs in the workplace. This result could be due to the context of the study, as study participants might not have experienced a decrease of need satisfaction as much as they have experienced in a field

study (e.g., Schlicher and Maier, 2019b). Still, our study is among the few that examine dissatisfaction of psychological needs and contribute to the understanding of the role of demands for psychological needs satisfaction. Yet, there might also be other working mechanisms that lead to the development of frustration. Promising explanatory mechanisms lie in the social exchange processes (Cropanzano et al., 2017), which has an effect when employees perceive that an organization does not show them appreciation when change demands are high and change support is not available during a change process and, as a consequence, do not feel obligated to reciprocate in change supportive behaviors.

Practical Implications

Change demands negatively affect employees during technological change. The stresses of organizational change can affect employee well-being (Day et al., 2017), so it is important that those responsible for change have effective interventions in place, and there is still a great deal of uncertainty about what the best interventions are. Based on our results, whether change practitioners are able to design change support intervention according to the specific change demands (interaction effect), or just provide any kind of support (direct effect), our results show that any form of support provided is useful in affecting technology implementation outcomes positively.

Still, the specific technology implementation in an organization can mean specific demands to employees. What exactly technology implementation means for a specific workplace can best be evaluated through employees as the job holders involved. Therefore, change practitioners are well-advised to start a technology implementation process by conducting organizational diagnosis (McFillen et al., 2013), for example by asking employees in focus groups for their evaluation of the impact of the technology on their jobs. Once the specific change demands of a current situation are identified, change support can be designed with the intention to provide for the specific need. In this way, the support intervention will have higher personal relevance (Garg et al., 2020). In organizations where resources are notoriously limited, the design of change support interventions according to specific change demands might lead to more effective yet also more cost-conscious interventions.

Change practitioners should also look out for the working mechanism of the specific change demand. When they understand why a change process is being perceived as frustrating, a change support intervention can be designed in order to affect this specific working mechanism. In case of SDT, this means that when employees, for example, feel their need for competence threatened, they require training that teaches them the necessary skills.

Strengths and Limitations

In our study, we applied an experimental vignette study approach in order to be able to systematically manipulate the variables of interest while at the same time controlling for the context of the research (e.g., Aguinis and Bradley, 2014). Experimental vignette studies have been criticized in the past for their lack of generalizability, which affects external validity, recommending for a combination of research strategies to increase validity

(Scandura and Williams, 2000). Yet, we decided to stick to the experimental approach in three consecutive studies for two reasons. First, the implications of the replication crisis have led to the conclusion of proving findings by replicating them (Shrout and Rodgers, 2018). In the context of our research question on the interaction of change demands and change support, this can best be conducted experimentally by applying different simulated contexts. Second, there already is one field study that, among other hypotheses, tested the interaction of change support and change demands, but suffered from practical issues solvable by experimental research (Schlicher and Maier, 2019b). As in our Studies 1 and 3, a moderating effect of change support could not be found, but participants also reported only low change demands. Such misbalances in study populations can lead to unclear study results. In experimental research, these misbalances can be compensated for by assigning equal numbers of participants to the experimental groups. Also, it can be assumed that the field study has not found an interaction effect because organizations have not yet designed change support to meet specific change demands, but experimental research can solve this problem. Yet, experiments can not only be conducted as vignettes, but also as laboratory experiments, simulating actual behavior (e.g., Deelstra et al., 2003). We still decided to conduct vignette experiments, because the implementation of a new technology and the demands and support it involves naturally develop over a longer time period that is not amenable to the laboratory setting. In addition, vignette study methodologies ask study participants to provide responses to a hypothetical situation, which compromises external validity if the scenario text does not include contextual information that a real-world scenario would provide. In response to the two aforementioned risks, we focused on recruiting participants that had hands-on work experience as dependently employed personnel in an organization, the vast majority also having experienced technology implementation in the past, in order to fully comprehend the described vignette scenario.

In terms of the specific limitations of the three studies, participants in all three studies had higher educational backgrounds and described themselves as average to highly tech-savvy, which may mean that they find it easier to adapt to technological changes and require less support than less educated or tech-savvy samples. This could affect the generalizability of the results. Study 1 examined a vignette with multiple kinds of demands and support provided, as this most closely resembles a practical scenario in organizations, but at the cost of not being able to attribute the effects to a single demand or support resource. In Studies 2 and 3, the vignette scenario was limited to a single demand and matching support, so only one effect was investigated at a time, but this may have been less realistic to a real-world scenario in which consequences of the technology implementation may be more complex. The “new competency requirement – training” scenario in Study 2 may have been easier for participants to navigate than the “role change – participation in role redesign” scenario in Study 3, which was more abstract. Indeed, Study 3 represented a vignette of emotional demand-support match, where demand might be more related to the job (role change) and therefore have a stronger relationship with outcomes that fall outside the scope of this manuscript,

for example commitment. Furthermore, we conducted the manipulation check of change demands using three items from the Job Impact Scale that did not distinguish between different demands or technology implementation impacts, but measured whether the work has changed. Although we believe this measure was sufficient to test whether participants noticed the low-high manipulation of change demands, we also see the need to develop more specific measures to assess change demands or technology impact.

The replication effect for the three studies was not as clear as expected. According to Maxwell et al. (2015), replication studies each provide their own distribution that can result in different effect sizes. For the context of technology implementation, the different nuances of change demands and change support was enough to result in different distributions. Furthermore, the proposed higher personal relevance of the interaction of the change demands skill requirement and the support training was a factor that led to a different mechanism of interaction that should find increased focus in future research.

The effects for the behavioral intention outcome were not as strong as for the other outcomes, which may be because the sample sizes of the three studies were too small. However, the meta-analytic integration across the samples of the three studies also showed no interaction between change demands and change support. More importantly, behavioral intention to use has its theoretical foundation in the technology acceptance model (Davis et al., 1989), where large parts of its variance is explained by a perception of the technology being implemented (perceived ease of use, perceived usefulness). The evaluation of the technology was a factor that was excluded from this study in order to only test the interaction effect of change demands and change support, but in practice this would play a huge role in determining employees' behavioral intention to use the technology.

CONCLUSION

Progressing digitalization and technological changes triggered by COVID-19 lockdowns means for organizations that new technologies need to be implemented in shorter time periods (Cascio and Montealegre, 2016; Dwivedi et al., 2020; Parker and Grote, 2020). Researchers and change practitioners have realized that the implementation can be demanding for employees (Smollan, 2015; Demerouti, 2020) and have designed support interventions (e.g., Iden and Eikebrokk, 2013). Yet, how change demands develop their effect and how change support can be best designed in order to effectively counteract change demands in a cost-saving manner has not been satisfactorily answered. With our research, we provide new evidence on the interaction of change demands and change support and open research fields and design recommendations for practice. We demonstrated that change demands of varying amplitudes and dimensions (i.e., instrumental and emotional demands) negatively affected technology implementation outcomes. An interaction effect between change demands and support that buffered the effects of change demands on outcomes was more likely to occur when demands were specific, instrumental, and controllable, and

support matched in content, than when demands were diverse or uncontrollable and emotional. This finding could be explained by a stronger personal relevance attributed by support recipients to these matches between demands and support. The relationship was mediated by perceived frustration, though the results were inconclusive for need satisfaction.

Our research contributes to the literature by describing the causal effects of change demands, highlighting the requirements for establishing a match between change demands and support (i.e., dimensional match and personal relevance), and questioning why change demands have a negative effect in order to develop more effective support measures. Designing effective change management measures is highly relevant in practice. The good news is that support, whether it matches or interacts with change demands, has a positive impact on change-related outcomes through both direct and moderated paths.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: OSF repository https://osf.io/5x2tk/?view_only=7e1bc26e94f2489f866fc75e3e94b43f.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethical Committee of Bielefeld University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KS designed the outline of the study, performed the statistical analysis, wrote the draft of the manuscript, and revised the manuscript. KS, JR, and GM contributed ideas to the design of the study. KS and JR collected the data. GM critically reviewed the drafts and supervised this work. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.824010/full#supplementary-material>

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Exploring the Necessity of Psychological Rounds and Psychological Interventions in General Hospitals in the Post-COVID-19 Period

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Objective: To explore the necessity of psychological rounds and psychological intervention in the post-COVID-19 period in a general hospital.

Methods: Based on the current pandemic influence on Chinese people's psychology, the medical experience, and environment were analyzed, and the feasibility of psychological evaluation and intervention were appraised with the psychological changes that might be brought by the medical behaviors, especially for surgical operations.

Results: Nowadays, the pandemic is under full control in China, although the pandemic is rampant abroad. In China, the "Normalized pandemic prevention" phase has begun. In the post-COVID-19 period, the prolonged pandemic has made numerous people pessimistic, angry, and other negative emotions. Several general hospitals are facing huge influences: under the influence of anxiety, such as "higher hospital-acquired infection rate," the patient attendance rate is reduced, and the hospital income is sharply reduced. Doctor-patient conflicts are more likely to occur during the medical procedures, affecting the medical experience, and reducing the rate of re-visit and referral.

Conclusion: After analyzing a series of "endogenous" and "exogenous" factors of medical procedures in a general hospital in the post-pandemic period, it suggests that anxiety and depression caused by uncertainties in the medical procedures may be more obvious. Also, it is necessary to pay attention to the psychological status of patients and carry out psychological rounds and psychological interventions in general hospitals. The service quality can be improved, the medical experience can be ameliorated, and it can help general hospitals to turn "crisis" into "opportunity," which also brings better development.

Keywords: post-pandemic period, post-COVID-19 period, general hospital, psychological interventions, psychological rounds

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INTRODUCTION

Since the end of January 2020, due to the spread of COVID-19, most Chinese citizens have suspended other major production activities other than basic living activities and stayed at home. Thanks to the joint efforts of the Chinese people, the pandemic in China has been effectively controlled. With the popularization of free vaccination for all, peoples' life and work have returned to the status before the pandemic. As the pandemic abroad is still not under effective control, there have always been new imported cases appearing, and China's pandemic prevention work has become normal. Therefore, in many peoples' minds, medical institutions are still high-risk places and medical staff is more susceptible to infection, even under the effective pandemic prevention and control measures in China. They dare not go to the hospital for fear of infection by COVID-19 in a hospital or from contact with medical staff. They prefer to buy medicine in pharmacies in their way or get medicines online. For those who must be hospitalized, especially those who need surgery and other invasive operations, avoiding medical treatment is tantamount to giving up treatment. Therefore, they seem to be in a dilemma and will inevitably have more concerns and worries, resulting in anxiety and even depression. Based on the above special situation, this study attempts to explore the necessity of psychological ward rounds and psychological intervention in general hospitals in the post-pandemic period.

ANALYSIS OF PSYCHOLOGICAL FACTORS AFFECTING SURGICAL PATIENTS IN GENERAL HOSPITALS

For many diseases, surgery has the effect of fundamentally and quickly solving the pain, but as an invasive operation, it has a certain trauma to the human body itself. Being diagnosed with a disease and being told that surgical treatment is needed can be regarded as a serious negative life event for patients. After diagnosis, most patients will have different degrees of anxiety, loneliness, inferiority complex, and other psychological events. Also, surgery and anesthesia are strong sources of stress, the curative effect of surgical trauma, uncertainty factors, the economic problems, and various aspects can all aggravate the patients' negative psychology, thus, leading to the psychological stress. Patients may fall into various negative emotional reactions, including anxiety, tension, insomnia, fear, depression, etc., which may start from the preoperative, intraoperative, to postoperative period. These negative emotions affect patients' vital signs, such as blood pressure and pulse, to varying degrees, and adversely affect the operation implementation and prognosis (Cao, 2011; Zheng et al., 2013). Taking anxiety as an example, it is an independent risk factor affecting the development and prognosis of the disease (Zhao et al., 2007). Anxiety can stimulate the thalamic-adrenal cortex system, excite the sympathetic nerve, increase the release of catecholamine, and excite the β receptor, resulting in accelerated heart rate, increased oxygen consumption of the myocardium, and increased blood pressure. Meanwhile, anxiety also stimulates the α receptor, causing coronary artery spasms (Chen et al., 2019), thus, significantly increasing the

risk of surgery and anesthesia. At the same time, these negative emotions will reduce patients' compliance and cooperation with surgery and postoperative rehabilitation.

Patients must bear not only the physical disease itself, including all kinds of physical discomforts, like a pain but also the psychosomatic distress caused by the negative emotions mentioned above. However, due to the great success of biological models in the control of acute diseases, doctors often ignore the above conditions by focusing only on biological factors in the diagnosis and treatment of diseases. The disease is born in the human body. As the "carrier" of the disease, people are often affected by various psychological and social factors. The emphasis on psychosocial factors is a new medical model of "bio-psycho-society" based on "mind-body monism," which avoids the disadvantages of the old model of "seeing the disease and not seeing the person" and focuses on the "sick person" rather than the disease itself (Xu, 1999). Such a monistic model can help clinicians better understand patients and their diseases, not only promote disease recovery more comprehensively and shorten the average hospital stay, but also play a good role in building a harmonious doctor-patient relationship and greatly improve patient satisfaction.

Many medical institutions, both in China and abroad, have studied a lot of preoperative and postoperative psychological interventions (Powell et al., 2010; Davidson et al., 2016; Chew et al., 2020; Villa et al., 2020; Gorsky et al., 2021). Research from Tongji University, an affiliate of Shanghai Pulmonary Hospital, based on thoracoscope lung resection of 174 cases of patients with non-small cell lung cancer, found that the implementation of perioperative psychological support can improve the psychological statement of patients after they get into the operating room, which means it helps to reduce the stress, maintaining the vital signs, such as blood pressure and heart rate, etc., more stable. At the same time, the postoperative extubation time, the total length of hospital stay, and the incidence of postoperative complications were also significantly reduced (Yan and Wang, 2020), leading to the reduction of the psychological and economic burden of patients and improving patient satisfaction.

PSYCHOLOGICAL ANALYSES OF NON-OPERATIVE PATIENTS IN A GENERAL HOSPITAL

Compared with non-surgical patients, patients requiring surgical treatment may suffer from greater psychological pressure. Psychological intervention during the perioperative period is conducive to the smooth implementation of surgery and postoperative rehabilitation of patients. Similarly, psychological ward rounds in non-surgical departments can also help to satisfy patients' needs and grasp their psychological dynamics and promote mutual understanding between doctors and patients, and humanistic care for patients (Roditi and Robinson, 2011; Harvey, 2015; Tselebis et al., 2016). For example, diabetes, as a chronic disease, affects patients throughout their life. Diabetes is characterized by a long course of the disease, poor curative effect, and various complications. Not only physical

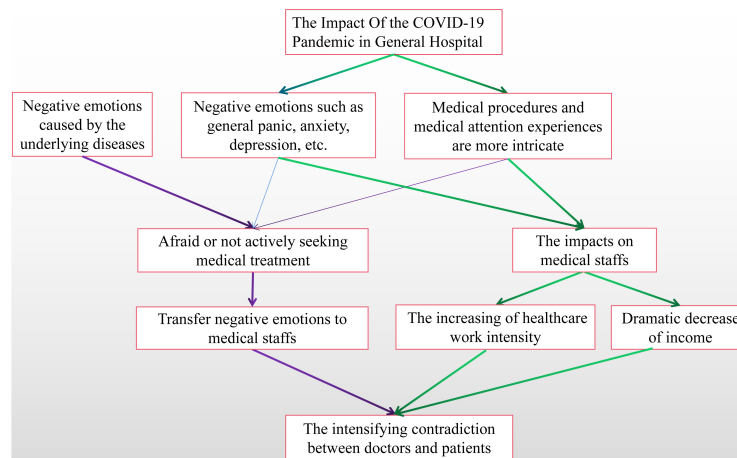


FIGURE 1 | Analysis of psychological factors affecting patients in general hospitals.

pain, but it also causes serious mental damage. In recent years, a large number of domestic and foreign studies have shown that the prevalence of anxiety, depression, insomnia, and other mental and psychological disorders in patients with diabetes is significantly higher than that in the general population (Smith et al., 2013; Chew et al., 2015; van Son et al., 2015; Chaturvedi et al., 2019; Yu and Yang, 2019; Liu et al., 2020). As early as the early 1990s, some scholars proposed that psychological disorders associated with diabetes should be treated as a special serious complication (Gong et al., 1997). Currently, the diagnosis and treatment of diabetes-related complications still focus on the physical aspect, and the diagnosis and treatment of mental disorders associated are seriously inadequate. However, self-management at home is more difficult for diabetics than for other chronic diseases. Strict daily dietary intake, regular blood glucose monitoring, etc., makes every patient with diabetes under huge psychological pressure, completing the psychological intervention can make diabetics taking more actively implement self-management, and, moreover, achieve the strict control of blood sugar and avoid or delay the onset of other complications of both long-term and short-term treatment goals (Yin et al., 2021). Therefore, for a better description, the analysis of psychological factors affecting patients in general hospitals could be seen in the **Figure 1**.

PSYCHOLOGICAL ANALYSIS AND COUNTERMEASURES OF GENERAL HOSPITAL MANAGEMENT AND PATIENTS' PSYCHOLOGIC STATUS DURING THE POST-PANDEMIC "NORMALIZED PANDEMIC PREVENTION" PERIOD

Since the outbreak of the COVID-19, the Chinese people have gone through the most severe periods, such as "home

quarantine for all the citizens" and "medical staff who were, regardless of life-or-death situations, worked hard to help Hubei province, especially Wuhan City to fight the pandemic." While the pandemic in China is under full control, it is getting more and more rampant abroad, the "normal pandemic prevention" phase has begun, during which we follow the policy that "preventing the importation from abroad and the rebound from home." Then, come the current post-pandemic period of "regular nucleic acid testing for key populations" and "over 3.36 billion people were vaccinated (Bureau of disease control and Prevention, 2021)." Many hospitals are facing a huge impact, and the number of outpatients and inpatients decreased to a certain extent, compared with the same period in previous years (Huang and Xie, 2021; Lili and Guo, 2021). There may be at least two reasons for this: under the influence of anxiety, people worried about a higher probability of infection while being in the hospital, which made not only the number of visits has dropped, but the hospitals also have to set some full-time positions in daily pandemic prevention (Chew et al., 2020), resulting in a significant increase of hospital operating costs than usual, while the income was greatly reduced. Many small and medium-sized hospitals have been struggling to survive, the medical staff's economic living standards have fallen, and due to the high risk of infection at work, medical staff also bear more pressure at work. The two reasons made their work enthusiasm somehow decline. On the other hand, the persistent and repeated pandemic makes both doctors (Wang, 2020) and patients have some negative emotions, such as pessimism, anger, and numbness. Doctor-patient conflicts are more likely to occur in the process of medical treatment, affecting patients' medical experience, thus, reducing the rate of re-visit and referral, and making the survival of hospitals more difficult (Lili and Guo, 2021). These reactions are further highlighted by patients with a variety of negative emotional reactions before the pandemic.

To effectively alleviate the plight of both doctors and patients caused by the pandemic, major hospitals have taken many intervention measures. Some carry out hierarchical diagnosis

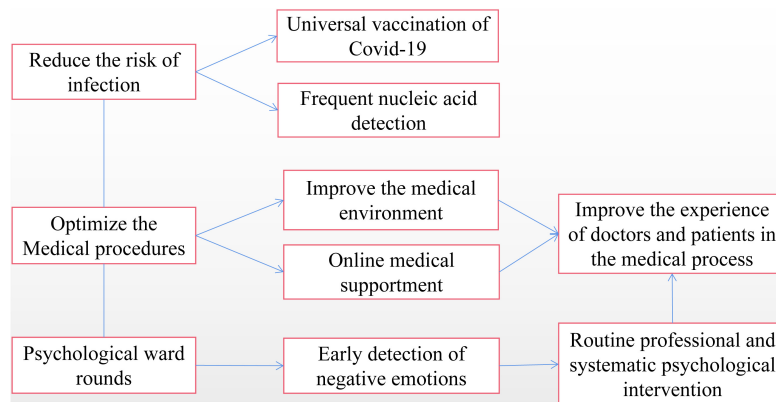


FIGURE 2 | Psychological analysis and countermeasures of general hospital management and patients' psychological status during the post-pandemic "Normalized pandemic prevention" period.

and treatment, refine management, optimize hospitalization procedures, and transform a comfortable medical environment; some carry out online appointments and home continuous diagnosis and care through the internet, so that patients can get a certain degree of professional help at home and relieve the anxiety of possibly being infected with the virus by going-out activities. Some are offering more frequent nucleic acid tests to medical staffs, and encourage the staffs to get vaccinated against the COVID-19 to reassure the negative thoughts about high infection rates. Others provide psychological intervention and support to patients and their families or even medical staff. The measures mentioned above have alleviated the possible crisis of the hospital during the post-pandemic period to a certain extent and provided some comfort to the psychological of both doctors and patients. However, the above mentioned psychological interventions are usually provided only by general department nurses, who did not accept enough professional psychological knowledge, and they often have to shoulder the heavy general nursing work in the department at the same time, usually working on "three shifts," which means they cannot supply sufficient professionalism, meaning regular and timely psychological service for eager patients who are struggling with nervousness needing stable supports. Routine psychological ward rounds, regular psychological intervention, and psychological crisis intervention under emergency conditions by qualified and systemically trained psychiatrists may be more worthy of consideration and praise. For better understanding, Psychological analysis and countermeasures of general hospital management and patients' psychological status during the post-pandemic "Normalized pandemic prevention" period could be seen in the **Figure 2**.

CONCLUSION

In summary, during the post-pandemic period, it is necessary to pay attention to the mental and psychological status of patients. Launch psychological ward rounds and psychological intervention in general hospitals and reduce the negative

aftereffects of the pandemic. Through psychological ward rounds and psychological intervention, patients' medical concerns can be eliminated, service quality and medical experience for inpatients can be improved, doctor–patient conflicts can be reduced, and even general hospitals may be helped to turn "crisis" into "opportunity" in this special period, to better survive and even better develop. Perhaps, it will also be necessary to help hospitals out of this dilemma.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

PT was mainly responsible for writing manuscript. ML was mainly responsible for the revision and guidance of the manuscript. Both authors agreed to be accountable for the content of the work.

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What are the essential components to implement individual-focused interventions for well-being and burnout in critical care healthcare professionals? A realist expert opinion

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Background: This study aimed to determine what, how, and under what circumstances individual-focused interventions improve well-being and decrease burnout for critical care healthcare professionals.

Method: This realist approach, expert opinion interview, was guided by the Realist And Meta-narrative Evidence Synthesis: Evolving Standards II (RAMESES II) guidelines. Semi-structured interviews with critical care experts were conducted to ascertain current and nuanced information on a set of pre-defined individual interventions summarized from a previous umbrella review. The data were appraised, and relationships between context, mechanisms, and outcomes were extracted, which created theory prepositions that refined the initial program theory.

Results: A total of 21 critical care experts were individually interviewed. By understanding the complex interplay between organizational and personal factors that influenced intervention uptake, it was possible to decipher the most likely implementable intervention for critical care healthcare professionals. The expert recommendation suggested that interventions should be evidence-based, accessible, inclusive, and collaborative, and promote knowledge and skill development. Unique mechanisms were also required to achieve the positive effects of the intervention due to the presence of contextual factors within critical care settings. Mechanisms identified in this study included the facilitation of self-awareness, self-regulation, autonomy, collaboration, acceptance, and inclusion (to enable a larger reach to different social groups).

Conclusion: This validation of a theoretical understanding of intervention that addressed well-being and burnout in critical care healthcare professionals by expert opinion demonstrated essential mechanisms and contextual factors

to consider when designing and implementing interventions. Future research would benefit by piloting individual interventions and integrating these new theoretical findings to understand better their effectiveness for future translation into the “real-world” setting.

KEYWORDS

critical care, healthcare professionals, well-being (I31), burnout—professional, individual interventions

Introduction

Workload and work-life balance are central to well-being, alongside the experiences of workplace support, respect, and feeling valued (Jarden et al., 2019). Well-being can be conceptualized as a spectrum, where high well-being denotes happiness and flourishing (Hall et al., 2016). Conversely, low well-being encompasses components of increase anxiety and depression (Hall et al., 2016). The concept of well-being has two facets—hedonic and eudaimonic well-being (Keyes, 2002). Hedonic well-being encompasses emotional components such as life satisfaction, happiness, and balance between positive and negative affect (Keyes, 2002; Schlieper, 2021). Eudaimonic well-being involves psychological and social components such as personal growth, autonomy, positive relations, and social integration and acceptance (Schotanus-Dijkstra et al., 2016). Critical Care Healthcare Professionals (CCHP) displaying both hedonic and eudaimonic well-being are viewed as “flourishing” within the workplace (Keyes, 2002; Keyes and Haidt, 2010). Being in a state of flourishing is a favorable form of mental health and describes the subjective estimate of one’s perceptions and evaluations of their life (in terms of social, emotional, and psychological functioning; Schotanus-Dijkstra et al., 2016; Schlieper, 2021). Schotanus-Dijkstra et al. (2016) reported that individuals who flourished within the workplace tended to have excellent physical and mental health and could cope with challenges both within and outside of work compared to people who were not flourishing (Schotanus-Dijkstra et al., 2016). The concept of flourishing is composed of varying factors that may play a role in counteracting high-stress levels, emotional exhaustion, and subsequently burnout experiences (Berend et al., 2020).

Burnout is defined as a negative reaction to chronic occupational stressors, where there is a misfit between the individual’s needs, values, and job performance (Galletta et al., 2016). Maslach et al. (1996) identified burnout as a psychological syndrome characterized

by emotional exhaustion, depersonalization, and personal inefficacy (Maslach et al., 1996). Emotional exhaustion is relative to the employee’s stress experiences and result in decreased physical and emotional resources (Maslach et al., 1997; Leiter and Maslach, 2005; Taris et al., 2017). Maslach et al. (1997) suggested that emotional exhaustion diminished self-initiative and engagement and progressively decreased the capacity for demanding work (Maslach et al., 1997; Leiter and Maslach, 2005; Taris et al., 2017). Similarly, cynicism is caused by the overload of exhaustion and concerns to reactions of work detachment (Maslach et al., 1996; Portoghese et al., 2014). It facilitates an environment for emotional involvement within the workplace and contributes to the loss of enthusiasm (Leiter and Maslach, 2005). The third component of professional inefficacy can be perceived as decreased productivity, ineffectiveness, and lack of achievement within the workplace (Leiter and Maslach, 2005). Perceived professional inefficacy can be categorized as a personality characteristic (Shirom, 2003), whereas both emotional exhaustion and cynicism can be recognized as two fundamental core components of burnout (Bakker et al., 2002; González-Romá et al., 2006).

Critical Care Healthcare Professionals (CCHP) are at high risk of distress and burnout due to their highly demanding and challenging work conditions (Galletta et al., 2016). These conditions enforce certain mental and social demands, negatively affecting their health and well-being (Galletta et al., 2016; Rattray et al., 2021). Example conditions included the constant care of high acuity patients, high workload and time pressures, reduced social support, and frequent unexpected critical events that often lead to suffering and death (Galletta et al., 2016; Rattray et al., 2021). For these reasons, critical care units are considered high-strain workplaces that predisposed workers to adaptation disorders and job dissatisfaction (Galletta et al., 2016; Rattray et al., 2021). Burnout experiences are common among critical care employees, having reached the epidemic level (Gomez et al., 2020). The COVID-19 pandemic and the healthcare system’s response have placed immense and unprecedented strain on the critical care workforce (Ripp et al., 2020). Being at the front line has meant that CCHP has been forced to meet sudden and dramatic rises in workload and demands, namely, expanding critical care provisions (Ripp et al., 2020). This experience has produced its own types of psychological stressors, including concerns

Abbreviations: CCHP, Critical care healthcare professionals; RAMESES II, Realist and Meta-narrative Evidence Synthesis Evolving Standards II; CMOC, Context-mechanism-outcome configuration; TP, Theory preposition.

regarding a lack of Personal Protective Equipment, contracting the virus and risking exposure to family and friends, as well as increased adverse patient outcomes and mortality (Gomez et al., 2020; Greenberg et al., 2021). These working conditions can adversely affect the mental health of CCHP, including moral injury and mental health diagnoses such as depression and post-traumatic stress disorder (Gomez et al., 2020; Greenberg et al., 2021).

Depression and post-traumatic stress disorder was identified as being more prevalent in critical care physicians and nurses with burnout syndrome (Kerlin et al., 2020). The effects of burnout can have wide-ranging effects on both the individual and the safety of patient care (Kerlin et al., 2020). An observational prospective multicenter study (31 intensive care units and 1,500 employees) determined that depression in CCHP was an independent risk factor for errors within the workplace (Garrouste-Orgeas et al., 2015). The study also reported a relationship between productivity and burnout—an increase in sick days and intent to leave the job as burnout experiences increased (Dewa et al., 2014; Garrouste-Orgeas et al., 2015).

In 2016, the Critical Care Societies Collaborative announced a “call for action” that encouraged stakeholder groups to promote well-being among CCHPs by protecting their mental and physical health (Moss et al., 2016). In addition, the Critical Care Societies Collaborative anticipated that novel methods for addressing burnout and well-being would be discovered with the assistance of stakeholders that may, in turn, shape regulations, promote quality patient care and decrease healthcare costs (associated with turnover; Moss et al., 2016). Stakeholders may be defined as a person or entity with a conceivable or declared stake or interest in a policy concern (Garthwaite et al., 2005). In this paper, we focused on expert stakeholders (herein referred to as experts) being people whose knowledge in the subject of interest (critical care workforce) has been earned through training or education and life experience (Garthwaite et al., 2005).

Evidence of interventions that address well-being and burnout specific to the critical care health professional community is lacking. In an umbrella review and realist-theory synthesis (in press) that focused on individual-level interventions, we identified contextual factors and mechanisms of interventions that broadly applied to the healthcare workforce (Adnan et al., 2022). While we were able to determine what interventions were likely to work, for whom and under what circumstances in the general population of healthcare professionals, our theoretical synthesis and preposition were not specific to the unique needs and profile of CCHP (because of a limited number of original intervention studies in CCHP). Additionally, the umbrella review identified gaps in understanding how self-efficacy, self-care, social support, and awareness/mindfulness may improve emotional intelligence and resilience—well-being indicators (Adnan et al., 2022). Moreover, there was insufficient evidence to consider the context-mechanism-outcome configurations for the critical care population. To address the need for and support the design of targeted interventions to CCHP that are theoretically sound (thus

likely effective) and feasible, this study sought opinions from critical care experts that determined contextual factors and mechanisms of potential interventions.

Objectives of this review

This study’s aim was to gather expert opinion to determine what types of individual-focused interventions work, under what circumstances and how to improve well-being and decrease burnout for Critical Care Healthcare Professionals (CCHP). The specific study objectives were to:

1. Gather expert opinions on the anticipated effectiveness of implementing one or a combination of individual-focused interventions to improve well-being and decrease burnout among CCHP.
2. Identify issues relating to the feasibility of implementing identified singular or combination of intervention(s) among CCHP.
3. Identify and confirm uncovered and present ideas about mechanisms and contextual factors that may contribute to the effective (or ineffective) implementation of singular or combination intervention(s).

Materials and methods

This prospective qualitative study used semi-structured interviews with a realist evaluation method. In addition, this study was reported in adherence to the Realist And Meta-narrative Evidence Synthesis II: Evolving Standards (RAMESES II) guideline (Wong et al., 2016). This study received ethics approval from Flinders University Human Research Ethics Committee.

Program theory

The paper used our earlier umbrella review’s program theory to understand the context, mechanism and outcome of individual interventions aimed at improving well-being and decreasing burnout (Adnan et al., 2022). The main elements of the program theory are described in [Supplementary File 1](#).

Study population

A total of 21 critical care healthcare professionals were included in the advisory interviews. The critical care healthcare professionals included the following eight professions: intensivist, registered nurse, psychiatrist, social worker, speech pathologist, physiotherapist, psychologist, and dietitian, as summarized in [Table 1](#). The authors used the World Health Organization’s definition of healthcare professionals ([World Health Organization](#),

TABLE 1 Demographics and professional characteristics of participant's current practice.

Characteristics	<i>n</i> (%) of participants
Response rate	
Invited and participated	21 (100%)
Gender	
Male	6 (29%)
Female	15 (71%)
Role in critical care	
Senior registered nurse	8 (38%)
Intensivist	3 (14%)
Psychiatrists	2 (10%)
Speech pathologist	2 (10%)
CC clinical psychologist	2 (10%)
Senior medical registrar	1 (5%)
Social worker	1 (5%)
Physiotherapist	1 (5%)
Dietitian	1 (5%)
Area of specialty	
Clinical	15 (71%)
Academia	6 (29%)
Country/state of service	
South Australia	7 (33%)
New South Wales	4 (19%)
Queensland	4 (19%)
New Zealand	3 (14%)
Western Australia	1 (5%)
Victoria	1 (5%)
Australian Capital Territory	1 (5%)

CC, critical care. Percentages (%) depicted in this table have been rounded to full number.

2019) and the American Association of Critical-Care Nurses definition of “critical care” (Every Nurse, 2018) These definitions are presented in [Supplementary File 2](#).

Experts

This expert opinion defined “experts” using Grundmann’s (2017) definition, which included individuals that possessed experience, technical skills (including intellectual and manual skills), judgment, trustworthiness, knowledge dissemination, and the ability to provide advice to others (Grundmann, 2017). Notably, technical skills are not merely knowledge; they include comprehensive reflections on relevant science and scientific activity (Grundmann, 2017). Therefore, in this paper, participants were screened based on these criteria to be included in the interview process.

Recruitment

The authors invited relevant organizations in Australia and New Zealand (Australian and New Zealand Intensive Care Society)

to contribute toward the expert panel process by distributing a flyer and supporting the nomination of representative expert individuals from the critical care workforce. Key experts through professional networks were also identified, directly emailed, and invited to participate. The authors ensured maximum variation in sampling to reflect diversity in terms of profession, professional experience, and skill level. The information sheet, pre-readings, and interview time and day were sent and arranged prior to the interviews. The information sheet included information about the preparation required for the interview and completion of the pre-reading of the preliminary results of the umbrella review in the form of Context-Mechanism-Outcome Configuration (CMOC) results tables.

The CMOC tables ([Supplementary File 3](#)) were provided (in confidence) with a relevant selection of provisional results of the umbrella review (in press), being a modified version of the results table that described the intervention’s context (i.e., population and setting), mechanism (i.e., how/why the intervention works, duration, context, follow-up), and outcomes (i.e., implicit and explicit reasoning and effectiveness) (Adnan et al., 2022).

Semi-structured interviews

Each semi-structured interview consisted of up to 16 questions and began with context-setting before the in-depth and core questions (DeJonckheere and Vaughn, 2019). An interview guide was developed and used, which had been pilot tested (research assistant, NA) in three mock interviews (two clinical psychologists, one senior registered nurse expert) to ensure ease of comprehension, validity (able to extract appropriate data that correlated with the aim), and guidance in the pace of the interview (i.e., not to exceed the time limit of 30 min per interview; DeJonckheere and Vaughn, 2019). Three questions (to the initially proposed 13 questions) were added as a result of the pilot interviews, which was directed to only clinical psychologists. The questions sought to determine the validity of each intervention’s proposed contextual factors and reasonings. All authors agreed upon all changes made to the guiding questions to form the final interview guide. This was part of ensuring questions were open-ended where appropriate, clear and neutral, and avoided leading language and jargon unsuited to this professional but multi-disciplinary group of participants (DeJonckheere and Vaughn, 2019). The 13 questions asked of all participants were about the perceived effectiveness of interventions (outcome) and reasoning (context and mechanisms; [Supplementary File 4](#)).

Interviews were conducted in real time *via* an online meeting platform (Zoom Video Communications, I, 2021). The first interviewer (research assistant) asked experts a range of questions. The lead researcher (NA) was additionally present during each interview, with the role of taking observational notes, making reflective memos and answering any direct questions from the interviewer or participant that sought clarification of information and only if required to ensure the smooth continuation of the

interview and depth of opinion obtained (NA). Observational notes and reflective memos were recorded in a pre-defined form to ensure consistency in the note-taking process.

Methodological rigor

To establish trustworthiness in this expert opinion, the study authors applied Lincoln and Guba's Four-Dimensions Criteria, which included the following stringent criteria: credibility, dependability, confirmability, and transferability (Lincoln and Guba, 1986). These criteria were chosen because of the commonality of their prior use in other contexts of qualitative health research, their practical process to meet the trustworthiness criteria for qualitative processes, and their applicability to expert opinion methodology where there is a need to minimize bias (Supplementary File 5; Lincoln and Guba, 1986; Nowell et al., 2017). Furthermore, the semi-structured interviews were carefully planned and conducted based on the four-dimension criteria to assess and ensure the robustness of the expert opinions.

Data extraction and synthesis

Expert opinions were evaluated using an interpretative evaluation strategy where notes recorded by authors during interviews were accumulated and re-checked with the recording in order not to lose information and avoid any corresponding distortion. The main statements by experts were checked independently by two authors (NA and DC) and respective notes (Korber and Becker, 2017). Each interview was also discussed (NA and DC) regarding its contribution to the Context-Mechanism-Outcome Configuration (CMOC). In the context of this study, the authors did not record non-verbal elements (Korber and Becker, 2017). Preliminary codes were initially generated, and overarching themes were identified from these codes. Within each theme, data were categorized into context, mechanism, and outcome configurations (Supplementary File 6) and examined for: *what individual interventions are effective and ineffective (outcome) when implemented on CCHCP (context)? What causes these effects (mechanisms), and what internal and external influences (context) produced this outcome?* Pawson and Tilley (1997) defined context as the condition in which the intervention is being introduced, ensuring relevance to the operation of the mechanism (i.e., demographics, relationships, technology; Pawson and Tilley, 1997; Salter and Kothari, 2014). Mechanism describes the underlying processes and how the intervention may produce the outcome (Salter and Kothari, 2014).

Data (empirical evidence) were synthesized by connecting underlying causal processes to Context-Mechanism-Outcome Configurations (CMOC) in order to produce theory prepositions (Shearn et al., 2017). To determine causal processes, authors initially employed abductive and retroductive logic of internal relations of a phenomenon (i.e., intervention) to facilitate

abstraction (Meyer and Lunnay, 2013). Both abductive and retroductive inferences are analysis tools that were used to refine and redevelop a conceptual framework or theory (Meyer and Lunnay, 2013). Retroduction sought to identify sufficient and necessary conditions and causes for the phenomenon to exist (Armet, 2013). Moving between data and theory, abductive reasoning was also used to compare, explore, and explain observable patterns within the data while exploring non-observable data that was overlooked by the umbrella review's program theory (Armet, 2013). Next, the authors used information from both retroduction and abduction to create associations (iteratively hypothesizing how an outcome is achieved using identified mechanisms) and recontextualize data (determining the context within which those mechanisms were triggered; Armet, 2013). Authors (NA and DC) discussed potential explanations, strategies, and new findings to refine CMOC, which then facilitated the creation of new plausible conclusions (Armet, 2013). Authors (NA and DC) then conceptualized the necessary processes and generative mechanisms used to create empirical outcomes (Armet, 2013). Next, abstract conceptualization was used, which involved learning about the phenomenon using theories, ideas, and logic to understand the phenomenon (Armet, 2013). An empirical social product was created, followed by the generation of a conceptual map and evaluation of claims for causality using realist criteria to create theory prepositions (Armet, 2013). Next, the authors (NA and DC) determined the relationships and connections between theory prepositions, which created a web of causation that reflected a rich picture of the process and integrated into the umbrella review's program theory to enable refinement (Adnan et al., 2022). The refined program theory is a full collation of supporting evidence.

Results

Demographical and professional characteristics of participants

A total of 21 critical care experts were invited and individually interviewed. There were $n = 15$ female and $n = 6$ male participants, with $n = 18$ from Australia and $n = 3$ from New Zealand. A summary of the demographical and professional characteristics of participants is demonstrated in Table 1.

Context-mechanism-outcome configuration

Four overlapping theoretical prepositions were generated explaining *what supported successful implementation and uptake of interventions among critical care healthcare professionals*. Four middle-range theories were used during data synthesis, which guided the development of theory prepositions: (1) skill acquisition theory (VanPatten and Williams, 2014), (2)

TABLE 2 Theory preposition (TP) using context-mechanism-outcome configuration (CMOC).

Identifier	Theory prepositions using context-mechanism-outcome configuration
TP1	Interventions that promoted knowledge and skill development (personal growth initiatives) (C), facilitated self-awareness (M) enabling individuals to exercise self-regulation with the assistance of appropriate resources (O).
TP2	Critical care healthcare professionals assessed and established the intervention's effectiveness using evidence-based knowledge—where the ability to justify facilitated ease in the translational process of the intervention. Having full awareness on its credibility (C) facilitated autonomy in their assessment and judgment of the intervention (M). This led to successful implementation of the intervention, which may allow prolonged usage of the intervention (O).
TP3	Interventions that were easily accessible and inclusive (C) provided opportunities for critical care healthcare professionals to interact with the resource (M), which facilitated feelings of acceptance and enabled a larger reach to different social groups (i.e., organizational, cultural, personality barriers) (O).
TP4	Interventions should be co-produced (C) as it facilitated collaboration (M), which meets end-users' expectations and needs (O).

C, Context; M, Mechanisms; O, Outcomes.

self-determination theory (Patrick and Williams, 2012), (3) social capital theory (Machalek and Martin, 2015), and (4) collaboration theory (Hurwitz and Adair, 2014). Descriptions of these theories in conjunction with the presented data/theory prepositions are provided in [Supplementary File 7](#). Theory Prepositions (TP) developed within the data synthesis are described in [Table 2](#). To promote transparency, the data described below also provided memo notes taken by the second interviewer (NA).

Theory preposition 1 (TP1): Interventions focused on knowledge and skill development to enhance self-regulation

Knowledge and skill development was identified to be a common theme among interventions (advocated as effective by experts). For example, resilience training, mindfulness, cognitive-based intervention, and communication and stress management skills promoted education and learning for self-improvement. One expert (*Critical Care Clinical Dietitian, 7years of experience*) described having conflicting preferences when choosing the most effective intervention for critical care healthcare professionals. However, the expert concluded that all interventions required education and skill development.

Everyone may choose an intervention based on their priorities and how the intervention may help them. It is normal because everyone is different, but in the end, many of the interventions require education so that skills can be developed and used.

Another expert (*Intensivist, 9years of experience as a specialist*) supported the idea of interventions that comprised of education as its foundations.

Using an intervention will allow us to be educated about an issue, which can be used to improve our day-to-day encounters. Education enables us to reason why we need to know something rather than looking at it as just faith. Without educating ourselves or improving our knowledge and skills, we will not be able to advance and overcome stressful and challenging experiences.

Self-awareness interventions also positively influenced the ability of critical care healthcare professionals to acquire personal

development skills. For example, an expert suggested that mindfulness (a type of self-awareness intervention) facilitated positive perceptions of a stressor by putting situations into perspective, resulting in positive reactions. Similarly, debriefing interventions facilitated knowledge and skill development by sharing new knowledge through discussions, collaborations, and reflection. Shared information is learnt, used, and implemented in future stressful situations. The expert below (*Intensivist, 15 years of experience*) reflected on the debriefing process, which led to the uptake of emotional intelligence skills. Thus, this can be used within the workplace to overcome stressors.

Team debriefing or team discussions can normalise an experience, and it helps to de-escalate the issue in one's mind. This way, we can rationally think about our circumstances and use appropriate resources.

The ability to become emotionally aware and self-regulated in challenging situations is promising, as experts noted potential opportunities for strengthening an already resilient cohort (critical care healthcare professionals).

Theory preposition 2 (TP2): Justifying interventions using evidence-based knowledge

Experts reported that critical care healthcare professionals required evidence to rationalize how and why an intervention is effective. The iterative requirements of ensuring that clinical interventions and performances are evidence-based have shaped their daily thought process to ensure the credibility of information before implementing it within their daily practices. Critical care health professionals use evidence-based reasoning daily within their workplace. Consequently, any intervention implemented needed to be based on similar rigor before being accepted by this group, as stated by an expert (*Critical Care Senior Registered Nurse, 28 years of experience*).

These interventions work because they are evidence-based; this is how critical care healthcare professionals work. It is a cause-and-effect response...we are medically minded, that is, using evidence and education – what is the practice and its benefits.

Experts suggested that interventions such as resilience training, communication and stress management, and mindfulness and cognitive interventions were “logical” (provided sound reasoning to their effectiveness) and would resonate with critical care healthcare professionals. One expert (*Intensivist, 18 years of experience*) suggested that these interventions were proposed as “logical” due to the abundance of literature and evidence of their effectiveness.

These interventions would work within the critical care workforce because there is a lot of research and evidence to prove their effectiveness. I have also seen the effects of these interventions within the clinical setting, and there are positive results in terms of improved wellbeing and decreased stress.

Theory preposition 3 (TP3): Accessibility and inclusivity of interventions

Nine experts reported that implementing the intervention would be practical and effective in terms of consistency and long-term use. One respondent (*Critical Care Senior Registered Nurse, 22 years of experience*) explained that interventions should be implemented within a whole system as factors that facilitated well-being and burnout are interrelated. For example, implementing communication skills on an individual level does not prevent the employee from being affected by negative conversations by their colleagues.

It is not only about the individual but rather a whole system. If you instil changes within the system, then everyone will follow.

Another expert (*Critical Care Senior Registered Nurse, 28 years of experience*) suggested that exhaustion may also influence the accessibility to interventions.

Exhaustion potentially limits the critical care workforce to use an intervention. If you have an intervention done during personal time, it becomes hard to think about it and do it. It would be better to have the intervention during your work hours and within the clinical setting.

Twelve experts supported interventions used during the critical care healthcare professional's time. This decision was majorly influenced by workplace factors such as negative work cultures and lack of management support—preventing accessibility and engagement to interventions as mentioned by one expert (*Intensivist, 9 years of experience as a specialist*).

If you are in a unit that allows you to show your vulnerability and talk about wellbeing, then it can be an excellent place to implement the intervention (i.e., debriefing) – vice versa, it would be difficult to implement depending on the workplace culture.

Other experts have also emphasized the extreme work environments within critical care settings. One expert suggested the following (*Intensivist, 9 years of experience as a specialist*).

Expecting staff to engage in interventions can be difficult if they are working hard already.

Other experts justified that implementing interventions at an individual level should not hinder the accessibility and consistency in using the interventions. One expert stated the following (*Critical Care Senior Registered Nurse, 10 years of experience*).

Critical care nurses would be motivated to participate in something good for them...they became nurses for a reason... don't think that they will leave their role unless they are unable continue due to stress and burnout.

One expert proposed using digital technology to ease accessibility, for example, using online debriefing sessions or mobile applications for mindfulness practice.

Theory preposition 4 (TP4): Collaboration using co-production

Interventions enforced by managers tended to be short lasting and created an environment of reluctance. Experts reported that a top-down approach would be ineffective as critical care healthcare professionals felt unvalued of their feelings, thoughts, and ideas. As an expert (*Critical Care Senior Registered Nurse, 22 years of experience*) stated.

Ask people what they would like (implemented). People will provide suggestions and feel valued and invested in the project, which means that they will be more likely to implement it (intervention)... when imposed, people become less motivated.

Instead, working with critical care healthcare professionals and co-producing interventions was reported as potentially effective as it allowed end-users' expectations to be met. This process also considered differences in individual needs, which can be more engaging according to an expert (*Critical Care Senior Registered Nurse, 22 years of experience*):

People will resonate with different interventions, and everyone is at different levels as an individual, so it might be more beneficial to have interventions that addressed issues that the person may want to improve.

Other established theory prepositions

This study identified theory prepositions that were previously reported in the umbrella review (Adnan et al., 2022). This included (1) the use of a tailored intervention, (2) the process of learning and education, (3) engagement, and (4) maintaining the quality of interventions in terms of delivery, duration, and intensity. Due to

the similarity of these findings, the authors have decided not to repeat the reporting of these findings. Nevertheless, these theory prepositions demonstrated similarities between critical care healthcare professionals and general healthcare professionals.

Discussion

Twenty-one experts were interviewed to determine what individual interventions work for the critical care workforce, under what circumstances, and why. The program theory from an umbrella review was used to guide the questions and develop a refined program theory exclusively directed to critical care healthcare professionals (Adnan et al., 2022). A wide range of experts from differing professional fields was included within the population sample, encompassing in gender, state/country, and specialty (academic/clinical) variations. As a result, the depth and breadth of the population reached theoretical saturation and met this study's objectives. The interviews extrapolated four theory prepositions, which led to the identification of five main themes discussed below.

Personal growth and self-awareness

Personal growth initiatives were a prominent theme within interventions endorsed by experts. This is referred to as attaining skills for self-improvement by using cognitive skills (planfulness and readiness) and behavioral skills (utilize resources, intentional behavior; van Woerkom and Meyers, 2019). High levels of personal growth protect individuals from psychological distress (van Woerkom and Meyers, 2019), which mirrors the effects of (expert endorsed effective) interventions – such as debriefing, mindfulness, and cognitive behavioral therapy. For example, mindfulness interventions develop the capacity to accept and tolerate painful experiences (personal growth and development) by acquiring resources that help stabilize distressful effects and reduce impulsivity (Segall, 2005). van Woerkom and Meyers (2019) suggested that interventions surrounding personal growth and development restructured perceptions of stressors to build and enhance self-confidence, which provides opportunities for positive changes and growth (van Woerkom and Meyers, 2019). The concept of self-awareness resonates with the ideologies of personal growth and development (Sutton, 2016). Self-awareness enable individuals to perceive their traits, behaviors, and feelings (Drigas and Papoutsis, 2018). It facilitates positive thought changes, allowing changes in emotions and, eventually actions (Drigas and Papoutsis, 2018). Reflection is a prime example of this process, where the cycle commences with awareness, description, analysis, evaluation, learning and eventually leads to the development of new knowledge and skills (Jayatilleke and Mackie, 2013). Experts suggested that the lack of awareness and recognition of low well-being and high burnout hinders opportunities to cope with its symptoms and consequences. Self-awareness is paramount to

preventing burnout—also known as self-knowledge (Harman, 2010). Relative to the concept of anosognosia, if individuals lack the insight or awareness of a condition, in this case, burnout, it can precipitate undesirable behaviors such as misperceptions, conflicts, recklessness, and avoidance of treatments (National Alliance on Mental Illness, 2022). Likewise, if individuals are not self-aware of their burnout experience, they may not be interested in utilizing interventions to overcome their negative experiences (National Alliance on Mental Illness, 2022), impacting the usability and sustainability of interventions.

Reflection such as reflective writing, meditation, and debriefing, are effective in developing self-awareness and overall improvement of burnout (Harman, 2010). When investigating the transactional model of burnout, it is prominent that all three stages, including (1) job stressors, (2) individual strain and (3) defensive coping, are relative to the concept of self-awareness (Maslach and Leiter, 2016). That is, in the component of (1) job stressors, the Job-Demands-Resources (JD-R) model proposed that an imbalance between work demands and individual resources may contribute to (2) individual strain that can elicit an emotional response such as anxiety and exhaustion (Maslach and Leiter, 2016). It is theorized in the program theory (from the umbrella review) that decreased job stress awareness discouraged the use of resources; this is also relative to the concept of anosognosia and avoiding treatments (National Alliance on Mental Illness, 2022). Consequently, the lack of awareness and non-use of resources led to an automatic (3) defensive coping behavior and attitude such as increased cynicism, a component prominent within the gold-standard definition of burnout (Maslach and Leiter, 2016).

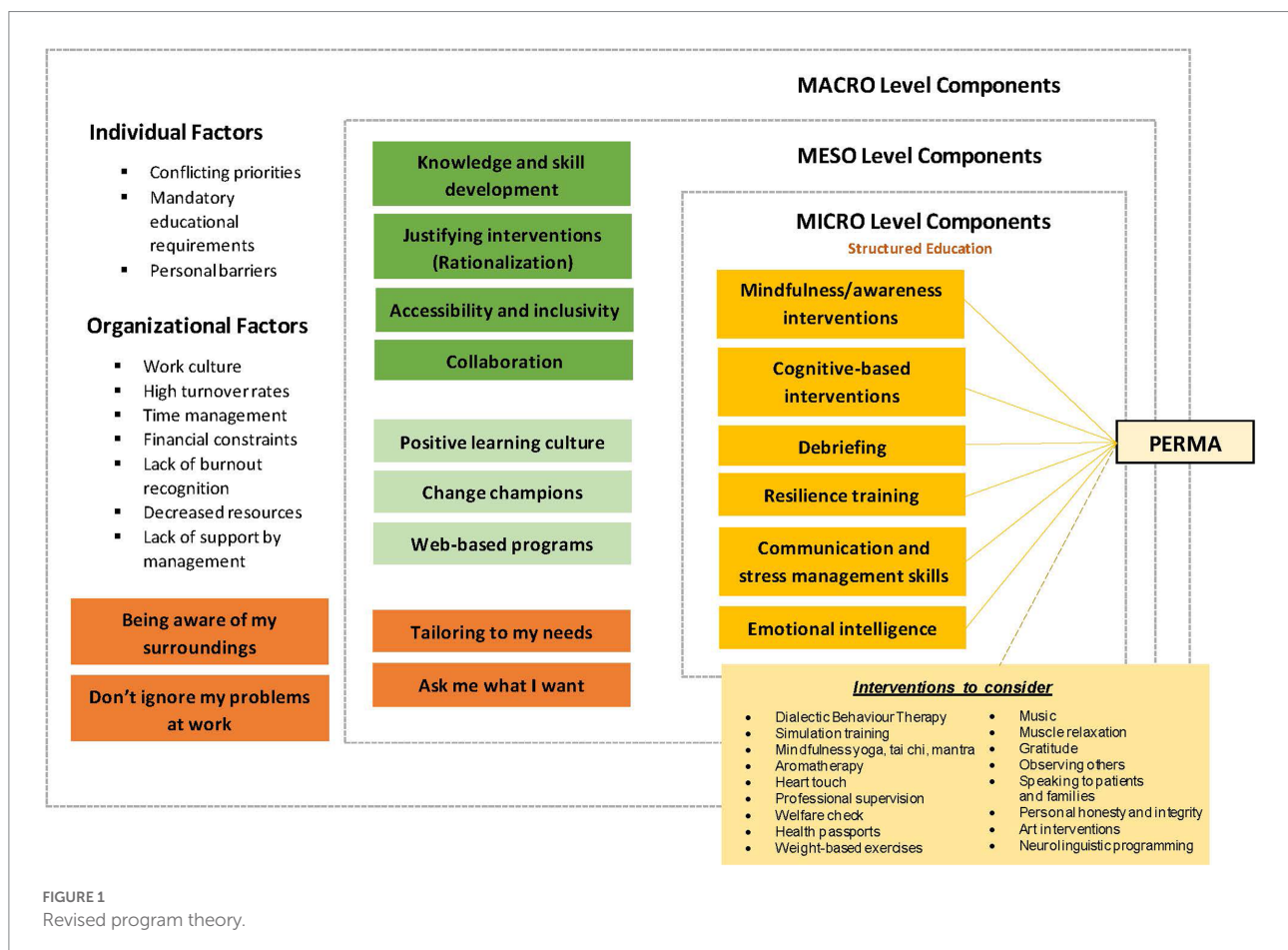
Evidence and credibility

A prominent opinion among experts included the notions that attributes of rationality and evidence-based knowledge in decision-making processes are often found among critical care healthcare professionals. Rationale decision-making is defined as a multi-step process that favors objectivity, logic, and analysis over insight and subjectivity (Prowle, 2020). Rationale behaviors are often referred to as a decision-making process that chooses the optimal level of utility or benefit for the individual (Lighthall and Vazquez-Guillamet, 2015). Although there were no identified studies that supported explicitly or opposed such claims, it is evident that there is a growing recognition of the applicability of intuitive strategies such as the heuristic and pattern recognition to be applicable within high acuity environments such as among critical care practitioners (Lighthall and Vazquez-Guillamet, 2015). The critical care workforce environment is recognized for its highly stressful and uncertain environment (Piquette et al., 2009). Healthcare professionals in this environment care for patients with few physiological reserves; hence, such professionals are forced to utilize and make timely and accurate decisions (Lighthall and Vazquez-Guillamet, 2015). Often, such decision-making is based on both the hypothetical-deductive model

and intuitive methods, creating a hypothetical framework for subsequent data collection and analysis and subjective experience and recognizing clinical patterns, respectively (Lighthall and Vazquez-Guillamet, 2015). Rationality falls into the intuitive method of thinking, where authors such as Djulbegovic et al. (2018) explained that in evidence-based medicine, actions and beliefs are justified by evidence trustworthiness and reliabilism (Djulbegovic et al., 2018). Therefore, if the evidence is of higher quality, calibrating the estimates of harms and benefits are enhanced (Djulbegovic et al., 2018) due to the premise that “rational people respect theory evidence” (Djulbegovic et al., 2009). This relates back to the results, where experts suggested that even though the proposed interventions provided logical and robust evidence on why or why not an intervention may work, the explanation of interventions lacked a depth of evidence and the exploration of physiological mechanisms. Thus, experts suggested that critical care health professionals would be captivated by interventions with strong logical evidence as it provided credibility and coincides with their thinking process. By providing solid evidence on the effectiveness of interventions, it provides strengths of evidence to appropriately consider the application of intervention within one’s life through the core principles of rationality—provides the autonomy to consider components such as benefits, harms, goals, reliability, probabilities, uncertainties, context, constraints, and ethics and morality (Djulbegovic et al., 2018).

Autonomy in assessment and judgment

The ability to provide evidence also facilitate the autonomous decision process of utilizing an intervention. Autonomy is a critical concept proposed both by experts and within literature (Wancata and Hinshaw, 2016; Wensing and Grol, 2019). Experts suggested that if interventions are enforced on the individual by higher authority, it is likely that interventions would not flourish and produce ideal well-being outcomes. Wancata and Hinshaw (2016) proposed that respecting an individual’s autonomy enable them to make the best decision for themselves, as they are the best judges of those interests (Wancata and Hinshaw, 2016). For example, a physician does not decide for their patient even though they possess a depth of knowledge that the patient may not have. Instead, the physician may guide the patient through the process (Wancata and Hinshaw, 2016). Likewise, both experts and literature such as Wensing and Grol (2019) and Miech et al. (2018) suggested that a key stakeholder or a change champion should “guide” the process of intervention uptake to enable successful implementation and utilization of the intervention (Miech et al., 2018; Wensing and Grol, 2019). The revised program theory is demonstrated in Figure 1, and its summary is located in Supplementary File 8.



Accessibility

Experts suggested that the component of accessibility to interventions is paramount to enable successful uptake. A combination of organizational and personal barriers impeded successful access and uptake of the intervention. Experts suggested that modifying the intervention to suit the individual's needs may be promising in minimizing such barriers. For example, integrating web-based instruments such as video conferencing and applications. [Hersch et al. \(2016\)](#) conducted a study using seven web-based intervention modules consisting of nurses sending emails describing their work environment's main stressors ([Hersch et al., 2016](#)). The nurses were then provided with directions on how to deal with the work stressor, which subsequently demonstrated overall improvements in stress management ([Hersch et al., 2016](#)). Another study that investigated the effects of web-based life skills education demonstrated improvements in burnout experiences ([Yektatalab et al., 2020](#)). [Heber et al. \(2017\)](#) compared the use of web- and computer-based intervention with face-to-face interventions for stress management and found no differences in the outcomes of depression or stress levels ([Heber et al., 2017](#)). However, the benefits of web-based interventions extended to their ability to have greater reach and facilitated a platform that reaches affected individuals at earlier stages of their burnout experiences ([Heber et al., 2017](#)).

Collaboration using co-production

Collaboration was also a significant theme raised during the interview, where experts suggested that individual interventions should be created based on the needs of end users—that includes seeking their advice on what would or would not work. Research suggested that it is currently widely acknowledged that stakeholder involvement is paramount to enhancing the quality of healthcare delivery ([Spanò et al., 2018](#)). Integrating the involvement of stakeholders within the planning and development stage of projects can facilitate the successful implementation of interventions and enhance sustainability and scalability within the healthcare workforce ([Lazo-Porras et al., 2020](#)). Moreover, the shared experience of co-production may leave a more beneficial and enduring legacy compared to traditional service development – often due to service user satisfaction ([Brook et al., 2020](#)). Co-production led to interventions that are more likely to meet end-users' needs through transparency, accountability, learning, responsiveness, and trust, all of which led to a more responsive organization ([Vanleene et al., 2015](#)). Although experts raised no limitations regarding the use of co-production of individual interventions, [Flinders et al. \(2016\)](#) suggested that factors such as the “rhetoric-reality gap” between the promised and delivered “co-produced” intervention was a significant impedance of successful utilization of co-production ([Flinders et al., 2016](#)). That is, despite the positive normative spirit of co-production, there exists a possibility where interventions may not meet the high expectations of end-users – often termed as an expectation gap ([Flinders et al., 2016](#)). Another significant gap in co-production

included the assurances of validity, how lived experiences can be translated into academic knowledge and what information may be lost in translation ([Flinders et al., 2016](#)). This is relative to the research objectivity and results, where the interests of researchers or partners can have an effect on questions asked in the co-production stage and the inclusion of information that may be deemed interesting or valuable ([Flinders et al., 2016](#)). Although limitations exist in the concept of co-production, experts proposed that the absence of co-production can decrease the utilization and sustainability of the intervention, as observed in many confounding factors within studies.

Strengths, limitations, and avenues for future research

This expert realist approach was able to determine the context, mechanisms, and outcome of individual interventions and understand why, how, and under what circumstances interventions may work among critical care healthcare professionals. It included a multi-disciplinary population enabling a robust representation of the nursing and medical workforce. However, it was not possible in this review to determine if questions directed to only psychologists reached theoretical saturation due to the inclusion of only two clinical psychologists. Nevertheless, expert interviews reached a point of theoretical saturation on all other questions.

As previously discussed, contextual factors such as work culture, high turnover rates, time management, and the lack of resources and support from management influenced how interventions are used within the critical care workforce. Determining the components of what makes the intervention useful and applicable for the workforce was beneficial for future applications within the “real-world.” Components such as ensuring interventions promote knowledge and skill development are evidence-based, accessible, inclusive, and take on a collaborative pathway were discussed as prime importance for critical care to accept and use the intervention. Future research, such as piloting individual interventions and integrating these theoretical findings may be promising to gain a greater understanding of its effectiveness for future translation and implementation in the “real-world” setting—potentially providing a unique evidence-based solution to improve well-being and decrease burnout among critical care healthcare professionals.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Flinders University Human Research Ethics

Committee (ID 4901). Verbal informed consent to participate in this study was provided by the participants.

Author contributions

NA, CB, HD, and DC: conceptualization, methodology, validation, formal analysis, visualization, and writing—review and editing. NA: writing—original draft preparation. All authors contributed to the article and approved the submitted version.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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