# SOCIAL CURE DURING COVID-19: THE ROLE OF SOCIAL CONNECTIONS, SOCIAL NETWORKS AND DIGITAL TECHNOLOGIES

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# SOCIAL CURE DURING COVID-19: THE ROLE OF SOCIAL CONNECTIONS, SOCIAL NETWORKS AND DIGITAL TECHNOLOGIES

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# A Perspective on Reprioritizing Children's' Wellbeing Amidst COVID-19: Implications for Policymakers and Caregivers

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The present work presents an analytical and investigatory view of the existing issues regarding COVID-19 with attention to children and their overall well-being during the second quarter of 2020. The authors conducted an extensive content analysis of media reports, government briefings, social platforms, and provide some recommendations to the policymakers and care providers for building more robust responses for the pandemic affected children. The article contributes to the existing field of study in the following ways. Firstly, the present manuscript describes the impact of COVID-19 on the psychosocial health of children. Secondly, the authors offered some outcome-based responses to policymakers and caregivers to mitigate the negative impact of the pandemic on COVID affected families and children. Thirdly, the article highlights the importance of social media, the role of storytelling, and using the concept of mandalas in handling the pandemic affected sensitive sections of the society. Lastly, the authors furnish some response initiatives to combat the novel COVID-19 pandemic based on real-world observations. These initiatives can influence policymakers as well as help caregivers to design efficient and adequate response programs for the pandemic affected children.

**Keywords: covid 19 (epidemics), children, psychosocial health and well-being, policymaker, caregivers', vulnerable sections**

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## INTRODUCTION

As the COVID-19 pandemic continues to ravage and spread in India as well as across the globe, it is increasingly becoming certain that the pandemic would leave a profound impact on mental health care (Jaspal and Lopes, 2020; Xiang et al., 2020) of the humankind. Not only in India, but the entire globe is experiencing the detrimental effect of COVID-19 on the psychological health of people (Gupta, 2020). The major psychosocial effect of this pandemic has resulted in school closures, lack of outdoor activity, aberrant dietary and sleeping habits which are likely to disrupt children's usual lifestyle and would strongly promote mental stress, impatience, annoyance, and other neurotic diseases (Ghosh et al., 2020). In the current reality of extended lockdown and movement restriction measures, children have been stripped of their access to socialization owing to school closures (UNESCO, 2020) restricted outdoor movements, and no physical contact with their peers. This may also lead to increased levels of frustration and anxiety (Idoiaga et al., 2020). Moreover, an increase in the use of digital and social media platforms especially among adolescents may also lead to such negative outcomes. It is also observed that COVID-19 has led to the emergence of new and unknown

stressors for adults as well as caregivers (Sun et al., 2020). This may inhibit their capability to provide care and remain effectively engaged with their children who are keen observers of their environments. Children may become aware of how their primary caregivers absorb and react to stressors in their environment which would unavoidably affect how they would react and would affect their overall well-being. Such a detrimental effect would be exponentially high among vulnerable families such as children who are deprived of parental care in childcare institutions or alternative care, children living in the streets, or children of migrants (Ghosh et al., 2020). Tracing from the literature, outcomes from public health emergencies have established a higher likelihood of an increase of violence (Mittal and Singh, 2020) including gender-based violence (Magnus and Stasio, 2020; Simonovic, 2020), domestic violence (Kumar et al., 2020) or corporal punishment against children and women. The present work focuses on assessing the significant impact which the current pandemic "is having" on children. The authors offer their views about the needs, circumstances, and experiences of vulnerable children and young people in this pandemic. The authors end with some suggestions for caregivers and policymakers to handle heightened issues of anxiety and pressure imposed on children because of the COVID-19 pandemic.

## METHODOLOGY

This study had reviewed several online research articles published, newspaper stories, government reports, and international organizations reports, using manual content analysis. It was a cross-sectional analysis that analyzed the English media reports and journal articles released in the time frame between February 2020 to August 2020. The authors had developed a standardized format for data collection. The authors searched the internet using the keywords such as "pandemic affected children," "domestic violence during COVID 19," "parenting during COVID 19," "mental health of caregivers," "quarantine," "lockdown," "public policy" and "physical literacy" and their combinations. Both authors performed data management and cleaning. The cited articles are selected based on their relevance in themes identified as the authors deem fit. Most of the articles cited are from renowned publishers like Elsevier, Emerald, Sage, Springer, Taylor and Francis, and Wiley. The selected research papers were not limited only to India but also from the United States, United Kingdom, and Europe to gain an international view of the topic. As the researchers analyzed the papers already written, there was no need to get the formal ethical clearance for citing them. The key themes identified and discussed included COVID-affected families and children, the quarantine issues in public health, and the detrimental effect of COVID 19 on disabled children.

## COVID-19 Detrimental Health Effects on Children and Family Dynamics: A Snapshot

Global statistics have shown the far-reaching consequences and effects of the current pandemic. Such effects are evident in a survey that posited that during the month of April, 70% of women have assumed the sole responsibility of their households and 66% of women are the primary caregivers of their children (New York Times, 2020). Such figures are preliminary examples of how COVID-19 has impacted societal family dynamics. Similarly, some reports have noted significant negative disruptions caused by COVID-19 to crucial areas such as vaccination, nutrition as well as children's health services in general (Shen and Yang, 2020). Such reports seem to suggest that over the next 12 months, South Asian countries might see more than 800,000 deaths of children aged five and under. Similarly, they project a death toll of 36,000 mothers. Most of these deaths would be accounted for by India and Pakistan (UNICEF, 2020). Projections also signal that countries such as Bangladesh and Afghanistan could face a high mortality rate (The New Indian Express, 2020).

Psychologically, it is evident that the disruptions to normal life brought about by the current pandemic have rendered children more prone to experience heightened levels of stress and anxiety (Restubog et al., 2020). It has been suggested that statistically, susceptibility to such adverse psychological effects is incrementally high among age groups from 2-year old to adolescents (Singh et al., 2020a; Singh et al., 2020b). With regards to the current pandemic, children might ask themselves if they would lose their loved ones due to COVID-19 which ultimately would lead to an immense level of stress as well as an inability to effectively regulate their emotions. A survey on doctors indicated that medical professionals believe that the psychological toll of COVID-19 on children would far outweigh any physical illness because of this virus (The Hindu, 2020). There is an urgent need to implement strategies that would ensure the good mental health of children during these trying times (NIMHANS, 2020). Jiao et al. (2020) in their study in China identified the presence of psychological problems in children amidst the COVID-19 pandemic, such as fear, clinging, inattention, and irritability. Further, it is estimated that because of the sudden changes happening globally, at least 65% of children are now addicted to electronic devices (Perez, 2020). To add on to this, some children have started exhibiting rebellious behavior that includes not listening to their parents, anger outbursts, increasing frustration, and so on (Times of India, 2020). Thus, children in these families may feel less understood by their parents and may respond in a more rebellious manner (Pinquart, 2017). Moreover, because of this, there is an alarming fear that there would be increased incidents of cyberbullying as COVID-19 would push more children to engage in online interactions as a coping mechanism (Readers Digest, 2020). There is an immediate need to develop social policies that would markedly improve the lives of children (Idoiaga et al., 2020). Such policies would need to bridge the gap between what exists between the role schools were playing in socializing children and how they integrated into society. As the learning process is fast becoming virtualized, there is a serious threat that this may affect peer to peer association, teacher-student association as well as the community overall. As such, there is a risk that children would negatively react to this new reality (The Wire, 2020). Similarly, with the global movement of people which

has been prominent in the last 20 years, it is estimated that the current lockdown conditions in most countries would inexplicably affect the lives of first-generation immigrants as well as their children (Economic Times, 2020). This is projected to be the result of their children's inability to access opportunities to learn, practice, and socialize in their second language outside of their homes. Also, it is projected that there would be an increase in domestic abuse cases due to living in overcrowded accommodations. This would lead to children being witnesses to grave acts of violence, thereby affecting their mental well-being. (BBC, 2020).

## COVID-19 Impact on the Health Situations of Vulnerable Children: An Overview

It is worth noting that lockdowns and social distance interventions are likely to disrupt transport networks and supply chains (Chaturvedi et al., 2020). It is going to present a challenge to ensure food security and to monitor already widespread malnutrition among children leading to increased mortality among infants and children (Khanna, 2020). Apart from the impact of the COVID-19 outbreak on children's well-being in general, a specific group of children, such as teenage girls, may be more vulnerable to the damaging impact of the pandemic (Kumar et al., 2020). It is because when they are kept within confines to abusive environments owing to the current pandemic situation, they would not be able to escape from their abusers. Statistical data from activists and survivors from different parts of the continent (e.g., Brazil, Germany, China) have voiced concerns that they are already witnessing an alarming increase in abuse cases (Campbell, 2020; Godin, 2020, WHO, 2020; Women, 2020a, Women, 2020b). As highlighted earlier, these measures push children to be dependent on electronic devices for socialization and thus more prone to sexual abuse or sexual exploitation (Kumar et al., 2020) as they may not be under constant adult supervision. According to the National Herald (2020), COVID-19 has also impacted homeless children. These children confined themselves to restricted spaces where they are unable to go out and play (Jiloha, 2020). It puts them at risk of being physically and emotionally abused (Grechyna, 2020). In addition to this, it also includes children with physical disabilities, for instance, children who are deaf are even more vulnerable than their peers (The Guardian International Edition, 2020). Young children with disabilities observed were having heightened responses to traumatic events of the current pandemic. It might have several negative impacts on disabled children, such as increased worry, distress, and a feeling of losing control, to name a few (Jiloha, 2020). Such detrimental effects are usually long-term in children with emotional or intellectual limitations who require additional care who might not be able to have access to them because of the current situation.

Therefore, there is an urgent need for governments to ensure adequate measures that would mitigate the negative impact brought about by the closure of academic institutions (Mukhtar, 2020). Such measures must include safeguarding the health and well-being of students (Dharmshaktu et al., 2020) and staff members and aim at reducing the stigma of the coronavirus (Singh et al., 2020a; Singh et al., 2020b). The authors have tried to give some suggestions to the policymakers and caregivers in the following section to tackle the current situation.

## Suggestions to Policymakers and Caregivers for Handling the Psychological Impact of COVID-19 on Children

There are a variety of ways in which children may react to the current reality. These may include adverse psychological distress, angry outbursts, and hyperactivity to name a few. Therefore, primary caregivers must pay close attention to their children to understand how their emotions are constantly changing during this tough period (Chaturvedi, 2020). Also, care should be taken to maintain active routines and schedules to help children to manage their time and avoid disruptive behavior because of witnessing violence or being victims of abuse. There is also a need for early psychological intervention and informative interactions that inform children that nobody should be abused or stigmatized for having any illness (Singh et al., 2020a; Singh et al., 2020b). More importantly, the number of time children spend on online platforms should be supervised and limited as they may be exposed to distressing information. Caregivers should also consider including mental health professionals to assist in addressing the anxiety that children may experience when there is a death or illness in the family.

## Prioritize "Physical Literacy" for the Vulnerable Children Amidst COVID-19

Summarily, there are priority actions that are urgently needed across different sectors working along with governments to ensure effective vulnerable child protection-sensitive response. In several nations, a recent phenomenon known as physical literacy is now well known (Shahidi et al., 2020). As defined by Whitehead, 2001, "Physical literacy refers to the confidence, competence, motivation, knowledge, and understanding to value and take responsibility for engagement in physical activities throughout the lifespan" (cited by Brian et al., 2019). The development and maintenance of physical literacy are of vital importance for disabled children (Pohl et al., 2019), who are under-represented and vulnerable during this pandemic. The policymakers and caregivers can do fun interventions for disabled children, for instance, the circus arts program to keep children active and mentally engaged during this pandemic (Kriellaars et al., 2019). In addition, many digital channels provide disadvantaged children with programs. For example, the Canadian "PLAYBuilder" platform is a cloud-based framework that offers activities to help children stay active and aware during a coronavirus pandemic while they are at home (https://sportforlife.ca/). "Appetite to Play" is another online program in Canada aimed at encouraging and enhancing good health and early childhood physical activity (https://www.appetitetoplay.com/). Along with this, caregivers can ensure the availability of standardized and effective procedures for documentation and referral processes for

children between different sectors to enable children to access adequate and appropriate services. For instance, New Zealand has pioneered a social bubble model, allowing a given group of people to have close physical interactions and to practice physical separation rules with those outside the group (Long et al., 2020). This method allowed the start of the lock-down family bubbles to progressively be expanded to small and specific groups of family and friends and to be further activated. This concept was sponsored by the United Kingdom nations and since June 2020 a similar bubble support arrangement has been introduced.

## Reduce the Risk of Segregation and Stigmatization of COVID-19

It is recommended to the caregivers to avoid using a vocabulary that has negative connotations that may increase stigmatization; for example, to avoid adding a position or ethnicity to the disease, not to mark patients as victims or COVID-19 cases, but to classify them as "people who have COVID-19" to speak about "acquiring" or "contracting" the disease, and not to use a phrase that may increase stigmatization. It is further advised to educate kids about stages of corona when it is communicable and when not communicable to create proper awareness. Since we know that children have lower personal resources to cope with the many changes that the pandemic poses on their lives (Liu et al., 2020) and recommendations say that parents should address and clarify the situation with them so they have the right awareness of what's going on. And the causes of the constraints that kids encounter are essential to the prevention of harmful psychological effects (Dalton et al., 2020). But how and when to do so is left entirely up to the parents' decision. We might believe that more depressed parents may be too distracted by the situation to find effective ways to be a caring figure for their children and to find the best ways to resolve children's problems and concerns (DiGiovanni et al., 2004). When kids do not find responsive responses from adults to their concerns, they may experience more anxiety, signs of more emotional and behavioral issues as well as a loss of focus, and difficulty in concentrating. Child healthcare providers should provide parents with an awareness of, for example, how children at various ages communicate anxiety and the value of expressing and communicating about worries and negative emotions (Dalton et al., 2020). In this way, even less resilient and more depressed parents can be encouraged to find ways to recognize and nurture their children (Belsky, 1984; Coyne et al., 2020). Besides this, policymakers should create strong and harmonized child-focused messages in the community about children's risks and vulnerabilities about disease outbreaks as per global recommendations (Clark et al., 2020) because it is seen that a similar zoonotic disease known as Brucellosis is spreading to humans in Lanzhou, the capital of Gansu province (The Tribune, 2020). It was first discovered in November 2019. By the end of December, around 181 people at the Lanzhou Veterinary Research Institute had been infected. Therefore, it looks like these zoonotic diseases would keep impacting human lives forever. These disease outbreaks had provided checklists for supervisors, instructors, parents, and children. The checklist includes empowering children to ask questions and to voice their concerns. For example, the safe school guidelines introduced in Guinea, Liberia, and Sierra Leone during the outbreak of the Ebola virus from 2014 to 2016 helped reduce school-based transmission of the virus.

## Encourage Joint Media Engagement (JME) Between Children, Primary Caregivers, and Parents During COVID-19

One way to share COVID-19 related knowledge with children is through illustrated eBooks. A variety of organizations such as St Jude's Children's Hospital and Oxford Press, health practitioners such as Block and Block (2020) involved in helping children in these difficult times have designed free eBooks for children. Children's educational media, such as television shows, short films, games, eBooks, etc., may be used as resources to promote discussions between children, families, and educators about the COVID-19 pandemic and other circumstances where health-related knowledge can be daunting for young children. From the theoretical lens of Joint Media Engagement (JME), this relationship between adults and children around the use of media can be examined. Stevens and Penuel (2010) say that JME applies to the mutual experiences of people using natural or design media together. JME can happen anytime and wherever there is contact between the media and multiple people. JME experiences can include watching, playing, searching, reading, and making, using digital media (ebooks, games, coding, etc.) or traditional media (books, radio, television, etc.) JME would make it easier for all participants to make sense of specific circumstances. For instance, parents and children watching television together, children involved in Minecraft as a group of friends are some examples of JME. Some researchers concentrated on home-based JME between parents and children (Penuel et al., 2009), while others concentrated on child-to-peer JME (Niemeyer and Gerber, 2015; Tissenbaum et al., 2017). Tiwari (2020) wrote an interactive children's e-book titled 'Q-Bot the Quarantine Robot' which interacted via social media (Facebook, Instagram, and Twitter) in conjunction with parents and faculty. ILS Q-BOTO is the story of a 40-pin robot that was built to make people feel relaxed and happy during the COVID-19 pandemic quarantine. This story gives details on the best health and hygiene practices to prevent the capture of the virus.

## Using the Concept of Storytelling and Mandalas for Psycho-Social Wellbeing of Children Amidst Pandemic

Due to COVID-19, the imbalance of psycho-social wellbeing in children must be taken care of in a more cautious way than earlier. The caregivers should focus on not making the conversation scary or fear-based for the child. This can be done by using the concept of storytelling. They can ask children to create stories on the prevention of COVID-19 using their cartoon characters and do role plays. Caregivers and parents can weave stories about learning the difference

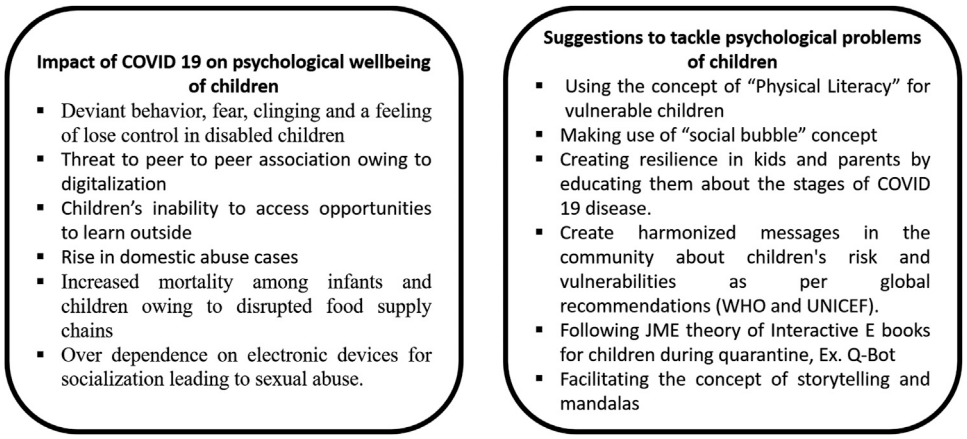


**FIGURE 1 |** A breif pictorial representation of the psychological problems of children during COVID-19 and their remedical measures.

between real and fake news. The caregivers can also work to restore the mental and emotional balance of children's minds by "using mandalas." Mandalas have a very hypnotic appeal in their circular form, which catches the attention and soothes the mind instantly. They mimic flower-like shapes in nature–and heals our minds because of spending time in natural surroundings. The use of mandalas has a beneficial impact on children's well-being as their brain reacts to geometric form shifts. For children, mandalas and animals in combination can work well for restoring their harmony amidst this lockdown owing to the COVID-19 pandemic.

## CONCLUSION

This paper offer insight into the current state of psychological health of children amidst COVID-19 (**Figure 1**). As societies move toward a new normal, with technology, remote working, and learning, caregivers and policymakers ought to adopt provisions to support families, regulate virtual platforms and fortify services as they work to safeguard children from all forms of violence. Caregivers and policymakers must build a strong response plan to tackle the psychological problems of pandemic affected children. The authors have presented the main findings of the paper in **Figure 1**. The authors have suggested that using the concept of "Physical literacy" through digital platforms for enhancing the physical activity of disabled children can work well. The paper also recommends caregivers to encourage more frequent communication with parents as well as children through e-books using the concept of JME. Moreover, caregivers should reduce the risk of segregation and stigmatization of COVID-19 by using positive language to communicate with children. Lastly, the authors showcased the importance of storytelling and mandalas for building the psychosocial wellbeing of children amidst the pandemic.

## ETHICS STATEMENT

The study did not include any human participants. Therefore no review or approval was required from REVA University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## AUTHOR CONTRIBUTIONS

SC and TP contributed to the conception, structure of the paper, and interpretation of available literature. SC contributed to the development of the initial draft. TP reviewed and critiqued the output for important intellectual content. All authors contributed to the article and approved the submitted version.

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# Technology: Saving and Enriching Life During COVID-19

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The pandemic of COVID-19 has arrested the life of 7.8 million people living on this earth. However, some people are more vulnerable to the risk of this deadly virus. The frailty of senior citizens put them at the top of this list. The past 6 months have not only presented a threat to their physical health but to mental health also. Although lockdown was necessary to check the spread of the coronavirus it culminated in an exponential rise in the problems of loneliness, anxiety, fear, helplessness, and depression. The present paper reviews the role of social networking sites, apps, and other digital platforms in saving and enriching the lives of the elderly, especially those who spent the lockdown alone and were devoid of a regular support system due to unavailability of transport and administrative restrictions on the movement of people. It also analyzes the efficiency of the virtual world in reducing their anxiety of being alone by connecting them with others and also make them feel empowered. The review is based on the online data collected about the insurgence in the percentage of elderly people using such platforms, recent studies analyzing the effects of the COVID 19 pandemic on senior citizens. Besides this personal telephonic discussions were conducted with some elderly people who spent their lockdown alone in their homes. The study was primarily focused on three objectives. Firstly it attempts to understand the ways in which senior citizens made use of social networking sites and various digital platforms for managing life better. Secondly, it analyses the process of adopting technology, and finally, it examined the width and depth of the impact technology created in their life and also the permanence of this change. The analysis clearly suggests an increase in the digital life of elderly people. The process moved in distinct stages from utter confusion to relative ease in using technology, thereby significantly reducing the loneliness, and bringing relatively stable change in the way they lead their life.

**Keywords: social network site, COVID-19, elderly, senior citizen, loneliness, digital payment**

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## INTRODUCTION

The pandemic of COVID-19 has arrested the lives of 7.8 million people living on this earth. After discovering the first infected case in Wuhan, China, in December 2019, COVID-19 has spread beyond China, Asia, and the rest of the world, raising an unprecedented public health problem.

The World Health Organisation (WHO), on March 11, 2020, announced COVID-19 as a pandemic, and as of March 24, 2020, more than 3.5 lakhs cases were confirmed, and more than

14,000 deaths were registered, affecting 190 countries worldwide (WHO website dated March 24, 2020, at 9:00 p.m. Indian standard time) (Coronavirus, 2019). These figures have exponentially increased to about 27.19 lakhs cases with about 1.9 lakhs deaths in 1 month time (WHO website date April 25, 2020, at 05:30 p.m. Indian standard time) (Holmes, 1999).

In response to "flatten the curve" and curb the community spread, In India, a national level "lockdown" was declared starting from midnight of March 25, 2020, initially for 21 days, which was later extended up to May 3, 2020 (The Lancet, 2020). "Lockdown" is an emergency protocol that restricts the public from traveling from one location to another. However, complete lockdown ensures that people remain where they are presently, and the government will permit no entry/exit motions. Although lockdown proves to be a powerful and effective technique to counter the increasing spread of the highly contagious COVID-19 virus, the key side effect of lockdown is that it exacerbated psychological well-being among the citizens. The popular slogan of "social distancing," which refers to physical distancing among individuals in social settings, gradually ushered people toward loneliness. Social isolation and quarantine, the primary treatment measures adopted, increased the psychological distress among patients and their caregiver manifolds. This results in significant mental health problems ranging from anxiety, fear, sense of loneliness, depressive symptoms, anger, sleep disturbances, etc. Similar findings were reported on SARS (Severe Acute Respiratory distress Syndrome) patients when they were kept in isolation (Reynolds et al., 2008).

However, the level of risk and distress people suffered from was of varying degrees. According to a survey by the US Centers for Disease Control and Prevention (CDC) in March 2020, more than 80% of deaths have been reported in patients over 65 years of age, indicating vulnerability of the elderly to the virus (Bialek et al., 2020; Li et al., 2020). The picture is largely the same in India also. According to the WHO data elderly (above 60) account for 51% of the 1,48,153 deaths in India (Guitton, 2020). Because of this, it is most likely that others might avoid meeting them, which further aggravates the consequences of social distancing. Santini et al. (2020) further verified this fact; they recently demonstrated that social disconnection puts older adults at an increased risk of depression and anxiety.

From a technological perspective, the COVID-19 pandemic has provoked massive, immediate switching to online platforms. With unprecedented changes in population use of digital technologies and media (Guitton, 2020), the digital platform's status changes from an amenity to a priority; not only are they the primary means of accessing information and resources, but they are also one of the only surviving routes for physical, educational and leisure activities and also for social interactions. This change is observed in all sections of the population, especially people who are in their 60s. In India, 25–30% of senior citizens are now active on the internet as compared to the 6–8% active users 6 months ago (Statista). This is an exponential rise in the number of users in this age group. A lot has been said and written to describe the increasing digital literacy among the elderly. However, a systematic and comprehensive study examining the interactive influence of the pandemic and technology on the life of the elderly is still needed. Precisely it would include the analysis of the functional utility of technology for neutralizing the physical and psycho-social risk of infection on the one hand and the compelling effect of a pandemic that broke the techno-resistance in the mind of people and ushered them to new normal away from their conventional way of doing things on the other. Therefore, a small qualitative study was designed, which primarily focused on three objectives. Firstly, it attempted to understand the ways in which senior citizens made use of social networking sites and various digital platforms for managing life better. Secondly, it analyzed the process of adapting to technology. Finally, it examined the width and depth of the impact technology created in their life and the permanence of this change.

## MATERIALS AND METHODS

Suitable participants were identified through convenient sampling and contacted over the phone. The objectives of the study were explained to them and their consent was taken. Proper appointment was fixed for the interview at a suitable time when they can easily spare 30 min for the interview. Special attention was given to rapport building before actual questions were asked. Interview was conducted on a video call connected through whatsapp and their responses were noted verbatim by the researcher. It started with simple questions about themselves and their family like their name, age, and residence to warm them up and also to make them comfortable before actual questions were asked. Familiarity with and use of technology is not a tabooed topic to talk about so it was not difficult at all to get responses. In fact, respondents enjoyed discussing various issues during the interview, which shows their positive inclination toward the interview. The scripts were later on analyzed for the basic issues raised in the study.

### Sample

In view of the objectives elderly people living all alone or with husband/wife at least for 5 years were identified. While selecting the sample it was ensured that (a) they have spent the whole lockdown away from their children and other members of their extended family, (b) they had access to smart-phones and laptops/desktops, which are the essential tools for entering into the virtual world. Convenience sampling method was used and 20 participants were included in the sample. Males ($n$ = 10) and females ($n$ = 10) were equally represented in the sample. Age ranged from 58 to 65 years. As the sample was selected through convenience sampling, especial care was taken to ensure the external validity of the sample. Participants were selected from five different states (i.e., Delhi, Rajasthan, Kerala, Uttar Pradesh, and Bihar) and 11 different cities (i.e., Varanasi, Mirzapur, Deoria, Ballia, Patna, Kushinagar, Gorakhpur, Trivendram, Jodhpur, Ghazaibad, and Delhi) of the country.

Participants came from diverse professional backgrounds. Among the female participants six were home-makers, two were

Post Graduate teachers in government schools, one was working in the private sector and one retired teacher (govt. School) was there. Among male participants five were retired from various government offices and five were in jobs. Out of these five, one was Sub-Inspector Police, one was a manager in Life Insurance Corporation, one was a contractor, and two were bank employees. When asked about their SES they all reported their monthly income between 40,000 and 100,000 INR.

Information about current health status revealed that 12 participants were suffering from problems like high blood pressure, diabetes, thyroid and goiter but they were functional enough to do their daily job. None of them were suffering from any serious or terminal illness. The participants were never found infected with COVID-19 during the lockdown.

### Instrument

This is a small qualitative study based on narrative approach where narratives were generated through a structured in-depth interview having twenty questions to understand the importance and use of electronic devices, digital payment methods and social networking sites in the life of senior citizens during the lockdown. Interview also focused on the way various social networking sites and digital payment apps helped senior citizens to manage their lives during this lockdown.

### The Interview-Schedule

An interview-schedule was developed to get a deeper insight into the impact of COVID-19 on the lives of elderly and its proper management with the use of technology. Core issues addressed by the interview were (a) familiarity with technology, (b) reluctance to technology, (c) difficulties in initiation, (d) functional utility of technology, and (e) long-term capacity building. Initially thirty questions were written. Thereafter based on elaborated discussions twenty questions were retained for their clarity and scope to elicit responses. The schedule contains twenty questions. The first section has five questions devoted to assessing their relationship with children. For example, how frequently do your children visit you? (Q. no. 3) and how much emotional support did you get from your children during the lockdown? (Q. no 5). Next section also had five questions related to the familiarity and utility of technology in daily life before COVID-19. For example, whether technology was a part of your life prior to COVID-19? (Q. no. 6). Have you used any digital payment mode prior to COVID-19? (Q. no. 9). Section three was devoted to understanding the reasons of resistance to technology and difficulties faced by the participants when they started using it. This section contained two questions viz., why didn't you use social networking sites/online shopping/payment before? (Q. no. 11) and when you started using these online platforms what were the difficulties or challenges that you faced? (Q. no. 12). Section four had five questions that gather information about the various usage of these online platforms during the lockdown. Sample questions are which social networking sites have you used to connect to your family? (Q. no. 13) or how these online platforms helped you reduce your anxiety and loneliness during lockdown (Q. no. 16). The last section had three questions. Q. 18 asked participants to describe their journey of learning and using technology. Q. 19 will you continue using these online mechanisms even after lockdown. Unlike the other questions, Q. 20 asked for direct comparison of seven important aspects of participants' lives pre and post lockdown on a five-point scale, where 1 represented minimum and 5 represented maximum. These were (i) friendliness of people around, (ii) confidence in using technology, (iii) connectedness with people around, (iv) experience of self-sufficiency, (v) level of self-esteem, (vi) level of mental alertness, and(vii) overall mental health.

Questionnaires were initially prepared in Hindi but considering the wider regional coverage in sample selection the questions were translated in English as well using the translation-back-translation method for the convenience of respondents.

## RESULTS

Content analysis of the transcripts started with examining the quality of participants' relationship with their children. This is an important factor determining the level of loneliness in elderly. Responses revealed that most of the participants were living alone for 5 years or less than that. Couples are living alone because their children are out for job/studies or are settled at a distant place after marriage. Participants reported regular visits of children before lockdown. The frequency of visits varies from once a week to once in 6 months depending upon the distance between the places they reside. During lockdown the children were continuously in touch with their parents over phone, WhatsApp, and video call. No history of family conflict or broken relationships was reported by anyone of them. So, living alone is due to situational constraints not because of any family dispute or broken relationships.

## Familiarity With and Reluctance to the Technology

Familiarity with digital platforms or technology refers to the knowledge of availability and functional utility of these things and does not necessarily include first hand use. Reluctance to technology refers to the reservations of participants for using communication technology, e-commerce sites, digital payment modes and social networking sites over other conventional methods of doing things.

While examining the familiarity of participants with the digital world that there were two levels of this familiarity. First was the familiarity with the tools and second was the familiarity with the software. Participants started their narration by saying that they have smart phones and laptops. When asked about their usage the most common response was that they use smartphones to make voice calls, video calls, and send WhatsApp messages. Six of them had their Facebook accounts also but were not very active on it except one who was the Sub-Inspector in the police department. So, there was a clear preference for communication technology over e-commerce technology. Participants were also using professional softwares relevant to their jobs. For example, the banker was working

with the banking software, the LIC agent was using his office software. However, there was no such techno-dependency of other participants.

Incidental use of online shopping and digital payments was reported. when asked about the ease of online shopping, which saves time and energy, participants said that local shopkeepers also give doorstep delivery. "We order routine stuff (especially grocery, fruits, vegetables, milk, bakery items) over phone and shops would deliver and we can pay them in cash."

### Reluctance to Technology

The reasons for this limited use of various digital/online tools were (a) face to face interaction was preferred over the virtual mode, (b) fear that is not safe; financial transaction is risky even sharing information on Facebook has a risk of unwanted use of personal details (c) difficult to understand, icons were confusing (d) could not find enough time to learn, (e) didn't feel a need to use technology, (f) children would do the things for us, as they don't find time to teach these things, (g) online shopping is difficult as we cannot try product before buying, the color, texture, and quality can be judged better if you see it. (h) what if the company doesn't pick up the product we want to return, (h) it takes a lot of time to get the product online whereas we can directly purchase it from the market. One of the participants was not using technology at all. So, it can be said that these people were familiar with the available online options but these options were not much preferred over the offline options.

## Difficulty in Initiation

All of them have started using these things during lockdown. however, the process seemed to be fairly difficult to initiate. Participants reported that it was confusing and difficult to understand. There is an unknown fear of things going wrong, instructions and options written in English were not clear to them. They didn't know how to change the language. Operating a smart phone or laptop was not so simple for them. The situation was even more difficult for those in job because they had to accommodate the professional requirements that too with the newly learned technology. There was no one to help them learn these things. Children instructed them over phone, which was not enough. Some of them tried to see YouTube videos to learn using technology.

### Functional Utility During Lockdown

People used online platforms for (i) making video calls and talking to friends and relatives, (ii) buying things/medicines online, (iii) financial transactions, (iv) official meetings, (v) learning new things on YouTube for managing one's leisure time. Facebook, WhatsApp, and YouTube are the most used sites. Some people have used zoom meeting app also. Almost all payment methods have been explored including Google pay, UPI (Unified Payment Interface), net banking, Paytm, Phone pe etc. participants used Amazon, Myntra, and Flipkart to buy things but it is largely combined with offline shopping especially for Grocery, fruits, vegetables, milk, and milk products. Only two participants said that they used online shopping to buy these kinds of stuff. Others preferred to buy these things offline. Either they go to the market or they ordered it on phone and the shopkeepers delivered it or there were some arrangements made by the local governing bodies to ensure proper distribution of these things in every locality. Participants reported that they had not required online medical consultation apps. If any such thing was required, they called their doctors and managed to get the prescription. Instead, they used online platforms to buy medicines other than ordering them on phone. They also said that SNS and other online platforms helped to overcome anxiety and loneliness as it was a nice way to spend time and learn something new and fruitful. Online shopping was an interesting experience. We could talk to family members and relatives over a video call, which reduced anxiety to a great extent as we could see them and discuss things with them.

### Long Term Capacity Building

All the participants reported that they will continue using technology even after COVID is completely over. They all described it as a journey of learning new things. They say that they are still in the learning phase. It was full of knowledge but difficult too. A direct pre- and post-lockdown comparison revealed that (a) people perceive people around them as less friendly than before COVID, (b) they felt more confident in using technology, (c) there is a slight increase in social connectedness, self-sufficiency, and self-esteem after lockdown and (d) the level of mental alertness and mental health was almost the same before and after lockdown.

# DISCUSSION

The present study was taken up to understand how SNS, digital payment modes, online shopping, and various apps help senior citizens manage their lives well during the lockdown.

The first step toward understanding the matter was the assessment of the participants' awareness of the availability and functions of these things and then to have an idea of the use of technology in daily life. Here the familiarity with technology and reluctance toward its use both are high. This means the unavailability of gadgets and the internet is not the only reason for its limited use by the elderly; psychological factors are also important. The apprehension of things being messed up or becoming a victim of online fraud while using a digital payment system or perceived inability to learn something new or the mindset that the conventional methods are better than the digital ones all are psychological factors that need to be addressed before elderly can become active users of technology. Similar findings were reported by studies carried out in the US and other European countries also (Yuan et al., 2016). These studies (e.g., Marquié et al., 2002; Selwyn et al., 2003) identify several non-cognitive factors such as lack of interest, perceived redundancy of technology, fear of computerization, negative attitude toward spread of technology, and lack of confidence as potential deterrents for using technology.

However, the sudden lockdown and the fear of contamination by the deadly CORONAvirus put the elderly under strict social isolation (Chen, 2020; Jordan et al., 2020; Niu et al., 2020). The fact that Information and Communication Technology was the only way to maintain contact with the outer world motivated them to practice what they knew. Examining the pattern of use reported by the participants clearly showed their inclination for communication technology. The technology was most frequently used to contact children and other family members living in distant places. Video calls took over the audio calls, and various online meeting apps like Google Duo and Zoom were also used for making family calls, which were like family reunion events during the lockdown. These platforms were also used for professional meetings with colleagues by those who were on the job. The two teachers in our sample used these platforms for taking classes in the new normal. The next preferred online service was digital payment. The participants explored different payment modes like G pay, Paytm, PhonePe, and other banking apps. For shopping of utility items, the trend was mixed. Participants preferred shopping the groceries and milk products from local shopkeepers over the phone, whereas other items were ordered on e-commerce sites. Amazon, Flipkart, Myntra, Snapdeal were the sites most commonly cited by the respondents. Unquestionably, the Information and Communication Technology was the biggest savior during the COVID-19 pandemic. However, it was not a smooth shift to the new normal from the conventional methods for most of us, especially for the elderly who had their reservations about technology use.

While talking of the difficulties in learning/using technology, the participants' most common problem was the lack of a proper support system. Children and other family members usually lack time and patience to match the learning pace of the elderly. Online aids are not easy to explore, and they also fail to accommodate the special needs of the elderly (Berkowsky et al., 2013). However, the extraordinary circumstances of the pandemic played a significant role in sensitizing people about this issue. Children themselves became the biggest motivator and instructed their parents over the phone about how to use a particular application. Number of specially tailored Youtube videos demonstrating the use of these things also increased manifolds.

The use of online platforms compensated for the face-to-face interaction with family and friends on the one hand and also enhanced their self-sufficiency, confidence, and self-esteem. The mechanism was also fascinating. After a certain age, when the elderly do not remain very open to new things and become confined to the conventional ways of doing things, they somehow become dependent on their children for (i) information, (ii) decision-making, and (iii) execution of that decision. The use of online services made the state-of-the-art information available at their doorstep. It simplified the exchange of information and facilitated discussion about a service or product with similar others, thereby helping them make proper decisions. The availability of various online shopping platforms, digital payment modes, and online apps like Urbanclap, on which they can book various services online, has made life easy. Availability of medical consultation apps like Practo that gives a package of consultation, diagnostic testing, and allied services like physiotherapy has reassured them easy access to all required facilities without dwelling into the hassles of going to the hospital everyday health problems. Mynatt and Rogers (2001) also highlight the importance of using technology in the "functional independence" and "independent living" of the elderly in their houses.

Few participants who were very new to the online world reported that they have started using SNS and online services, but they do not do it themselves; instead, their husbands have learned to use these things, and they do it for them. Maybe getting good experience and watching others using technology is the first step for overcoming resistance to it. Responses suggest that in the future, they would like to give it a try.

Findings reveal vivid uses of the technology and reaffirm the virtual world's efficiency to manage real-life crises. It gives very useful lessons to facilitate the diffusion of technology in the larger society, especially in those pockets with their own specific needs like remote rural areas, young children, females, and senior citizens. This also allows assessing the extent to which hiatus of the real world can be compensated by the virtual world, at least to some extent. It was a practical demonstration of the saying "there is no age to learn." For example, Facebook can help get help from people around in the hour of need when you stay away from your family. SNS gives an excellent method of talking and expressing oneself, which is a healing mechanism in itself. This is especially true for the elderly population, who often suffer from being heard of. This is substantiated because participants were happily talking to their distant relatives who were not in touch for a long time.

Moreover, this learning exercise has the immediate benefit of adding knowledge and skills and has a long-term benefit of keeping their brain active, reducing the risk of dementia and other age-related cognitive deterioration. This fact is reiterated on many occasions by many institutes working with the mental health of the elderly. The National Institute of Ageing, United States, emphasizes the importance of continuous stimulation of the brain through various sensory modalities, and learning something new is the best way to do that.

Overall, it can be said that technology has a synergistic effect on human adaptability. It has tremendous scope for crisis management. Future research must focus on simplification and effective dissemination of online tools and resources to develop an efficient crisis management system.

## 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/s.

## 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

SS and AV has equally contributed and were supported by PT. All authors contributed to the article and approved the submitted version.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.647681/full#supplementary-material

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# Do Social Connections and Digital Technologies Act as Social Cure During COVID-19?

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Although COVID-19 pandemic has re-orientated humans to be more physically healthy and hygienic, it has also persuaded humans to create affiliations and experience a sense of belongingness through social networks and digital technologies. However, amidst these changes, experiences of COVID-19 patients and their perception of the outside world's attitudes toward them appears to be less attended in literature which formed the basis for the current study's objectives. Using qualitative methodology, the present study explored the experiences, perceptions and attitudes of patients and their care-givers' toward COVID-19. The thematic analysis emerged with four major themes. Psychological Experiences of People was generated prominently with sub-themes indicating the perceived experiences like fear of spreading diseases to others, and the need for psychological counseling. Attitude of others toward patients and caregivers revealed that family members and relatives played a major positive role on the patient's mental health, however, the neighbor's stigmatized attitude led to several undesired behaviors. Social Connectedness was another major theme derived from the study. Altruistic volunteers, a sub-theme of Social connectedness have indicated that amidst these negative factors, one can spread social harmony by motivating and supporting the victims with basic needs, financial support, hope and social empathy. Opinions of participants for digital technology through technological aids and preventive measures emphasized an overall positive attitude as it helped the society, in general to maintain social connections as well to curb the rate of COVID-19 cases.

**Keywords: belongingness, social empathy, undesired behaviors, altruistic volunteers, social support**

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## INTRODUCTION

The new respiratory disease COVID-19 is highly contagious disease. The rate of its spread is much higher than the previous biological pandemics (Varshney et al., 2020). In order to prevent its outspread, ruling authorities across the world have announced mandatory home quarantine as a preventive measure. To minimize its spread a temporary shutdown has been imposed nationally in different ways, i.e., closing down of academic institutions, ban in public meetings, restrictions in social gatherings and social distancing. On contrary to the basic instinct of human kind, people were obliged to stay physically disconnected. While following these preventive measures, reports indicate the use of digital apps in connecting people worldwide and providing knowledge to be healthy

(Iqbal, 2020). Being in home quarantine and isolation can take a toll on both the mental and physical health. Various negative feelings such as anxiety, depression have been noticed among people during the lockdown period due to the pandemic (World Health Organization, 2020a). Along with this, numerous literatures have emphasized on the psychological effects experienced by individuals during previous pandemic eruptions like Ebola, MERS-Cov, SARS, and H1N1 (Sun et al., 2020). Besides, studies have statistically provided evidence of older patients' co-morbidity of Ebola with anxiety, depression, and post-traumatic stress disorder to be 24.9, 47.2, and 21%, respectively (Rojek et al., 2017). Notably, even the caregivers of these patients had been diagnosed with depression and anxiety; in fact, about 45% of them opted for psychological counseling albeit at a later date (Smith et al., 2017).

On the brighter side, few studies reported that acts of social wellness, such as community support, positive interactions with patients and empathy have led to positive psychological well-being of patients in such crisis (Kama et al., 2017). Studies like this have illustrated the role of social connectedness to ease psychological impacts. During COVID-19, due to imposed restrictions, modern technology could be the only way to maintain social relations. Thus, this study tries to examine the role of social connectedness in social cure.

## Social Connectedness

The feeling of connectedness is the basic need of human beings. During this pandemic, it has been reinstated since the time people were advised to follow "social distancing" norms even within the family. Recent researchers have argued to change the terminology of "social distancing" to "physical distancing," which would effectively reflect the actual meaning of the preventive measures to reduce the feeling of social disconnection (Sanderson et al., 2020). Nevertheless, the foremost drawback through the norm of "social distancing" that has been observed is that people at large began to develop an apathy to "social wellness behavior," whereby they began to discriminate COVID-19 patients, their family members, and at times even the "caregivers/care providers," i.e., doctors, medical personnel, police officers among others (Graupensperger et al., 2020). However, if we were to question ourselves on what is the phenomenon of "social wellnesses!" In order to understand the same, one needs to understand the experiences of patients and the attribution of the term "social connectedness." Rossi et al. (2012) defined it as "a person's subjective awareness of being in close relationship with the social world." Notably, this attribution of self reflects cognitions associated with an individual's on-going interpersonal closeness with the social world. Therefore, "social wellness" may refer to the way a person develops social health, while expanding connection with others in the dwelling/society. It alludes to a person interacting in a positive way, while creating and maintaining healthy relationships, which in essence serve a meaningful purpose in life. Thus, both social health and social wellness become an essential dimension for emotional, psychological as well as physical health (Kingsep, 2019).

Research in the past have shown the positive correlation of "social connectedness" with emotional resilience, conflict management, life satisfaction, and self–esteem (Fraser and Pakenham, 2009; Stavrova and Luhmann, 2016). Richards (2016) stated that despite an increase in income, the participants of his study were found to be happier when their social connections grew positively, which effectively meant that people did value social connections more as opposed to "income." On the contrary, chronically lonely people showed negative health outcomes, including the aspect of "addiction," be it to drugs, alcohol and others. Importantly, people with low social connections proved to be more toxic than obesity, hypertension and high blood pressure (American Psychological Association, 2017; Tate, 2018).

Interestingly, it was found that people who maintain healthy social connections could actually produce more antibodies through their immune systems, which eventually help them to fight diseases and provide longevity to the body (Marchant, 2013; Pappas, 2013). Studies have also highlighted the role of mirror neurons that help in producing empathy, sympathy, compassion and a feeling of belongingness within or others, often by inducing pain in selves and/or others. This goes on to prove that the aspect of "empathy" does make a person take proper moral or humane decisions eventually increasing the feeling of belongingness, while triggering an intent to help others (Lamm and Majdandzic, 2015). Psychological researchers have explained this phenomenon as reinforcement and vicarious learning (Kazemi and Rostamian, 2016; Pfefferbaum and North, 2020). Furthermore, people having good social connections were found to have better eating and exercise habits, which could be the result of reinforcing healthy habits by friends.

## Social Connectedness and Digital Technology

The "small-world problem" hypothesis showed social connections to be so dense that every person on this planet could be connected to just a few intermediaries. The experiment "Six Degrees of separation" conducted by Stanley Milgram (Milgram and Travers, 1969; Maier, 2019) found that to help a person in receiving a letter from one end of the world to the other, there would be in a need of only six hands exchange. In other words, on an average, only the involvement from six people could create nodes in establishing connections. Researchers have also shown that the "small-world network model" could be used to explain social networks, computer networks, neural networks and wireless networks (Watts and Strogatz, 1998). Sohn's (2017) "small-world network model" highlighted the difference in the number of people that could be connected indirectly through social network and a wireless network connection (Uzzi et al., 2007). Although social connectedness and belongingness has been identified as the third key need postulated by Maslow in his "hierarchy of needs," extensive research has shown and even reiterated the importance of "connectedness" to maintain a good physical as well as mental health (Baumeister and Leary, 1995).

Bronfenbrenner (1994) also discussed the interpersonal interactions of human at different levels that include micro, meso, exo-, and macro systems. With modern technology, interactions

between these spheres have become more compatible (Ashiabi and O'Neal, 2015).

The different palette of communication tools such as email, text messaging, WhatsApp, Facebook, etc. have all provided a platform to interact across the globe, albeit in a virtual mode. A few researchers divide social connectedness into two prominent divisions: (a) one to one connectedness (through text messaging) and (b) large basis of connectedness (through Facebook or Instagram) (Bel et al., 2009). Both one to one and large basis connectedness do help individuals to "connect" with family, friends, and the world at large.

Since the outbreak, Social media has been over-embellished with its persisting and exclusive coverage on the pandemic. For instance, the News18's (2020) strange news of two women doctors being threatened and abused, and asked to leave the grocery shop and empty their flat on an immediate basis by their neighbors had gone viral in social media. On contrary, India TV on 23rd April 2020 reported certain pleasant incidents of the warm welcome of recovered patients by the neighbors (India Tv, 2020). Interestingly, the *Washington Post*, on 8th April (2020) in one of its news bulletins, opined that such contrary behaviors have been observed across the world (The Washington Post, 2020). Social media has been a disseminating tool for both information and news, including many fake ones, ranging from the recovery rate, death rate, and vaccine development. World Health Organization team has stated, "The 2019-nCoV outbreak and response has been accompanied by a massive 'infodemic,' some accurate and some not, that makes it hard for people to find trustworthy sources and reliable guidance when they need it" (World Health Organization, 2020b). The term "infodemic" was meant to allude to an over-abundance of news. During this pandemic, World Health Organization (2020b) prompt response about infodemic calls for one's immediate attention to cross check the reliability of incidents that happen in the community.

## COVID-19 and Digital Technology

Scientists and researchers have used technology, ranging from high-tech robots to low-tech masks, to the best, to fight this pandemic. Robots have been used massively for cleaning, sterilizing, emitting Ultra Violet (UV) rays and delivering food to patients or the needy during quarantine in order to limit human-to-human contact. Digital technology has also been harnessed to provide innovative ideas; e.g., when patients were short of ventilators, researchers and engineers have formed several online groups on platforms such as Telegram, Facebook, Instagram etc. to share knowledge on manufacturing ventilators. This apart, Artificial Intelligence (AI) was also used; in fact, Blue-Dot software had triggered an alert even before WHO on this pandemic by analyzing data provided by the different agencies (Steig, 2020). The usage of AI for image-based analysis in Computerized Tomography-scan (CT-scan), understanding the working of coronavirus to produce drugs, telehealth has been an immediate relief provided by the technology.

Although largely technology has played an uplifting role, it has its own hazards; for instance, the aspect of individual privacy. When the world was facing global lockdowns, various countries using technologies such as AI tried to track down its people. Even though this was intended for a "noble" cause, it is also disadvantageous, as it leads to intrusion upon an individual's privacy (Tétrault, 2020). Media coverage, especially through television has also worked bi-directionally. While this pandemic continues to cause harm to society, scientists and researchers are no longer bound by geographies due to technology-based support. The technological advancements has helped immensely to provide different COVID-19 testing aids and treatment facilities across the globe within a short span of time.

## Social Connectedness and COVID-19

Following preventive measures and use of digital apps help to connect people worldwide and providing knowledge to be healthy (Iqbal, 2020). Being in home quarantine and isolation can take a toll on both the mental and physical health (Altschul, 2020). The role of social connectedness cannot be ignored during the pandemic.

Thus this study aims to record insights from the patients and caregivers' perception and experiences toward the COVID-19 as well as the usage of technological aids to maintain social connections in the unforeseen and disastrous situations such as this pandemic. In addition, this study explores attitudinal differences of people toward COVID-19 patients. The salience of this study is to explore and attempt to understand how social media network and social connectedness aided through digital technology play an important role in maintaining relationships as well as to see if they act as a social cure during the pandemic.

# METHODS

## Design and Participants

This study used an exploratory research design to understand the proposed objective. The participants of this study were chosen, using a purposive sampling method. Before conducting the interviews, informed consent was taken, and confidentiality was assured. This study included 38 adults (Male = 21, Females = 17) across India, between the age group of 21 to 40 years (Mean = 28.5, and SD= 4.5) having at least graduate-level qualification. Out of 38 participants, 20 were COVID-19 recovered patients, while 18 were caregivers.

## Procedure

This qualitative study aims at exploring the first-hand experiences of the recovered COVID-19 patients, along with their caregivers during the pandemic. Telephonic interviews with the participants were recorded after getting their due consent. They were also assured of total confidentiality, and were told that the data would exclusively be used for research. On an average, each interview lasted about 40–45 min. A set of semi-structured questions were prepared to conduct the interviews, in consultation with the experts. Semi-structured interview questions were framed after several scrutiny of experts. To ensure the inclusion and exclusion criteria few questions were asked initially during telephonic interview. For instance, a few questions like following were asked: (1) During the crisis of COVID-19, what was your experience of social distancing? (2)

Has it affected your emotional well-being? and (3) What were your strategies to cope up with the same?

Few questions asked to COVID-19 patients: (1) What was your first reaction the moment you got positive report for COVID-19? (2) Who all has helped you to fight this situation? How did they help you? and (3) What was the perception of others toward you once you recovered from such illness?

Few questions asked to caregivers: (1) What was your experience and approach to help the person who was diagnosed positive for COVID-19? (2) Except being COVID-19 as a contagious disease, what all could be the reason for not helping needy?

## Data Analysis

The data of this study was analyzed using Braun and Clarke's (2006) Thematic Analysis research method. Thematic analysis is a method for identifying, analyzing, organizing, describing and reporting themes within a data set. The approach of thematic analysis suits to explore and identify prominent themes of the data collected here. After each telephonic interview, recorded content was carefully converted into verbatim and thoroughly reviewed by the researchers. This was done to assure the accuracy of the information provided by the participant transferred to the paper. During the analysis of the data, researchers have gone through verbatim again and again to refine the understanding of data and identifying the words, sentences which were providing similar meaning. Further, responses provided by the participants were noted under different columns. Each column represented the responses which provided similar meaning and through literature review suitable sub-themes and themes were assigned. The criteria provided by Guba and Lincoln (2011) for evaluation of qualitative research was taken under knowledge during analysis. Through data analysis each criterion, firstly credibility of information was assured through repeated reviews of data gathered and transferred in verbatim. Secondly, transferability of knowledge via mentioning actual responses of participants, their characteristics was assured, which could help other researchers to generalize their findings in respective findings. The proper division of step-by-step administration by researchers assures the non-biasing and removes dependability on limited researchers. Lastly, the fourth criterion of conformability was assured when the final result of the data analyzed and the accompanying process involved was reviewed by researchers.

# RESULTS AND DISCUSSION

The present situation of COVID-19 has brought diverse experiences to the human kind. This outbreak has led people to follow various preventive measures such as home quarantine them physically distanced from each other. At the same time, technology is on the peak which smoothen the route to connect with each other which may have positive as well as negative impacts.

In this research, data was collected from 38 participants, in which 20 were COVID-19 recovered patients, while 18 were caregivers. Upon employing thematic analysis, four major themes, along with 10 sub-themes emerged. They include Psychological Experiences, Attitude toward the patients. The description of these four themes and overall, 10 sub-themes are as follows.

## Psychological Experiences of People

COVID-19 has affected people both physically and psychologically. Participants have reported various psychological struggles that they experienced on the basis of which three sub-themes evolved such as: *perceived experiences, concern toward patients and the negligence of psychological counseling.* The significant findings from the experiences that have been observed in the obtained data of this study are mentioned below.

## Perceived Experiences

Participants, who recovered from COVID-19, as well as their caregivers had gone through the distressing psychological experiences during the critical time of their illness. This primarily included depression and anxiety, while some were stressed, and a few others traumatized. However, the causal factors for the disturbances between these two groups were found to be different. Herein, it is vital to note that these experiences were also the result of social distancing, home quarantine and unexpected financial crisis faced by the participants.

However, the overall responses under this sub-theme of "*perceived experiences*" were majorly negative because people were afraid of this uncertain situation. This has been also observed in previous epidemics in history (Smith et al., 2017; Varshney et al., 2020).

## Unpleasant Experiences of Patients and Caregivers

Among several psychological distress faced by the participants, anxiety was the most dominant, followed by depression, stress and insomnia. Rehman et al. (2020) reported a wide range of psychological experiences, such as the perception of risk, fear, anxiety, stress, and depression level among the different populous, caused by COVID-19. A male participant AK for instance, encountered a lot of anxiety during his self-isolation. He stated "*one day... I heard from the cabin man that... my neighbors patient suffering from breathlessness and sent to a different ward. And it created tremendous anxiety in me. I had chosen a single cabin room because I don't want to see the others' packed body.*"

While a few reported their experiences of anxiety, others shared their reactions to various traumatic incidents. For example, a female participant DK stated, "*I was so much traumatized that everyone came to know about my reports. I felt like I can't do anything. It was so depressing.*"

The anxiety level was higher among healthcare professionals and women during pandemic events (Hacimusalar et al., 2020). However, in the present study, such gender-based differences could not be found. Few participants, irrespective of them being patients or caregivers, experienced higher stress levels. For example, a male participant NJ stated, "*Me, my wife and my youngest daughter were tested positive for Covid-19. The day before the report came; I had cremated my mother.… Due to this lockdown…caused me a lot of financial crisis. And the report of my daughter has shaken me inside and made the situation more*

*stressful*." In certain studies, the anxiety level was high among the caregiver community (Cici and Yilmazel, 2020).

Caregivers in specific have reported insomnia symptoms. A caregiver SD stated "*I'll get up at two o'clock/three o'clock.… she was in a separate room.… I used to peek from the window itself and come back. Like the Attention, apprehension what we'll happen? will she recover or not*?"

Some of the caregivers claimed that the disturbances were related to the uncertainty of future and fear of loss of their family members.

These psychological disturbances led the participants to develop insomniac conditions too. Caregivers in specific have reported insomnia symptoms. A caregiver SD stated "*I'll get up at two o'clock/three o'clock.… she was in a separate room.… I used to peek from the window itself and come back. Like the Attention, apprehension what we'll happen? will she recover or not*?" The caregivers claimed that the disturbances were related to the uncertainty of future and fear of loss of their family members.

This category therefore, revealed that both patients and caregivers experienced anxiety, depression, stress, and insomnia due to various issues. However, the causes of experiences differed in both groups. While patients' psychological disturbances were mostly concerned with isolation and tensed panic environment, caregivers' anxiety was more associated with an uncertain future, and the well-being of their loved ones due to lack of proper treatment.

## Pleasant Experiences of Patients and Caregivers

Despite negative psychological experiences, a few people found home quarantine and lockdown to be pleasurable in the initial phase, as they were having quality time. This sub-theme emphasizes on the positive experiences of the participants. A female participant NJ stated, "*my mom cooked a lot so I was so happy. I am a very homey type of person.... stay with my parents. So, it was very fortunate.... I enjoyed talking and spending good time with family. Also, I wasn't living in my house for few years and I felt that I need to spend time*." Concisely, the participants enjoyed being at home and spending quality time with their families.

Hacimusalar et al. (2020) noted that the anxiety level was higher among healthcare professionals and women. However, in the present study, such gender-based differences could not be found. Furthermore, findings similar to this study were also noted by Cici and Yilmazel (2020) which stated that the anxiety level was high among caregivers.

However, the overall responses under this sub-theme of "*perceived experiences*" were majorly negative because people were afraid of this uncertain situation. This has been also observed in previous epidemics in history (Smith et al., 2017; Varshney et al., 2020).

## Concern Experienced by Patients (Causing Others)

While interviewing patients, most of them were concerned more about their family members toward COVID-19. Fear for their significant partners and children were more prominent. For instance, a female participant NY stated "*my husband did not have any fear of getting corona we had some fear for children... because if they got... then how to take care of them we can't go near them*."

These findings reflect the phenomenon of higher risk perception (Cowling et al., 2010) that is during the pandemic, people perceive more risk of spreading infection. This increases the motivation to protect oneself and others to avoid infection. Notably, Simione and Gnagnarella (2020) also found that higher the risk perception in a given group of respondents, the higher is their concern toward health. Perceived severity and self-efficacy have been found to be positively correlated with self-isolation in order to prevent spreading of COVID-19 (Chen et al., 2020).

## Negligence of Psychological Counseling

This sub-theme focuses mainly on the lack of psychological counseling services that participants thought was necessary. The Indian government-initiated state-specific intervention strategies, tele-psychiatry consultations, toll-free numbers specific for addressing the psychological and behavioral issues faced by the COVID-19 victims (Roy et al., 2020). However, efficacy of these psychological counseling on patients and caregivers has still been unreported and is thereby ambiguous. A male participant PG stated, "*Apart from taking medicines there should be a programs like psychological counseling, which the govt or anyone can arrange so that they can help covid patients from psychological issues they are facing*." Another caregiver participant, AB stated, "*As I say that it is more on the mental side, not on the physical side*." In fact, some of the caregivers went on to highlight that although they did not contract COVID-19, their mental health was as affected as of the patients. While patients were being treated by the hospitals, there was no psychological support provided from the government for the caregivers. Das (2020) emphasized the need for psychological interventions at a large scale to counter the after-effects of post-traumatic stress, frustration, stigmatization etc. Thus, there is indeed a need to have a strong policy for such provisions.

## Attitude of Others Toward the Patients and Caregivers

This main theme, which originated based on shared experiences, sheds light on attitudes of family members and support from neighbors as well as peers. This theme has been sub-divided into two, i.e., during recovery and post-recovery, which in essence, shows the differences in people's attitudes toward participants both during and after recovery. This theme also involves some pleasant as well as unpleasant experiences, which are stated as below.

### During Recovery

This was a time when patients were asked to isolate themselves, and avoid making contact with family members and others. The differences in the experience of social connectedness have been due to their varied situations, such as when the participant was infected by COVID-19 vis a vis after him/her getting cured. Although family members were concerned about patients,

another dominant social support system, i.e., the "neighborhood" was found to be failing in establishing and maintaining social connections with the patients.

***Family Care***

In the initial stages, parents have had difficulty in accepting their son and/or daughter diagnosed with COVID-19. However, family members reported that they gradually provided the required support to the patients with proper care. A male participant AK stated "*they all were just motivating us, saying that no problem, it happened just happened, be positive.*"

Though family members and near ones initially displayed denial and non-acceptance, eventually they accepted and found the courage to support their loved ones, which increased their feeling of togetherness.

***Societal Attitude***

This sub-theme highlights the discriminating, stigmatizing and traumatic treatments by the neighbors toward the patient and caregivers. World Health Organization (2020) stated that having more ambiguity due to a new disease may lead to unconscious discrimination, which reflects through stigma and stereotype. A male participant PG stated "*They ignored me.....my name was given to the newspaper and people announced it in the whole colony. People used to run away from our house as if there is a ghost inside. Everyone got to know.*" A few statements highlighted the discrimination and stigmatization of the disease, resulting in name-calling such as "virus home."

Contrary to these negative attitudes, a few interviewees indicated a positive attitude by their neighbors also. A female participant AA noted, "*One of our neighbors is so good. They used to come home only in night, till then they took care of children. We didn't feel the need for friends; our neighbors helped us thoroughly.*"

Since caregivers were directly or indirectly in touch with the patients, the stigma toward patents might have been generalized toward caregivers as well. Overall, the neighbors' attitudes toward the patients as well as the caregivers have been negative. The behavior shown could also be understood through negative dominance theory (Covello et al., 2001; Glik, 2007), which states that when people are fearful, they give more weight to negative information and respond accordingly.

***Peer Support***

Support provided by the friends and colleagues has worked as a healing system to many survivors. It has been noticed that friends of the patients have helped their family members too and assured their presence in an emergency. A female participant MB noted "*They were being too supportive ….actually my mum was Home alone. my friends... used to bring all the fruits and required materials by ordering it online and it would be delivered at home. So that was a good thing.*" A positive social connectedness and concern by the friends stayed prevalent during as well as after the recovery period.

### After Recovery

This second sub-theme focuses on the attitude and perception of patients after their recovery. In addition, caregivers reported that a few neighbors initially avoided them due to risk perception but, such behaviors subsided eventually.

A male participant AK responded, "*Since, no one in my area had it before me, I had become like the godfather for everyone. Whoever got it later called me for suggestions.*" Similar differences in attitudes were observed by caregivers, as others sought help to know the ways to maintain hygiene and prevent contracting COVID-19 from patients. This showed that people sought help from both caregivers and patients but for different reasons. This could be explained with the "mental noise theory" (Baron et al., 2000), which explains that people during a pandemic, get stressed, and they attend to a great deal of internal "mental noise," albeit unconsciously, which in turn results in a lesser ability to attend to externally generated information. Notably, this indicates the change of behavior in people in which, negativity toward someone is not intentional or fabricated, but rather a representation of chaos and fear.

## Digital Technology

This main theme highlights the dual role played by the technology. The digital technology has worked as a carrier to spread fear as well as knowledge about the disease condition and at the same time extent support to the community.

In its sub theme, at one place social media is working as a carrier to spread fear causing anxiety, depression. On other hand through ease in communication through digital technology has worked wonders to provide support and strength to the society.

## Influence of Digital Media

This main theme emphasizes the influence media has on the individual's thoughts, perceptions and behaviors.. Gao et al. (2020) found that 80% of the participants who were exposed to social media had a prevalence of depression and anxiety. Das (2020) provided evidence that social media news has been the leading cause of over-reactive behavior, especially of the Indian people. With technological advancement, there are various platforms, which provide information to the viewer. Some platforms are very recent and some have been there for a long time.

The experience of listening to unpleasant news related to COVID-19 significantly influenced the people. For instance, a male participant LD stated "*In the initial times.... hearing all such news that is many people died and there is no cure there is no treatment for this disease hearing all those stuffs I was getting disturbed that if I will get what will happen. So later, I didn't follow them at all to avoid panicking.*"

This sub-theme showed that most of the people relied on newspapers than on news channels or any social media platform.

On the contrary, the contemporary news feed from digital media platforms such as WhatsApp, Facebook, and Twitter form to be posing as a major problem than the news from television. A female participant ST shared "*I remember someone posted a list with my name. I got mad. I said okay, you take precautions and*

*all... but don't disclose the names of people. And this resulted in back to back comments and quarrel and I just left that group*."

Apejoye (2015) stated that information and facts shared through the means of both newspaper and television are more credible than social media platforms. The report provided by World Health Organization (2020) regarding infodemic seems to be true in this study also. However, results of this study show more of the negative aspects of the digital media, which is an indication for the government, and respective organizations to look upon this issue seriously, as news from these sources could be channelized to help create positive influence, which would bring the community closer.

## Technology Aids: Perception and Attitude

During home quarantine and isolation, the only convenient method to stay connected was through mobile phones and social media platforms. This advancement has provided an opportunity to embrace social connectedness in a distinct way. Chen et al. (2020) mentioned about the ease provided by technological advancements during COVID-19 in order to connect with acquaintances. The perceived support provided by technological advancement worked as a mental component in recovery of patients. The advancement commencing from cell phones to the development of various tools to diagnose COVID-19, as well as to restrain the spread, has created an enormous difference in stalling the pandemic. This theme emerged because of shared experiences by the participants about these technological advancements by further focussing on social connection and social media attitude toward treatment and related aids. More or less the technology evolved as a companion who provided relief by even connecting the stranded people with their close ones.

## Opinion Toward Treatment and Related Aids

With the advancement in technology, treatment to certain diseases has been made possible to diagnose and be cured. Researchers worked day and night to provide credible diagnostic systems to COVID-19. The purpose of this cannot meet until the common man does not trust and perceive it as a cure to the disease. This sub-theme is further divided into two divisions that include the perception of people toward COVID-19 testing, and applications, which promote a healthy lifestyle.

### Opinion Toward COVID-19 Tests

Two prominent testing, i.e., Antigen Test and RTPCR test were widely used to diagnose the presence COVID-19 virus in human body. Antigen test also known as Rapid Antigen Test—(RAT), provides results within 4–5 h, while the RTPCR test provides results after a span of 2–3 days. It was an attempt to know the patients/ caregiver's perception related to the credibility and reliability of both the tests for diagnosis.

A male participant KJ mentioned, "*what I know is if rapid test there as false negatives... as far as I have seen if it comes positive, RTPCR also comes positive around 99% cases.... So, if it is negative with symptom better to go with RTPCR....*"

On contrary to this, a few participants mentioned the use of antigen test as the need of the hour. A few reasons mentioned by participants included the point of India's humongous populous, coupled with the virus spread being so high. They further stated that for the government, it would be more convenient to do testing through rapid tests. On other hand, experimented medicines and treatment provided by the government found to be not more reliable than the Ayurvedic *Kada*, which is a drink prepared with the use of herbs to boost immunity.. A female ST mentioned, "*I trusted more on ayurvedic treatments*."

### Opinion Toward Apps

This subtheme emerged in accordance with the claim done by various health-based applications to provide a good knowledge base to stay healthy (Warman, 2015). In contrast, the majority of participants denied the utility of such apps and any exercise-based application. Most of them favored ancient Indian practices to stay fit, such as practicing "*Yoga*,"*and* "*Pranayama*," and consuming "*Kada or maintain a balanced diet*" to stay healthy and boosting immunity.

A male participant PG responded, "*I didn't prefer it that much. I used to do yoga and kappalbharti and I have continued that in lockdown also and when I was in quarantine that time also*."

The responses provided by the participants were not in the favor of using any of the health-based applications. Husain and Spence (2015) provided evidence that a few health applications may accurately show some aspects of health, but it would not be wise to solely rely on such apps. This shows the trust and beliefs of people on traditional knowledge.

Although, in this study the advancement of technology has been found to be beneficial in some domains, the importance of traditional practices could not be overlooked. In support of this, the traditional knowledge for "*yoga*," exercises and to prepare medicines and "*Khada*" to cure the illness has also been preferred and given the importance of traditional and indigenous knowledge.

## Social Connectedness

In order to follow social distancing and home quarantine, the only way to connect acquaintances was through social media platforms and mobile phones. In this theme, experiences of patients and caregivers are described which highlights the usage of digital media platform.

## Social connection and Social Media

This theme emerged in the viewpoint of an increase in the use of social media as a helping aid for people to connect with others. It has been observed that the order of staying at home became easier due to technological aids. A male participant for instance, reported: "*Thank god! We have this internet thing otherwise it could be difficult to stay home for so long*."

Moore and March (2020) found that social media helps to connect people with their loved ones and bring down the feeling of being in isolation during this pandemic. Most of the recovered patients mentioned that the frequent calls by the acquaintances through social media platforms they received during the lockdowns provided a lot of strength and mental support.

When interviewees were further probed, they revealed that through social media connection and in-person meet, they got to know certain new trends being carried around them. A female participant AK for instance, stated, "*It was a new experience that we were exploring and we were doing something.... Every Saturday and Sunday, there were some Tam bola Night, some other means or some other puzzle game. So, it was very interactive*."

None of the participants preferred in-person meeting against social media connection, and added that it was the need of the hour. Thus, interactions in social media platforms helped people to cultivate a sense of social connectedness.

## Preventive Measures

Most of the participants talked about their respective concerns, and followed preventive measures, such as staying at home in order to restrain the spread of the virus either to themselves or to others. A male participant noted, "*Home quarantine was mandatory for oneself and others.*" Other preventive measures, such as wearing masks, sanitization, and "social distancing" were acknowledged and approved by the participants. Some of them even talked about educating others to strictly follow these preventive measures. A male participant, PG stated, "*We ourselves* need to *sanitize our society*." Thus, people took care of themselves as well as others in order to remain safe from the virus' onslaught.

## Altruistic Volunteers

This sub-theme has emerged as an additional finding to the primary objectives that were framed. Although COVID-19 has been a contagious disease, most participants have voluntarily helped others in need. The life instincts have been believed to be the cause of such self-preserving behaviors. It is believed that people due to life instinct would self- preserve themselves. Mawson (2005) explained such contrary behavior by linking it to a massive panic among people during such pandemic. On this contrary belief, literature shows that pro-social and altruistic behaviors are predominant.

A male participant, PG stated, "*Yes me and my social club members used to cook food for 200 people who were migrants. It went for 2 months. We use to prepare food for two meals. It was just a blessing*."

Moreover, separation and guilt of not helping others is an unbearable psychological stressor than the physical danger (Glik, 2007). This may be attributed to the altruistic behavior shown by most of the participants during this pandemic. This kind of helping attitude builds the community as a whole, and provides a mental cure that strengthens the feeling of togetherness, which possibly plays the lead role in the healing process. Thus, it may be affirmed that social connectedness does enhance the sense of belongingness to the society that can sustain even during a pandemic.

This study reported that both patients and caregivers have experienced discrimination, stigmatization, as well as psychological disturbances during the battle against COVID-19 and find certain meaning to their lives. Conspicuously, negative experiences faced by both the caregivers and recovered patients have felt the need for psychological counseling. The changes in the attitude of neighbors, both before and after a patient's recovery has been seen clearly, indicates the necessity of socio-psychological theories and their applications. Although many caregivers did not contract the disease, they emphasized that their mental health was ignored drastically, while they were attending to the patients. Patients, caregivers and Doctors could interact more feasibly than ever in this pandemic, which alters the way to provide support and guidance to the patient and caregiver which impact psychologically (Sanderson et al., 2020). Importantly, this study also highlights the need for counseling and therapeutic services in all the government and private health sectors. Therefore, proper policies, strategies must be implemented through top-down approach. The study also provides insights regarding the role of self-introspection to be healthy, while enabling others to remain healthy and safe. On the contrary, negative influence of digital media, which highlights the need for the government to implement policies to regulate the information that the media delivers, especially social media. The conceptual framework derived from the findings of the study could be found in **Figure 1**. The study also provokes researchers, employees and health officials to design guidebooks and prepare oneself as well as others to create immediate awareness and knowledge among the common people for any such similar catastrophes in future.

# CONCLUSION

The major findings of this study highlighted the positive role of the strength provided by the social connections to the patients and caregivers. In the cases where support was not provided, although the reasons varied, both caregivers and patients did experience psychological disturbances. While patients were mostly concerned with isolation and tensed surrounding, the caregivers were anxious about their uncertain futures, financial crisis and well-being of their loved ones. Although the caregivers were not infected with the virus, they reported that they could also not be free from fear and agony due to multiple situational causes. Further, patients opined that adequate counseling services should be mandatory for the patients as well for themselves; whereas caregivers shared that, their mental health also needs greater attention. In addition, although family members and friends supported the patients, as well as caregivers, the support of the neighbors was compromised most of the time due to the fear of contacting the disease. However, after recovery, the neighbors welcomed them to the extent that they sought help regarding preventive measures.

This study also highlighted the ease to connect with loved ones through digital technology which was found to be a blessing in disguise. The voluntary help provided by the participants highlighted the concern for social welfare and shows the positive use of digital technology propounding social connectedness.

The study also revealed the way the attitude toward the COVID-19 patients is considerably different among the

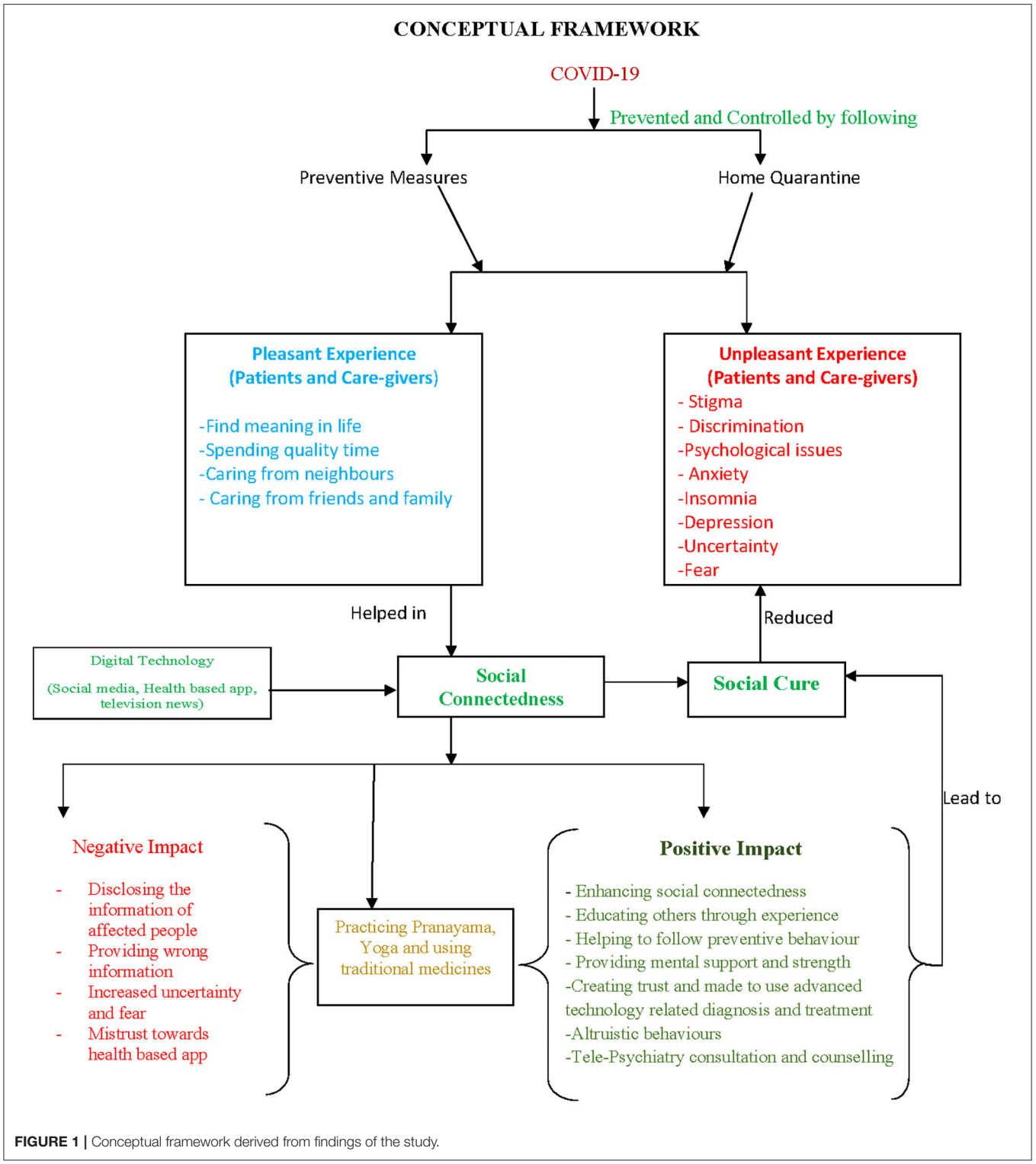


**FIGURE 1 |** Conceptual framework derived from findings of the study.

individuals due to certain existing stigma, varied information through social media as well as uncertainty about the prognosis of the disease and their treatment. Further, this states a dire need of proper awareness, counseling, and several other researches, which can bridge the gap between the existing practices, varied perceptions and attitude which may further help us in treatment of COVID-19 as well to enrich the theoretical, cultural as well as policy-based contributions.

## LIMITATIONS AND FURTHER RECOMMENDATION

Owing to the tensed situation created by the pandemic and reduced interaction among individuals, the researchers experienced difficulty in obtaining a varied representation of sample, e.g., socio-demographics that in essence play a major role in attitudes of individuals toward study variables. Moreover, several important variables, such as personality, religion, caste, age, comorbidities, possible financial constraints, and traditional practices to avoid the illness, variations of administration to tackle such issue and available resource on or before COVID-19 could be incorporated in future studies which may provide a cure paradigm for any such calamities in future. Integration of multiple disciplines, i.e., social science subjects with medical science and technology could be taken together to understand, as well as map the understanding of acts toward such situations in the future.

## 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 Departmental Review Board, Central University of Karnataka. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

VP, AA, NM, and RG conceived and performed the study design, data collection, and mastered the data. SJ, AA, RG, and GP ran the data analysis. ER, GL, and GP discussed the results. VP and AA wrote the manuscript with the support of RG, GP, and ER. SJ, ER, and GL supervised the project and manuscript preparation. All authors contributed to the article and approved the submitted version.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.634621/full#supplementary-material

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frontiers in Human Dynamics

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# Dynamics of Social Networks and Collective Behavior: A Social Identity Approach

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**Keywords: COVID-19, social networks, social relationships, social identity approach, collective behaivor**

## INTRODUCTION

As the world grapples with the pandemic, a look at the response of different countries and communities reveals that communities and governance have played a crucial role. The collective efficacy of the communities has helped in mitigating the effects of COVID-19, and as we enter into succeeding stages of this pandemic, collective efficacy continues to serve as the foundational factor. A wide variety of group processes have occurred; we mention the most relevant ones like, group cohesion, solidarity behavior, governance and leadership, social inequalities, discrimination, compliance, and non-compliance of the people to the newer policies and coping behaviors.

The social identity approach, mainly consisting of two theories: social identity theory and social categorization theory (Tajfel and Turner, 1979; Turner et al., 1987), describes collective action as a function of the shared identity between the group members. It suggests that individuals have both personal and shared social identities, and these shared social identities are based on self-categorizations and comparisons. It offers a theoretical basis for understanding the relationship between intragroup and intergroup behaviors (Drury and Reicher, 2009, 712). When people recognize themselves as the members of the group, they share goals and visions of the group and act upon it collectively (Cocking, 2017, 115). Identification as community members, and salience of social identity rather than personal identities, leads to mobilization and collective action which is beneficial for all the group members (Tajfel and Turner, 1979, 35). Social networks and relationships are crucial because they provide a sense of belongingness, recognition (Hopkins et al., 2019, 1292), motivate collective action (Rockenbauch and Sakdapolrak, 2017, 2), and are important for the health of the community members (Poortinga, 2006); and are all a result of cognitive functions.

During the current pandemic many restrictions and limitations have been imposed upon people; they have been forced to isolate themselves, and restrict themselves to socializing virtually. Although, human beings are fundamentally social, and while the need for people or groups is extremely important in times of distress and adversity, because the restrictions have been placed by an external authority or imposed from outside, these limitations challenge people who ultimately violate these restrictions. This is where social identity comes into play. When restrictions or instructions are provided at the individual level, people who belong to the minimum risk category might not necessarily comply. That said, if they are convinced that these restrictions are for the welfare of all, including their group members, behavioral changes happen in a better way. In social identity terms, if personal identity dominates the social identity, people might act in terms of individual benefits rather than community welfare. For example, if an individual who is in the low-risk category perceives that the chances of contracting the virus and having serious consequences are less for her, there is less initiative on her part to comply with the imposed restrictions. But when the risk is perceived at the level of her social identity, as a member of the group, she would be obliged to follow the measures for

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the whole group. Hence invoking behavioral changes in terms of social identity helps better in the present situation.

Effective response to pandemic depends on triggering social identity and through collective behavioural change. Policy measures and other regulations are effective only with the compliance of people. If people perceive the crisis in terms of "me", ("It won't happen to me, I can go out without a mask or necessary precautions") the whole community suffers. However, if this thought is about "we", it will instigate moral responsibility of each group member to the other, which results in collective behavioural change. Understanding the root causes of major behavioural violations and working on it to make it right can increase the adherence of people. When asking to keep physical distance or enforcing to stay at home, the authorities miss to see if it is possible or not. If not, by making arrangements and enabling them to it do as a community can increase the social cohesion and trust between people and authorities. Stating clear and transparent reasons for the strategies adopted, setting clear expectations for the people to modify their response, and developing and promoting a sense of collectivism within the community are some of the common factors that have been adopted by the countries that handled the health emergency better. They proved that actions taken by the authorities, and people in response to the COVID-19 crisis have to be communicated clearly to build mutual trust and support.

All of this takes place in the context of a systematic community set up where systems and organizations are in place. The concept of social capital is explained in these circumstances but there is a failure to explain the emergent group formation which exhibits solidarity behavior, and is crucial at the response and recovery stages (Cocking, 2017, 114). In emergencies and disasters, there is group formation of the victims, not necessarily people belonging to the same community, who express solidarity behaviors. These emergent groups formed out of circumstances or common fate are also able to mobilize collective action (Ntontis et al., 2019, 2). In terms of the social identity approach, these emergent group formations are a function of a social identification formed because of a common fate or a circumstance; identification happens when people perceive similarities over differences.

The social identity model of collective resilience (SIMCR) (Drury, 2012) is grounded in social identity and social categorization theories, and explains the psychological antecedents, and psychological and behavioral consequences. It helps understand perceptions, expectations, motivations, and behaviors of people in emergencies. It details the process of a cognitive transformation of individual identity to collective identity, which leads to a relational transformation in the ways of interacting with each other that finally leads to an effective transformation of collective action (Cocking, 2017, 115). If applied to the situation arising out of COVID-19, when people behave in a responsible manner (wearing masks and maintaining protocols), a cognitive transformation is said to have occurred. More than protecting themselves, they show a concern for others' their well-being. Getting groceries for the neighbors, watching entry and exit points to note visitors, and helping authorities in contact tracing are some of the behaviors exhibited in different communities the world over. Such solidarity behaviors arise from feeling of a shared identity and a social responsibility, and are exhibited in communities with strong social networks and communications. The sense of solidarity arises when there is a shared bond or a shared goal (Sherif, 1958). Sharing a common destiny becomes the base for feeling a sense of community which eventually contributes to the development of solidarity among individuals and societies. During the present crisis, the collective behavior of the people, cohesion within the community, and the social bonding, and its salience creates resilience. An increase in the mortality rates of an affected population makes a disaster or an emergency critical. (Aldrich, 2019, 75) claims that the determinant factors of mortality rates have shown that the intensity of the event, demographic, and local environmental characteristics, political and economic factors along with the capacity of local social networks affect the mortality rate among the disaster-affected communities. Research suggests that the mortality rates were less during certain disastrous events due to the solidarity behaviors of the community members (Aldrich, 2012; Aldrich, 2019; Goyal, 2019).

## CONCEPTUAL REFLECTIONS AND MAJOR TAKEAWAYS

No doubt disasters and emergencies bring destruction to the community, and disruption in the communication channels. At such times, personal communications between people help in rescue and relief activities through the existence or build-up of strong community ties; dense networks and strong communications help in easy transmission of messages, and timely help. Family members, neighborhood groups, relatives (Aldrich, 2019), pitch-in to rescue in the initial stages and are called "Zero responders" (Briones et al., 2019). COVID-19 has compelled people to follow lockdown measures, thus alienating themselves from their social connections, however communities with strong ties have made sure that their group members are adequately provided for. People have connected widely through the digital platforms, organized community kitchens to provide food for the needy, arranged shelters, all examples of resilience behavior, and made possible because of the strong social networks and relationships, and identification within communities. These social identities evoked community spirit and motivated people to mobilize virtually, and provide necessary support to the vulnerable and the needy. The micro-processes of emergency behavior showed how groups emerge, mobilize, and provide important social support in emergencies or disasters; key psychological transformations (cognitive, relational, and affective) that show group behavior have been explained with the help of the social identity approach. On the cognitive level, perception plays an important part, where individual perception of the self is transformed to a collective level, and changes individual values and goals to collective ones. During these transformations, individual identities are put to rest while group identities become salient, thereby transforming behavior. Solidarity and trust in the group members are the

result of this transformation (Drury, 2012; Drury, 2018). Apart from community actions and cohesiveness, governmental action has had a major role to play in dealing with the current pandemic.

The present pandemic emphasizes the accountability of governance in handling the crisis. When strict late preventive measures such as lockdowns, curfews, quarantines, and social distancing measures were implemented, they tested both the individual moralities and governance abilities. The pandemic highlighted the loopholes in the governance and the necessity of being self-sufficient. The already existing inequalities widened and the vulnerable population became more vulnerable. That said, even with limitations, communities can be hopeful of a better future if there is suitable integration of social capital and governance. The latter can concentrate on the bottom-up approach and enhance resource mobilization and social support with the help of the community members. Being transparent in actions and being accountable for decisions and plans can be the beginning of an effective relationship with the community. Increasing the competence of the community, communicating clear action-oriented information can empower them and make them self-sufficient. Integration of community-based organizations and institutions, and non-governmental institutions with people and the government is the most effective strategy for handling this world-wide crisis. Losing social connections, maintaining physical distance, stigma, and associated discrimination may culminate into hostility, which can turn people's lives upside down. Empowering social networks and connections, and effective governance as catalyst to enhance the resilience mechanisms of the community can be the solution for surviving the present. The recognition of the importance of we over me is the stepping stone of change during this period. A social identity approach to COVID-19 can help reduce political polarizations, discriminations, and prejudices, and create the "we" feeling through invoking a strong social identity by means of an effective identity governance.

## AUTHOR CONTRIBUTIONS

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

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# Techno Trend Awareness and Its Attitude Towards Social Connectedness and Mitigating Factors of COVID-19

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While COVID-19 has taken a toll on many professions and livelihood of all walks of lives, technology has amplified its intrusion to ease the necessities. Innovative technology, therefore, has improved the glitches and provided the software to adhere to these new normal. However, individuals' awareness and attitude toward the advancements of these technological trends need to be addressed. Although the government has taken measures to prevent and curb the growing cases for COVID-19 with the help of technology, the support from the individuals would depend mostly on their level of awareness and the attitude toward those measures. The present qualitative study explored the techno trend awareness, perception and attitudes of techno experts and technical professionals toward social connectedness and mitigating factors of COVID-19. Besides, it also explained individuals' shift toward virtual interaction to maintain social connections during the pandemic. The thematic analysis generated four prominent themes. Social Connectedness, emphasized on the emotional connections that created a positive feeling of belongingness. Technological Advancement provided three sub-themes highlighting perception, techno trend awareness and desirable attitudes toward the mitigation of COVID-19. The categories under Treatment and Preventive Measures indicated the enhanced self-care of individuals and also the tendencies to minimize the spread of diseases. The emergence of the theme Inclination toward Indigenous Knowledge, which is an important finding, indicated the techno-experts inclination toward the indigenous knowledge amid vague scientific shreds of evidence.

**Keywords: social connectedness, belongingness, technological trend awareness, COVID-19, indigenous knowledge, Indian culture**

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## INTRODUCTION

Generational cohorts are a group of people who experience events similarly and are loosely defined by their birth year. Generation "Z" were born between 1997 and 2015, Generation "Y" or "Millennials" were born between 1981 and 1996, while Generation "X" were born between 1965 and 1980 (Dimock, 2019). The literature has quite evidently indicated that there exists a significant positive correlation between techno trend awareness and Generation "Z", as they were born into the digital world (Othman and Rashid, 2018). While research indicates that for "Millennials" the

utilization of technology has been a device for entertainment and hedonistic needs, individuals of generation "X" engage with technology to search for information and fulfill utilitarian functions (Calvo-Porral and Pesqueira-Sanchez, 2019). Owing to rapid developments in technology, it has become a necessity for individuals to be in constant touch with technology, especially during the COVID-19 pandemic. The pandemic continues to work as a catalyst for scientists, researchers, and technology experts to invent applications that could meet the challenges and mitigate the spread of COVID-19.

Studies have indicated that the use of Artificial Intelligence (AI) increased drastically when the pandemic began. It has been well-utilized for things such as tracking down the patients who had come from other countries or states, as well as detecting fever and other symptoms through facial recognition. Drones and robots were used to deliver products or food, to disinfect public places, and to identify if people were maintaining social distancing. AI and other technological advancements were incorporated for diagnostic purposes, for predicting patient's health recovery and mortality rates, drug repurposing, and for other medical and social utilities (Kumar et al., 2020a; Vaishya et al., 2020; Zhou et al., 2020). Although these technological developments are being utilized at a fast rate to meet current pandemic need, the extent of awareness of these advanced developments, in terms of privacy, domain knowledge, and how user-friendly these technologies are, has not been so clearly discussed in the literature (Leslie, 2020).

## Technology Acceptance: Theories and Models

Technology trend awareness refers to the skill of an individual to be aware and mindful of new and popular technology that has been gaining widespread acceptance across concerned industries or markets (Rahimah et al., 2018). This may also include an individual's ability to recognize and understand the utilities as well as benefits of these technologies for a successful business (Rahimah et al., 2018) and other areas like health, which is our concern in this paper. Numerous studies have given significant importance to technology acceptance theories. For instance, the innovation diffusion theory (Rogers, 1962) stated that attributes like compatibility, relative advantage (perceived usefulness), observability, trialability, and complexity (ease of use) were the parameters that would help to determine an individual's adoption of innovation (Momani and Jamous, 2017). The theory of reasoned action developed as a theory of planned behavior (Ajzen, 1991), has been widely used in several applications in diverse fields, i.e., technology, by the addition of perceived behavioral control. The Technology Acceptance Model (Davis, 1985) has further replaced the theory of reasoned action with two additional factors: *perceived ease of use* and *perceived usefulness*. Model of *PC* Utilization *(MPCU)* gives a better understanding of the influence of several factors such as social norms, individual habits, perceived outcomes of usage, facilitating conditions, and direct as well as indirect experiences of computer usage on individuals' behavior (Thompson and Higgins, 1991).

Motivational Model (MM), which was proposed by Davis et al. (1992), highlighted the application of extrinsic and intrinsic motivation to understand the use and adoption of technology. This was recognized due to perceived usefulness as the extrinsic motivator and perceived enjoyment as an intrinsic motivator. Furthermore, a Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003) indicated that effort expectancy, performance expectancy, and social influence proved to be the factors that determine the intention and behavior of technology use. Studies focusing on Information and Communication Technology (ICT) have been incorporating recent developments of deterring factors in their theories to fulfill needs and improve facilities, as these are essential prerequisites for the technology's utilization, realization, and acceptance (Momani and Jamous, 2017). Although ICT creates innovation and incorporates the theories into action, a lack of knowledge and proper awareness would hinder them from availing the benefits of these services provided by the government and private sectors (Reffat, 2003). The current study, therefore, aims to explore and understand the attitude, perception, and awareness of technological experts and skilled individuals toward these technological innovations to sustain life and life activities during the pandemic.

## Awareness: Self, Other, Group Perspectives

Any individual's awareness of any event depends on various components. According to Greenspan's model 1981, an individual's social awareness is dependent on three main factors: *sensitivity* (perceptual component), *insight* (interpretation component), and *communication* (Black and Rojewski, 1998). When an individual is *sensitive*, he or she will be able to recognize the happenings in the surrounding or a social event and would be able to identify others' experiences at such events. The second component, *insight,* indicates the ability to understand the reasons (why it happened) behind the situations and to comprehend possible factors for others' behaviors in those situations, as well as to exhibit social reciprocity. Depending on these two factors, the third component, *communication,* reflects on the ability to take action in a given situation (Black and Rojewski, 1998). In addition to this model, Polanyi (1969) and Wegner (1982) have tried to build on the idea of focal and tacit awareness that human beings experience. At first, usually, individuals would focally become aware of a situation by constituting the surroundings, comprehending the event, and then evaluating the event.

A social event or social context influences an individual's behavior and therefore forms a relevant factor to determine human interactions (Rakotonirainy et al., 2009). According to Dey (2001), when individuals interact, they use all their sensations to listen and watch attentively and try to perceive, think, and behave following others' intentions. People adapt and react to situations and conversations based on the interacting partners as well as on their intentions. Social meanings and contextual references are generated through such widened

interactions, giving rise to social norms. Thus, social interactions are necessary for social norms and human group behaviors (Rakotonirainy et al., 2009). Furthermore, emotional awareness facilitates positive interactions, leading to improved social well-being and social support (Beaman, 2008). However, awareness of oneself and others in the surroundings and awareness of the situation becomes an indispensable part of human interactions (Rakotonirainy et al., 2009).

The main objective of the study is to explore techno trend awareness and practices of techno experts to mitigate and reduce the psychological and physical ailments caused by the COVID-19 pandemic and associated protocols.

## Social Connectedness: Belongingness Hypothesis and Shared Stress

The information of awareness means being aware of others' whereabouts, including others' feelings, experiences, moods, and activities. These play a major role in strengthening the bond of belongingness and relatedness. Social Connectedness could be understood by these experiences, mainly subjective, that lead to feelings of belongingness and relatedness that are dependent on the salient relationships and social appraisals (Van Bel et al., 2009). The belongingness hypothesis explains that individuals have a dire need to form and maintain interpersonal relationships at least to a minimum quantity of positive, lasting, and significant relationships (Baumeister and Leary, 1995). Classical experimental research highlighted the ways where groups' socialization and intergroup relations are maintained using common co-operative goals and establishment of behavioral and emotional patterns of communications, leading to feelings of cohesiveness (Tajfel and Billig, 1974; Brewer, 1979; Sherif et al., 1988). Thus, it is not only through positive situations that individuals bond, but individuals can also connect more strongly or positively when they share similar negative experiences or circumstances, which was supported by the social comparison theory (Festinger, 1954; Latané et al., 1966; Kenrick and Johnson, 1979). This could indicate that the adverse and negative circumstances shared by everyone due to the COVID-19 pandemic could bring people closer. Therefore, one can assume that under such adverse and negative situations, the emotional and social interactions between individuals would be strengthened and the bond would be stronger. This study intends to explore this line of thought to understand the social connectedness under such shared stressful circumstances.

## Technology: COVID-19 and Mitigating Factors

Artificial Intelligence, Information and Communication Technology, and other innovative technologies are being incorporated to mitigate and curb the spread of COVID-19 as well as to maintain social relationships. The use of AI to analyze, predict, and treat COVID-19 patients, as well as to prevent contamination, has been well-acknowledged (Kumar et al., 2020a), although the attitude to all these experiences needs to be explored at a deeper level. Further, AI has also been applied for accurate COVID-19 diagnosis by using neural networks (COVNet), 3-dimensional deep learning model, and by extracting radiological features. AI-incorporated models, as well as machine learning and deep neural network models, continue to contribute greatly toward predicting protein structure, generating novel drug compounds, preventing unsupervised clustering, and various other such preventive and treatment measures (Kumar et al., 2020a).

Social Connectedness was found to be critical for good and balanced physical as well as mental health, while poor connectedness correlated with poorer mental health, like depression and anxiety (Saeri et al., 2018). To curb the increasing rates of mental and physical illness during the pandemic, many online medical, counseling, and therapy sessions were organized by various universities and institutes, which were possible only because of the improved technological facilities under such circumstances. While maintaining social relationships using online social network applications might help people to stay connected even during lockdowns, measures to mitigate the spread post-lockdown have also begun. ICT's implementation of physical sensors and improving Heating, Ventilation, and Air-Cooling (HVAC) systems to maintain health and safety and achieve sustainable development goals have been in the limelight (Franco, 2020). With the emergence of more and more innovative applications, the individuals' extent of awareness, attitude, and perception toward their experiences is highly ambiguous. Additionally, since literature has proved that culture has an effect on technology acceptance, India's cultural values could contribute to the attitude formations which would thus influence their perception of techno trend facilities (Fusilier and Durlabhji, 2005; Bandyopadhyay and Fraccastoro, 2007). Culture, according to Hofstede (2001) refers to "the collective programming of the mind which distinguishes the members of one group of people from another." Relative to other western civilizations, India has been considered as a collectivist culture which highlights the presence of high social pressure and social influence, indicating the strength of conformity values. Conformity values emphasizes on the belief system to be obedient and maintain social order as well as to cause no harm to others (Konsky et al., 2000). While conformity influences individuals' attitude toward technology use (Bandyopadhyay and Fraccastoro, 2007), tradition plays a role in the individual's belief to follow and maintain their cultural, family, and religious traditions (Schwartz, 2012). Traditions influence individuals to follow certain rituals and customs to maintain social bondage and gain social acceptance (Banerjee, 2008), which could alter and aid in attitude formation and technology acceptance. Thus, the role of their cultural and professional identity, in addition to the underlying Indian specific cultural and traditional values, might play a major role in the formation of their awareness, perception, and attitude toward the amenities provided by the techno trend facilities (Slay and Smith, 2011; Karjalainen, 2020). Therefore, the study intends to explore the techno trend awareness of techno experts toward advanced tests and preventive measures to mitigate the spread of COVID-19.

# METHODS

## Design

The present research used an explorative qualitative approach to discover the techno trend awareness, perception, and attitudes of techno experts toward social connectedness and mitigating factors of COVID-19. Furthermore, it aims to understand the techno experts' shift toward virtual interaction to maintain social connectedness with close family and friends, as well as with others with whom they interact during the lockdown and the spread of this pandemic.

## Participants

The participants included professionally qualified techno-experts of their respective areas who were equipped with enhanced and updated technical skill and knowledge. It was also mandatory that they were specifically active in handling and assessing the COVID-19 related testing, diagnosis, and treatment as well as the other technical professionals who were dealing directly with people facing COVID-19-related problems. Experts who were post-graduates in science with a minimum qualification in a technical background and who had knowledge about testing of COVID-19, as well the professionals involved in treatment, were included for this study. The participants had to be aware and mindful of technology that was becoming popular in recent times, especially that which has been accepted readily in relation to COVID-19 diagnostic and preventive measures. The participants who were experts but not dealing with COVID-19 patients were excluded from the study. Additionally, those who did not agree to contribute enough time for providing the data (due to the scarcity of manpower, they were assigned more responsibilities) were excluded. Also, those who lacked a basic level of English (reading and writing) were excluded from the present study. These kinds of information have been obtained from the participants over telephonic and personal conversation. Owing to the ethical considerations, informed consent, and confidentiality of the participants, further details and their identity are not revealed here. Purposive sampling technique was used wherein the researcher acquired the consent of the participants to participate in the study. A total sample of 31 adults aged between 26 and 40 years (Mean age = 31.97, SD = ± 3.851; Males = 16; Females = 15) who showed a willingness to participate in the study were selected.

## Procedure and Data Collection

The participants were informed about the purpose of the study, and verbal consent was taken from each of them. Initially, a screening was done to establish a strong rapport through telephonic interviews and their permission and availability for participating in the study was sought. To accommodate their work schedule and to reduce lengthy conversations given their strict and overloaded responsibilities, semi-structured open-ended questions were administered through circulated Google Forms from the selected participants. The intended semi-structured open-ended questions were asked to understand their techno trend awareness, perception, and attitude toward the diagnostic and preventive measures for COVID-19. Further, they were also asked how technologically-adapted facilities were useful for increasing social connectedness and eventually in helping to mitigate the newly emerged problems related to COVID-19. The questions were asked in English to explore the opinion pertaining to major objectives of the study i.e., (a) *What is your opinion on the rapid testing and non-rapid tests designed to diagnose COVID-19?* (b) *What is your perception about home quarantine for asymptomatic patients or patients with mild symptoms?* (c) *Since the stay-at-home order began, how often have you been talking or chatting with friends or family?* (D) *Have you felt that connection through digital media was similar to that of meeting in person?*. On average, each participant took ∼40–50 min to complete the questions (and received their feedback regarding the entire schedule) and a follow-up session was done to recheck and confirm their responses through telephonic conversation.

## Data Analysis

Qualitative thematic analysis was employed to analyze the data. The data obtained from Google Forms was downloaded and systematically arranged by the researcher; additionally the researchers' conversations were also used to confirm the meaning of the participants' answers to the questions. The verbatim was well-read and carefully studied by researchers to understand the underlined meanings of their responses and finalize the major themes. Graneheim and Lundman's 2004 approach was used to analyse the data. The process of abstraction was utilized to code and create categories and themes. All the words, sentences, and paragraphs that indicated similar meanings were put together and condensed. Categories with similar meaningful homogeneous data were combined. Major themes, sub-themes, and categories were formed through the process of abstraction.

# RESULTS AND DISCUSSION

The COVID-19 pandemic has encouraged experts of all fields to help the community as well as to achieve a common goal of making individuals' lives better. Government and private sectors have implemented various policies and taken technologically supported measures to fulfill these goals. However, the success of these measures largely depends on the awareness and support of the individuals who directly use these technological facilities. Recent literature indicated that COVID-19 has led to increased mortality and increased morbidity globally; it specifically caused a greater risk of mortality on patients with comorbidities (Wang et al., 2020).

The techno experts' awareness and attitude in the analysis identified three ways– *home quarantine, early diagnosis,* and *treatment and preventive measures*– to reduce or prevent the mortality and morbidity due to COVID-19.

## Home Quarantine and Social Connectedness: Perception, Awareness, and Attitude

### Perception and Attitude Toward Home Quarantine

The techno experts shared their perception, awareness, and attitude toward the protocol of following home quarantine,

especially for asymptomatic patients and patients with mild symptoms. Most of the participants had a positive attitude toward this protocol. They advised that patients with asymptomatic and mild symptoms should follow home quarantine instead of being hospitalized due to a lack of facilities in hospitals. A male subject, PSC, responded, "*A home quarantine is best for asymptomatic patients with proper guidelines, and treatment is good instead of hospitalizing them as they don't need much attention or respiratory aid.*" Another male respondent, RR, opined that "*If the patient is less than 50 years [old] without comorbid conditions with no or mild symptoms, they can be home quarantined. It helps the actual needy patients for bed availability in hospital.*"

This indicated the concerns and support of techno experts and directions to the patients in following the precautions by themselves for their fast recovery. Song et al. (2020) have also exerted the public's supportive attitude toward home quarantine and following other necessary protocols, keeping in mind the nation's larger interest. It has also been observed that India's higher tendency to conform to rules and formal obligations that are considered important for the larger group (Bandyopadhyay and Fraccastoro, 2007) might have also impacted these behaviors. So, this study provides an insight into the possible perception people may have.

Digital media and online apps which represent the techno trends in the market to ease communications have allowed people to increase their social connectedness while being home quarantined and physically distanced from each other.

## Attitude Toward Online Interaction

The pandemic has caused people to stay connected using virtual applications. Similarly, the irritability and feelings of loneliness and boredom which were caused by home quarantine have reduced with the help of online interactions that enhanced social connectedness. Although all the respondents admitted that virtual interactions are not as good as compared to face-to-face or physical communication, it still helps social connectedness For example, a respondent, AS, said: "*Virtual interaction may be good for some days, it has brought us closer and made us feel that we are together and so helped us to be confident and we felt supported but [it] still doesn't bring the same love and affection as with Physical interaction.*"

Some respondents agreed that digital interactions have helped them to stay connected, depending on the closeness of the relationships. For instance, a participant, SSD, responded, "*Yes, digital interactions help to reduce the distance [during] such disaster times but it can never replace the physical presence. And it all depends on the kind of relationship we have with the person.*"

Overall, digital interactions have proven their major role mitigating the boredom, loneliness, and irritability caused due to home quarantine during the pandemic (Oh et al., 2014; Gabbiadini et al., 2020; Subrahmanyam et al., 2020). The participants suggested that it is the association of the quality of interaction in establishing psychological well-being and social support that needs to be emphasized irrespective of it being digital or face-to-face, indicating a greater emphasis on society's social bondage, social interdependence, and social sharing. This in turn suggests creating a collective identity which is a representation of the Indian cultural values (Banerjee, 2008). Moreover, in India relationships are a major concern. Additionally, a study by Gabbiadini et al. (2020) also emphasized the positive role of digital technologies in reducing psychological distress experienced due to social isolation, indicating toward a positive attitude toward the role of technology trends to help individuals during the pandemic.

## Online Social Reunion

The pandemic allowed individuals to reunite with old friends and acquaintances, which was possible mainly because of social media networking sites. This sub-theme emphasized the positive effects on digital media in reuniting with childhood and old friends and acquaintances.

For example, a respondent, SR, emphasized that "*Yes definitely, [a] few people [have] been connected, who remained out of sight for some time. This made me happy cause I never thought I would have time to reconnect with old friends. We all are so busy in our daily life activities.*"

A few responses indicated the time this pandemic has offered in aiding to reconnect with long lost friends which otherwise would not have been possible. Hacker et al. (2020) emphasized the ways social reunions have taken place during the pandemic, which gave rise to an increased number of interactions with families and friends.

Overall, techno experts' awareness revealed that techno trends have aided virtual interactions in a way that has helped them to reduce boredom and loneliness, increase the feeling of belongingness, and thereby enhance social connectedness even during the time of the pandemic. These examples are emphasizing the importance of technical aids and their positive attitude toward the techno trends as well as its positive effect on social connectedness which has helped in mitigating the psycho-social problems caused by COVID-19. Similar findings highlighted the role of social connectedness in reducing stress and fatigue as well as promoting resilience against COVID-19 related worries (Nitschke et al., 2020).

## Early Diagnosis: Awareness and Attitude Toward COVID-19 Diagnostic Tests

This main theme emphasizes on the techno-experts' and technical professionals' awareness, attitude, and perception toward the facilities technology has offered in mitigating COVID-19 crisis. The use of Artificial Intelligence (AI) and radiology features to diagnose COVID-19 have been covered in this main theme. Although several advanced technologies exist, the standard protocol on which technology and how that suggested technology is to be used is still not very precise and clear. This ambiguity has been mentioned by techno experts of this study in an unquoted manner wherein they opine that the ambiguity has created confusion on using the technologies based on their convenience, availability, and personal experiences, leading to varied results and interpretations of testing and treatment.

## Rapid and Non-rapid Testing

There are two main types of tests that are being widely used across the globe: Rapid antigen tests (U.S Food Drug Administration,

2020), also known as the rapid diagnostic test- RDT and RT-PCR tests–real-time reverse transcription-polymerase chain reaction. Among the various alternative diagnostic tests, RT-PCR tests have been considered as the most efficient (Júnior et al., 2020). Although sources revealed that RT-PCR tests take time to produce results, the accuracy is far better than the antigen tests, which are quick in terms of availing the results of the test (World Health Organization, 2020a). In line with this difference, this theme indicated awareness as well as the attitude of techno-experts. While some indicated the accuracy of non-rapid tests, a few recommended considering the technicians' efficiency in conducting the tests. A female expert, SSD, responded, "[The] *Rapid test just gives a superficial idea about the condition which must be correlated with clinical symptoms and other issues of patients. While non-rapid tests provide an accurate report (majority cases) but it requires well-experienced staff*". However, citing the immediate need, a male expert, SR, responded, "*Testing is very crucial in deciding the emergence of COVID-19 /non-COVID-19 patients. As there is no perfect vaccine for COVID-19, rapid antigen testing becomes very pivotal.*"

Overall, though the need of the hour demands rapid testing, the experts in this study opined that accurate testing is more required than rapid testing, especially since they all agreed that non-rapid tests are more reliable due to the specificity and sensitivity. However, accurate testing would mean slow and expensive testing, which is a crucial deciding factor for whether rapid or non-rapid tests are used. However, with the current confused state and with no other option, rapid testing seems to be proving beneficial, at least at a superficial state (New York Times, 2020; Radcliffe, 2020).

## Awareness and Attitude Toward BALF Tests

Bronchoalveolar Lavage Fluid tests are used for the diagnosis of lung pathology. A bronchoscope is passed into the lungs either through the nose or the mouth to recollect the fluid, which was squirted into the lung for analysis (Guthrie, 2012). Since COVID-19 majorly affects the respiratory system, studies have been proving that the BALF test could help to improve in determining the diagnosis faster. A male expert, RR, suggested "*Bronchoalveolar lavage sampling is an invasive procedure. It can't be done on all patients, only for patients who have severe disease Bal fluid can be collected.*"

Most of the responses indicate a similar line of thought, which is the efficacy in the technician's testing ability and the practical feasibility options to conduct these tests in large samples. Most responses about the BALF tests have a positive attitude. Some studies also recommended BALF tests. However, experts suggested that the testing should not rely on BALF alone, it should be integrated with other testing procedures as it cannot be used to confirm COVID-19 alone but instead helps to resolve the complex diagnostic issues (Jahromi et al., 2020; Ora et al., 2020).

## Awareness and Attitude Toward Physiological Measures

This sub-theme emerged with the significant aspects such as the data collected from heart rate, sleep patterns, deep neural networks, and X-ray scans helpful in diagnosing or detecting COVID-19.

Concerning the data related to heart rates' and sleep patterns' contribution in detecting the virus, mixed responses emerged. For example, a male expert, SR, suggested, "*Sleep is a very important factor to defeat COVID-19. As per one study, sleep produces some proteins in the body, thought to be antiviral in nature.*" However, some responses have also indicated an unclear perspective. A female respondent, SSD, emphasized that "*As the symptoms vary from person to person, with age, previous history, etc. It may require immense research and strict follow-up studies*".

Also, concerning the correlation of X-ray results with COVID-19 diagnosis, most of the participants were not aware that X-rays could also give a significant or effective diagnosis. However, some respondents highlighted their logical reasoning. A female subject, SST, said, "*Studies have said X-Ray or CT scans have limited scope to diagnose COVID-19 as the infection seen in the images might be due to other illness also*". Another female subject, SC, responded, "*X-ray & CT scans [are] useful to know the changes in lungs but not in all groups of COVID positive patients.*"

Overall, the participants in this study revealed that they possess a general awareness of the technology-applied tests to detect COVID-19; however, they assumed an unambiguous attitude toward the efficiency or accuracy in diagnosis. However, AI incorporation seems to be supportive in the long run for such clinical diagnosis (Kumar et al., 2020a; Ozsahin et al., 2020).

## CO-rad Efficiency

This sub-theme emerged with an indication of the participants' awareness and attitude of COVID-19 Reporting and Data Systems (CO-RAD). CO-RADS is a standardized classification and reporting system for patients with COVID-19 symptoms, developed for a range from moderate to high prevalence setting. The CT findings would indicate if the level of COVID-19 suspicion is very low (CO-RAD 1) or very high (CO-RAD 2) (Prokop et al., 2020). This sub-theme revealed the experts' awareness and attitude toward CO-RAD's feasibility to assess the severity of COVID-19 infections as well as risk factors of COVID-19 negative patients.

For instance, a male subject, RR, responded, "*To some extent, it gives us.… statistics about [the] percentage of people infected, rate of spread, incubation period, and many other variables."*

Overall, the participants perceived that CO-RAD is a good monitoring system, but it requires the genuine and committed efforts of the staff, technicians, and media involved in reporting the data faithfully without which the entire purpose would be lost. A few studies also indicated that CO-RAD has good diagnostic accuracy and the results can be relied on, however, researchers recommend that assessments and diagnosis should never be based solely on any one kind of testing as there have been some cases that could not make the perfect differential diagnosis (Fujioka et al., 2020; Prokop et al., 2020).

## Treatment and Preventive Measures: Mixed Approach

Techno experts have indicated an overall positive attitude toward the utilization and efficiency of the technological trends or advanced products like virtual media for enhancing social

connectedness and early diagnostic measures for identification and spread of the disease. However, due to the ambiguity involved in the nature of the COVID-19 variants, symptoms, prevention, and treatment protocols, the experts also indicated an ambiguous attitude toward the standard scientific treatment and preventive measures. The techno experts' identity concerning their culture and profession has greatly influenced the formation of their attitude toward these treatment and preventive protocols. Techno experts' cultural identity and traditional knowledge might have led them to incline toward their traditional and cultural practices.

Cultural identity indicates an individual's personal identity that represents one's self-understanding of a given culture or culture specific traits (Karjalainen, 2020). In this context, techno experts emphasized their trust on traditional roots, especially under the pretext of an ambiguous situation. Their cultural identity has led them to acknowledge and follow traditional and indigenous-based practices which have proven to be useful for their families or ancestors. For example, a male, AS, responded that "*In the end, our culture comes back to us.*"

However, professional identity also played a huge role while making decisions about the kind of treatment and preventive measures to be used. Professional identity revolves around their professional self-concept which is influenced by their different attributes, values, beliefs, motives, and experiences (Slay and Smith, 2011). To avoid the ambiguity toward standard protocol and traditional -cultural preventive measures brought upon by their cultural and professional identity, techno experts relied on a multifaceted approach by integrating both the scientific and traditional or indigenous knowledge to mitigate the spread of COVID-19.

Therefore, there are two main subdivisions under this mixed treatment and prevention approach: Techno trend measures and Traditional Indigenous practices.

## Techno Trend Awareness for Treatment

The theme emphasizes the use of technological advancement in the race to mitigate the spread of COVID-19.

*i) Perception of telemedicine consultation*:

This sub-theme emerged, highlighting the importance of online health or medical services during the lockdown and pandemic crisis. A female subject, SSD, said, "*It seems to be a better option as going to hospital may increase the risk of transmission to large groups.*"

Most of the respondents agreed that to contain the spread of COVID-19 it is advisable to opt for online medical services. Also, online medical services could be very helpful for asymptomatic patients as well. However, the use of telemedicine services has only improved the medical services during the COVID-19 crisis while also mitigating the spread of the virus (Monaghesh and Hajizadeh, 2020; World Health Organization, 2020b).

*ii) Awareness on Plasma Therapy*:

Scientists have been in a race to find a vaccine to tackle COVID-19 since it emerged. Although various treatment trials are ongoing, only a few vaccines are available for frontline health workers at present. It may take some time in order to reach to a larger segment of the population. Until the vaccination drive reaches more people, it is necessary to continue with symptomatic treatment as a cure. Plasma therapy has also been integrated as one of the treatment measures that might prove an effective cure for COVID-19, which emerged in the analysis. A male subject, JP, responded, "*Yes, plasma therapy is more useful for the newly infected people to fight against infection. Plasma therapy involves the use of antibodies from cured persons for newly infected people. Antibodies help boost up the immunity and cure patients as easily as possible*". Although some experts suggested that plasma therapy could prove helpful in curing a patient, they also highlighted the possibilities of it not working.

In addition to this, most of the participants have also rated Remdesivir as the most efficient drug in combating COVID-19 based on the data received from media and other sites. Since COVID-19 is a new disease, prior research does not exist; therefore, even the participants find it difficult to logically imply that plasma therapy would work. Lack of research is another highlighted reason for this ambiguity. Literature also indicates the dearth in this regard as the myriad of studies done are still contemplating the effectiveness of plasma therapy due to ongoing clinical trials. While it proved to be effective for some clinical trials, the long-term effects are not known yet (Agarwal et al., 2020; Duan et al., 2020; Ghosh, 2020).

## Techno Trend Awareness for Prevention

*i) Attitude toward PPE kit*:

Literature has indicated that good quality Personal Protective Equipment (PPE) is required for front-line workers to serve safely and their availability ensures a major factor in combating the pandemic (Sharma et al., 2020).

A male respondent, JP, said, "*Until we habituate to it, wearing PPE kits for a longer period has many adverse effects on health as we can't eat or drink. It mainly affects homeostasis and causes heat generation in body results in extreme burning sensation of palms and also causes mouth ulcers.*"

Overall, the experts opined that, although PPE kits protect the workers from the virus, being in the kit for a long duration hampers their activities and causes other health difficulties. It is also suggested that PPE kits may adversely lead to skin infection and behavior changes among staff which could make them vulnerable to contracting the virus (Foo et al., 2006; Atzori et al., 2020; Kantor, 2020).

*ii) Attitude toward Techno Trends in reducing COVID-19 spread*:

This sub-theme emerged with an emphasis on the various technological advancements that were developed to mitigate the spread of the virus. Participants opined on the use of robotics and drones for disinfecting and food delivery systems as well as the use of the wristband alert system for contact tracing. A male respondent, SR, opined that "*Well, these things can become technically successful in developed nations; [in] a country like India, it takes a lot of toll on our economy, our government has to pour lots of money on this.*"

With concern to the uses of a wristband alert system, a male subject, RR, responded, "*It depends upon the people, how they accept [it] because many are not using mask only, I doubt they will accept and, moreover there is social stigma created.*"

Overall, the participants being techno experts themselves, this theme revealed the economic and genuine concerns about mitigating COVID-19. India is still a developing country and to use drones and robots on a wide scale requires strong finance, which the country might be lacking. Therefore, self-awareness is required more than any technological tool. However, many studies have supported the efficiency in the usage of drones and robots where it has helped and reduced direct contact, which thereby aided in mitigating the spread of COVID-19 (Euchi, 2020; Kumar et al., 2020b; Preethika et al., 2020).

*iii) Attitude toward health-based applications*:

This sub-theme revealed the participants' attitude toward health-related applications, especially the ArogyaSetu app, which was an Indian Government initiative to track and alert people with COVID-19 symptoms. Most of the participants had a positive attitude toward the initiative. For example, a female respondent, SSD, opined that "*Although the purpose of developing the ArogyaSetu app was good. But I feel it must have incorporated a few more amenities in it. For instance, it shows the number of ill or COVID-19 positive patients around us in terms of the radius (kilometers). Instead, it could be developed to inform us about their street and can give some alarming sound when we are around 100-200 meters closer to that area.*" Although overall response indicated a positive attitude, some acknowledged that they had not installed any other health-related apps as they were not of much use and *ArogyaSetu* was installed only because it was mandatory.

Studies indicated similar findings that emphasize the user's acceptance of the ArogyaSetu app, however, users have also suggested the possible inclusive modifications that would help the people, in general, to understand the details of containment zones, tracking systems, and to some extent prevent the transmission of fake news (Kodali et al., 2020).

## Traditional Indigenous Practices

The techno experts' ambiguous attitude toward the standard protocols have led them to incorporate their traditional and cultural knowledge and practices with scientific knowledge.

*i) Inclination toward Indigenous Knowledge*

A very important theme emerged with an emphasis on knowledge, which indicates the inclination to trend toward age-old customs with a scientific realm. While the study has participants who represent technology experts with a strong scientific background, their Indian roots seemed to be highlighted when science has not been able to provide a vaccine for COVID-19. For instance, a male respondent, AS, emphasized that "*In the end, our culture comes back to us. Traditionally we were following all these things for being healthy and boosting immunity, which then stopped. And now in this uncertain situation, we are shifting again to these traditional practices.*"

This theme helps in understanding the Indian cultural context and the influence it has on individuals, irrespective of the professional background. The responses indicated that, when in dilemma, individuals–including the ones who practice science–might eventually resort to traditional practices. However, it does not mean a total abolition of science but an integration of science with traditional practices. These also indicate toward Indian conformity values. Society and individuals are interdependent and interrelated. People welcome change but those which are more acceptable are incremental. This would ensure a more perfect balance between the new and old ideas which could be more acceptable (Dev and Babu, 2007). The integration of traditional and modern science and exploring it with randomized clinical trials might eventually help in combating future viruses also (Kumar, 2020; Pathania et al., 2020).

*ii) Measures for Immunity Boosting*

This sub-theme emphasized the various preventive measures taken up by people and their attitude toward it to boost immunity. Some health-related news suggested that sources like sunlight, because of vitamin D, vitamin C, Zinc tablets, and ayurvedic *Kada,* which refers to traditional herb-based drinks, help in immunity boosting. Participants had a mixed response toward this.

A male subject, PCS, said that "*Vitamin D shows [an] effect against respiratory disease and antiviral effect but there is need for substantial evidence for its therapeutic use for COVID-19.*" Another male respondent, JP, said, "*Vitamin C and zinc tablets are responsible for boosting or triggering specific immune powers which would help combat viral infection.*" Yet another female subject, SS, said that "*Ayurvedic Kada helps to fight colds and good for immunity as it contains a lot of medicinal based herbs.*"

To prevent infections or viral diseases, people did resort to consuming these preventive tablets even though they are not aware or believe they are not properly proven by scientific research studies. A study indicated that, though traditional, many indigenously-based herb drinks or fruits contain medicinal properties that have been exclusively used and practiced by the ancestors in India (Ganguly, 2013). Older generations are highly respected, and their wisdom and experience are highly regarded which is why their methods are being followed and passed on to generations in India (Krishnan and Mahadevan, 1992). This study's findings also confirm the still persistent and importantly influential Indian values.

# CONCLUSION

The findings revealed that techno trends awareness of techno experts aided in maintaining social connections during the pandemic. People connected with family and friends through digital means; although the interactions did not meet their physical needs, it still helped them to obtain a feeling of belongingness and social support during home quarantine, thereby reducing the feelings of loneliness, boredom, and other negative effects. An important finding emphasizes online reunions with long lost friends and acquaintances.

The techno experts opined that, due to a lack of health facilities, home quarantine is the best choice for asymptomatic patients. Also, they emphasized that, although RT-PCR tests are more reliable and accurate, the current conditions required diagnosis using the rapid antigen tests which are not as accurate but fast. Findings also show that the techno experts' and technical professionals' cultural and professional identity influenced them to integrate science and tradition amid a lack of relevant scientific research and ambiguity in the standard protocols for COVID-19. The study also found that a few experts shifted to traditional healing practices to boost their immunity. Technological advancements have made life easier in many ways, especially in diagnosing COVID-19, in reducing the spread of COVID-19 by using telemedicine services, and in the usage of drones and *ArogyaSetu* apps. Overall, the findings indicated that the experts had good techno trend awareness to maintain social connections and mitigate the impact of the COVID-19 pandemic. Besides, the findings also showed the experts' opinion that if people take responsibility for their health then they would follow the protocols and thus help in mitigating the factors for the spread of COVID-19.

## IMPLICATIONS

The study emphasizes the techno experts' awareness and attitudes toward the recent technology aids that were used to diagnose and mitigate COVID-19. Since they represent individuals who are directly in contact with COVID-19 patients and directly engaged in the diagnostic, treatment, and preventive protocols, this study explores their level of acceptance and attitude toward these facilities. This research paves a way toward understanding the role of integrating different medicinal approaches for a common treatment, suggesting the importance of having an eclectic and multidimensional approach. COVID-19 in India particularly has ignited and aided individuals to reconnect with their traditional roots, which have greater potential for future research. Further, research in exploring these traditional practices would help in revisiting and inheriting the almost forgotten indigenous practices and norms. The current study also highlights the importance of social connectedness and belongingness through digital interactions to maintain relationships and social bondage. Irrespective of the mode of interaction, social relationships are of higher importance especially at a time where it is greatly needed. These perceptions indicate toward the underlying Indian culture values which still stay strong.

## LIMITATIONS AND RECOMMENDATIONS

Up against the plans of the study, researchers, amidst adversities of the pandemic situation, could not obtain a larger representation of the population. Also, owing to the surge in new cases and increased testing rates, the techno experts with their busy schedule of testing and allied responsibilities could not allocate sufficient time to help researchers provide in-depth data. Further research could be directed toward the differences in the attitude, awareness, and perception of technology trends and social connectedness between the techno experts and other individuals. The present findings contribute to improving the quality of health-related and other technological applications and software which would enhance individuals' quality of life. The study also emphasizes the feasibility and practicability of certain applications that would promote the design of better functioning, accurate, and user-friendly apps in future. Further, research with a more diverse sample concerning the individuals' cultural perspective and moral values would help to understand the deep-rooted beliefs that might play a role in technology acceptance.

## 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 Departmental Review Board, Central University of Karnataka. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

All the authors contributed equally during all the stages of this research work. Each author has given their full consent and approval for finalizing the schedule, data collection, analysis as well as submission of the manuscript. To understand the technical information/jargon given by the respondents, a special contribution has been made by NM.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.637395/full#supplementary-material

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REVIEW
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# Social Connectedness, Excessive Screen Time During COVID-19 and Mental Health: A Review of Current Evidence

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With an advancement of digital technology, excessive screen time has become a grave concern. This has pushed researchers and practitioners to focus on digital well-being. Screen time during COVID-19 has further increased as a result of public health measures enforced by governments to curb the pandemic. With the global societies under lockdown, the only medium to stay socio- emotionally connected was the digital one. A lack of comprehensive empirical overviews on screen time in COVID-19 era in the present literature prompted us to conduct this review. The present review attempts to understand the virtual social connectedness, excessive use of digital technology, its consequences and suggest strategies to maintain healthy use of digital technology. Results reveal that screen time has increased drastically during COVID-19. Though there are mixed consequences of prolonged screen time use and blurred understanding between healthy and unhealthy social connectedness over digital media, the suggestions for negative implications on (physical and) mental health warrant a strict need for inculcating healthy digital habits, especially knowing that digital technology is here to stay and grow with time.

**Keywords: screen time, COVID-19, social connection, digital habits, positive mental health, digital health promotion**

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## INTRODUCTION

The last two decades have seen an explosion in the use of digital technology. It has accelerated human's exposure to prolonged screen time which is becoming a growing concern. Digital technology is essentially the use of electronic devices to store, generate or process data; facilitates communication and virtual interactions on social media platforms using the internet (Vizcaino et al., 2020). Electronic devices include computer, laptop, palmtop, smartphone, tablet or any other similar devices with a screen. They are a medium of communication, virtual interactions and connectedness between people. Social connection is fundamental to humans. In addition, social connectedness also enhances mental well-being. COVID-19 pandemic has imposed digital platforms as the only means for people to maintain socio-emotional connection (Kanekar and Sharma, 2020). The digital technology is influencing how people use digital devices to maintain, or avoid social relations or how much time to spend for virtual social connectedness (Antonucci et al., 2017).

Screen time refers to the amount of time spent and the diverse activities performed online using digital devices (DataReportal, 2020). For instance, screen time encompasses both, using digital

devices for work purposes (regulated hours of work or educational purpose) as well as for leisure and entertainment (unregulated hours of gaming, viewing pornography or social media use).

The COVID-19 pandemic came with restrictions, regulations and stay-at-home orders. This meant that people stayed indoors, offices remained shut, playgrounds were empty and streets remained barren of human interaction. Many individuals could not return to their homes, many stuck in foreign lands and many in solitude. As a result, the usage of digital devices has increased manifold across the globe. Irrespective of age, people are pushed to rely on digital platforms. Education, shopping, working, meeting, entertaining and socializing suddenly leaped from offline to online. Here, digital technology came as a blessing in disguise, enabling individuals to remain emotionally connected despite the social distancing. At the same time, prolonged screen time has caused concerns related to its impact on physical and mental health. While mindful (and regulated) use of digital devices is linked with well-being, excessive screen time is reported to be associated with a range of negative mental health outcomes such as psychological problems, low emotional stability, and greater risk for depression or anxiety (Allen et al., 2019; Aziz Rahman et al., 2020; Ministry of Human Resource Development, 2020). Negative consequences often result when digital use is impulsive, compulsive, unregulated or addictive (Kuss and Lopez-Fernandez, 2016).

Restricted social interactions imposed by the pandemic aggravated the over-use of digital devices for socializing which included virtual dates, virtual tourism, virtual parties, and family conferences (Pandey and Pal, 2020). Notably, in times of social distancing; there is a possibility that screen time may not negatively interfere with well-being as it is the only way to remain socially connected. However, mindful use of the digital screen time needs to be under the check. The unprecedented digital life during the pandemic also gave rise to increased levels of anxiety, sad mood, uncertainty and negative emotions like irritability and aggression, a normative response to pandemic (Rajkumar, 2020). However, anxiety and aggression also meant an increase in cybercrimes and cyber-attacks (Lallie et al., 2021). This has raised concerns about the impact of screen time on mental health. A survey recorded about 50–70 percent increase in internet use during the COVID-19 pandemic and of that 50 percent of the time was spent engaging on social media in 2020 (Beech, 2020). Reiterating, it is difficult to discrepantly state healthy versus unhealthy extents of social connectedness over digital media; however, negative effects of digital technology are undeniable. Interesting to note is the fact that though digital health technology boomed, digital health and well-being demanded a lot more attention with prolonged hours being spent on the screen. Numerous studies have highlighted the increased screen time propelled by COVID-19; however, they are scattered. The present review synthesises the evidence on the use of digital technology in the context of COVID-19 pandemic, its impact on health and summarizes recommendations reported in the literature to foster positive health. It also identifies recommended digital habits to optimize screen time and warrant protection from its ill effects. Lastly, it introduces a multipronged approach to prevent adverse effects of prolonged screen time and promote healthy digital habits.

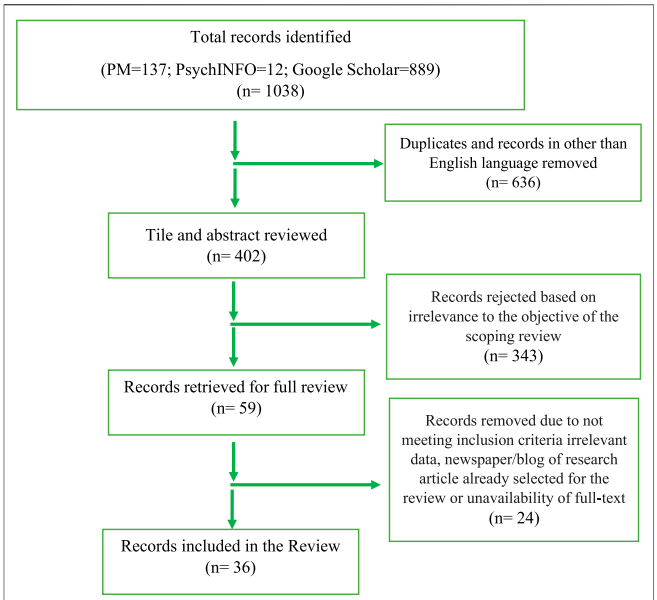


**FIGURE 1 |** The PRISMA diagram of the study.

## METHODS

The review was conducted using Arksey and O'Malley's scoping review framework (Arksey and O'Malley, 2005).

### Search Strategy and Selection Criteria

References for this review were identified through searches of PubMed, PsychINFO, and Google Scholar with the search terms "screen time," "social connectedness," "digital habits," "health" and "COVID-19" from January 2020 until June 2021. These keywords were combined with Boolean operators to narrow down the search results. Manual searches were executed to identify additional articles based on the references mentioned in the articles selected for full- text review. Records published in English language were considered for the review. The initial search yielded 1,038 records (PubMed-137; PsychINFO-12; Google Scholar-889) of which 636 were excluded based on title review and duplications. Later 343 records were rejected based on the abstract review and 59 records were selected for full text reviews. Out of which, a total of 36 records (29 peer-reviewed articles & seven newspaper articles & blogs) met the inclusion criteria and were finally selected for the scoping review. The PRISMA chart is presented in **Figure 1**. The final reference list was generated on the basis of originality and relevance to the broad scope of this Review.

Inclusion criteria

- Records published between January 2020 until June 2021.
- Reviews or studies exploring social connectedness using digital platforms, screen time, and its consequences.

- Studies conducted in the context of COVID-19.

Exclusion criteria

- Studies published before January 2020.
- Studies published in other than English language.

## Data Extraction

The literature search was done separately by two researchers (AP and PL). Initially selected records were coded in the domains such as author's name, year of publication, type of publication, country of study conducted, screen time in the COVID-19, impact of increased screen time, and strategies for optimizing use of digital devices. The results were matched by repeating search exercises using keywords and removed duplicating and unqualified records based on the exclusion criteria. Full text of selected records was critically appraised. Overall data synthesis was reviewed by all authors.

# RESULTS

Of the 36 selected records, 29 articles were peer-reviewed (15 original research, two meta-analyses, five systematic reviews; four editorials/commentaries and three guidelines) and the rest seven were news articles and blogs. Studies were heterogeneous in terms of methodology and types of research. Most original studies were cross-sectional research and one study adapted a mixed method research approach. Records selected were published from 10 countries (**Table 1**), the majority of them were published in the United States (8) followed by that in India (6).

**TABLE 1 |** Country of the selected records.

| Country | United States | Switzerland | India | Canada | Australia | China | Singapore | United Kingdom | Hungary | Taiwan | France | German | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | 11 | 2 | 8 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 36 |

## Key Findings From Meta-Analysis

Recent meta-analyses (Hancock et al., 2019; Liu et al., 2019) have indicated mixed results from no significant impact to moderate impact of digital screen time on health and psychological well-being. Authors reported that discrepant positive and negative effects of screen time is contingent on what kind of the digital activity engaged in.

## Synthesis of Reviewed Literature (Other Than Meta-Analysis)

There isn't a singular aspect of social, economic or political development that has escaped the rapid and deep trenched transformation of the digital revolution. The lockdown induced by COVID-19 pandemic has been a unique social experiment that has impacted our social relationships and how we connect interpersonally. Some relations strengthened while others came under severe strain.

During the pandemic induced lockdown, people turned to social media, messaging applications and video conferencing platforms. These platforms provided people with an opportunity to stay connected (Kietzmann et al., 2011). Social connection and interaction is one of the strongest predictors of well-being, thus potentially impacting the mental health of a person. Research conducted to understand the impact of digital

social interactions on well-being has shown both positive and negative effects (Gurvich et al., 2020; Pandey and Pal, 2020). Overall, people who spend some time using digital and social media are happier than those who do not use internet at all, but those who spend the most time online tend to be the least happy (Qin et al., 2020). For working people, checking email and being interrupted by digital messages was found to be linked with experiencing greater stress. Given that digital communications have increased manifold during the pandemic, these negative aspects of digital interactions may only be magnified while social distancing. Indispensable to note is that this is not a simplistic correlational understanding, there are several factors like personality traits, existing social support, thriving environment and balance with in-person communication bound to affect the screen time impact. Many people rely on technology to build and sustain relationships but at times over dependence on digital technology leaves people feeling qualitatively empty and alone. There is a need to regulate the digital social connectedness which can be established by mindful and healthy digital habits that can promote a balance between plugging in and unplugging, consequently impacting well-being and mental health.

Technology has had a profound impact on what it means to be social, challenging its overhauling essence. Furthermore, the coronavirus has atrophied the social skills of many individuals in the absence of peers. With most of us too used to interacting on digital platforms, we have missed the subtler nuances of what it means to exercise our social skills and etiquettes around people; which is only likely to surge especially when social distancing will fade. In COVID-19 times, it is important to question if over-engagement in being socially connected through digital technology (and social media platforms) is compulsive, negative use or a healthy coping mechanism? Another question that surfaces is also that social connectedness was promoted by digital platforms earlier that were organically blended by fact-to-face communication, but with physical distancing, how much does digital media facilitate social connectedness.

## Increased Screen-Time During Lock-Down and COVID-19

Several research studies during the pandemic period (in countries like India, China, United States, Canada and Australia) have delineated the problem with increasing screen time. As aforementioned, COVID-19 aggravated use of digital devices and consequently its impact on health colossally (Bahkir and Grandee, 2020; Gupta, 2020; Ko and Yen, 2020; Moore et al., 2020; Small et al., 2020; Ting et al., 2020). Overall digital device usage increased by 5 h, giving a plunge to screen time up to 17.5 h per day for heavy users and an average of 30 h per week for non-heavy users (Balhara et al., 2020; Dienlin and Johannes, 2020; Ministry of Human Resource Development, 2020; Vanderloo et al., 2020; Xiang et al., 2020). A recent study, (Ministry of Human Resource Development, 2020) reported 8.8 h of screen time among younger adults and 5.2 h among elderly (>65 years old), presenting concerns among these populations too. A recent narrative review discusses that screen time increased for children and adults (men and women) during the pandemic (as compared to pre-pandemic times) globally. The jump in screen time among children and adolescents was noted to be higher than what is the prescribed screen time by American Academy of Child and Adolescent Psychiatry (from the recommended hours to more than 6 h). For adults, screen time has been between more than 60–80% from before the pandemic. However, there aren't any comparative studies to state exact differences for the same (Sultana et al., 2021). Another report prepared by the UNICEF had pointed out the several gaps and methodological limitations in evidence-based literature supporting the validity and utility of having arbitrary screen-time cutoffs in today's digital world (Kardefelt-Winther, 2017).

## Impact of Increased Screen Time on Physical and Mental Health

Research has delineated negative impacts of increased screen time on physical and mental health. Problematic screen time is characterized by obsessive, excessive, compulsive, impulsive and hasty use of digital devices (Lodha, 2018).

### Children and Adolescents

Children and youth showed lowered physical activity levels, less outdoor time, higher sedentary behaviour that included leisure screen time and more sleep during the coronavirus outbreak (Bahkir and Grandee, 2020). Sudden increase in complaints of irritability without internet connectivity and smartphone; gambling, inability to concentrate; absenteeism in online educational classes or work due to disturbed sleep cycle, and unavoidable excessive use of smart-phones have been reported in the media (Smith et al., 2020).

The two crucial negative impacts of screen time on the physical health of children & adolescents is that of sleep problems and increased risk of myopia (Singh and Balhara, 2021). A large number of original studies indicate excessive screen time has adverse health effects in long run such as physical health symptoms like eye strain, sleep disturbance, carpal tunnel syndrome, neck pain as well as mental health problems ranging from difficulties in concentration, obsession to diagnosable mental illness such as anxiety, depression and attention-deficit hyperactivity disorder (Király et al., 2020; Meyer et al., 2020; Oberle et al., 2020; Stavridou et al., 2021). In a study (George et al., 2018) with older adolescents aged between 18 and 20, researchers found that smartphone dependency can predict higher reports of depressive symptoms and loneliness. Another study (Twenge et al., 2018) revealed that the generation of teens, known as "iGen"–born after 1995–are more likely to experience mental health issues than counterparts–their millennial predecessors.

The mental health impacts of excessive digital use include attention-deficit symptoms, impaired emotional and social intelligence, social isolation, phantom vibration syndrome, and diagnosable mental illnesses such as depression, anxiety, and technology addiction like gaming disorder (Amin et al., 2020; Dienlin and Johannes, 2020; King et al., 2020; Lanca and Saw,

**TABLE 2 |** Recommendations for reducing screen-time reported in studies.

| Recommendations | Description | Reference |
|---|---|---|
| Digital detox or digital well-being | It entails taking in between breaks and adopting healthier digital practices to curtain digital toxicity | Stavridou et al. (2021) |
| Intermittent social fasting | Avoiding using social media while working so that one gets the break for extra screen time eventually contributing to a good balance of work-life | Qin et al. (2020) |
| Promoting physical activities | In times where screen time is unavoidable, one can be digitally online and engage in physical activities through platforms such as online physical activity classes, online yoga, exercise mobile applications, or video games that have a physical activity component | Colley et al. (2020), Qin et al. (2020), Rolland et al. (2020), World Health Organization, (2020), Stavridou et al. (2021) |
| Staying active during screen time | Have an active time in front of the screen time where one could stretch or do exercises while sitting or standing to cut the stagnancy of long screen time | World Health Organization (2020) |
| Family digital detox or Digital free family time | Ensuring free time off digital devices as a family can not only reinforce staying away from digital technology but can also build healthier spaces for family members to interact. Making meal times with family is one of the easier ways to practice this | American Academy of Child and Adolescent Psychiatry (2020), Winther and Byrne (2020) |
| Modelled digital well- being | There is a need for responsible adults to model digital well-being for the younger pupil so that it can be inculcated as a habit. Observational learning is impactful | American Academy of Child and Adolescent Psychiatry (2020) |
| Set screen time limits | Fix a total number of hours of screen time and consciously try to reduce this by cutting down half-an-hour each day. Alternatively, track your time spent online, the activities you indulge in as well as your feelings after a few hours of screen-time | Ramirez et al. (2011), Amin et al. (2020), Colley et al. (2020) |
| Dumb phones | Using phones that enable voice calls only and do not allow the extra distractions of the smartphones. This can help reduce social anxiety and better engagement with people around | Harvard Pilgrim HealthCare (2021) |
| Use alternatives to screen | Choose activities such as walking, cycling, dancing, reading print books, magazines, etc that can be done without a digital screen | Harvard Pilgrim HealthCare (2021) |
| Active listening while screen use | Work on attentive listening skills by becoming aware of real-life surroundings while you are interacting virtually | Wiederhold (2020) |
| Indoor games | Indoor games can be promoted to engage a family across ages | Gupta (2020) |
| Use of digital platforms for promoting healthy lifestyles and seeking mental health care services | Digital platforms can be used to promote healthy habits and learning opportunities such as learning dance, language, attending yoga sessions and educational webinars (avoiding the rather pandemic of a webinar). There is also access to mental health information as well as consultation (reliable resources like that by the government, medical bodies, UN or WHO should be considered) | Lodha and De Sousa (2020), World Health Organization (2020) |

2020; Lodha and De Sousa, 2020; Oswald et al., 2020; World Health Organization, 2020; Xiang et al., 2020; Hudimova, 2021; Wong et al., 2021). Though digital devices kept many socially and emotionally connected, screen time also resulted in experiences of irritability, corona-anxiety, sleep problems, emotional exhaustion, isolation, social media fatigue and screen fatigue and phantom vibration syndrome (Gurvich et al., 2020; Lodha and De Sousa, 2020; Hudimova, 2021). Although few studies highlight the psychiatric disorders (Stiglic and Viner, 2019) among children and adolescents with excessive screen time use, the correlation between psychological well being and screen time among these populations remains inconsistent. The qualitative versus quantitative engagement with screen time is a prime factor to study its consequential effects.

## Adults

The WHO highlighted that increased screen time replaces healthy behaviours and habits like physical activity and sleep routine, and leads to potentially harmful effects such as reduced sleep or day-night reversal, headaches, neck pain, myopia, digital eye syndrome and cardiovascular risk factors such as obesity, high blood pressure, and insulin resistance due to increase in sedentary time among adults (World Health Organization, 2020). Evidently, increased screen time has alarmingly caused collateral damage to optical health, eating

habits and sleep routine (Di Renzo et al., 2020; Gupta et al., 2020; Lanca and Saw, 2020; Wong et al., 2021). Studies have found association between excess screen time and poor mental health among adults (Ministry of Human Resource Development, 2020).

Quintessentially, the perception of the individual users and their kind of engagements (how they use and what they do), rather than mere longer duration, make screen time negative or positive (Twenge and Campbell, 2018). This has been ascertained by a large study done by Google as well (Google, 2019).

## Key Recommendations Reported in the Reviewed Studies

Despite the potential adverse effects of screen time on health, it is impossible to abstain from screen time in modern times. Oftentimes, the most successful tactics to minimize technology harm are not technical at all, but behavioural such as self-imposed limitations on use of digital platforms, using non-digital means when possible and using digital platforms for better health and well-being.

Unregulated amounts of screen time may lead to adverse effects on health. Studies clearly indicate differences in the effects of regulated, rational use and actively engaging with the digital devices than passively absorbing what is on the screen (Bahkir and Grandee, 2020; Dienlin and Johannes, 2020; Ministry of Human Resource Development, 2020; Pandey and Pal, 2020; Winther and Byrne, 2020). Digital devices can be adapted for numerous positive activities such as online exercise classes, mindfulness training, webinars on healthy lifestyles, and so on (Harvard Pilgrim HealthCare, 2021). **Table 2** presents a synthesis of strategies recommended in reviewed studies that promote healthy digital habits among adults.

The above recommendations are conducive to socio-emotional connectedness among adults whilst keeping in mind that they practice healthy digital habits that promote better health and well-being. In addition, the following may be kept in mind:

1. Resort to audio calls to beat screen fatigue as a result of multiple video calls;
2. Use the voice note option on various social media platforms to reduce the screen stare time while typing a message;
3. Actively giving up phone phubbing (the act of snubbing someone you're talking with in person in favour of your phone) and connecting with people around.
4. Proactively be in touch with friends and relatives.
5. Making small talks, checking on people around about their days and ditching the digital devices once in a while can make for a good break and enhance social connections;
6. Use of mobile applications for promoting digital wellbeing. Mobile health apps are becoming increasingly popular to stay socially connected as well as aid mental wellbeing.
7. Healthy and discrete boundaries between the personal and professional temporal spaces is helpful.

# DISCUSSION

It is inevitable to realize the need to be socially connected with one another which has also led to momentous increase in screen time during the COVID-19 induced lockdown. Literature on screen time is reflective of both positive and negative consequences of screen time on (mental) health. Perhaps, digital technology offered a platform to deal with psychological reactions fuelled by COVID-19 if it were for a shorter period. However, the prolonged period of the pandemic has led the use of digital technology to culminate into threat for people's physical as well as mental health. Literacy about digital habits and parental supervision on children's digital habits command attention. Increased use of games among youth is concerning. Indispensable to note is that digital habits must be balanced with the non-connected activities. It is important to be cognizant of what are the absolutes where one can depend on digital devices for convenience and betterment versus where one needs to pause and disconnect.

## Three-Pronged Approach During COVID-19 Pandemic and Beyond

A concerted and evidence informed effort with a three-pronged approach is imperative to promote social connectedness while ensuring to prevent the ill effects of prolonged screen time. We propose immediate, intermediate and long-term strategies to promote healthy digital habits among communities during COVID-19 pandemic and beyond. They are described in the following sections and summarized in **Table 3**.

## Immediate Strategy

Some immediate strategies encompass- generating evidence, synthesizing evidence on screen time across ages in the local context- that may assist in reducing excessive screen time and its negative consequences. Once evidence is established on screen-time, measures need to be rapidly implemented.

Promoting healthy digital habits is imperative. Although potentially challenging, public campaigns and establishing a reliable platform for sharing information regarding healthy digital habits are imperative. Using a behaviour change communication approach, people can be educated on signs of excessive screen time or gaming, healthy digital habits and available screening and treatment services. Partnership with digital media giants (such as IT companies, social media companies) to promote healthy digital habits, positive use of digital media can be scrutinized.

## Intermediate Strategy

One of the intermediate measures can be developing digital health guidelines and standardized screening tools, remedial and treatment protocols (for treating internet addiction, gaming disorder, or online gambling) in localized contexts. Educational institutions, corporates and (mental) health agencies can comfortably ensure implementation of such guidelines. Further, establishing a strong referral for management of severe consequences of screen-time is indispensable.

Another measure is to embed digital health education into school and university curriculums. This may range from incorporating signs and symptoms of excessive screen time and risky digital habits in schools and universities, to setting the foundations of digital health modules in health and medical education.

**TABLE 3 |** A three-pronged approach to promote social connectedness through healthy digital habits.

| Strategies | Immediate | Intermediate | Long-term |
|---|---|---|---|
| **Measures** | Generate<br>• Evidence<br>• Synthesize evidence<br>Create Digital Health Literacy and Habits<br>• Public health awareness campaigns<br>• Establish a reliable platform for sharing information<br>Partner<br>• With digital technology giants to promote healthy digital habits | Develop<br>• Digital habits guideline<br>• Screening tools<br>• Referral mechanism<br>Involve<br>• Role models<br>• Educational institutions/corporate<br>Integrate<br>• Curriculum on digital health at all levels of education | Develop<br>• Evidence-informed policy<br>• Establish Legislature<br>• Surveillance<br>Monitor<br>• Digital media usage/screen time through Artificial Intelligence and Machine Learning<br>Promote<br>• Research and preventive interventions |

## Long-Term Strategy

In the evolving pandemic, restrained resources, economic and political pressure create a challenging atmosphere to promote evidence informed policy making and legislation. Despite these challenges, evidence-informed policy and legislations for protecting rights of people for monitoring digital use patterns and privacy of patients' using telehealth services should take the forefront. Thus, incorporating screen-time and its consequences in the national health surveys can be an important policy decision to generate population level data as a long-term strategic plan.

Machine learning and big data analytics can be potential in understanding digital screen usage. The screenome project (Reeves et al., 2021) is an initiative that studies duration of screen time, specific content observed, created and/or shared, exposures to apps, social media, games etc. Such data catalyses to inform policy, maximizing the potential of digital devices and interventions to remedy its most pernicious effects.

Interventions to reduce distress and lifestyle modification along with diurnal practices to regulate screen time can potentially promote positive mental health while rejoicing in the inescapable digital use. Moreover, longitudinal studies can help assess digital habits across all ages, its impact on physical and mental health and cost-effectiveness of healthy digital habits promotion interventions in low-and-middle-income countries.

# CONCLUSION

Largely, evidence indicates negative effects of prolonged screen time on health including mental health. Although digital technology provides avenues to connect socially, over indulgence or over use of digital devices can be harmful in the long-term. Promoting healthy digital habits and positive use of digital technology is inexorable to avert ill effects of excessive screen time. While it is important to adopt critical measures to cease the spread of COVID-19, it is necessary to assess and mitigate the impact of COVID-19 on screen-time and prevent potential negative consequences. Having visited the impact of screen time on health, it calls for individual as well as systemic level action. Adapting immediate, short-term and long-term strategic measures can help scrutinize digital use and screen time not only amidst the regulations of COVID-19 but also ahead, considering that digitalisation is the way forward. Empowering individuals to make scientific-information based decisions is the need of the hour to mitigate these ill-effects. Building and imbibing healthy digital habits is a promising preventive measure conducive to health in the light of globally growing digitalisation.

# AUTHOR CONTRIBUTIONS

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

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frontiers in Human Dynamics

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# Exploring the Relationship Between Social Ties and Resilience From Evolutionary Framework

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This conceptual paper examines the necessity and importance of social bonds and networks in building resilience to fight the COVID-19. Resilience is a quality that energizes an individual's actions and acts as a buffer to stressful events. The current article is intended to explore the evolutionary programmed behavior of the human mind to make social ties and structure. Humans have a strong need to connect and relate with other individuals by developing cooperation and perspective-taking. The ability to make social connections, group living, and sharing resources had a selective advantage in coping with physical and psychological stress. Social bonds provide resilience to people's approach while making adjustments and adapting to situations, thus presents fitness benefits at both group and individual levels. An attempt has also been made to address how social isolation as a strategy to contain the infection adversely influence body homeostasis. Finally, this article recommends health practitioners, clinicians, and researchers to encourage research on the impact of social isolation/social interaction on mental and physical health indicators.

**Keywords: social connections, COVID-19, stress, resilience, evolutionary process**

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## INTRODUCTION

The end of 2019 and the beginning of 2020 were marked by a worldwide outbreak of the COVID-19 pandemic. Coronavirus infection spread amongst the human population through droplet infections, contacting contaminated surfaces, and aerosols. The most effective strategy to contain the spread of the virus is to break the chain through social distancing, quarantine, hand hygiene, and wearing the mask (Saltzman et al., 2020). The nation-wise lockdown was imposed in various countries to contain the spread of coronavirus in March–April 2020. This global event has been tremendous in scale, with a far-reaching and profound impact on physical, psychological, social, economic, educational, and health systems across countries. The pandemic has shaken the world upside down with its nature and long-lasting effects, making us reflect on the integral and innate aspects of life. These aspects help us to survive, adjust, and function better in everyday situations. Social bonds and networks are one of those whose importance got highlighted. We acknowledge the significance of isolation during the pandemic. At the same time, there is a need to differentiate isolation without social interactions (as it happens in hospitals) and isolation at home (where an individual has interactional access with significant ones while following social distancing). In this article, we argue that isolation without social interactions may present short- and long-term undesirable effects on psychological and physical health. It is quite evident from the recommendation for home isolation given by several experts and governments (Mariani et al., 2020). In home isolation, the patient is not deprived of

social interactions. As a result, the patient receives necessary emotional and psychological care at home. In contrast, hospitals follow stringent protocols that disallow interactions from family members and relatives. Patients are isolated in a ward wherein there is the absence of emotional and psychological support, which, in turn, may delay recovery and adversely affect mental health (Cruces et al., 2014; Cacioppo et al., 2015; Holt-Lunstad et al., 2015; Campagne, 2019).

An exciting theme which the pandemic has presented is why the absence of social interactions is pivotal for human existence. In evolution, survival and reproductive success of species depend on the balance between benefits and costs. de Waal (2008) pointed out that consequences of behavior form the basis of evolutionary analysis. Behaviors producing desirable or undesirable effects are affected by environmental and contextual factors such as the number of members in a group, predators, climate, and competition. Social isolation is one such behavioral aspect that can positively or negatively affect health, depending upon several factors. Nevertheless, the notable point is that humans have developed and relied extensively on social relationships for inclusive fitness. Whether for a short or long period, social isolation may pose adverse fitness consequences (Bailey and Moore, 2018). Against this background, the current paper argues that the evolution of enriched sociality develops resilience capability in humans during the crisis, thus producing a beneficial impact on physiological and psychological health.

## EVOLUTIONARY SIGNIFICANCE OF SOCIAL INTERACTIONS

Social interactions and networks play a major role in the survival of people. Throughout the process of evolution, the essential nature of social bonds has always been emphasized (Wilson and Williams, 2013). According to the evolutionary perspective, a socially isolated and lonely individual feels unsafe and tends to be highly sensitive to danger and attacks. To feel safe and protected, our ancestors formed social connections by working in groups, sharing food, and helping each other. In stressful situations or trauma, this ability has a selective advantage of survival (Cacioppo et al., 2006a) by weakening the effects of stressful experiences through these social connections (Cohen and Wills, 1985; Wolins and Wolins, 1993). Compared to several other species, humans are not physically strong and fast. Thus, humans have an extended infancy period and development occurs within different forms of social relationships that are hierarchical with strong in-group cohesiveness (Brewer, 2004). Hence, close connections with others helped fulfill the survival and reproductive needs of humans (DeWall et al., 2011).

To achieve the goal of fitness, individuals form social groups using social strategies (Dunbar and Shultz, 2007). People in groups receive physical and mental benefits contributing to their well-being (DeWall et al., 2011). Silk (2007) also explains that fitness benefits at the group level reach the individual because of relationships. Similarly, downward causation is about the social regulation of biology in which group living influences an individual's hormonal activity. For example, women living in close proximity for a significant period have coordinated menstrual cycles. The communal group living is essential for survival because it acts as a moderator between individual and environmental requirements. Humans' capacity to adapt to diverse physical environments results from the collective knowledge and cooperative information sharing. This capacity created obligatory interdependence (Caporael and Brewer, 1995), making it a process of genetic and sociocultural coevolution, thus suggesting that the survival chances of an individual are not only dependent on his or her abilities, skills, and efforts but also on the efforts and behavior of other related individuals within a social community (Brewer, 2004).

Another aspect of the evolutionary origin of social connections is anxiety related to the individual's awareness of his mortality. For our ancestors, not having social connections was equivalent to death and social exclusion induced existential worry (Koole et al., 2006) motivated people to form long-lasting and positive relationships. The drive for social connections is considered as a desirable trait fulfilling basic survival and reproductive goals and also reducing existential anxiety associated with awareness of death (DeWall et al., 2011). Conversely, social isolation may obstruct reproductive success. Isolation refers to separating oneself from other people, thereby inhibiting social contacts and activities. Harlow and Harlow (1962) found that isolated infant monkeys showed abnormal and compulsive behavior, self-aggression, emotional pathology, deviated sexual behavior, and less attention to conspecifics. In a study conducted by Li et al. (2016), socially isolated rats displayed impairment in cognitive functioning in the form of weakened prepulse inhibition. Judge (2010) found in a study on field cricket *Gryllus pennsylvanicus* that socially isolated females exercised less sexual selection on males relative to females having interactional access to members of the group. Humans, like other mammals, are socially interdependent and bonded to each other (Panksepp, 2005). The evolutionary explanation of depression focuses on separation distress - one of the primary mammalian emotional systems - involved in bonding and social attachment. It gets activated by incidences of separation in infancy and early childhood and motivates reunion seeking, which supports maintaining social bonds (Watt and Panksepp, 2009).

Using Behavioral Immune System (BIS) theory, Brüne and Wilson (2020) argued that humans evolved several defense mechanisms such as avoidance of interpersonal and social interactions, neophobia, and isolating or rejecting sick individuals during the time of infection. While agreeing with the argument, it is also imperative to understand that infectious diseases in human history had not been overcome by merely following social isolation or social rejection. Instead, contagious diseases were controlled by integrating the efforts of medicine development and community participation and support. Here, as mentioned previously, we make a distinction between self-imposed isolation and social isolation. Self-imposed isolation does not preclude social interactions while simultaneously adheres to social distancing. Bailey and Moore (2018) suggested that self-imposed isolation could provide adaptive benefits to fight off pathogens.

## SOCIAL INTERACTIONS, RESILIENCE, AND HEALTH

Social connections and support are causal components of resilience. Social connections and interactions help individuals to deal with stressful situations, come out of the adverse conditions and display adaptive capacity (Marsh, 1996; Fuller-Iglesias et al., 2008; Masten, 2014). Social connections within and between diverse groups indicate recovery from personal and community level traumas by showing the resilience quality. It can be seen in the communities with the history of volunteerism, having evolved a structure of mutual trust and self-help, thus supporting people to live through the crisis (Wilding, 2011). According to Houston and Buzzanell (2018), social connections and support promote coping behavior and psychological adaptation to emerging situations.

Post disasters, resilience can be seen as an outcome of social support (Xu and Ou, 2014; Saltzman et al., 2018). Thus, while experiencing stress and trauma, social networks become crucial to promoting resilience (Sippel et al., 2015). In resilience, an individual's traits, family, and social environment act as protective factors (Werner and Smith, 2001). Studies revealed that social support meets informational, material, and emotional needs that help building up mutual trust, interpersonal care, and shared space (Marsiglia et al., 2002; O'Donnell et al., 2002; Gralinski-Bakker et al., 2004; LaFromboise et al., 2006; Jones, 2012).

A strong association between resilience and interpersonal connections highlights the importance of social relationships for positive health outcomes. Castro and Zautra (2016) found that strong relations elicit effective short-term responses to stress and lower overall pressure exerted on the body by the process of adaptation. It suggests that social connections and relations work at the psychological, physical, and community levels in the time of stress, adversities, and traumas to help people deal with challenging and uncertain times and build resilience during this adaptation process. Also, these connections and relations let people enjoy fitness benefits at both the group and individual level (Luthar, 2006).

Deprivation of social relations causes serious physiological and psychological disturbances, making individuals weaker and incapable of facing stress and adversities effectively. Mariani et al. (2020) and Nathiya et al. (2020) found that family support enhances psychological coping strategies during the pandemic.

American Psychological Association has acknowledged the importance of social support as a response to COVID-19 (American Psychological Association, 2020). Literature has also pointed out the broader role of social support in decreasing negative symptomatology and encouraging positive adaptation post-COVID-19. Similarly, Psychological First Aid (PFA) and Skill for Psychological Recovery (SPR)—first-line disaster interventions—have also emphasized social support as a mechanism of coping (Ruzek et al., 2007; Wade et al., 2014). However, COVID-19 management demands social distancing, so it is required for people to change their ways of making connections and methods to stay connected (Saltzman et al., 2020), which would enhance a resilient response to the situation.

The lack of social interactions and unfulfilled personal and social needs cause loneliness (Cacioppo et al., 2006b; Grossman et al., 2020). Loneliness develops social pain, which is neurocognitively similar to physical pain (Eisenberger et al., 2003), thus leading to low self-esteem, declined feelings of control, and depression (Van Orden et al., 2010; Vanhalst et al., 2012; Beutel et al., 2017; Wang et al., 2018). Literature suggests that an unpredictable chronic mild stress (during the pandemic) followed by social isolation, whether objective or subjective, and inadequate social support increases morbidity, mortality, major depressive disorder, suicidal ideation, and suicide attempts (Lau et al., 2005; Cacioppo et al., 2006b; Kessler et al., 2006; Mak et al., 2009; Holt-Lunstad et al., 2015; Beller and Wagner, 2018; Wang et al., 2018; McClelland et al., 2020; Moccia et al., 2020; Sani et al., 2020).

Giallonardo et al. (2020) showed that quarantine also leads to frustration, loneliness, and worries about the future. This causes fear and errors in risk perceptions, thus leading to negative societal behavior (Shigemura et al., 2020). Particularly in COVID-19–positive patients, the experience of hospital isolation and perceived danger, uncertain physical conditions of self, and fear of dying act as risk factors and develop the symptoms of anxiety, depression, and PTSD (Bo et al., 2020; Xiang et al., 2020).

Break in social bond with the fear of losing occupation, contacting the viral infection, and restricted movements might hyperactivate the stress axes, which, in turn, adversely affect the physiological systems, including immunity (Matthews et al., 2015; Courtin and Knapp, 2017; Taylor et al., 2018; Smith and Victor, 2019), resulting in a high degree of fatality in comorbidity cases (Holt-Lunstad et al., 2015; Beller and Wagner, 2018; Boyraz et al., 2020). Conversely, interpersonal interaction and social connectedness help individuals overcome post-pandemic socioeconomic and mental health complications (Boyraz et al., 2020).

Social isolation impacts all age groups of the population. In children, lack of face-to-face interactions with peers and friends and limited outdoor activities psychologically affect them adversely. It is reflected in the form of loneliness, distress, anxiety, depression, and self-harm or suicide (Elovainio et al., 2017; Matthews et al., 2019; Galea et al., 2020; Brooks et al., 2020; Pfefferbaum and North, 2020; Wang et al., 2020). COVID-19–related loneliness can have an intensified impact on adolescents and young adults (Beam and Kim, 2020). A strong association was found in older adults between social isolation and behavioral symptoms like sleep disturbance and fatigue (Cho et al., 2019).

Further, social isolation poses a detrimental effect on human physiology. Research studies have stated the significant association between social isolation and diseases such as coronary heart disease (CHD) (Orth-Gomér et al., 1993) and memory loss (Ertel et al., 2008). The loneliness that comes with social isolation shows a significant association with cardiovascular diseases, diabetes, migraine, and sleep problems (Christiansen et al., 2016). According to Seeman et al. (1987), long-standing stress and

lower coping resources related to social isolation are responsible for immune and neuroendocrinal changes. Similarly, social isolation itself also acts as a stressor causing prolonged elevations in the hypothalamic–pituitary–adrenal (HPA) axis and sympathetic nervous system (SNS) activation (Cacioppo et al., 2015). These systems regulate the functions of various internal bodily systems for better immune functioning. The following section covers, in detail, the relationship between social isolation, stress, and physiology.

## PHYSIOLOGY OF STRESS AND STRESS RESPONSES

Studies in the context of COVID-19 unanimously underline that social isolation increases the stress level in humans. An important aspect of stress resistance is the functioning of human physiology during stress. Physiological and psychological components are symbiotically related to each other. Hence, the understanding of human responses during COVID-19 requires a description of physiological responses and how it affects psychological functioning. Any environmental, physiological, and psychological stimulus that disharmonizes the homeostasis of an organism is perceived as stress (Drolet et al., 2001; Beery and Kaufer, 2015; Mumtaz et al., 2018). The stress-induced neurosensory signals are perceived and processed in the parts of the brain locus coeruleus (LC) and paraventricular nuclei (PVN) of the hypothalamus (Charmandari et al., 2005). To reestablish the homeostatic state, the body responds to these stressors *via* activating hypothalamic–pituitary–adrenal (HPA) and sympatho-adreno-medullary (SAM) axes (Charmandari et al., 2005). The stress stimuli elicit the release of corticotropin-releasing factor (CRF) and vasopressin (VPN) from PVN of the hypothalamus, which, in turn, stimulates the production of proopiomelanocortin-derived peptides, enkephalins, endorphins, and adrenocorticotropic hormone (ACTH) in the pituitary (Schulkin et al., 1994; Drolet et al., 2001; Goeders 2002; Dallman et al., 2003; Charmandari et al., 2005). ACTH further acts on the adrenal cortex and stimulates the production of glucocorticoids, corticosterone in rodents, and cortisol in humans. Moreover, the CRF stimulates the production of norepinephrine in the sympathetic nervous system and the peripheral tissues. The stress-response mechanism in animals has been designed to prepare the organisms to cope with the stress through "flight or fight" responses. While the stress-mediated increase in plasma glucocorticoid level raises blood glucose level, an increase in norepinephrine level stimulates cardiac output, rate of respiration, heartbeat, and blood flow, and thus prepares the organism to cope with the stress through the "flight or fight" mechanism (Charmandari et al., 2005). However, prolonged stress responses, as observed in chronic stress, adversely affect various physiological functions, including immunity, and thereby make the organism vulnerable to multiple metabolic diseases and potential infections (Dallman and Bhatnagar, 2010).

Depending upon the type of stressor, different parts of the brain are activated during stress. Physical stressors like blood loss, trauma, and cold temperature activate the brainstem and hypothalamic regions (Reiche et al., 2004). On the other hand, psychological stressors like social embarrassment, examination, deadlines, and social isolation involve the activation of the amygdala, prefrontal cortex, and hippocampus for controlling emotions, learning, memory, and decision-making (Reiche et al., 2004). About chronic restriction movement and social isolation, stress-mediated increase in norepinephrine and serotonin level in PFC cause anxiety, learning disability, and depressive behavior (Reiche et al., 2004). It further results in suboptimal physiological functioning and impaired immune functions.

The social behavior of animals ensures better survival chances through reproductive success, protection from predators, and environmental factors (Neumann, 2009). First evolved in insects, the complex and coordinated social behavior is observed in mammals, including humans (Neumann, 2009; Blumstein et al., 2010; Ebensperger et al., 2012). The social lifestyle, in general, ensures optimal functioning of the neural, endocrine, and immune system, that, in turn, maintains a homeostatic state, reduces anxiety and depression, promotes proper cardiovascular and immune functioning and thus life expectancy (Taylor, 2006; Taylor et al., 2007; Neumann, 2009; Blumstein et al., 2010; Ebensperger et al., 2012; Beery and Kaufer, 2015). On the contrary, social isolation-induced psychological stress disturbs the coordinated functioning of neural, endocrine, and immune functions (Cruces et al., 2014). Consequently, hyper- and prolonged activation of the stress axis (HPA) causes fluctuation in the blood pressure, sleep impairment, anorexia, reduced cognitive and behavioral responses, compromised immune system (Cruces et al., 2014), and thus increased chances of comorbidity.

Chronic stress responses marked with increased production of catecholamines, opioid peptides, and glucocorticoids adversely affect the immune functions. Numerous experimental evidences support that glucocorticoids, catecholamines, and opiate peptides at elevated levels suppress both innate and adaptive immune functions (Reiche et al., 2004; Cruces et al., 2014). It has been reported that social isolation adversely affects both innate and adaptive immune systems (Cruces et al., 2014), making individuals susceptible to potential infections. Studies pertaining to address the effect of social isolation on the HPA axis and body homeostasis have been widely explored in diverse animal species, including mammals. Moreover, the responses of individuals to stress are influenced mainly by age, sex, species type, isolation regimen, and type of stressor (Hawkley et al., 2012). While chronic isolation stress increased the plasma corticosterone level in rat, mice, hamsters, pigs, and cattle (Creel and Albright, 1988; Detillion et al., 2004; Dronjak et al., 2004; Weiss et al., 2004; Hermes et al., 2006; Grippo et al., 2007a; Grippo et al., 2007b; Kanitz et al., 2009; Williams et al., 2009; Weintraub et al., 2010; Ferland and Schrader, 2011; Toth et al., 2011), in nonhuman primates such as marmosets (Cross et al., 2004; Smith et al., 2011) and rhesus monkey (Higley et al., 1992), it causes the increased production of cortisol. Though glucocorticoids support the body physiology under stress conditions, prolonged exposure to stress causes adverse effects, including compromised immune responses, and hence increased vulnerability to infections.

## IMPLICATIONS AND FUTURE RECOMMENDATIONS

The first implication is clinical intervention. In hospitals, patients can be given access to meet family members and friends by following social distancing norms. This will strengthen their mental health and enhance the coping behavior. The second implication is that systematic studies should be conducted on recovery from COVID-19 under home and hospital isolation. Although there is no data available, the encouragement given to home isolation by health experts makes it a better strategy to recuperate from the disease. Home isolation provides relational access to patients, thereby substantially limiting the deleterious effect of complete social isolation. Third, experimental studies should be conducted to test the varying levels of isolation on health. As mentioned in the article, isolation leads to psychological and physiological changes adverse to mental health, reduces immune responses, and brings disruption in neural and endocrinal activity. This can be done by creating three conditions: home isolation, hospital isolation, and hospital isolation with some interactions following social distancing. Researchers, then, can test whether there is a significant difference in the psychological and physiological parameters in these three groups.

## AUTHOR CONTRIBUTIONS

SA and SK contributed to the manuscript's writing as per the design and conception of the work formulated by RR. SA has written about the psychological aspects of social isolation and social interactions. SK has written about the physiological implications of social isolation and physiological responses to stress.

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# Social Isolation, Loneliness and Well-Being: The Impact of WeChat Use Intensity During the COVID-19 Pandemic in China

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This study is aimed to examine the impact of WeChat use intensity on social isolation, loneliness, and well-being during the lockdown period of the COVID-19 pandemic. Drawing on the regulatory loop model of loneliness, the notions of Internet Paradox, the Time Displacement hypothesis and previous literature on WeChat use intensity, we propose that lockdown loneliness (partially) mediates the relationship between lockdown WeChat use intensity and well-being (i.e., lockdown stress and lockdown life satisfaction). Moreover, we assume that lockdown WeChat use intensity moderates the relationship between lockdown social isolation and well-being (i.e., lockdown stress and lockdown life satisfaction) in both a direct and in an indirect way, that is through lockdown loneliness. The results from our Structural Equation Modeling analyses, using a sample of 1,805 Chinese respondents, indicate that all of our research hypotheses are confirmed. From this empirical work, it becomes clear that online social interactions, which are believed by many people to be able to compensate for the lack of offline social interactions during the COVID-19 lockdown period, in fact are endangering their mental health and life satisfaction instead. This article concludes with theoretical and practical implications of our study, followed by its limitations and recommendations for future research.

**Keywords: lockdown social isolation, lockdown loneliness, well-being (lockdown stress and lockdown life satisfaction), lockdown WeChat use intensity, COVID-19**

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## INTRODUCTION

The COVID-19 (COrona VIrus Disease) pandemic that broke out in December 2019 is an unprecedented global public health crisis, as of 27 June 2021, more than 180 million people worldwide are or have been diagnosed with the virus, and with already more than 3.9 million deaths as a result (World Health Organization (WHO), 2021). In response to the COVID-19 pandemic, many governments implemented measures, such as the lockdown and social distancing regulations, to prevent the spreading of the virus and to cope with the extreme burden that is put on the healthcare system. This lockdown and social distancing regulations force people to isolate themselves at home and to cut off face-to-face gatherings and interactions within family members, friends, colleagues, classmates, and so on. However, as human beings are in essence social animals,

social relationships are among the most fundamental elements in their lives. Therefore, in the COVID-19 pandemic, social media (e.g., Facebook and WeChat) has been widely used among people to keep close social connections with others and to help them to cope with the various demands in their work and private lives, that had to be combined at home with all of its accompanying challenges.

Based on the data from Tencent (https://www.tencent.com/zh-cn/investors.html), published on May 20th 2021, WeChat (WeiXin in Chinese), as a popular social media tool, has become an important part of Chinese people's daily work and life, with more than 1.2 billion active users worldwide, on a monthly basis. Chinese people not only use WeChat app to conduct commercial transaction, to work, and to learn, but also use WeChat app to shop, to play games, and to communicate with each other. In addition, WeChat has also been widely used for prevention of infection with the COVID-19 virus and for close surveillance in China. For example, during the period of the COVID-19 pandemic, Chinese people had to submit their health reports, using the WeChat app, daily; and they needed to scan a health code using the WeChat app to enter and leave public places. As a result of this, WeChat use is like a double-edged sword. WeChat use can not only help an individual to enhance interpersonal interactions and social connections, and, through this, to improve their subjective well-being (He and Huang, 2020), but it may also increase one's loneliness due to the lack of face-to-face interpersonal interactions (Jiao, 2016). At the same time, through WeChat groups, professionals could provide professional consultation and psychological counseling services for home-quarantined people in the COVID-19 pandemic (Hu et al., 2020).

From recent research, we already know that social isolation is an important predictor of loneliness (Cheng et al., 2020; Tomova et al., 2020), that both social isolation and loneliness have detrimental effects on one's well-being (Hwang et al., 2020; Lewis et al., 2020; Kasar and Karaman, 2021), and that social media use may have both positive and negative impacts on one's well-being in the COVID-19 pandemic (Gonzlez-Padilla and Tortolero-Blanco, 2021). Additionally, in China, some researchers found that Internet use can significantly improve individuals' subjective well-being (Zhou and Sun, 2017; Zhu and Leng, 2018), while others reported that frequency of Internet use did significantly enhance subjective well-being (Long and Yi, 2019). Accordingly, we posit that WeChat use intensity may be an important determinant of these variables as well.

To the best of our knowledge, so far, no empirical studies that dealt with the relationships between WeChat use intensity, social isolation, loneliness, and well-being have been performed, let alone scholarly research that focused on Chinese self-quarantined residents during the COVID-19 pandemic. Therefore, the current study aims to investigate whether lockdown loneliness (partially) mediates the relationship between WeChat use intensity and well-being (i.e., lockdown stress and lockdown life satisfaction) within a Chinese context. Moreover, we also examine whether WeChat use intensity moderates the relationship between social isolation and well-being (i.e., lockdown stress and lockdown life satisfaction), both in a direct way and in an indirect way, that is through lockdown loneliness. The findings in this study will help us to better understand the influence mechanism of WeChat use intensity on people's well-being during the COVID-19 pandemic, and to provide evidence-based recommendations for sufferers on how to manage their use of WeChat in a pandemic situation.

# THEORETICAL BACKGROUND AND HYPOTHESES

## Social Isolation, Loneliness, and Well-Being

Social isolation usually refers to a paucity of social relationships or social connections (Tanskanen and Anttila, 2016; Kobayashi and Steptoe, 2018), while loneliness refers to the subjective experience of social isolation (Hawkley and Cacioppo, 2010; Kobayashi and Steptoe, 2018). The emotional state of loneliness has often been viewed as biological concomitants or responses of social isolation (Steptoe et al., 2013), and people usually feel lonely and crave social contacts after acute social isolation, just like the way fasting causes hunger (Tomova et al., 2020). However, as Kiyoshi (1987)) noted, "Loneliness is not in the mountains but in the streets, not in one person but among many people" (p. 59), yet, social isolation and loneliness do not necessarily occur at the same time, or one after the other. What we know for sure, is that both social isolation and loneliness have negative effects on well-being, and that such detrimental effects can be interpreted by the stress-buffering and main effects models of social relationships (Holt-Lunstad et al., 2010), and by the regulatory loop model of loneliness (Hawkley and Cacioppo, 2010).

Social relationships are central to well-being as human beings live in groups. In particular, first, the stress-buffering model suggests that social relationships may provide social support (emotional, instrumental, or informational) that improves neuroendocrine or adaptive behavioral responses to acute or chronic stressors (e.g., self-quarantine, social transitions) (Cohen, 2004). Social support thereby buffers or moderates the harmful influence of stressors on well-being. Accordingly, self-quarantined people might suffer more from stress in comparison with others, due to a lack of social connectedness, which, in turn, might bring about an adverse effect on their well-being.

Second, the main effect model emphasizes that social connectedness is beneficial for well-being, irrespective of whether individuals are under stress or not, and social connectedness may be linked to protective health effects by means of cognitive, emotional, behavioral, and biological influences (Cohen, 2004). For example, being a member of a badminton club may give individuals more opportunities to exercise. Analogously, when people feel lonely due to self-quarantine, they might relieve stress, keep healthy and protect their life satisfaction by exercising at home. Recent research also confirmed that people who do exercise almost every day during the COVID-19 pandemic period usually have the best mood (Brand et al., 2020). Indeed, we have managed to see some videos through

WeChat groups, wherein Chinese people play badminton during the self-quarantine period.

Third, the regulatory loop model of loneliness (Hawkley and Cacioppo, 2010) proposes that social isolation is divided into objective social isolation and perceived social isolation. Loneliness is synonymous with perceived social isolation and refers to "a distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships" (p. 218). Loneliness is also regarded as feeling unsafe, and this sense of unsafety may trigger implicit hypervigilance for social threat in one's surroundings. Unconscious surveillance for social threats may lead to cognitive biases, namely, people who feel lonely or isolated see society as a more threatening place than those who are not alone, anticipate more negative social interactions, and remember more negative social messages.

In other words, lonely people's hypervigilance for society can result in more negative feelings and attitudes toward others; and they hunger for establishing a sense of psychological security and protection once they feel that their interpersonal needs are not met, and that specific situations make them feel lonely or isolated (Hawkley and Cacioppo, 2010). Doing so makes lonely people even more alert and sensitive to social relationships, and prompts them to continually assess the situation and judge whether their interpersonal relationships meet the need for belonging or not. In general, loneliness can produce a negative loop of social interactions; and the stronger the loneliness of a person is, the more likely he or she develops negative attributions to others, which, in turn, lead to negative behaviors and a decrease in belonging and security (Hawkley and Cacioppo, 2010). Correspondingly, this loop of self-reinforcing loneliness, which we expect to have occurred during the COVID-19 pandemic, is likely to be accompanied by feelings of stress (anxiety) and life dissatisfaction.

In addition, Cornwell and Waite's (2009a) found that social isolation could exert an influence on self-rated physical health and mental health through a mediation effect of loneliness. Well-being could be defined as a multi-dimensional construct that includes the absence of negative affects, such as stress, and the presence of positive affects, such as life satisfaction (Diener, 1984; Houben et al., 2015; Utz and Breuer, 2017). Mental well-being could be defined as a positive state of psychological and emotional health, in which one can cope with the normal stressors of life (Tuzovic and Kabadayi, 2020). Therefore, based upon the theoretical outline given above, we formulated the following hypotheses:

***Hypothesis 1a**: Lockdown social isolation is positively associated with lockdown loneliness in the COVID-19 lockdown period.*

***Hypothesis 1b**: Lockdown loneliness (partially) mediates the relationship between lockdown social isolation and lockdown stress in the COVID-19 lockdown period.*

***Hypothesis 1c**: Lockdown loneliness (partially) mediates the relationship between lockdown social isolation and lockdown life satisfaction in the COVID-19 lockdown period.*

## The Influence of WeChat Use Intensity on the Relationships Between Social Isolation, Loneliness and Well-Being

Social media refers to "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan and Haenlein, 2010, p. 61). Social media use can be defined as various activities performed by human beings through social media platforms, such as providing a personal profile for self-presentation, online interpersonal interactions, and a stream of frequently updated content (e.g., WeChat's News Feed) (Verduyn's et al., 2017). The measurement of social media use is generally divided into two main categories: intensity and addiction, which evaluate how much time (frequency or intensity) an individual spends on social media or experiences feelings of connectedness to the platforms, as well as assess an individual's addictive behaviors or symptoms related to social media (Mieczkowski et al., 2020). In our empirical study, intensity is chosen to assess the impact of social media use (i.e., WeChat use intensity).

At present, social media in China mainly includes online interactive modes such as WeChat, QQ, Weibo, Blog, Forum, Podcast and social networking sites, which provide an ideal impression management platform and more control over social interactions for individuals. WeChat is China's most popular messaging app that integrates instant communications, social contacts, e-commerce, mobile payments, and public services. Chinese people have incorporated WeChat into their daily lives by using it to communicate with family and friends, to shop, to play games, and to pass time. Whether social use of WeChat has positive or negative effects depends on whether WeChat enables an individual to keep a sound balance between close and loose social connections that they establish and maintain. As far as interpersonal relationships are concerned, online relationships are usually a representation and extension of offline relationships. That is to say, in case the offline relationships are close, the online relationships are also close; and vice versa. For example, family space, friend space (e.g., Moments), colleague space, and classmate space are reflections of such close or loose interpersonal relationships.

### WeChat Use Intensity, Loneliness, and Well-Being

As social media use intensity usually refers to the frequency of social media use (Boer et al., 2021), in this contribution WeChat use intensity refers to the frequency of WeChat use or feelings of connectedness to WeChat. The relationships between WeChat use intensity, loneliness, and well-being can be explained by the notion of Internet Paradox (Kraut and Burke, 2015) and the hypothesis of Time Displacement (Putnam, 2000). First, unlike empirical studies that concluded that increased use of the Internet was related to reduced stress, depression, and loneliness (Shaw and Gant, 2002; Teppers et al., 2014), because individuals would have more chances to receive social support from online interactions, Kraut and Burke (2015) contended that an increased use of the Internet could decrease the amount of social support because of the weaker social ties in online settings. As a result

of the diminished social support, individuals may experience more stress, loneliness, and life dissatisfaction. More specifically, strong social ties (e.g., communications with family members and close friends online) may have positive effects on life satisfaction and negative effects on loneliness and stress. On the contrary, weak social ties (e.g., communications with strangers) may have harmful effects on psychological well-being (Kraut and Burke, 2015).

Second, the hypothesis of Time Displacement (Putnam, 2000) suggests that individuals' time is limited and that the amount of time spent on the Internet may crowd out time spent in socializing (Putnam, 2000). Consequently, the time for face-to-face communications will reduce with a higher amount of Internet use, loneliness will increase and psychological well-being will decrease. In a similar vein, Turkle (2014) stated that interpersonal relationships will be reduced into simple relations in case the Internet technology is utilized to deal with intimate relationships; continuous online communications, in turn, will lead to anxiety concerning losing one's contacts; and whereas it makes them connect more closely, the Internet use will make individuals more isolated.

As far as empirical work is concerned, recent research has demonstrated that excessive use of social media was positively associated with loneliness and anxiety (Boursier et al., 2020), and that WeChat use could exert a negative impact on social interaction behaviors (Xu et al., 2020), as offline social relationships are critical to human well-being. Based on the outline given above, and in combination with Hypothesis 1b-1c, we formulated the following hypotheses:

***Hypothesis 2a****: Lockdown WeChat use intensity is positively associated with lockdown loneliness in the COVID-19 lockdown period.*

***Hypothesis 2b****: Lockdown loneliness (partially) mediates the relationship between lockdown WeChat use intensity and lockdown stress in the COVID-19 lockdown period.*

***Hypothesis 2c****: Lockdown loneliness (partially) mediates the relationship between lockdown WeChat use intensity and lockdown life satisfaction in the COVID-19 lockdown period.*

### WeChat Use Intensity as a Moderator in the Relationship Between Social Isolation and Loneliness

In order to better understand the impact of WeChat use intensity on social isolation and loneliness, we build upon the notion of Internet paradox (Kraut et al., 1998). Kraut et al. (1998), in their two-year longitudinal study, reported that people used the Internet mainly for interpersonal communication; that the Internet reduced the importance of face-to-face communications in creating and maintaining strong social ties; and that the more time they spent in using the Internet, the stronger they felt depression and loneliness. On the contrary, Shaw and Gant (2002) found that Internet use decreased loneliness and depression because, online, individuals had more opportunities to meet and form friendships with others, which made them feel less lonely. From the longitudinal study by Teppers et al. (2014), it appeared that, while using Facebook to make new friends reduced loneliness, with the passage of time, using Facebook to compensate for social skills increased loneliness.

Furthermore, some scholars found that the more time young adults spent in using social media, the greater they felt dispositional anxiety (Vannuccia et al., 2017). While WeChat use may improve interpersonal interactions and social connections (He and Huang, 2020), excessive use of WeChat may increase loneliness due to a lack of face-to-face social communications (Jiao, 2016). In addition, Kraut and Burke (2015) posited that whether Internet use has positive or negative effects depends on how individuals use the Internet, what they talk about, and whom they talk to.

Apparently, during the COVID-19 pandemic, individuals spend more time in the Internet use and WeChat use than common because social isolation (e.g., self-quarantine) cuts off face-to-face communications, and online social contacts substitute offline communications. We assume that individuals use the Internet and WeChat more frequently or excessively, and in combination with Hypothesis 1a, we formulated the following:

***Hypothesis 3a****: Lockdown WeChat use intensity positively moderates the relationship between lockdown social isolation and lockdown loneliness in the COVID-19 lockdown period.*

***Hypothesis 3b****: Lockdown WeChat use intensity positively moderates the relationship between lockdown social isolation and lockdown stress, through lockdown loneliness, in the COVID-19 lockdown period.*

***Hypothesis 3c****: Lockdown WeChat use intensity negatively moderates the relationship between lockdown social isolation and lockdown life satisfaction, through lockdown loneliness, in the COVID-19 lockdown period.*

Our study model is depicted in **Figure 1**.

## METHOD

### Sample and Procedure

A pilot study was conducted among acquaintances by using convenience sampling (Sedgwick, 2013) in July, 2020. Three hundred and nineteen valid questionnaires were collected during an on-line survey, and were used to revise the pilot questionnaire into the final version. The main survey study was conducted by using stratified sampling (Thompson, 2012) in August 2020. More specifically, first, based on the data of "Baidu's Epidemic Real-time Big Data Report" published on July 29, 2020, and on China's demographic data from 2019, we divided China into three regions for our sampling strategy. The first region was Hubei Province, with a resident population of 4.2 per cent of China's total, where 68,135 people were infected with COVID-19; the second region included six provinces (Guangdong, Henan, Zhejiang, Hunan, Anhui and Heilongjiang), with a resident population of 31.5 per cent of China's total, where 7,177 people were infected with COVID-19; and the third region included other provinces, with a resident population of 64.3 per cent of China's total, where 12,368 people were infected with COVID-19.

Second, in order to obtain a suitable amount of data for Structural Equation Modeling (SEM), following our stratified

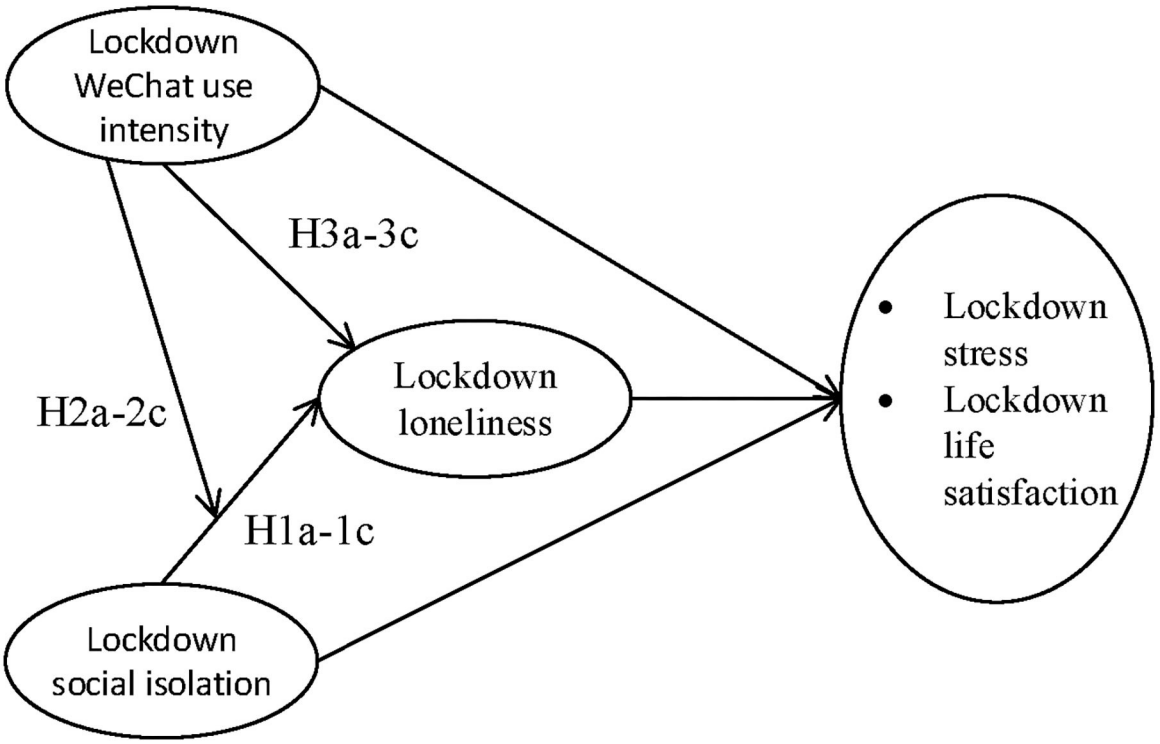


**FIGURE 1 |** Conceptual model.

sampling approach, we strived to collect 2,000 valid surveys including 400, 800, and 800 respondents in the first, second and third regions, respectively.

Third, online questionnaires were collected through the following three ways. First, WeChat groups were used to collect data in the first region. Here, all participants completed the survey voluntarily and anonymously, and received a certain amount of cash (i.e., 8.88, 11.0 and 23.6 CNY) as compensation ($N = 893$). Second, we signed a sample service contract with Questionnaires Platform, through which data was randomly collected across the nationwide, and 644 completed questionnaires were obtained. Third, we signed a sample service contract with the NetEase positioning platform, through which the data was randomly collected across China, and 620 completed questionnaires were collected. To sum up, 2,157 completed questionnaires were obtained.

Next, the filled out questionnaires were validated. In particular, those respondents who had not experienced the lockdown or other enclosed anti-epidemic modes, those who had no work units during the period of the lockdown or other enclosed management, those who had retired or worked in rural areas, and those who lived in Hong Kong, Macao and Taiwan or abroad were eliminated from the final data set. Finally, 1,805 valid questionnaires were gathered including 358, 745, and 702 in the first, second and third regions, respectively.

**Table 1** shows the social-demographic characteristics of the sample.

## Measures

*Lockdown social isolation.* Considering the context of the COVID-19 lockdown, the measure for social isolation focused on external aspects (Zavaleta et al., 2017), such as infrequent contact with network members (Brummett et al., 2001), low participation in social activities (Ellison and George, 1994; Thoits and Hewitt, 2001; Benjamins, 2004), and social disconnectedness (Cornwell and Waite, 2009b). Lockdown social isolation was assessed using a four-item ($\alpha = 0.83$) scale (e.g., "I hadn't seen many of my family members whom I should have seen if there had been no lockdown?"). The response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree").

*Lockdown loneliness.* Loneliness can be divided into emotional loneliness and social loneliness; emotional loneliness stems from the lack of "family attachment," while social loneliness stems from the lack of "social overall relationship" (Gierveld and Van Tilburg, 2006). Given the fact that individuals usually lived with their families in the Spring Festival, there was no lack of "family attachment" during the enclosed management of the COVID-19 pandemic in China. Accordingly, only social loneliness was incorporated in this study. Lockdown loneliness was assessed using a five-item ($\alpha = 0.88$) based on the scales by Hughes et al. (2004) and Schrempft et al. (2019) that measure lockdown social loneliness (e.g., "During the COVID-19 lockdown, I often felt that I lacked companionship"). The response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree").

**TABLE 1 |** The socio-demographic characteristics of the sample.

| Description of Variable | *N* (%) |
|---|---|
| **Gender** | |
| female | 812(45%) |
| male | 993(55%) |
| **Age** | |
| born in/after 2000 (at least 18 years old) | 7(0.4%) |
| born in 1990s | 557(30.9%) |
| born in 1980s | 839(46.5%) |
| born in 1970s | 288(16.0%) |
| born in 1960s | 111(6.1%) |
| born in 1950s or earlier | 3(0.2%) |
| **Level of education** | |
| junior high school graduate or below | 11(0.6%) |
| senior high school graduate | 79(4.4%) |
| college degree | 298(16.5%) |
| bachelor's degree | 1050(58.2%) |
| Master's degree | 279(15.5%) |
| PhD. | 88(4.9%) |
| **Income** | |
| [How much on average did you earn monthly last year (CNY)?] | |
| <= 999 | 4(0.2%) |
| 1,000–2,999 | 46(2.5%) |
| 3,000–4,999 | 283(15.7%) |
| 5,000–9,999 | 797(44.2%) |
| 10,000–19,999 | 472(26.1%) |
| 20,000–49,9999 | 116(6.4%) |
| 50,000–99,999 | 50(2.8%) |
| > 100,000 | 37(2.0%) |

*Well-being*. Based on the research by Diener (1984) and Utz and Breuer (2017), in this study, well-being was operationalized as stress and life satisfaction. *Lockdown stress* was assessed using a five-item scale ($\alpha = 0.92$) based on the scales by Antony et al. (1998) and Lee et al. (2019) that measure stress (e.g., "During the period of COVID-19 enclosed management, I remember that I often felt nervous and anxious at that time"). The response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree").

*Lockdown life satisfaction* was assessed using a five-item scale ($\alpha = 0.82$) based on the scales by Diener et al. (1985) and Margolis et al. (2019) that measure life satisfaction (e.g., "During the period of COVID-19 enclosed management, on the whole, I was satisfied with my life at that time"). The response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree").

*Lockdown WeChat use intensity*. Given that in China, frequency of Internet use, rather than Internet use, appears to significantly increase subjective well-being (Long and Yi, 2019), in this study, we measured lockdown WeChat use intensity using a four-item scale ($\alpha = 0.88$) based on scales developed by Moqbel et al. (2013), Ellison et al. (2007) and Wang et al. (2019). Sample items included: "During the period of COVID-19 enclosed management, I felt out of touch when I had not logged on to WeChat for a while." The response categories range from 1 ("strongly disagree") to 5 ("strongly agree").

The details for all measures are presented in **Appendix 1**.

## Control Variables

Control variables included the experience of the lockdown, working status, family situation, gender, age, educational level, and income. The experience of the full lockdown, which means "the strictly and fully enclosed isolation of the whole city (or the whole region)," was coded as 1 while "less strict lockdown measures or partial lockdown" was coded as 0. Concerning working status, the respondents were divided into two categories: individuals who have stopped working due to epidemic prevention and control were coded as 1; while 0 referred to those individuals who worked in their unit or at home online. Family situation was coded as 1 in case individual lived together with family members, and it was coded 0 in case one lived alone.

In addition, we followed Fair (1978) for the data coding. Gender, 0 = female, 1 = male; Age, 19 = under 20, 25.5 = 20–30, 35.5 = 30–40, 45.5 = 40–50, 55.5 = 50–60, 65.5 = 60 or over. Educational level, 9 = grade school; 12= high school graduate or below; 15 = junior college graduate; 16 = college graduate; 18 = Master's degree, 20 = Ph.D., or other advanced degree; average month income, 0.05 = 1000 CNY or below, 0.2 = 1000–3000 CNY, 0.4 = 3000–5000 CNY, 0.75 = 5000–10,000 CNY, 1.5 = 10,000–20,000 CNY, 3.5 = 20,000–50,000 CNY, 7.5 = 50,000–100,000 CNY, 15 = over 100,000 CNY.

## Data Analysis

We followed Hair et al.'s recommendations Hair et al. (2010) to examine the discriminant validity of our measurement model, using SEM, and the following six model fit indices were computed: normed chi-square statistic ($x^2$/df), goodness-of-fit index (GFI), Tucker-Lewis index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). As a rule of thumb, the $x^2/df \leq 3$ (Hair et al., 2010), GFI, TLI, and CFI values >0.90 (Bentler, 1990), a RMSEA $\leq 0.05$ (Kenny et al., 2015), and a SRMR $\leq 0.08$ (Hu and Bentler, 1999) indicate a close fit between the model and the data.

Subsequently, we conducted a series of confirmatory factor analyses to investigate whether all the variables that were examined in this study were distinct. Compared to other models (see **Table 2**), the proposed five-factor structure (i.e., lockdown social isolation, lockdown social loneliness, lockdown stress, lockdown life satisfaction, and lockdown WeChat use intensity) was found to be a significantly better fit with the data, $x^2/df = 580.562/125 = 4.64$, $p < 0.001$, CFI = 0.976, TLI = 0.970, RMSEA = 0.045, SRMR = 0.032. This finding suggested that all study variables were distinct from one another.

We also followed Podsakoff et al.'s suggestions Podsakoff et al. (2003) to overcome the concern of common-method variance (CMV). First, to optimize the psychometric qualities of the measurements that were used in this study, we used well-validated scales. Second, we made sure that all participants complete the questionnaires anonymously. Furthermore, we conducted Harman's single-factor test to examine the CMV; it comprises a type of confirmatory factor analysis in which all

**TABLE 2 |** Testing the discriminant validity of the constructs.

| CFA models | $x^2$ | *df* | $x^2/df$ | CFI | TLI | RMSEA | SRMR |
|---|---|---|---|---|---|---|---|
| 5 factors | 580.562 | 125.000 | 4.644 | 0.976 | 0.970 | 0.045 | 0.032 |
| 4 factors | 2520.937 | 129.000 | 19.542 | 0.872 | 0.848 | 0.101 | 0.074 |
| 3 factors | 4499.065 | 132.000 | 34.084 | 0.766 | 0.729 | 0.135 | 0.111 |
| 2 factors | 7512.185 | 134.000 | 56.061 | 0.549 | 0.140 | 0.175 | 0.605 |
| 1 factor | 9620.501 | 135.000 | 71.263 | 0.492 | 0.425 | 0.197 | 0.149 |

*5 factors model: lockdown stress, lockdown life satisfaction, lockdown social loneliness, lockdown WeChat use intensity, lockdown social isolation.*
*4 factors model: lockdown stress + lockdown life satisfaction, lockdown social loneliness, lockdown WeChat use intensity, lockdown social isolation.*
*3 factors model: lockdown stress + lockdown life satisfaction, lockdown social loneliness, lockdown WeChat use intensity + lockdown social isolation.*
*2 factors model: lockdown stress + lockdown life satisfaction + lockdown social loneliness, lockdown WeChat use intensity + lockdown social isolation.*
*1 factor model: lockdown stress + lockdown life satisfaction + lockdown social loneliness + lockdown WeChat use intensity + lockdown social isolation.*

the variables are specified to load onto one common factor (cf. Mossholder et al., 1998). The one-factor model appeared to have a very poor fit with the data, $x^2/df = 9620.501/135 = 71.26$, $p < 0.001$, CFI = 0.492, TLI = 0.425, RMSEA = 0.197, SRMR = 0.149. This indicated that a majority of the variance in our model was not explained by one single factor.

# RESULTS

## Descriptive Statistics and Correlation Analysis

Means, standard deviations, and correlation coefficients for all the study variables are presented in **Table 3**. Lockdown social isolation had a significant positive correlation with lockdown social loneliness ($r = 0.15$, $p < 0.001$), lockdown stress ($r = 0.21$, $p < 0.001$) and lockdown WeChat use intensity ($r = 0.20$, $p < 0.001$), whereas it had a significant negative correlation with lockdown life satisfaction ($r = -0.06$, $p < 0.05$). Lockdown social loneliness appeared to have a significant positive correlation with lockdown stress ($r = 0.55$, $p < 0.001$), while it had a significant negative correlation with lockdown life satisfaction ($r = -0.27$, $p < 0.001$). Lockdown stress had a significant negative correlation with lockdown life satisfaction ($r = -0.35$, $p < 0.001$). Moreover, lockdown WeChat use intensity had a significant positive correlation with lockdown social loneliness ($r = 0.16$, $p < 0.001$) and lockdown stress ($r = 0.21$, $p < 0.001$).

We also found that our control variables were related to lockdown social isolation, lockdown social loneliness, lockdown stress, lockdown life satisfaction, and lockdown WeChat use intensity, and the mean for family situation ($M = 0.92$) confirmed that most of participants stayed with families. With these outcomes, we found preliminary evidence for our research hypotheses.

## Hypotheses Testing

We used latent moderated structural model (LMS) (Klein and Moosbrugger, 2000) within Mplus Version 8.3 to test the structural model as shown in **Figures 2**, **3**, which incorporate all research hypotheses. First, we tested the model with lockdown stress as the dependent variable (see **Figure 2**). In particular, we started with estimating a model with the direct effect and the mediation effect only, i.e., excluding the interaction effect, which demonstrated a satisfactory overall model fit: $x^2/df = 883.672/182 = 4.855$, $p < 0.001$, CFI = 0.957, TLI = 0.951, RMSEA = 0.046, SRMR = 0.049. Next, we estimated the proposed model with the interaction term included, which appeared to significantly improve the model fit, $-2\Delta LL = 6.958$, $\Delta df = 1$, $p < 0.01$ (the difference between the log-likelihood LL0 of the baseline model (M0) and the log-likelihood LL1 of the wherein the interaction term was added (M1) multiplied by −2, i.e. $-2\Delta LL = -2$(LL0–LL1), is chi-square distributed, cf. Gerhard et al., 2015).

Second, analogously, we tested the model with lockdown life satisfaction as dependent variable (see **Figure 3**). We estimated the baseline model with the direct effect and the mediation effect only, i.e., excluding the interaction effect, which demonstrated a satisfactory overall model fit: $x^2/df = x^2/\mathrm{df} = 613.846/143 = 4.293$, $p < 0.001$, CFI = 0.960, TLI = 0.953, RMSEA = 0.043, SRMR = 0.047. We then estimated the proposed model with the interaction included. Adding the interaction term appeared to significantly improve the model fit: $-2\Delta\mathrm{LL} = 6.888$, $\Delta df = 1$, $p < 0.01$ (cf. Gerhard et al., 2015).

Hypotheses 1a, 1b, and 1c stated that in the COVID-19 lockdown period, lockdown social isolation is positively related to lockdown social loneliness, which, in turn, (partially) mediates the relationship between lockdown social isolation, on the one hand, and lockdown stress and lockdown life satisfaction, on the other hand. From **Figures 2**, **3**, we can infer that after controlling for experience of the lockdown, working status, family situation, gender, age, educational level, and income, lockdown social isolation was significantly related to lockdown social loneliness ($\beta = 0.13$, $p < 0.001$), which, in turn, partially mediated the relationship between lockdown social isolation and lockdown stress ($\beta = 0.08$, $p < 0.001$), and fully mediated the relationship with lockdown life satisfaction ($\beta = -0.03$, $p < 0.001$). With these outcomes, we have found full support for Hypotheses 1a, 1b, and 1c.

Hypotheses 2a, 2b and 2c stated that lockdown WeChat use intensity is positively related to lockdown social loneliness, which, in turn, (partially) mediates the relationships between lockdown WeChat use intensity, on the one hand, and lockdown stress and lockdown life satisfaction, on the other hand. **Figures 2**, **3** indicate that after controlling for experience of the lockdown, working status, family situation, gender, age,

**TABLE 3 |** Mean, standard deviations, and correlations matrix for the whole sample.

| | Mean | SD | Range | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Lockdown social isolation | 3.53 | 0.91 | 1–5 | 1 | | | | | | | | | | | |
| 2 Lockdown social loneliness | 2.34 | 0.96 | 1–5 | 0.148*** | 1 | | | | | | | | | | |
| 3 Lockdown stress | 2.79 | 1.06 | 1–5 | 0.209*** | 0.545*** | 1 | | | | | | | | | |
| 4 Lockdown life satisfaction | 3.37 | 0.81 | 1–5 | −0.059* | −0.274*** | −0.349*** | 1 | | | | | | | | |
| 5 Lockdown WeChat use intensity | 3.85 | 0.87 | 1–5 | 0.196*** | 0.155*** | 0.208*** | 0.019 | 1 | | | | | | | |
| 6 Experience of the lockdown | 0.32 | 0.46 | 0–1 | 0.131*** | 0.089*** | 0.156*** | −0.092*** | 0.035 | 1 | | | | | | |
| 7 Working status | 0.21 | 0.41 | 0–1 | −0.011 | 0.071** | 0.054* | −0.081*** | −0.014 | 0.104*** | 1 | | | | | |
| 8 Family situation | 0.92 | 0.26 | 0–1 | −0.095*** | −0.099*** | 0.014 | 0.038 | 0.053* | −0.091*** | 0.052* | 1 | | | | |
| 9 Gender | 0.55 | 0.50 | 0–1 | 0.020 | 0.105*** | −0.046* | −0.017 | −0.052* | −0.042 | 0.002 | −0.085*** | 1 | | | |
| 10 Age | 35.23 | 8.60 | 19–65.5 | −0.084*** | −0.124*** | −0.093*** | 0.031 | −0.034 | −0.053* | −0.028 | 0.103*** | 0.122*** | 1 | | |
| 11 Educational level | 16.17 | 1.72 | 9–21 | 0.072** | −0.097*** | −0.025 | 0.098*** | −0.080** | −0.028 | −0.192*** | −0.003 | −0.066** | 0.052* | 1 | |
| 12 Income | 1.53 | 2.34 | 0.05–15 | −0.018 | −0.039 | −0.103*** | 0.049* | −0.034 | −0.026 | −0.025 | −0.012 | 0.029 | 0.047* | 0.102** | 1 |

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

educational level, and income, lockdown WeChat use intensity was indeed positively related to lockdown social loneliness ($\beta = 0.11$, $p < 0.001$), which, in turn, partially mediated the relationships between lockdown WeChat use intensity and lockdown stress ($\beta = 0.07$, $p < 0.001$), and between lockdown WeChat use intensity and lockdown life satisfaction ($\beta = -0.03$, $p < 0.001$). With these outcomes, we also found full support for Hypotheses 2a, 2b and 2c.

Hypotheses 3a, 3b and 3c predicted that lockdown WeChat use intensity positively moderates the relationship between lockdown social isolation and lockdown social loneliness, and further, that lockdown WeChat use intensity positively moderates the relationship between lockdown social isolation and lockdown stress, through lockdown social loneliness, and last, that lockdown WeChat use intensity negatively moderates the relationship between lockdown social isolation and lockdown life satisfaction, through lockdown social loneliness. **Figures 2**, **3** display that when the experience of the lockdown, working status, family situation, gender, age, educational level, and income were controlled for, lockdown WeChat use intensity indeed positively moderated the relationship between lockdown social isolation and lockdown social loneliness ($\beta = 0.07$, $p < 0.01$). In addition, lockdown WeChat use intensity appeared to positively moderate the relationship between lockdown social isolation and lockdown stress, through lockdown social loneliness ($\beta = 0.04$, $p < 0.01$), while lockdown WeChat use intensity appeared to negatively moderate the relationship between lockdown social isolation and lockdown life satisfaction, through lockdown social loneliness ($\beta = -0.02$, $p < 0.01$). With these outcomes, we also found full support for Hypotheses 3a, 3b and 3c. The outcomes of the simple slopes' analyses results illustrated that the predicted positive relationship between lockdown social isolation and lockdown stress, through lockdown social loneliness, was stronger for self-quarantined individuals who reported a higher lockdown intensity of WeChat use in comparison with those individuals who reported a lower lockdown intensity of WeChat use (see **Figure 2**). In addition, it was found that the predicted negative relationship between lockdown social isolation and lockdown life satisfaction, through lockdown social loneliness, was stronger for self-quarantines individuals with a higher lockdown intensity of WeChat use in comparison with those with a lower lockdown intensity of WeChat use (see **Figure 3**).

# DISCUSSION

## Reflections and Contributions

In order to explore the relationships between WeChat use intensity and social isolation, loneliness, and well-being, we tested a moderated mediation model using SEM, herewith building on the regulatory loop model of loneliness (Hawkley and Cacioppo, 2010), and the notions of Internet Paradox (Kraut and Burke, 2015), and the Time Displacement hypothesis (Putnam, 2000). To the best of our knowledge, this is the first empirical study using a nationwide Chinese sample to explain the impact of lockdown WeChat use intensity on lockdown social isolation, lockdown loneliness, and well-being (i.e., lockdown stress and lockdown life satisfaction) among self-quarantined people during the COVID-19 pandemic. Accordingly, this study contributes to the already existing literature in several ways.

First, unlike previous studies that indicated that loneliness did not exert a mediating effect in the relationships between social isolation, on the one hand, and physical health (e.g., chronic lung disease, arthritis) and well-being (e.g., depression symptoms, quality of life), on the other hand (Steptoe et al., 2013), we found that lockdown social isolation in a period of lockdown could affect well-being (i.e., lockdown stress and lockdown life satisfaction) through lockdown social loneliness. This finding is in line with the work by Cornwell and Waite's (2009a) who reported that loneliness could mediate the relationship between social isolation and self-rated physical health and mental health. Tuzovic and Kabadayi (2020) thought that mental well-being is a positive state of psychological and emotional health, in which one can cope with the normal stressors of life. Correspondingly, given the lack of research on the interrelatedness of social isolation, loneliness and health outcomes up to now (Mehrabia and Béland, 2020), our empirical findings extend previous scholarly research

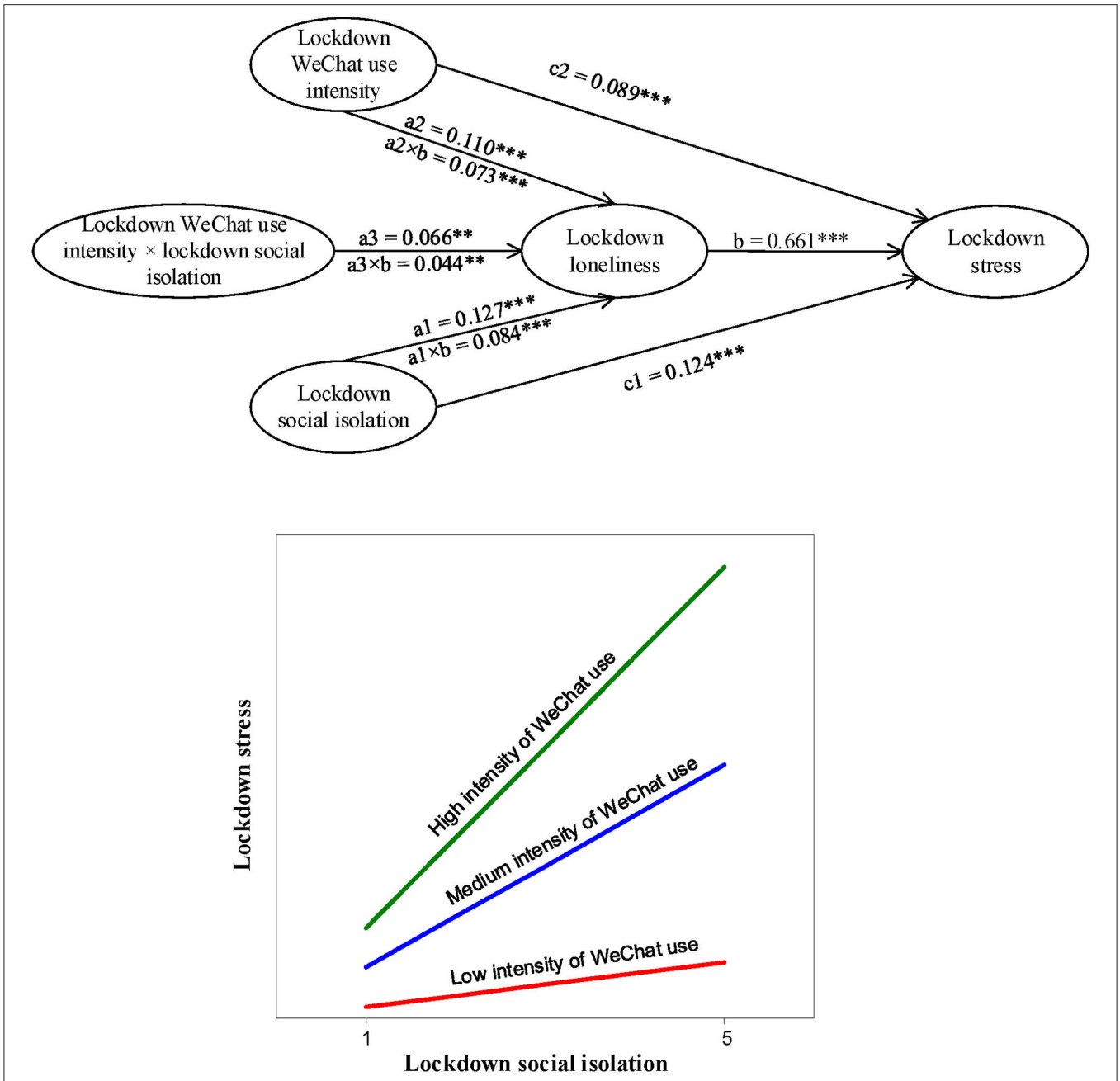


**FIGURE 2 |** A graphical illustration of parameter estimates and moderation by intensity of WeChat use (lockdown stress as dependent variable). Number of Free Paramaters = 59, *LL* = −33208.532, *AIC* = 66535.063, $^{**}p < 0.01$, $^{***}p < 0.001$, $n = 1805$. Note.—The indirect effect of Lockdown Social Isolation on Lockdown Stress is conditional on Intensity of WeChat Use: (a1 × b) + (a3 × b) × Lockdown WeChat use intensity.

and, besides, add to the knowledge in this field by using a Chinese sample.

Second, by examining the role of WeChat use intensity as a predictor in the mediation model, with loneliness as a mediator, and well-being (i.e., stress and life satisfaction) as the outcome variable, we have explicitly addressed the impact mechanism through which WeChat use intensity effects individuals' well-being. In doing so, we have also extended previous scholarly work that focused on the influence of Internet use or social media use on loneliness and well-being. Building on the notion of the Internet Paradox (Kraut and Burke, 2015) and the Time Displacement hypothesis (Putnam, 2000), as the underlying frameworks of our study, we found that lockdown WeChat use intensity positively affects lockdown social loneliness, which, in turn (partially) mediates the effect of lockdown WeChat use intensity, on the one hand, and lockdown stress and lockdown

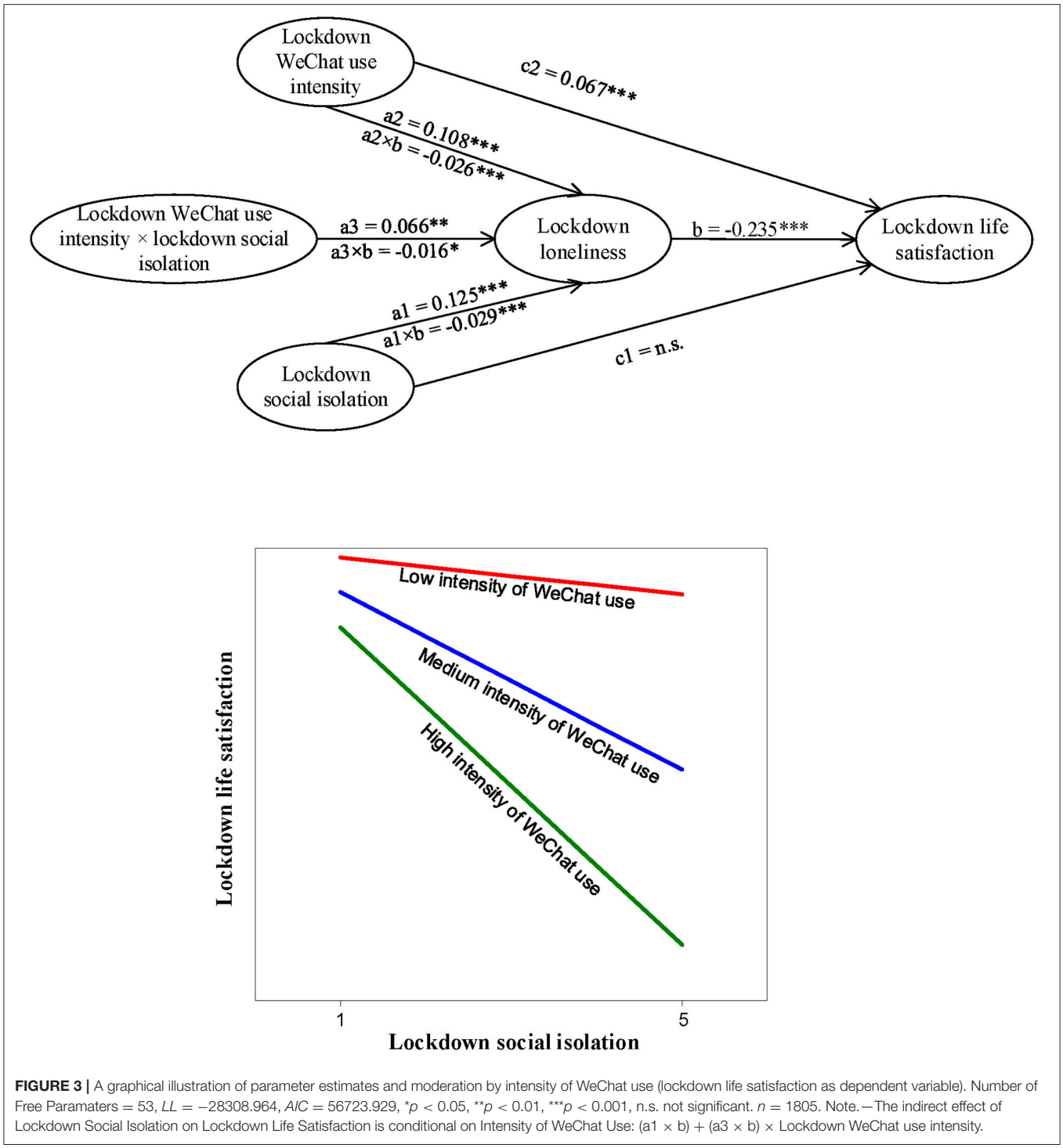


**FIGURE 3 |** A graphical illustration of parameter estimates and moderation by intensity of WeChat use (lockdown life satisfaction as dependent variable). Number of Free Paramaters = 53, *LL* = −28308.964, *AIC* = 56723.929, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, n.s. not significant. $n = 1805$. Note.—The indirect effect of Lockdown Social Isolation on Lockdown Life Satisfaction is conditional on Intensity of WeChat Use: (a1 × b) + (a3 × b) × Lockdown WeChat use intensity.

life satisfaction, on the other hand. More specifically, lockdown WeChat use intensity can increase lockdown stress and decrease lockdown life satisfaction in a direct way, and in an indirect way, that is through lockdown social loneliness, as well.

Recent scholarly work illustrated that social media use had both positive and negative effects on one's well-being during the period of the COVID-19 isolation (Gonzlez-Padilla and Tortolero-Blanco, 2021). In addition, Kantar Group (2018) also found that for Chinese people, social media use (e.g., WeChat use, Weibo) could relieve their stress and improve their life experience (e.g., interpersonal communications with families and friends, online shopping, and self-presentation), whereas, at the same time, it could increase their stress (anxiety) (e.g., less sleep, poor eyesight, and privacy security) due to spending more time in

maintaining interactions with others online. In accordance with these findings, our study reveals that WeChat use intensity is a double-edged sword as it can not only buffer stress and enhance life satisfaction, but can also increase both factors.

In previous studies, some researchers found that social media use promotes individuals' psychological well-being (e.g., happiness and satisfaction with life), however, more scholars found that social media use negatively affects their physical and mental health (e.g., depression symptoms and life dissatisfaction) and is related to greater loneliness (O'Day and Heimberg, 2021). Verduyn's et al. (2017) suggested that whether positive or negative effects of social media use on well-being are found might depend on the specific types of social media use: active versus passive. In other words, the effect of social media use on well-being is positive in case one uses social media actively; and vice versa. Furthermore, Verduyn's et al. (2017) also proposed that active usage of social media might positively affect individuals' social capital and connectedness, which, in turn, positively affects their subjective well-being. In contradiction, passive usage of social media positively affects upward social comparison and envy, which, in turn, negatively affects subjective well-being. Hence, Verduyn, Ybarra, Rsibois, Jonides and Kross (2017) research implies that increased usage of WeChat due to self-quarantine might be interpreted as a passive type of social media use, which may exert a negative impact on well-being (i.e., higher levels of perceived stress and lower levels of life satisfaction) in a direct way, and in an indirect way, that is through social loneliness, as well. Our findings support their review outcomes and add to the empirical knowledge in this field.

Third, we found that lockdown WeChat use intensity positively moderates the relationship between lockdown social isolation and lockdown social loneliness, which, in turn, partially mediates the relationship between lockdown social isolation and lockdown stress, and fully mediates the relationship with lockdown life satisfaction. These outcomes are important as during the COVID-19 lockdown many Chinese people's WeChat use intensity increased, herewith endangering their well-being (i.e., higher levels of lockdown stress and lower levels of life satisfaction). These findings also indicate that online social interactions, which presumably are valued by many people who believe that these can compensate for the lack of offline social interactions, relieve their perceived stress (anxiety) in actual life, and make their lives better (Kantar Group, 2018), are in fact endangering their mental health and life satisfaction during the COVID-19 lockdown period.

Hawkley and Cacioppo (2010) considered that the more lonely an individual feels, the more likely they develop negative attributions to others, which, in turn, lead to negative behaviors and a decrease in feelings of belonging and security. O'Day and Heimberg (2021) suggested that individuals who report a higher amount of loneliness are also more hungry for online social contacts and the more negatively compare themselves with others, which, in turn, may prevent them from experiencing the benefits of social media use, and drive them to use social media more passively. Accordingly, the more frequently or intensely a lonely person uses social media, the more lonely he or she feels, which, in turn, results in higher levels of stress and lower levels of life satisfaction. In addition, Putnam (2000) also argued that the amount of time spent on the Internet might crowd out time spent in socializing.

Analogously, for many Chinese people, increased use of WeChat may crowd out their time spent in offline social interactions, which, in turn, may lead to higher levels of stress and lower levels of life satisfaction. Indeed, all in all, our findings suggest that high levels of WeChat use intensity, which mainly originate from acute self-quarantine during the COVID-19 lockdown period in China, and which are believed to help people to cope with such a situation of forced social isolation and to relieve their anxiety and other mental symptoms (Zhang et al., 2020), rather strengthen the harmful effect of loneliness on their well-being instead of protecting them.

## Limitations and Suggestions for Future Research

Although our findings serve as a useful baseline for further investigations on the impact of WeChat use intensity on social isolation, loneliness, and well-being during the COVID-19 pandemic in China, the present study also has several limitations. First, this empirical work was based on respondents' self-reporting after the full lockdown was abolished, and this might lead to selection bias and memory bias. Moreover, there might be some concern whether common-method bias may have affected our results (Podsakoff et al., 2003). Fortunately, Harman's single factor test indicated that this was not a large problem in this study (ibid.).

Second, in China, social relationships and social structures are built on the hierarchical structure of family, and social relationships are often an extension of family relationships. As Fei xiao-tong once said: "The structure of Chinese society is like ripples caused by throwing a stone into a pond. Everybody is situated at the center of water rings, which are extended to reach an edge of one's social influence. No matter when and where one finds oneself, one is always situated at the center of the flexible social network" (Hwang, 1999, p. 173). In this context, social loneliness may be considered to be the reflection of emotional loneliness (which mainly originates from the lack of "family attachment"). Therefore, we did not examine the influence of WeChat use intensity on emotional loneliness.

However, as China is undergoing a drastic social transition, Chinese nuclear families are decreasing and single-person households are increasing (Peng and Hu, 2015). As a result, the meanings of social loneliness and emotional loneliness may have evolved considerably with the transition of family structure. Correspondingly, to get a more in-depth picture of the effect of WeChat use on well-being, future research is needed wherein a broader operarationalization of the concept of loneliness is used. Besides, WeChat use, stress, loneliness, and well-being may vary between countries, and therefore further evidence is needed to confirm the generalizability of the results across countries.

Moreover, future research is needed to further explore the model relationships using longitudinal approaches. More specifically, more insight into the stability and change of model

variables and cross-relationships (i.e., overtime) can be provided by multiple-wave research (Taris and Kompier, 2003; De Lange et al., 2004). Specifically, from the perspective of social learning (Bandura, 2014), psychological functioning is dependent upon the continuous interaction among people, environment and behavior. Half of the prevalence of loneliness can be explained by heredity and half by one's environment (Boomsma et al., 2005).

Last but not least, some scholars have also found that high levels of loneliness might drive individuals to use WeChat and Internet more frequently in order to extend their interpersonal relationships online (Jiao, 2016) to compensate for their social isolation, that stress is associated with more hedonic and less eudaimonic media use (Eden et al., 2020), and that excessive use of social media during this period of isolation partially mediates the relationship between loneliness and anxiety (Boursier et al., 2020). Therefore, ideally, follow-up research is based on tracking data (e.g., China Health and Retirement Longitudinal Study, CHARLS) rather than cross-sectional data. If scientists in this field manage to collect more multi-wave data, a better understanding of the causality in our research model can be gained.

### Practical Implications

First, given the fact that high levels of WeChat use intensity may exert a more pernicious effect on stress and life satisfaction, through both direct and indirect ways, it is very important that self-isolated individuals prevent themselves from an excessive use of WeChat and Internet. In other words, individuals should prescribe themselves a limited time to access WeChat and Internet every day, and they should find beneficial substitutes (e.g., reading, exercising, playing games with family members), even in very difficult periods as during self-quarantine. In order to avoid people from the excessive and wrong use of social media like WeChat and the Internet, one's family, and representatives from school, government, enterprises and society should provide effective education for people to reduce the harm of over-use of social media. In particular, some small programs can be developed to help people to limit their online time. Once they overuse social media and the Internet, these small programs are meant to send warning messages to them.

Second, China is a society that is highly family-oriented (Yang and Yeh, 2008), and family has been an important source of economic strength and security for Chinese people since ancient times. High quality care and family companionship are good medicines against emotional loneliness, as the latter mainly results from the lack of "family attachment." Hence, for Chinese people, instead of escaping in excessive WeChat and Internet use, it is important to establish and maintain good family relationships as these might reduce stress and anxiety, and enhance their satisfaction with life. Indeed, in China, family has become the most fundamental unit to cope with the adverse influences of both social isolation and loneliness, and to promote well-being, especially during the self-quarantined period due to the COVID-19 lockdown.

## DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical considerations.

## 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. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

## AUTHOR CONTRIBUTIONS

LZ: data curation and formal analysis. HT, SL, LZ, and ZG: funding acquisition. LZ, SL, and JL: investigation. LZ and JL: methodology. LZ and ZG: project administration. BV, ZG, and JL: supervision. All authors conceptualization, writing original draft, review and editing, read, and agreed to the published version of the manuscript.

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**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.

# APPENDIX 1

**TABLE A1 |** Description of measurement scales.

| Scale items (1 = strongly disagree, 5 = strongly agree) | References |
|---|---|
| ***Lockdown social isolation*(*CR* = 0.829, α = 0.825, AVE = 0.621)** | |
| ◇ I hadn't seen many of my family members whom I should have seen if there had been no lockdown.<br>◇ I hadn't seen many of my relatives whom I should have seen if there had been no lockdown.<br>◇ I hadn't seen many of my friends whom I should have seen if there had been no lockdown.<br>◇ I hadn't participated many activities which I should have been in if there had been no lockdown. | Ellison and George (1994), Brummett et al. (2001), Thoits and Hewitt (2001), Benjamins (2004), Cornwell and Waite (2009b), Zavaleta et al. (2017) |
| ***Lockdown Loneliness(CR = 0.847, α = 0.846, AVE = 0.649)*** | |
| During the COVID-19 lockdown,<br>◇ I often felt that I lacked companionship.<br>◇ I often felt that nobody could truly understand me.<br>◇ I often felt left out.<br>◇ I often felt that I lacked having someone I could be close to.<br>◇ I often had feelings of being isolated and lonely. | Hughes et al. (2004), Schrempft et al. (2019) |
| ***Lockdown stress*(CR =0.918, α =0.917, AVE =0.693)** | |
| During the period of COVID-2019 enclosed management,<br>◇ I often felt nervous and anxious.<br>◇ I tended to over-react to situations.<br>◇ I felt I was rather touchy.<br>◇ I found it difficult to relax.<br>◇ I found it hard to wind down. | Antony et al. (1998), Lee et al. (2019) |
| ***Lockdown life satisfaction* (*CR* = 0.831, α = 0.823, *AVE* = 0.624)** | |
| During the period of COVID-2019 enclosed management,<br>◇ My living conditions were quite good.<br>◇ My living standard was higher than that of other people around me.<br>◇ I was satisfied with how my life had gone.<br>◇ On the whole, I was satisfied with my life at that time. | Diener et al. (1985), Margolis et al. (2019) |
| ***Lockdown WeChat use intensity*(CR = 0.888, α = 0.884, AVE = 0.726)** | |
| During the period of COVID-19 enclosed management,<br>◇ WeChat was a part of my everyday activity.<br>◇ WeChat was like a life companion.<br>◇ WeChat had become an indispensable part of my daily routine.<br>◇ I felt out of touch when I had not logged on to WeChat for a while. | Ellison et al. (2007), Moqbel et al. (2013), Wang et al. (2019) |

*The values of CR, α, and AVE were calculated within the R packages "Lavaan" (Rosseel, 2012) and "SEMTools" (Jorgensen et al., 2021).*

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# Feeling Socially Connected and Focusing on Growth: Relationships With Wellbeing During a Major Holiday in the COVID-19 Pandemic

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Numerous major holidays celebrate socially gathering in person. However, in major holidays that happened during the pandemic, desires to nurture relationships and maintain holiday traditions often conflicted with physical distancing and other measures to protect against COVID-19. The current research sought to understand wellbeing during American Thanksgiving in 2020, which happened 8 months into the COVID-19 pandemic, after months of physical distancing and stay-at-home orders. American Thanksgiving is a major holiday not limited to any religion. We asked 404 American adults how they spent Thanksgiving Day and to report on their experiences of that day. Predictors of wellbeing that we drew from self-determination theory were satisfaction of the fundamental needs for social connection (relatedness), for doing what one really wants (autonomy), and feeling effective (competence). The predictors of wellbeing that we drew from regulatory focus theory were a focus on growth (promotion), and a focus on security (prevention). We found that feeling socially connected and focusing on growth related most strongly to wellbeing. Additionally, participants who saw even one other person face-to-face reported significantly higher relatedness satisfaction, promotion focus, and wellbeing than those who did not. Our research could help construct persuasive messages that encourage nurturing close relationships at major holidays while remaining safe against the virus.

**Keywords: satisfaction, positive affect, negative affect, regulatory fit, ideals, duties, caution, self-control**

## INTRODUCTION

Measures to slow the spread of the COVID-19 virus during the pandemic included quarantines and stay-at-home orders, and even when those orders were not in place, many government agencies and other institutions encouraged physical distancing and staying at home. Months of uncertainty about how and when the pandemic would end, as well as economic and social costs of slowing the spread of the virus, strained people's sense of social belonging and their wellbeing (e.g., Dawel et al., 2020; Gray et al., 2020; Vanderweele et al., 2020; Okabe-Miyamoto et al., 2021). In the United States, for example, negative mental health consequences of quarantining, social distancing, and closures were widespread by fall of 2020 (e.g., Mental

Health America, 2020; National Center for Health Statistics, 2021; Panchal et al., 2021). The quality and quantity of social relationships were key factors for wellbeing during the pandemic (Okabe-Miyamoto et al., 2021), but measures to slow the spread of the virus presented threats to felt social connection and wellbeing (Sikali, 2020). Many major holidays celebrate socially connecting in person and could offer welcome respite from social isolation. However, for many people, the desire to nurture relationships and to secure important holiday traditions conflicted with the desire to protect the self and others from the virus. Wellbeing in these challenging circumstances is important to understand for resilience, both for the current pandemic and for future large-scale epidemics, which may become more common (Hilsenrath, 2020). The current study is basic research that examined predictors of wellbeing in the American holiday of Thanksgiving in 2020. To do so, it extended research on wellbeing in major holidays as well as two major theories pertaining to wellbeing, self-determination theory (Deci and Ryan, 2000; Ryan and Deci, 2017) and regulatory focus theory (Higgins, 1997; Scholer et al., 2019a,b).

## Holidays and Wellbeing

Major holidays are important for maintaining and growing close connections with family members, and people often experience increased wellbeing at these times (e.g., Fiese et al., 2002; Kasser and Sheldon, 2002; Páez et al., 2011; Allan et al., 2013; Hanke et al., 2016). It is common for family members to travel long distances to gather and enjoy traditions that emphasize the importance of family and the occasion. At Thanksgiving in the United States, these traditions often include gathering with extended family, expressing gratitude for relationships and other good things in life, having a holiday dinner, watching a parade on TV, playing games, and watching football after dinner (Thanksgiving (United States), 2020). Gallup polls consistently have shown that for Americans, Thanksgiving is one of the happiest days of the year with the least stress (Witters, 2011; McCarthy, 2015). It is also a major holiday that is not limited to any religion (unlike Christmas, for example, cf. Kasser and Sheldon, 2002).

American Thanksgiving occurs on the fourth Thursday of November (Thanksgiving (United States), 2020), which was several months into the COVID-19 pandemic in 2020. In fall 2020, the Centers for Disease Control and Prevention and others recommended revising traditional Thanksgiving celebrations to be safer, such as by keeping gatherings small, self-quarantining, and avoiding travel (Grantham-Philips, 2020; Sullivan, 2020; Centers for Disease Control and Prevention, 2021). Many Americans limited their holiday celebrations (Reuters, 2020; Whitcomb and Layne, 2020), and 57–61% of public opinion poll respondents said they changed their Thanksgiving plans due to COVID-19 (Abidi and Gramlich, 2020; Thomas, 2020). Still, amidst a surge in cases, more Americans traveled for Thanksgiving than at any time since the beginning of the pandemic (Caspiani and Borter, 2020; Tanne, 2020; Trotta and Layne, 2020). Many felt trepidation but made the trip anyway, because they had not seen their family members in a long time (Caspiani and Borter, 2020; Trotta and Layne, 2020). There are countless things about American Thanksgiving that could make people feel satisfied and happy, but for many people, Thanksgiving during the COVID-19 pandemic in 2020 was relatively subdued (Reuters, 2020; Whitcomb and Layne, 2020). Many Americans felt conflicted about how to celebrate the holiday. For example, how could they feel close to family members, maintain family traditions, and have fun, while also remaining vigilant against COVID-19?

In contrast to earlier longitudinal research that has examined whether holidays make people happy (e.g., Gilbert and Abdullah, 2004; Nawijn et al., 2010; Allan et al., 2013), the current cross-sectional research sought to understand what experiences could relate most strongly to wellbeing during Thanksgiving in the COVID-19 pandemic. We applied self-determination theory (Deci and Ryan, 2000; Ryan and Deci, 2017) because it proposes that relatedness (feeling close and connected to others) is one of the three fundamental psychological needs that are crucial for wellbeing. Relatedness is also a key experience that people seek on Thanksgiving (e.g., Fiese et al., 2002; Kasser and Sheldon, 2002; Páez et al., 2011; Allan et al., 2013; Hanke et al., 2016). We also assessed satisfaction of the other two needs that self-determination theory proposes are fundamental to wellbeing: autonomy and competence. This is because the needs for autonomy, competence, and relatedness mutually satisfy each other (e.g., Ryan and Deci, 2017). The other theory we applied was regulatory focus theory (Higgins, 1997, 1998; Scholer et al., 2019a) because it distinguishes between two self-regulatory orientations that relate to wellbeing (Lanaj et al., 2012; Koopmann et al., 2016; Zhang et al., 2019; Wu and Chen, 2020) and that are important in responses to COVID-19 (Vaughn et al., 2020). These orientations are promotion and prevention focus.

Given the value normally placed on gathering physically with others on Thanksgiving and other major holidays (e.g., Fiese et al., 2002; Kasser and Sheldon, 2002; Páez et al., 2011; Allan et al., 2013; Hanke et al., 2016), we expected that people who spent Thanksgiving alone would report lower wellbeing and less satisfying connections with others. In addition to testing these hypotheses, we explored how seeing no one else in person *versus* one, a few, or more people in person related to satisfaction of other basic needs and to strength of promotion and prevention focus on Thanksgiving.

## Self-Determination Theory's Basic Needs and Wellbeing on Thanksgiving

Self-determination theory proposes that all people have psychological needs for autonomy, relatedness, and competence (e.g., Deci and Ryan, 2000; Ryan and Deci, 2017). It proposes that satisfaction of all three needs is essential for wellbeing and optimal psychological functioning and that when any of these needs are frustrated, the individual suffers. The need for autonomy is do what one really wants, the need for competence is to feel effective at challenging tasks, and the need for relatedness to feel close and connected to others (also see

Baumeister and Leary, 1995). Self-determination theory also proposes that the three needs are interdependent: In general, satisfaction of one need facilitates satisfaction of the other two (e.g., Ryan and Deci, 2017). For example, if people do not feel able to be their true selves or competent within romantic relationships, they likely will not feel very emotionally close to their partners (Knee et al., 2013). Research shows that greater satisfaction of all three needs correlates very strongly with wellbeing, feelings of personal integrity, and feeling volitional (for reviews, see Deci and Ryan, 2000; Ryan and Deci, 2017). Satisfactions of these needs tend to be highly correlated (e.g., Sheldon and Hilpert, 2012; Chen et al., 2015; Vaughn, 2017, 2019; Vaughn et al., 2020), and balanced satisfaction of these needs appears to be important for wellbeing, both within persons (Sheldon and Niemiec, 2006) and between life domains (Milyavskaya et al., 2009). With that said, "in different settings, any one of the three needs will emerge to 'take the lead' in terms of its association with wellness outcomes, even as the other two remain important" (Ryan and Deci, 2017, p. 247).

Relatedness support is highly valued at major holidays (e.g., Fiese et al., 2002; Kasser and Sheldon, 2002; Páez et al., 2011; Hanke et al., 2016). Thus, we predicted that higher relatedness satisfaction would relate to wellbeing. Research on wellbeing at major holidays has not emphasized support for autonomy or competence, so our examination of relationships between these other two needs and wellbeing at Thanksgiving was exploratory.

## Regulatory Focus and Wellbeing on Thanksgiving

Regulatory focus theory distinguishes between two self-regulatory orientations: promotion focus and prevention focus (Higgins, 1997, 1998). These orientations are independent of each other (e.g., Higgins et al., 2001; Haws et al., 2010) and the strength of each orientation differs temporarily, depending on the immediate circumstances, as well as chronically between individuals (e.g., Higgins et al., 2001). According to regulatory focus theory, prevention focus serves the need for security, whereas promotion focus serves the need for growth (for reviews, see Higgins, 1997; 1998; Molden et al., 2007; Scholer et al., 2019a,b). Individuals in a promotion focus seek to approach successes and avoid failures, which they view as gains and nongains, and to be eager to fulfill hopes and aspirations. Those in a prevention focus also seek to approach successes and avoid failures, which they view as nonlosses and losses, and to be vigilant to protect the self and others and to fulfill duties and obligations.

We expected that on Thanksgiving, promotion focus would relate more strongly than prevention focus to positive wellbeing, which is a common finding (cf. Grant and Higgins, 2003 Lanaj et al., 2012; Koopmann et al., 2016; Zhang et al., 2019; Wu and Chen, 2020). In general, promotion focus feels better than prevention focus does (e.g., Vaughn, 2017, 2019; Scholer et al., 2019b; Vaughn et al., 2020). In part, this difference reflects how promotion-focused goals are oriented toward gains and away from their absence, whereas prevention-focused goals are oriented away from losses and toward their absence (Higgins, 1997;1998; Scholer et al., 2019a). This difference also reflects how the preferred strategies in promotion- and prevention-focused goal pursuit tend to feel. Eagerness, which fits promotion, involves thinking more positively than vigilance, which fits prevention (for reviews, see Higgins, 2000; Scholer et al., 2019b). Thus, compared with people in a prevention focus, those in a promotion focus experience more intense positive affect (Higgins, 1997, 1998; Idson et al., 2000), selectively attend more to positive information (Yoon et al., 2012), and recall more positive information about the self (Scholer et al., 2014). Additionally, studies that have used Linguistic Inquiry and Word Count software (LIWC; Pennebaker et al., 2015) to analyze thousands of descriptions of promotion- and prevention-focused experiences have found that participants describe promotion experiences more positively than prevention experiences (Vaughn, 2018, 2019; Vaughn et al., 2020; cf. Scholer et al., 2010). Research also has shown that participants report more satisfaction of needs for autonomy, competence, and relatedness in promotion-focused experiences than in prevention-focused ones (Vaughn, 2017, 2019; Kim et al., 2019).[1] With that said, people tend not to view prevention-focused experiences as need thwarting (Vaughn, 2017, 2019; Kim et al., 2019; Vaughn et al., 2020), and LIWC analyses of prevention-focused experiences show that the emotional tone of prevention experiences is much more positive than of experiences that are explicitly low in need satisfaction (Vaughn, 2019).

## Relative Strength of Promotion and Prevention on Thanksgiving

In the COVID-19 pandemic, prevention was encouraged (Centers for Disease Control and Prevention, 2020b,c, 2021). Research in the first month of the COVID-19 pandemic showed that participants judged prevention focus to be more useful than promotion focus for responding to the virus (Vaughn et al., 2020).

[1]Relationships between each regulatory focus and satisfaction of needs for autonomy, competence, and relatedness could differ depending on the context. These are important relationships to examine because they pertain to the need-support model (Vaughn, 2017), which bridges self-determination theory and regulatory focus theory. Thus, although exploring relationships between regulatory focus and need satisfaction were not the main goal of the current research, **Supplementary Table S1, S2** show results of the analyses of these relationships. In one set of analyses, we treated promotion and prevention focus as simultaneous predictors of each type of need satisfaction. In the other set of analyses, we treated autonomy, competence, and relatedness satisfaction as simultaneous predictors of promotion and prevention focus. Overall, we found strong, positive relationships between promotion focus and satisfaction of autonomy and relatedness. Relationships with need satisfaction differed substantially between duties and caution/self-control aspects of prevention focus. Consistent with common views of duties as pressuring (e.g., Deci and Ryan, 2000; Chen et al., 2015; Ryan and Deci, 2017; Vansteenkiste et al., 2020), participants who reported being more dutiful at Thanksgiving reported feeling less able to do what they wanted and more pressured on that day – that is, less autonomy satisfied. However, they also felt more competent and connected to others. In contrast, focusing on caution and self-control at Thanksgiving related only weakly to any type of need satisfaction. Caution/self-control may often be for maintaining the status quo, and as such, it could be somewhat boring (Ecker and Gilead, 2018) – especially on a celebratory day like Thanksgiving.

In the current research, we examined whether participants reported being more prevention-focused than promotion-focused during Thanksgiving, 2020. We did not have strong predictions about the relative strength of promotion and prevention focus. On the one hand, prevention focus could continue to be stronger than promotion focus on this Thanksgiving because a surge in COVID-19 cases in the United States was happening at that time (Tanne, 2020), which could prompt many people to remain vigilant. Additionally, prevention focus could continue to be strong because maintaining holiday traditions sometimes can feel obligatory (e.g., Hanke et al., 2016). On the other hand, promotion focus could be stronger than prevention focus on this Thanksgiving because the holiday emphasizes nurturing relationships and having fun. This could be a welcome break from the stress and exhaustion of keeping vigilant and socially distanced over the previous months. Thus, we did not have a strong hypothesis about whether promotion or prevention focus would be stronger on this day.

## The Current Research

This study happened on the Friday after Thanksgiving Day, 2020, which is part of the Thanksgiving holiday (Thanksgiving (United States), 2020). We asked participants to describe what they did on Thanksgiving Day. Then, we asked them to report their need satisfaction, regulatory focus, and wellbeing on this Thanksgiving. Consistent with other research on wellbeing at holidays and in general (e.g., Kasser and Sheldon, 2002; Sheldon and Hilpert, 2012), our measures of overall wellbeing at Thanksgiving were positive affect, low negative affect, and satisfaction with Thanksgiving (cf. satisfaction with Christmas; Kasser and Sheldon, 2002).

We predicted that at Thanksgiving in 2020, participants who were higher in relatedness satisfaction and promotion focus would report higher wellbeing, whereas participants who were higher in prevention focus would report lower wellbeing. Additionally, we predicted that participants who spent Thanksgiving physically alone would report lower wellbeing and less relatedness support than those who did not. We did numerous exploratory analyses, as well. For example, we explored how many participants reported being satisfied with Thanksgiving and whether more participants reported higher prevention focus than promotion focus that day. We also explored how autonomy and competence satisfaction related to wellbeing, and whether participants who did *versus* not see anyone else face-to-face differed on autonomy, competence, promotion, or prevention focus.

# MATERIALS AND METHODS

## Reporting

We obtained approval from the Ethics Committee of Ithaca College. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. We report how we determined our sample size, as well as all data exclusions, all manipulations, and all measures in the study. This study was not preregistered. We used SPSS 26 and JASP (JASP Team, 2020, Version 0.13.1). The data files, data dictionaries, and verbatim materials for the current investigation are available at https://osf.io/fy6rc/. We conducted sensitivity power analyses with G*Power (Faul et al., 2007), and the results of these power analyses are in the relevant parts of the results section.

## Participants and Recruiting

Data collection happened on November 27, 2020, which was the day after American Thanksgiving. The target sample size was 400 participants, based on available research funds. We recruited participants through Prolific (https://www.prolific.co/), a participant pool for online studies that has been found to provide high-quality data for social science research (Peer et al., 2017; Palan and Schitter, 2018). In it, we set the following criteria for participation. Participants had to be at least 18 years old, live in the United States, and have English as their first language. They also had to have an acceptance rate on Prolific studies of at least 95% and to have not done any of our lab's prior studies on Prolific. To reduce variability in written responses, they had to do the study on a tablet or desktop computer rather than a phone. The study took approximately 8 min, so respondents received USD $1.27 for participating.

We excluded 48 cases either because they reported not living in the United States ($n = 43$) or because the latitude/longitude data automatically collected by Qualtrics indicated a location outside the United States ($n = 5$). Most of these exclusions happened because initially, we accidentally opened the study to Canadians as well as Americans. Canadian Thanksgiving was on October 12, 2020, and it is a relatively minor holiday (The Old Farmer's Almanac, 2020). Most of the excluded participants lived in Canada. These excluded cases are in a separate data file at https://osf.io/fy6rc/. We exceeded the target sample size because we anticipated needing to exclude more cases.

In the final sample of 404 participants, 234 (57.9%) identified as female.[2] Mean age was 32.9 years ($SD = 12.76$). Participants selected the racial and ethnic categories to which they belonged; 320 selected White (79.2%), 50 selected Asian (12.4%), 37 selected Black or African American (9.2%), 29 selected Hispanic or Latinx (7.2%), five selected Native American or Alaska Native (1.2%), and eight selected "other" (2.0%). The methodology and data files at https://osf.io/fy6rc/ contain the other background information we collected, including education and occupation.

# MATERIALS

## Writing Task

The first page of stimulus materials was titled "How You Spent this Thanksgiving Day." It stated, "First, we would like to learn about how you spent this Thanksgiving Day, 2020. This is a general question, and you can write about your thoughts,

[2]No state had a majority of participants. California had the most with 41 participants (10.1%), followed by New York with 38 (9.4%), Illinois with 21 (5.2%), and Michigan with 19 (4.7%).

**TABLE 1** | Correlations, Cronbach's alphas, means, and standard deviations.

| S. No. | Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Promotion | – | | | | | | | | |
| 2. | Caution | 0.03 | – | | | | | | | |
| 3. | Duties | 0.32** | 0.27** | – | | | | | | |
| 4. | Autonomy | 0.58** | −0.04 | 0.01 | – | | | | | |
| 5. | Competence | 0.54** | 0.15** | 0.39** | 0.49** | – | | | | |
| 6. | Relatedness | 0.69** | 0.00 | 0.29** | 0.60** | 0.55** | – | | | |
| 7. | Pos. affect | 0.82** | 0.01 | 0.30** | 0.60** | 0.52** | 0.78** | – | | |
| 8. | Neg. affect | −0.59** | 0.10* | −0.15** | −0.58** | −0.48** | −0.68** | −0.77** | – | |
| 9. | SWTS | 0.77** | −0.07 | 0.24** | 0.56** | 0.44** | 0.70** | 0.80** | −0.65** | – |
| Cronbach's $\alpha$ | | 0.87 | 0.72 | 0.69 | 0.81 | 0.65 | 0.82 | 0.96 | 0.92 | 0.92 |
| *M* | | 4.37 | 5.07 | 5.22 | 5.18 | 4.98 | 5.42 | 5.21 | 2.29 | 4.59 |
| *SD* | | (1.32) | (1.38) | (1.28) | (1.21) | (0.97) | (1.26) | (1.47) | (1.29) | (1.66) |

*SWTS, Satisfaction with Thanksgiving Scale. M and SD represent mean and standard deviation, respectively. *p < 0.05. and **p < 0.01.*

feelings, and/or behaviors. Please take a minute or two and write about how you spent this Thanksgiving Day."

## Need Satisfaction on Thanksgiving

The second page of stimulus materials automatically piped in what the participants wrote on the first page and asked them to rate how much they agreed with statements about how they spent this Thanksgiving Day (1 = *strongly disagree* and 7 = *strongly agree*). This page contained the Balanced Measure of Psychological Needs (Sheldon and Hilpert, 2012), which contains three six-item subscales that measure satisfaction of autonomy (e.g., "I was really doing what interested me" and "There were people telling me what I had to do"; reverse-scored), competence (e.g., "I took on and mastered hard challenges" and "I did stupid things that made me feel incompetent"; reverse-scored), and relatedness (e.g., "I felt close and connected with other people who were important to me" and "I feel unappreciated by one or more important people"; reverse-scored). After appropriate reverse scoring, we calculated an index for each subscale by taking the mean of the relevant items. **Table 1** shows the Cronbach's alphas for the final indexes of regulatory focus, need satisfaction, affect, and satisfaction with Thanksgiving.[3]

## Promotion and Prevention Focus on Thanksgiving

There was no existing measure of recalled regulatory focus from the previous day that assessed aspects of the promotion and prevention systems other than hopes/ideals for promotion and duties/oughts for prevention (cf. Vaughn, 2017, Study 2). Therefore, we developed a new scale for the current research by modifying the promotion and prevention measure in Vaughn et al.'s (2020) research. Because hopes/ideals and duties/oughts are the most common ways to operationally define promotion and prevention focus (e.g., Summerville and Roese, 2008; Hodis, 2017), we included items about these goals. We also included items based on research about regulatory focus and openness to new experiences (Vaughn et al., 2008), questionnaire measures of chronic and situational regulatory focus (Higgins et al., 2001; Lockwood et al., 2002; Ouschan et al., 2007; Wallace et al., 2009; Haws et al., 2010; Fay et al., 2019), and research on how regulatory focus relates to episodes of exploration and self-control (Manczak et al., 2014; Vaughn et al., 2020) as well as optimism and defensive pessimism (e.g., Grant and Higgins, 2003; Scholer et al., 2019a). Participants used this scale on the day after Thanksgiving to describe how they spent the previous day.

The third page of stimulus materials automatically piped in what the participants wrote on the first page. It asked participants to "Please indicate how much each of the following describes how you spent this Thanksgiving Day." Participants responded on a 7-point scale (1 = not at all and 7 = very much). Eight items represented promotion (e.g., "Being spontaneous") and eight represented prevention (e.g., "Exerting self-control"). **Table 2** shows these items.

Because this is the first study to use this new scale, we submitted the 16 regulatory focus items to an exploratory factor analysis using maximum likelihood estimation and direct oblimin rotation, with delta = 0. The Kaiser-Meyer-Olkin measure showed that the sampling was adequate, KMO = 0.831. Bartlett's test of sphericity showed that the correlation structure was adequate for analyses, $\chi^2$ (120) = 2552.19, $p < 0.001$. These factors together accounted for 50.81% of the variance. Each item loaded >0.40 on only one factor, except for the following three items, which loaded <0.40 on each factor: "I avoided making mistakes," "I thought through anything that could go wrong," and "I avoided thinking about what could go wrong." These questions were in positions 1, 5, and 16, respectively.

When we re-ran the factor analysis without these three items, KMO = 0.822 and Bartlett's test $\chi^2$ (78) = 2552.19, $p < 0.001$. **Table 2** shows the pattern-matrix factor loadings and the communalities for the items. The resulting promotion and positive affect factors accounted for 52.93% of the variance.

[3]This page also contained the four-item Beneficence Scale (Martela and Ryan, 2016), which we included for exploratory purposes. It includes statements such as, "I felt that my actions had a positive impact on the people around me," and "The things I did contributed to the betterment of society." The **Supplementary Material** contains the results of all analyses with the Beneficence Scale included.

**TABLE 2 |** Communalities and factor loadings from the exploratory factor analysis of regulatory focus items.

| Item No. | Factor | | | Communalities | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | Initial | Extracted |
| 14. I was excited. | **0.861** | 0.027 | 0.052 | 0.723 | 0.777 |
| 4. I was enthusiastic. | **0.860** | 0.069 | 0.035 | 0.729 | 0.785 |
| 6. I was optimistic. | **0.835** | 0.021 | 0.047 | 0.676 | 0.728 |
| 12. I did what I ideally liked to. | **0.735** | −0.044 | −0.041 | 0.547 | 0.517 |
| 8. I was spontaneous. | **0.614** | −0.050 | −0.067 | 0.400 | 0.354 |
| 10. I avoided missing out on anything good. | **0.472** | 0.021 | 0.233 | 0.360 | 0.341 |
| 11. I was careful. | −0.007 | **0.810** | −0.036 | 0.466 | 0.634 |
| 13. I was cautious. | −0.224 | **0.792** | −0.022 | 0.451 | 0.604 |
| 15. I exerted willpower. | 0.209 | **0.437** | 0.001 | 0.400 | 0.268 |
| 3. I exerted self-control. | 0.047 | **0.416** | 0.079 | 0.354 | 0.214 |
| 9. I did what was expected of me. | −0.143 | −0.016 | **1.033** | 0.365 | 0.999 |
| 7. I fulfilled duties and obligations. | 0.264 | 0.120 | **0.462** | 0.423 | 0.414 |

*N = 401. Maximum likelihood exploratory factor analysis and direct oblimin rotation with delta = 0. Loadings are from the pattern matrix, and loadings over 0.40 are in bold font. Factor 1 represents promotion, Factor 2 represents caution/self-control, and Factor 3 represents duties.*

As expected, the promotion items loaded into one factor. However, the prevention items loaded into two factors: one for duties and the other for caution/self-control. The promotion factor correlated at $r = 0.26$ with duties and at $r = 0.18$ with caution/self-control. The duties and caution/self-control factors correlated with each other at $r = 0.36$.[4]

## Positive and Negative Affect on Thanksgiving

The fourth page of stimulus materials automatically piped in what the participants wrote on the first page. It asked participants to "Please think about what you did and experienced on Thanksgiving Day. Then report how much you experienced each of the following feelings." Participants responded on a 7-point scale (1 = very slightly and 7 = extremely). The six positive feelings (happy, positive, good, pleasant, joyful, and contented) and six negative feelings (sad, negative, bad, unpleasant, afraid, and angry) were the Scale of Positive and Negative Experience (Diener et al., 2010).[5]

## Satisfaction With Thanksgiving

The fifth page of stimulus materials automatically piped in what the participants wrote on the first page. It asked them, "How satisfied are you with how this Thanksgiving Day went?" For this measure, we adapted the five-item Satisfaction with Life Scale (Pavot and Diener, 1993) and asked participants to report on a 1 (strongly disagree) to 7 (strongly agree) scale their agreement with items, such as "I was satisfied with this Thanksgiving Day" (cf. Kasser and Sheldon, 2002).[6]

## Number of People That Participants Lived With and Saw on Thanksgiving

The sixth page of stimulus materials automatically piped in what the participants wrote on the first page. First, participants responded to the question, "How many other people did you see face-to-face on Thanksgiving Day **this year**?" using a slider that went from 0 to 100 in increments of 1 and showed the value. Next, participants responded to the question, "Including you, how many people normally live in your usual residence?" with response options of 1, 2, 3, 4, 5, 6, 7, or more (The average size of an American household in 2020 was 3.15 people; Statistica Research Department, 2021). The third question on this page was, "How many other people did you see face-to-face on Thanksgiving Day **last year, in**

[4]G*Power does not include factor analysis. However, 200 participants support an exploratory factor analysis under moderately good conditions (communalities of 0.40 to 0.70, with at least three measured variables per theorized factor; Fabrigar and Wegner, 2012). Several of the communalities in our analyses were slightly below this range, and 400 participants can support an exploratory factor analysis under these conditions (Fabrigar and Wegner, 2012).

[5]Because promotion focus and positive affect were strongly correlated ($r = 0.82$), we submitted the items in these two scales to an exploratory factor analysis using maximum likelihood estimation and direct oblimin rotation, with delta = 0. The Kaiser-Meyer-Olkin measure showed that the sampling was adequate, KMO = 0.958, and Bartlett's test $\chi^2$ (120) = 4597.31, $p < 0.001$. Table S3 in the Online Resource shows the pattern-matrix factor loadings and the communalities for the items. The analysis revealed two factors, one for promotion focus and the other for positive affect. Together, these factors together accounted for 66.31% of the variance, and they correlated at $r = 0.79$. The only item that loaded >0.40 on both factors was "Being optimistic." Given the importance of optimism in supporting eager goal pursuit (e.g., Grant and Higgins, 2003; Ouschan et al., 2007; Hazlett et al., 2011), we retained the optimism item in the promotion focus scale.

[6]Because promotion focus and satisfaction with Thanksgiving were strongly correlated ($r = 0.78$), we submitted the items in these two scales to an exploratory factor analysis using maximum likelihood estimation and direct oblimin rotation, with delta = 0. The Kaiser-Meyer-Olkin measure showed that the sampling was adequate, KMO = 0.938, and Bartlett's test $\chi^2$ (66) = 3483.26, $p < 0.001$. Table S4 in the Online Resource shows the pattern-matrix factor loadings and the communalities for the items. The analysis revealed two factors, one for promotion focus and the other for satisfaction with Thanksgiving. Together, these factors accounted for 60.77% of the variance, and they correlated at $r = -0.81$. The only unexpected loading was for "I did what I ideally liked to," which loaded >0.40 on the satisfaction with Thanksgiving factor. Given the importance of ideals in promotion focus (e.g., Higgins, 1997, 1998; Molden et al., 2007; Scholer et al., 2019a), we retained the ideals item in the promotion focus scale.

**2019**?" to which participants responded using a slider that went from 0 to 100 in increments of 1 and showed the value. Finally, participants responded to the question, "Including you, how many people normally lived in your usual residence at that time last year?" with response options of 1, 2, 3, 4, 5, 6, 7, or more.

For our analyses that compared participants who did *versus* did not see anyone else face-to-face on Thanksgiving, we grouped participants into three categories. We based these categories on what research suggests may be important for assessing relationships between social contacts and wellbeing in the COVID-19 pandemic (Okabe-Miyamoto et al., 2021). They were for participants who reported seeing no one ($n = 27$), one other person ($n = 63$), or two or more other people ($n = 314$) face-to-face on Thanksgiving.

## Pages After the Stimulus Materials

After the stimulus materials, participants reached two pages where they answered demographic questions and gave their impressions of the study. On the last page, participants received a debriefing to read and a code for them to show they had finished the study on Prolific.

# RESULTS

Because of the large number of results, we provide most of the statistics in tables. We describe sensitivity power analyses in footnotes to make it easier to follow the main results.

## Descriptive Statistics and Correlations

**Table 1** shows the correlations between the measures of regulatory focus, need satisfaction, affect, and satisfaction with Thanksgiving. It also shows the Cronbach's alphas and descriptive statistics for these variables.[7]

## How Happy Were Participants on Thanksgiving?

**Table 3** shows the percentage of participants scoring within different ranges of the three overall wellbeing variables in this study. This table shows that the holiday involved substantially more positive affect than negative affect for most participants, with 79.5% scoring above the scale midpoint on positive affect and 9.7% scoring above the midpoint on negative affect. Participants generally were satisfied with their holiday experience, with 64.9% scoring above the midpoint of satisfaction.

## Promotion and Prevention Focus on Thanksgiving

As shown in **Table 4**, participants reported being more prevention focused than promotion focused on Thanksgiving. We did three paired-samples *t*-tests between the regulatory focus indexes, with a Bonferroni adjustment of $p = 0.0167$. Participants scored significantly lower on promotion ($M = 4.37$, $SD = 1.32$) than duties ($M = 5.22$, $SD = 1.28$) or caution/self-control ($M = 5.07$, $SD = 1.38$). With the Bonferroni adjustment, duties and caution/self-control did not differ significantly.[8]

## Regression Analyses on Affect and Satisfaction With Thanksgiving

We included each measure of regulatory focus and need satisfaction as simultaneous predictors of positive affect, negative affect, and satisfaction with Thanksgiving. Each multiple regression satisfied assumptions regarding multicollinearity, outliers, and normality of residuals. These results of the multiple regressions are in **Table 5**. According to G*Power, 404 participants provide 80% power to detect an individual coefficient in a six-predictor multiple regression with $f^2 = 0.02$, $p = 0.05$, two tailed, which is equivalent to $sr^2$ of 0.0191.[9] We emphasize results that met this criterion.

## Relationships With Positive Affect

Positive affect associated significantly and positively with promotion and relatedness, with $sr^2 > 0.0191$. This is consistent with our hypotheses that promotion and relatedness satisfaction would associate positively with wellbeing. Additionally, positive affect associated significantly and positively to autonomy, but with $sr^2 < 0.0191$.

## Relationships With Negative Affect

Negative affect associated significantly and negatively with relatedness with $sr^2 > 0.0191$. This is consistent with our hypothesis that higher relatedness satisfaction would associate with more wellbeing. Additionally, negative affect associated significantly and negatively with promotion and competence, but with $sr^2 < 0.0191$. Negative affect also associated significantly and positively with caution/self-control, but with $sr^2 < 0.0191$.

[7]We did sensitivity power analyses for bivariate normal correlations. According to G*Power, 404 participants provide 80% power to detect a Pearson *r* of 0.14, $p = 0.05$, two tailed.

[8]According to G*Power, 404 participants provide 80% power to detect a difference in a paired-samples t-test of $d = 0.16$, $p = 0.0167$, two tailed.

[9]We did a sensitivity power analysis for a single regression coefficient in a six-predictor linear multiple regression with 404 participants. G*Power provides $f^2$s for this type of analysis. In our multiple regressions, we used $sr^2$ as the measure of effect size, as recommended by Disabato (2016). The variable, $sr^2$, is the correlation between the predictor of interest and the dependent variable, controlling for the relationships between the other predictors and the predictor of interest. To translate between $f^2$ and $sr^2$, we used an online calculator (Lenhard and Lenhard, 2016) to determine the correlation *r*s that were equivalent to the square roots of the $f^2$s, and we squared those *r*s. According to G*Power, 404 participants provide 80% power to detect an individual coefficient in a six-predictor multiple regression with $f^2 = 0.0195$, $p = 0.05$, two tailed, which is equivalent to $sr^2$ of 0.0191. This is the same as what G*Power shows for three-predictor, four-predictor, and seven-predictor multiple regressions, which is relevant to exploratory analyses contained in **Supplementary Table S1, S2**. These include analyses predicting regulatory focus from need satisfaction and *vice-versa*, as well as all regression analyses including the candidate need for beneficence.

**TABLE 3** | Percentages of the sample scoring 1–2, 2–3, 3–4, 4–5, 5–6, and 6–7 on the three wellbeing variables during Thanksgiving.

| Measure | % 1–2 | % 2–3 | % 3–4 | % 4–5 | % 5–6 | % 6–7 |
|---|---|---|---|---|---|---|
| Positive affect | 5.2 | 4.7 | 10.6 | 15.9 | 33.4 | 30.2 |
| Negative affect | 56.9 | 19.8 | 13.6 | 5.5 | 2.5 | 1.7 |
| Satisfaction | 9.2 | 11.1 | 14.8 | 22.1 | 22.0 | 20.8 |

## Relationships With Satisfaction With Thanksgiving

Satisfaction with Thanksgiving associated significantly and positively with promotion and relatedness, with $sr^2 > 0.0191$. This is consistent with our hypothesis that promotion and relatedness satisfaction would associate positively with wellbeing. Satisfaction with Thanksgiving also associated significantly and positively with autonomy, but with $sr^2 < 0.0191$. Additionally, satisfaction with Thanksgiving associated negatively with caution/self-control, but with $sr^2 < 0.0191$.

## Analyses With Number of Face-to-Face Contacts

Participants reported seeing significantly fewer people face-to-face on Thanksgiving 2020 ($M = 5.14$, $SD = 8.70$) than on the previous Thanksgiving ($M = 13.99$, $SD = 14.95$), $t\ (403) = -12.62$, $p < 0.001$, $d = -0.63$. This was not because of changes to the sizes of their usual households: Participants reported that about the same number of people lived in their normal residence on Thanksgiving 2020 ($M = 3.04$, $SD = 1.46$) as on the previous Thanksgiving ($M = 3.10$, $SD = 1.45$), $t\ (403) = -1.11$, $p = 0.268$, $d = -0.06$. In this study, 78% of participants reported seeing fewer people on Thanksgiving in 2020 than on the previous Thanksgiving, 11.4% reported seeing the same number of people, and 7.7% of participants reported seeing more people on Thanksgiving 2020.

As expected, seeing anyone at Thanksgiving was associated with more wellbeing and relatedness satisfaction than seeing no one. We examined the other measures of need satisfaction and regulatory focus for exploratory purposes. **Table 6** shows the results of one-way ANOVAs with Bonferroni-adjusted *post-hoc* comparisons. Those who saw either one or more people reported significantly higher relatedness satisfaction, promotion focus, positive affect, and satisfaction with Thanksgiving than participants who saw no one. The former two groups did not differ significantly on these variables.

Additionally, there were several other variables that showed significant between-group differences, and we report results of these exploratory analyses for the sake of completeness. Autonomy satisfaction was highest among those who saw one other person, and the other two groups did not differ significantly on this variable. A focus on duties and obligations was highest among those who saw two or more people, and the other two groups did not differ significantly on this variable. An ANOVA revealed a significant effect on caution/self-control, but *post-hoc* analyses revealed no significant differences between the three groups. The ANOVAs revealed no significant between-group differences on competence satisfaction or negative affect.

# DISCUSSION

Several months into the COVID-19 pandemic, American participants reported being more prevention focused than promotion focused on Thanksgiving in 2020. However, most also reported having a happy and satisfying Thanksgiving, almost as much as on major holidays outside of the pandemic (e.g., Kasser and Sheldon, 2002). Participants had a happier and more satisfying Thanksgiving overall when they felt more connected with others and focused more on growth – that is, when they experienced more relatedness satisfaction and were more promotion focused. In contrast, associations of wellbeing with autonomy and competence satisfaction were weaker, as were associations of wellbeing with the duties and caution/self-control aspects of prevention focus. About 7% of participants in this study reported seeing no one face-to-face on Thanksgiving, compared with 11% of American respondents in a public opinion poll who saw no one face-to-face during the 2020 December holidays and 16% of respondents in that poll who saw no one face-to-face on the following New Year's Eve and Day (Sanders, 2021). Wellbeing, relatedness satisfaction, and promotion focus were significantly higher among participants who saw anyone else face-to-face on Thanksgiving. These findings have implications for wellbeing at major holidays (not just in the pandemic), self-determination theory, and regulatory focus theory. Additionally, they have implications for persuasive messaging about how to gather safely at major holidays.

## Implications for Self-Determination Theory and Major Holidays

Major holidays emphasize maintaining and growing close relationships with family members (Fiese et al., 2002; Kasser and Sheldon, 2002; Páez et al., 2011; Allan et al., 2013; Hanke et al., 2016). Although satisfactions of autonomy, competence, and relatedness all are crucial for wellbeing (e.g., Deci and Ryan, 2000; Ryan and Deci, 2017), self-determination theory proposes that depending on the circumstances, one or another of the needs can "take the lead" in associating with wellbeing outcomes (Ryan and Deci, 2017, p. 247). The current research strengthens support for the idea that relatedness takes the lead in major holidays (also see Kasser and Sheldon, 2002; Páez et al., 2011; Allan et al., 2013; Hanke et al., 2016).

Additionally, we found that participants in the current study who reported seeing no one else face-to-face on Thanksgiving also reported lower relatedness satisfaction and wellbeing than participants who saw one or more people face-to-face that day. Consistent with research showing that living with a household partner but not the size of the household buffered negative effects of the pandemic on social connection

**TABLE 4** | Tests of differences between measures of regulatory focus.

| Measures in the test | *t* | *df* | Value of *p* | Mean diff. | *SD* diff. | 95% CI | *d* |
|---|---|---|---|---|---|---|---|
| Duties *vs.* promotion | 11.31 | 403 | <0.001 | 0.85 | 1.51 | [0.70, 1.00] | 0.56 |
| Caution/self-control *vs.* promotion | 7.41 | 403 | <0.001 | 0.69 | 1.88 | [0.51, 0.88] | 0.37 |
| Duties *vs.* caution/ self-control | 1.97 | 403 | 0.049[a] | 0.16 | 1.61 | [0.00, 0.32] | 0.10 |

[a]*With the Bonferroni adjustment of p = 0.0167, this pair of means did not differ significantly.*
*Positive numbers indicate higher scores for the first variable in each pair. Mean diff. = mean of between-condition differences. SD diff. = standard deviation of between-condition differences. CI = confidence interval. d = Cohen's d.*

(Okabe-Miyamoto et al., 2021), we found no significant differences in relatedness satisfaction or wellbeing between participants who saw one *versus* more people face-to-face on Thanksgiving. Of the 27 participants who saw no one else face-to-face, 85% reported seeing fewer people face-to-face on Thanksgiving 2020 than on the previous Thanksgiving. This finding suggests that these participants either could not find satisfying ways to connect with loved ones remotely, did not have anyone to reach out to that year, or had other things going on that day – such as quarantining – that could reduce relatedness satisfaction. A limitation of the current study is that it did not assess the specific ways participants connected with others remotely, and future research on wellbeing at major holidays in the pandemic could address this limitation. Public opinion polls commonly show that major holidays can be lonely times for people (Kerman, 2017; Savage, 2020), even when not in a pandemic, and future research on ways people may connect virtually with others could be important even once the pandemic is over.

## Implications for Regulatory Focus Theory and Major Holidays

During major holidays, including those not occurring in a pandemic, people can feel torn between ideally wanting to do something for the sake of enjoyment and feeling obligated to do something to maintain social relationships (e.g., Kasser and Sheldon, 2002; Allan et al., 2013; Hanke et al., 2016). Ideally wanting to do something is an aspect of promotion focus, whereas feeling obligated to do something is an aspect of prevention focus (e.g., Higgins, 1997; Vaughn et al., 2020). For example, an exciting opportunity to take a plane flight across the country to visit extended family can also feel obligatory if there are long lines and delays at the airport (The obligation to stand in long lines at airports also could conflict with another prevention goal, to remain safe against the virus, and to which we turn next.) Nonetheless, promotion was the regulatory focus that most strongly and consistently related to wellbeing: The more promotion-focused participants were on Thanksgiving, the happier and more satisfied they were with Thanksgiving Day. This expected positive relationship between promotion focus and wellbeing is consistent with other research on regulatory focus and wellbeing (e.g., Lanaj et al., 2012; Koopmann et al., 2016; Zhang et al., 2019; Wu and Chen, 2020).

Additionally, we speculate that during Thanksgiving in 2020, participants experienced a new prevention-prevention conflict specific to the pandemic. Participants' descriptions of what they did that day, news accounts (Caspiani and Borter, 2020; Trotta and Layne, 2020), and the fact that duties and caution/ self-control aspects of prevention focus loaded on different factors (cf., Haws et al., 2010; Higgins et al., 2001; Vaughn et al., 2020) suggest that many people experienced conflicts between two types of prevention goals. It appears that one was to fulfill duties to maintain holiday traditions by gathering with extended family. The other was to remain cautious and exert self-control to protect the self and others from COVID-19.

Even so, being focused on duties at Thanksgiving in 2020 did not relate significantly to any wellbeing measures, when controlling for relationships between measures of need satisfaction and regulatory focus. Additionally, being focused on caution/ self-control at Thanksgiving 2020 related to less wellbeing, but even when these associations were statistically significant, they were weak. Thus, in contrast to what other research has shown about relationships between prevention focus and affect and/ or wellbeing (e.g., Lanaj et al., 2012; Koopmann et al., 2016; Zhang et al., 2019; Wu and Chen, 2020), prevention focus on Thanksgiving 2020 did not relate strongly to lower wellbeing. While obligations can feel pressuring (e.g., Chen et al., 2015; Vaughn, 2018), they can be highly meaningful at holidays (e.g., Hanke et al., 2016). Many Americans had not seen extended family for months before Thanksgiving 2020 (Caspiani and Borter, 2020; Trotta and Layne, 2020), which could have made fulfilling duties to maintain in-person Thanksgiving traditions feel more meaningful than usual, even when balanced against remaining careful. Future research could examine whether the often-negative relationships between prevention focus and wellbeing (cf. Grant and Higgins, 2003; Lanaj et al., 2012; Koopmann et al., 2016; Zhang et al., 2019; Wu and Chen, 2020) generally are weaker during major holidays.

## Implications for Persuasive Messaging About COVID-19 at Major Holidays

The strongest predictors of wellbeing at Thanksgiving in this study were feeling connected with others and focusing on growth – that is, relatedness satisfaction and promotion focus. Given that promotion focus serves the survival needs for growth and nurturance (Higgins, 1997, 1998), the current findings

**TABLE 5 |** Multiple regressions modeling relationships with positive affect, negative affect, and satisfaction with Thanksgiving.

| Dependent variables and predictors | *B* | *β* | $sr^2$ | Value of *p* | 95% CI for *B* |
|---|---|---|---|---|---|
| Positive affect | | | | | |
| Autonomy | 0.12 | 0.10 | 0.005 | 0.003 | [0.04, 0.20] |
| Competence | −0.04 | −0.03 | <0.001 | 0.417 | [−0.14, 0.06] |
| **Relatedness** | **0.43** | **0.37** | **0.061** | **<0.001** | **[0.35, 0.52]** |
| **Promotion** | **0.56** | **0.50** | **0.113** | **<0.001** | **[0.48, 0.64]** |
| Caution/self-control | −0.01 | −0.01 | <0.001 | 0.790 | [−0.06, 0.05] |
| Duties | 0.12 | 0.05 | 0.001 | 0.119 | [−0.01, 0.12] |
| Negative affect | | | | | |
| Autonomy | −0.21 | −0.19 | 0.019 | <0.001 | [−0.31, −0.11] |
| Competence | −0.13 | −0.10 | 0.006 | 0.030 | [−0.25, −0.01] |
| **Relatedness** | **−0.41** | **−0.40** | **0.070** | **<0.001** | **[−0.51, −0.30]** |
| Promotion | −0.16 | −0.16 | 0.012 | 0.001 | [−0.26, −0.06] |
| Caution/self-control | 0.10 | 0.11 | 0.011 | 0.003 | [0.04, 0.17] |
| Duties | 0.03 | 0.03 | <0.001 | 0.525 | [−0.05, 0.11] |
| Satisfaction with Thanksgiving | | | | | |
| Autonomy | 0.14 | 0.10 | 0.005 | 0.012 | [0.03, 0.25] |
| Competence | −0.10 | −0.06 | 0.002 | 0.154 | [−0.23, 0.04] |
| **Relatedness** | **0.39** | **0.30** | **0.038** | **<0.001** | **[0.28, 0.51]** |
| **Promotion** | **0.67** | **0.53** | **0.124** | **<0.001** | **[0.56, 0.78]** |
| Caution/self-control | −0.09 | −0.07 | 0.005 | 0.016 | [−0.16, −0.02] |
| Duties | 0.03 | 0.02 | <0.001 | 0.516 | [−0.06, 0.12] |

*B, unstandardized regression weights. β, standardized regression weights. $sr^2$, semi-partial correlation squared. CI, confidence interval. Rows in bold font indicate significant results with power > 0.80.*

suggest that persuasive communications that support wellbeing at major holidays should emphasize ways to nurture connections with close others. Vigilance is effortful and stressful (Warm et al., 2008), but emphasizing relatedness support and promotion focus on a holiday - while also remaining safe – could help balance the strong vigilance involved in preventing the spread of the virus. The tension between having an ideal holiday celebration and maintaining vigilance against the virus may not go away while the pandemic continues. However, research on how regulatory fit can affect persuasion suggests that this tension could be useful.

Regulatory fit (Higgins, 2000) occurs when people think about or use strategies for pursuing a goal (e.g., making sure everything goes right at the holiday celebration) that fit and sustain their regulatory focus toward the goal (e.g., having the ideal holiday celebration). Regulatory nonfit occurs when people think about or strategies for pursuing a goal (e.g., being careful and making sure nothing goes wrong) that do not fit or sustain their regulatory focus toward the goal (e.g., having the ideal holiday celebration). Regulatory fit feels right (Higgins, 2000, 2005) and people can attribute this feeling of rightness to what they are judging (e.g., for reviews, see Higgins, 2000; Higgins, 2005; Vaughn et al., 2006a,b, 2010b; Avnet and Higgins, 2021). They may assume that if they feel right when thinking about something (e.g., ways to have the ideal holiday celebration), it is because what they are thinking about is right. Regulatory fit can enhance persuasion through advocacy messages, which explicitly intend to persuade (e.g., Cesario et al., 2004, 2008; Lee and Aaker, 2004; Koenig et al., 2009; Ludolph and Schulz, 2015), and through narratives, in which the explicit intent is often more subtle (Vaughn et al., 2009, 2010a).

With that said, when people's initial attitudes about a topic are strongly negative, regulatory nonfit can de-intensify negative attitudes and increase how carefully people think about a message that opposes their initial attitudes (Fridman et al., 2016, 2018a,b). This upside of regulatory nonfit (Avnet and Higgins, 2021) could be useful in communications about how to have a good holiday with others while remaining safe against COVID-19. Ideally wanting to have a better holiday than one's dreary pandemic norm could be a promotion-focused goal, whereas being careful and exerting self-control against the virus could be examples of vigilant strategies of goal pursuit. Research on regulatory nonfit (Avnet and Higgins, 2021) suggests that messages that include regulatory nonfit could lead people to think more abstractly and creatively about how to have a good holiday. Such messages could have especially positive impacts on people who initially have the strongest attitudes (Fridman et al., 2016) and are determined to have a holiday gathering that lives up to their ideals, no matter how risky. Indeed, many organizations' suggestions about how to celebrate holidays safely during the COVID-19 pandemic have incorporated this regulatory nonfit implicitly (e.g., Poplett, 2020; Centers for Disease Control and Prevention, 2021). Future research could examine whether, how, and for whom the upsides of regulatory nonfit extend to communications about how to have safe and enjoyable holiday celebrations in a pandemic. This future research could examine both wellbeing and physical health, including the percentages of participants who contract COVID-19 during the holiday. Such research would likely also be relevant to future epidemics and pandemics, which may become more frequent (Hilsenrath, 2020).

**TABLE 6 |** Tests of differences between participants who saw 0, 1, or 2+ other people face-to-face on Thanksgiving.

| Measure and test | *df*s | *F* | Value of *p* | $\eta^2$ | Mean diff. | Sig. | 95% CI |
|---|---|---|---|---|---|---|---|
| **Autonomy** | **(2, 401)** | **9.37** | **<0.001** | **0.045** | | | |
| 0 *vs.* 1 other | | | | | 0.38 | 0.482 | [−0.27, 1.04] |
| 0 *vs.* 2+ others | | | | | −0.31 | 0.570 | [−0.89, 0.26] |
| **1 vs. 2+ others** | | | | | **−0.70** | **<0.001** | **[−1.09, −0.30]** |
| Competence | (2, 401) | 0.31 | 0.733 | 0.002 | | | |
| 0 *vs.* 1 other | | | | | 0.17 | 1.000 | [−0.36, 0.71] |
| 0 *vs.* 2+ others | | | | | 0.13 | 1.000 | [−0.33, 0.60] |
| 1 *vs.* 2+ others | | | | | −0.04 | 1.000 | [−0.36, 0.28] |
| **Relatedness** | **(2, 401)** | **11.74** | **<0.001** | **0.055** | | | |
| **0 vs. 1 other** | | | | | **1.21** | **<0.001** | **[0.53, 1.89]** |
| **0 vs. 2+ others** | | | | | **1.18** | **<0.001** | **[0.59, 1.78]** |
| 1 *vs.* 2+ others | | | | | −0.03 | 1.000 | [−0.44, 0.38] |
| **Promotion** | **(2, 401)** | **7.90** | **<0.001** | **0.038** | | | |
| **0 vs. 1 other** | | | | | **1.05** | **0.001** | **[0.33, 1.76]** |
| **0 vs. 2+ others** | | | | | **1.02** | **<0.001** | **[0.40, 1.64]** |
| 1 *vs.* 2+ others | | | | | −0.03 | 1.000 | [−0.46, 0.40] |
| **Caution/self-control** | **(2, 401)** | **3.25** | **0.040** | **0.016** | | | |
| 0 *vs.* 1 other | | | | | −0.26 | 1.000 | [−1.02, 0.50] |
| 0 *vs.* 2+ others | | | | | −0.58 | 0.108 | [−1.24, 0.08] |
| 1 *vs.* 2+ others | | | | | −0.32 | 0.286 | [−0.77, 0.14] |
| **Duties** | **(2, 401)** | **22.30** | **<0.001** | **0.100** | | | |
| 0 *vs.* 1 other | | | | | 0.62 | 0.079 | [−0.05, 1.30] |
| **0 vs. 2+ others** | | | | | **1.35** | **<0.001** | **[0.77, 1.94]** |
| **1 vs. 2+ others** | | | | | **0.73** | **<0.001** | **[0.33, 1.13]** |
| **Positive affect** | **(2, 401)** | **6.03** | **0.003** | **0.029** | | | |
| **0 vs. 1 other** | | | | | **0.96** | **0.013** | **[0.16, 1.76]** |
| **0 vs. 2+ others** | | | | | **1.01** | **0.002** | **[0.31, 1.71]** |
| 1 *vs.* 2+ others | | | | | 0.05 | 1.000 | [−0.43, 0.53] |
| Negative affect | (2, 401) | 2.30 | 0.102 | 0.011 | | | |
| 0 *vs.* 1 other | | | | | −0.57 | 0.167 | [−1.28, 0.14] |
| 0 *vs.* 2+ others | | | | | −0.54 | 0.106 | [−1.16, 0.08] |
| 1 *vs.* 2+ others | | | | | 0.02 | 1.000 | [−0.40, 0.45] |
| **Satisfaction with Thanksgiving** | **(2, 401)** | **10.80** | **<0.001** | **0.051** | | | |
| **0 vs. 1 other** | | | | | **1.51** | **<0.001** | **[0.62, 2.41]** |
| **0 vs. 2+ others** | | | | | **1.50** | **<0.001** | **[0.72, 2.28]** |
| 1 *vs.* 2+ others | | | | | −0.01 | 1.000 | [−0.55, 0.52] |

*2+ others = saw two or more other people face-to-face. Group sizes: saw 0 other people (n = 27), 1 other person (n = 63), and 2+ others (n = 314). Bonferroni post-hoc tests, in which numbers indicate higher means for the second condition within the pair. Mean diff. = mean of between-condition differences. CI = confidence interval. Bold font indicates rows with significant effects.*

## Limitations and Future Research

Although we speculate that participants in this study experienced goal conflict at Thanksgiving, this study had no measures of goal conflict (cf., Boudreaux and Ozer, 2013; Gere and Schimmack, 2013; Gray et al., 2017; Vowels and Carnelley, 2020). Goal conflict occurs when pursuing one valued goal interferes with the pursuit of another valued goal. Wellbeing relates negatively to goal conflict, either when the conflict is between one's own goals (e.g., Boudreaux and Ozer, 2013; Gray et al., 2017) or between the goals of relationship partners (e.g., Gere and Schimmack, 2013; Vowels and Carnelley, 2020). Conflicts between the goal of gathering face-to-face and the goal of remaining safe from COVID-19 will likely continue for the duration of the pandemic. Research on goal conflict and wellbeing in the pandemic could examine how people manage these conflicting goals on major holidays and at other times.

The present research was cross-sectional, so we cannot infer causality from the results. Although we treated positive affect, negative affect, and satisfaction with Thanksgiving as outcome variables, they could themselves be predictors of the other variables in the study. Moreover, future research could measure participants' baseline wellbeing to understand how it relates to happiness and other aspects of wellbeing at Thanksgiving. Future research could use a diary study design to address these limitations (e.g., Allan et al., 2013).

Another limitation of this research is that it did not have a representative sample of Americans. Prolific samples resemble MTurk samples (Peer et al., 2017), and MTurk samples do not represent the general US population (Goodman et al., 2013; Walters et al., 2018). For example, MTurk samples tend to be younger, more educated, less employed, and have more White and Asian respondents and fewer Black and Latinx or

Hispanic respondents than the general US population (Walters et al., 2018). COVID-19 has stronger impacts on people who are older (McCarthy, 2020) and on people of color (Centers for Disease Control and Prevention, 2020a), which could have affected wellbeing at Thanksgiving.

Future cross-cultural research on social connection, regulatory focus, and wellbeing at major holidays in a pandemic could find stronger relationships between prevention focus and wellbeing. People tend to be somewhat promotion oriented in contexts that emphasize the values of individualism, such as the United States (e.g., Lee et al., 2000). In more collectivist cultural contexts that emphasize the value of fulfilling duties and obligations (e.g., Miller et al., 2011; Buchtel et al., 2018), people who believe they are maintaining important holiday traditions may have substantially higher wellbeing. Additionally, prevention focus may be a better fit for cultural contexts with tighter norms, whereas promotion focus may be a better fit for cultures with looser norms (Kumar et al., 2019), such as the United States (Gelfand et al., 2011). In contexts with stronger norms and less tolerance for deviant behavior, the prevention focus on minimizing losses could be especially valued and meaningful – especially if it means protecting loved ones from COVID-19 on a major holiday.

The current study was designed to be basic research on how need satisfaction and regulatory focus relate to wellbeing in a specific context, and as such, it was designed to extend theory and research in three areas: wellbeing on major holidays, self-determination theory, and regulatory focus theory. Given that numerous other studies have examined wellbeing and mental health in the COVID-19 pandemic (e.g., Dawel et al., 2020; Gray et al., 2020; Mental Health America, 2020; Vanderweele et al., 2020; National Center for Health Statistics, 2021; Okabe-Miyamoto and Lyubomirsky, 2021; Panchal et al., 2021), the current study's unique emphasis on wellbeing during a major holiday in the pandemic is both a strength and a limitation. We did not design this study to assess aspects of mental health, such as depression or anxiety, and it is beyond the scope of the current research to speculate at length about implications of our findings for these aspects of mental health. However, we hope that the current work inspires future researchers to apply these findings to design and rigorously test interventions that may protect or improve mental health in the COVID-19 pandemic and beyond.

## CONCLUSION

In 2020, American Thanksgiving occurred 8 months into the COVID-19 pandemic, when many people had become more stressed, anxious, depressed, and lonely (e.g., Mental Health America, 2020; National Center for Health Statistics, 2021; Ravenscraft, 2021). Participants reported being more prevention focused than promotion focused on Thanksgiving in 2020. However, most also reported having a happy and satisfying Thanksgiving. Participants had a happier Thanksgiving overall when they felt more connected with others and focused more on growth. While these experiences could be especially important during major holidays in a pandemic, they could be just as important just as important once the pandemic is over, on any day when simultaneously having fun and meeting obligations is important.

Overall, this study suggests that messages about how to accomplish one's ideals and connect with others at holidays could help boost wellbeing. Additionally, research suggests that it could be beneficial to include information about how to remain safe against the virus, especially for people who have the strongest intentions to gather with many people who might not be vaccinated (see Fridman et al., 2016). We hope future research will explore this possibility, both for the COVID-19 pandemic and for any future epidemics.

## 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 at: Open Science Framework, https://osf.io/fy6rc/.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ithaca College Institutional Review Board. The participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

LV conceptualized and designed the research, acquired the data, and wrote the first draft of the manuscript. LV, PB, RC, JJ, and CG contributed to the analysis and interpretation of the data. LV, PB, RC, JJ, CG, and JL commented on the previous versions of the manuscript, and read and approved the final manuscript. RC, JJ, and CG contributed equally, and their authorship order was decided by random draw. 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.2021.710491/full#supplementary-material

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# The Wisdom Acquired During Emergencies Scale – Development and Validity

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The COVID-19 pandemic and its related lockdown restrictions had repercussions on health status, psychological states of mind, and emotion regulation. Attitudes towards these restrictions, beliefs, emotions and behaviours could be wise, as in the acceptance of, and adaptation to, these constraints. On the other hand, they could be unwise, as in the rejection of rules and limitations, denial of the consequences, irrational beliefs, self-accusation, rage and general intolerance. This study aims to introduce the development and validation of the 25-item Wisdom Acquired During Emergencies Scale (WADES). It is a measure to assess the wisdom and self-regulation that are needed to cope with unexpected and unpredictable emergency situations. On the basis of a preliminary study ($N1 = 212$ Italian adults), a multiple-choice scale of 52 items was developed. In the reliability study ($N2 = 1777$), items were scaled, analysed according to the optimal score technique and selected to provide a final and reliable version (Cronbach's $\alpha = 0.83$). The validity study ($N3 = 1{,}345$, $N4 = 1{,}445$, $N5 = 878$) provided correlations with established scales measuring, for example, traditional wisdom, emotion regulation, empathy, post-traumatic growth, collectivism, conscientiousness and satisfaction with life. The results confirmed that high scores on the WADES are associated with the ability to regulate emotions, control impulses and develop goals in emotional situations, to tolerate current difficulties, while developing new attitudes, values and behaviours, entailing changes in self-perception and relationships. It was thus confirmed that high WADES scores indicate a higher degree of acquired wisdom.

**Keywords: COVID-19, pandemic lockdown, validation, optimal scoring, wisdom scale, emotion regulation**

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## INTRODUCTION

The coronavirus pandemic of 2019 (COVID-19) entailed a worldwide outbreak of respiratory illness (Zhang et al., 2020). Italy, and the region of Lombardy in particular, was the earliest affected area in the Western world with 243,506 cases and 34,997 deaths reported by the end of July 2020. The Italian Government responded to the outbreak by implementing a country-wide lockdown in March 2020. It is well-known that the COVID-19 pandemic also affected mental health and well-being (Fiorillo and Gorwood, 2020). The related social distancing and self-isolation can impact mental health, also considering that reduced social interactions are well-known risk factors for mental disorders (*ibidem*).

The concept of wisdom has been linked to the ability to recognise and cope with uncertain situations. This construct of wisdom is multifaceted and complex, involving behaviours, attitudes, cognitive abilities and emotional states at both personal and interpersonal levels (Staudinger and Glück, 2011). A number of influential models have attempted to capture the concept of wisdom in terms of subcomponents. Thus, Bangen et al. (2013) suggested that over half of the definitions of wisdom in literature include the following central elements: decision-making related to the social world and pragmatically oriented life-skills; a prosocial stance, including altruism and empathy; an ability to reflect on oneself; emotional regulation; and finally, the ability to acknowledge and react constructively to uncertainty. The latter more contextual aspect is also underlined by other authors (Bigelow, 1992; Kunzmann and Baltes, 2003), who defined wisdom as a type of expertise that operates in undetermined situations, including the ability to tolerate the ambiguity and uncertainty of human existence. In accordance with philosophical traditions and lay beliefs, a number of empirical researchers have also underlined moral aspects of the construct of wisdom (see for example, Sternberg, 1998; Zheng and Wang, 2014; Fowers et al., 2017, 2021). Glück and Bluck's (2013) MORE model of wisdom suggested that mastery, openness, reflectivity, emotion regulation and empathy are essential aspects of the construct (also see Kunzmann and Glück, 2019). A more recent model suggests that wisdom entails the application of morally informed metacognitive reasoning and problem-solving (Grossman et al., 2020). These authors also underlined the importance of balancing interests of the self and of others, the acknowledgement of a common humanity and a quest for truth. Finally, Sternberg and Karami (2021) suggested a '6P model of wisdom' which includes: (1) *purpose*, for example in terms of seeking the common good; (2) *environmental press* or situations that stimulate wisdom such as the current pandemic, which necessarily imply values of both individuals and groups; (3) characteristics of *wisdom-based problems*, which by definition are ill-defined, contextual, resolved only to varying degrees, require balancing conflictual interests, are often emotional in nature, which are all characteristics of the current pandemic and its consequences; (4) *persons*, i.e., the characteristics of wise individuals which are highly variable; (5) the *process* of wisdom which entails motivational, affective, cognitive, spiritual and metacognitive processes; and finally (6) the *products* of wisdom such as solving problems, decision-making and subsequent actions. However, according to the authors, none of the existing models address all the above-mentioned perspectives.

The clinical literature (Puechlong et al., 2020), lay beliefs and some wisdom researchers (see Glück et al., 2020 for example) also suggest that emotion regulation (ER) may be essential in situations that are perceived as stressful, traumatic or potentially harmful, although this aspect is still somewhat controversial in wisdom research (Grossman et al., 2020). A broad definition of ER entails an unconscious or conscious effort to modulate one's felt or expressed emotion (Mauss et al., 2007). In situations of emotional distress, ER implies evaluating and changing emotional responses and behaviours (Thompson, 1994; Gratz and Roemer, 2004).

In the past, quarantine measures were associated with widespread fear and uncertainty, the discrimination of certain social groups, economic hardship and social rebellion (Hull, 2005). However, in accordance with resilience theory, the outcome of stressful or traumatic situations is not always harmful. It is of great importance to identify protective factors that can enhance positive responses to adverse events (Marčinko et al., 2020). In line with this framework, the concept of post-traumatic growth (PTG) was proposed (Tedeschi and Calhoun, 1996), which describes positive changes in levels of functioning, lifestyle and the development of insight, in response to highly adverse events. This kind of reaction to negative events seems to be linked to both personal and environmental resources that favour coping strategies (Prati and Pietrantoni, 2009). Three dimensions of PTG were suggested: at a personal level, changes in self-perception including an increase in self-value; at an interpersonal level, higher levels of empathy and closeness to others; and finally, at the level of life philosophy, changes in values and priorities.

Similarly, social scientists distinguish between individualistic societies that value independence and in which personal aims prevail and those based on collectivism. The latter orientation conceives of individuals as interconnected with others, with the group's well-being and harmony being a priority (Triandis and Gelfand, 2012). In emergency situations, such as pandemics, individual needs may in fact be in conflict with those of the wider community, and thus, a collectivist orientation may constitute a further dimension of situational wisdom during the health crisis. Recent literature (Fowers et al., 2021) focusing on virtues during the COVID-19 pandemic also underlined the importance of finding a balance between individual needs and the collective good, as well as the necessity to take appropriate risks and adhere to safety protocols. The construct of conscientiousness, which captures some of these aspects, refers to a global personality trait characterised by several facets, including industriousness, diligence, dutifulness and perseverance (MacCann et al., 2009). Conscientiousness thus refers to the likelihood of following rules and adhering to regulations, both collectively and personally. Moreover, a growing body of research shows that conscientiousness acts as a protective factor of health (Bogg and Roberts, 2004; Friedman and Kern, 2014; Israel et al., 2014).

The notion of *Acquired wisdom* is defined as an attitude that can develop in individuals who have to come to terms with a potentially life-threatening situation. These events entail being suddenly and unpredictably forced to comply with a number of restrictions such as being confined to one's home, thus having limited (or forced) personal and/or social contacts. Wisdom entails the need to quickly develop new behaviours, attitudes and psychological strategies to face both the restrictions and fear of contagion. These emotional and cognitive strategies and behaviours may be rated as more or less wise, rational, adaptive, secure, safe and sensible.

As discussed above, wisdom is generally conceived in terms of a long-term attitude or behaviour, while acquired wisdom

refers to a temporary state, which includes the ability to refrain from irrational, maladaptive or despairing states of mind. Our construct concerns specific behaviours (e.g., prophylactic actions) and attitudes or emotions (e.g., fear of contagion) as reactions to the realistic threat of dying, being infected or infecting (significant) others. Another difference between our concept and the other models and measures of wisdom is that they do not usually consider disturbing or highly maladaptive thoughts like fear of persecution, fear of insanity or conspiracy theories. Our scale explicitly measures the opposite pole to wisdom and rationality.

From a methodological point of view, there is an inherent difficulty in defining wisdom with self-report Likert scales. The maximum of a scale can only be achieved by endorsing items like *I am wise* or *I always behave wisely* to a high degree. However, authentically wise individuals are unlikely to describe themselves as very wise because they are aware of their limits, while the unwise are more likely to grossly overestimate their wisdom (Glück et al., 2013; Flebus, 2017). One way of avoiding this difficulty is to resort to a multiple-choice format, the same format as the questions used in tests of maximum performance. The problem is that this scoring method is not frequently applied in psychological measurement: it is the optimal scores method, also known as *correspondence analysis* (Benzécri, 1992; Greenacre, 2007) reciprocal averaging, dual scaling (Nishisato, 1980), Guttman's least squares method (Guttman, 1950) and by a number of other names. This method refers to Eckart and Young's (1936) theorem of spectral decomposition (see also Weller and Romney, 1990), which is an equivalent of canonical analysis with dummy variables corresponding to the nominal scale (Tanaka, 1979).

By employing this method, the final result is a set of weights to be applied to the items, on a *z*-score scale, which is the same scale as the factor scores (hence the term correspondence analysis). The fact that the method is hardly known does not prevent its use with duly phrased items. As a matter of fact, items should be cast in such a way that the targeted underlying variable can easily emerge as the first dimension, namely, items are formulated so that they are very likely to tap the targeted concept. For instance, in the case of wisdom, the options are either very wise or very unwise, while some options fall in between. The method is still experimental, although some published articles or papers in international conferences (Flebus Flebus, 2017) testify to its appropriateness (Flebus, 1988, 2019). In a self-report questionnaire, there is no correct answer; however, if there is an intrinsically homogenous underlying trait in the items, scaling can still be applied which will yield a set of weights (e.g., −1.3, −1.0, −0.8, 0.5, 0.95) for every item, which correspond to varying degrees with the options of a given item.

## General Aim of the Study

The present studies aimed to develop a questionnaire to measure the acquired wisdom, arising in times of sudden, unforeseen and devastating epidemics, such as the COVID-19 epidemic in Italy during late winter 2020. It was hypothesised that a general psychological trait or dimension (for sake of brevity termed '*wisdom*') exists and can therefore be measured, with an appropriately devised questionnaire. The format is well-known (multiple-choice format) but new in its application. In fact, multiple-choice questions are only used to measure maximum performance traits, because for each question, there is an exact answer, but these are almost never used for typical performance traits, where it is hard (or impossible) to indicate the right answer.

Likert scales are commonly used as closed-ended responses that allow quick extractions and analyses (Baburajan et al., 2020). A widely shared criticism concerns not only the indeterminacy of the number of grades and response styles (Preston and Colman, 2000; Simms et al., 2019), but also the lack of commonly shared guidelines for choosing the rating scales for specific research (Taherdoost, 2019). These limits can introduce serious biases in the measurement of certain constructs such as wisdom. A different approach is possible by asking respondents to express their best, or preferred, option or their first choice (multiple-choice). For instance, the situational judgment tests (SJT) include a situation followed by several possible responses. These responses are nominal multiple-choice options, and their scoring is performed by relying on item response theory-based procedures or on specific methods for nominal responses (Revuelta and Ximénez, 2017; Revuelta et al., 2020; Zu and Kyllonen, 2020).

Unlike Likert scales, in the present questionnaire, each item had several nominal options from which participants selected an answer. There was no *a priori* weight assigned to answers. The self-calibrating score method allowed a transformation of respondent's choices into numerical measures and subsequently into a measurement of the latent variable. In particular, no pre-existing underlying order was hypothesised for the nominal options, although it may have existed in the minds of respondents (see for example, Revuelta et al., 2020). In summary, Likert's scales posit *a priori* scores, the values are recognisable, and the scales have an order from low to high. In the optimal scoring, only *a posteriori* scores are available.

Another objective was to illustrate a novel procedure used to develop a questionnaire, with a different method of scaling items. The suggested procedure, described in detail below, is particularly useful because the main concept (acquired wisdom) is highly complex, with a variety of facets that would require an extremely high number of items or scales to provide an acceptable measurement.

## Phase 1: Questionnaire Development

### Aim

The aim was to develop a new questionnaire to measure the construct of acquired wisdom. Given the novelty of the epidemic and the related lockdown, it was judged that research from scratch was needed.

### Participants

A snowball technique was used to contact the participants online. The questions were distributed to Italian-speaking

participants, with the help of psychology students who received academic credits for their participation. The instructions asked participants to complete the provided sentences with personal views, thoughts and feelings.

Respondents were 212 Italians (sample $N_1$), of diverse social demographic backgrounds (aged from 19 to 87, 72% females, 21% from Lombardy, 49% with a university degree).

### Methods

#### *Procedure*

A written sentence completion technique, drawing from Nuttin's Methode d'Induction Motivationnelle (Nuttin, 1985) or the 40 Complete sentence list (Rotter and Rafferty, 1950), was adopted. This technique is used both in clinical practice and research (Holaday et al., 2000) and is very efficient in obtaining and accumulating new material and suggestions for research. Sixty-three sentences to be completed by participants were administered (see **Supplementary Material**). Examples of these sentences are *Once the quarantine is over, I am afraid/I hope…* or *At the moment, what is the most difficult to bear is…* and: *Despite the health crisis, people do not seem to understand that…*

### Results

The complete answers were 142. The research team formulated 91 items which underwent scrutiny as to readability, content and strict adherence to the aims of the research. All items had to offer one or two very wise options and one or two extremely unwise options. The initial form for each item included 8 to 10 options to facilitate a final quick selection. Unwise options could refer to any form of lack of wisdom, namely, excess of anger, persecutory thoughts, regrets, excessive concerns for one's health, despair, depression, extreme individualism, perfectionism or extreme control. At the end of the collective scrutiny, 52 items were selected that had the same format: a stem sentence to be completed with an answer chosen from seven options. An example of an item and the seven possible answers is the following: I will be happy when…(1) They will find a vaccine and infections will diminish; (2) Those who are not law-abiding will be punished; (3) Those who are responsible for the pandemic will be punished; (4) I will no longer be forced to be alone; (5) People will admit it was all a joke; (6) I will be able to escape from this house or this city; (7) I will be free to do whatever I wish.

## Phase 2: Item Selection and Reliability

### Aim

This study aimed to select the items of the WADES questionnaire. In this process, we merged the assessment of the internal validity of the questionnaire.

### Participants

The research questions were presented randomly after a number of socio-demographic questions. The questionnaires were distributed online to 2,233 Italian-speaking participants (living in or outside of Italy), with the help of psychology students who received academic credits for their participation. The usable sample (criterion: at least 26 questions completed) was made of 1777 individuals (sample $N_2$), aged from 17 to 86 years ($M = 31.15$, $SD = 15.05$), mostly highly educated (38.9% had a university-level education) and mostly from Lombardy (56.5%).

### Methods

#### *Procedure*

The 52 nominal items could not be submitted to a regular factor analysis. Categorical factor analysis, also known as correspondence analysis, was thus performed. The Categorical Principal Component Analysis (CatPCA) Subroutine of SPSS computes (a) the weights for all options for all items (b) scores for all participants and (c) Cronbach $\alpha$ coefficient (the default is two dimensions or factors but we only requested one). For each item, the subroutine computes a discriminant index which can be used to discard it, if the correlation with the factor is low; Cronbach's $\alpha$ allows for a reliability analysis (if a bad item is discarded, the alpha coefficient rises and confirms that the discarding was legitimate).

Initially, the sample was split into two subsamples (A and B). The subsample A was used to locate poor variables, namely, those which did not reach at least 11% of common variance with the first factor (equivalent to a factor loading of 0.31). After discarding low discriminating items, the analysis was cross-validated on subsample B either to confirm the good items or to remove further ill-suited items (17 items were thus eliminated).

The process of item selection underwent a second step by means of a search for correlated residuals (Hambleton and Rovinelli, 1986). To perform the latter, all items were recoded with their numerical weights obtained by means of CatPCA and submitted to regular factor analysis, without rotation with seven factors being extracted (the number was set arbitrarily). If high secondary loadings (cross-loadings) emerged (i.e., there were correlated errors among certain variables), the offending items were discarded one at a time and the analysis was repeated until no more offending items emerged (Lord and Novick, 1968). This kind of item analysis left us with 30 items. However, there was still room for further selection, because 30 items were deemed too many for a one-dimensional scale. Thus, we took into account the composition of the whole sample, composed of 34.8%, males and 65.2% females, 50.3% up to 22 years and 49.7% from 23 years to 87 years, 61.2% up to high school and 38.9% with a university degree. The sample was stratified – one variable at a time – according to gender, age and education. On each subsample, a regular exploratory factor analysis (performed on the CatPCA outcome) located those items with high residual loadings on factors beyond the first. Five further items were thus discarded.

The 25 questions of the final questionnaire are too long to report here (for the full version please see the **Supplementary Materials**, Suppl. 2). The weights are *z*-scores, which testify the position of each option along the continuum from low (negative scores) to high wisdom (positive scores).

The administration of the questionnaire is relatively simple: the questionnaire, composed of 25 questions with 7 options each (totalling 175 answers) is administered. Each chosen answer is then recoded with its quantification (presented in the **Supplementary Materials**).

Finally, because the scores – expressed as *z*-scores – did not have a fully Gaussian shape, they were normalised and slightly adjusted to follow a really normal distribution (subroutine RANK of SPSS).

## Results

The final 25 items all moderately loaded on the first factor (*min* 0.307, *max* 0.496, *mean* and *median* = 0.397; see the suppl4 in **Supplementary Materials** for the whole factor matrix), with an alpha coefficient of 0.827, with no strong bias related to age, gender and education. **Table 1** presents the final weights for two items as an example.

**Figure 1** displays the scree plot for the 25 items, which suggests that there is only one factor in the data, as expected with efficient and reliable one-dimensional scales. One large eigenvalue, extracted from a 25-item correlation matrix and negligible succeeding eigenvalues, testify that the effort to assign numerical coding to each of the options of the 25 items as a quantification was a legitimate procedure.

**Figures 2, 3** present the scores before and after the normalisation. The Bravais-Pearson correlation between the two measures was 0.955, whereas Kendall's *tau* and Spearman correlations were exactly 1.00.

**TABLE 1** | Two examples of multiple-choice items.

| Item | | frequency | weight |
|---|---|---|---|
| **# 9: At bedtime…** | I feel overwhelmed by anxiety | 194 | −0.802 |
| | I spend a lot of time online | 1,241 | −0.701 |
| | I wonder for how long I will be able to bear this situation | 400 | −0.694 |
| | I constantly think about the current situation | 177 | −0.004 |
| | I feel better thinking about my loved ones | 1,418 | 0.223 |
| | I prepare for tomorrow, setting myself some goals | 1888 | 0.369 |
| | I think that sooner or later this situation will end | 546 | 0.502 |
| # **25: This period will teach us all…** | That no one can save us | 34 | −1.755 |
| | That one cannot trust people | 47 | −1.477 |
| | Nothing, people do not change | 1,351 | −0.749 |
| | That the world is not a safe place | 71 | −0.450 |
| | To show more solidarity and be less selfish | 752 | 0.146 |
| | To be more conscientious and have more common sense | 1715 | 0.261 |
| | To recognise our limits and that we are not invincible | 1935 | 0.326 |

The average of the 25-item scores is computed and then divided by the standard deviation (*s.d.* = 0.40241). The result of this computation can be considered a z-score and interpreted as such. A high score signifies high levels of wisdom, while a low score suggests low levels of wisdom. In order to convert the z-scores into percentiles, the reader can refer to Suppl3 in the **Supplementary Materials**.

## Phase 3: Concurrent Validation

### Aim

This study aimed to determine the concurrent validity of the wisdom scale. To this end, the WADES scores were compared with established scales, measuring a number of variables which have previously been associated with the general construct of wisdom or that were hypothesised to be particularly relevant to the current pandemic: (1) general wisdom (2) the ability to regulate emotions and behaviours (3) empathy (4) a sense

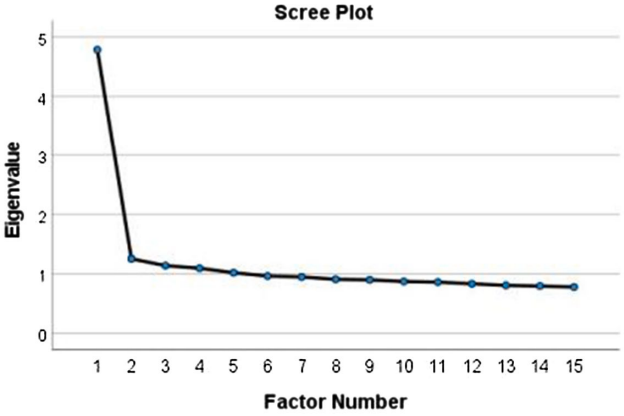


**FIGURE 1** | Scree test of the first 15 eigenvalues extracted from the matrix of the 25 optimally scaled items.

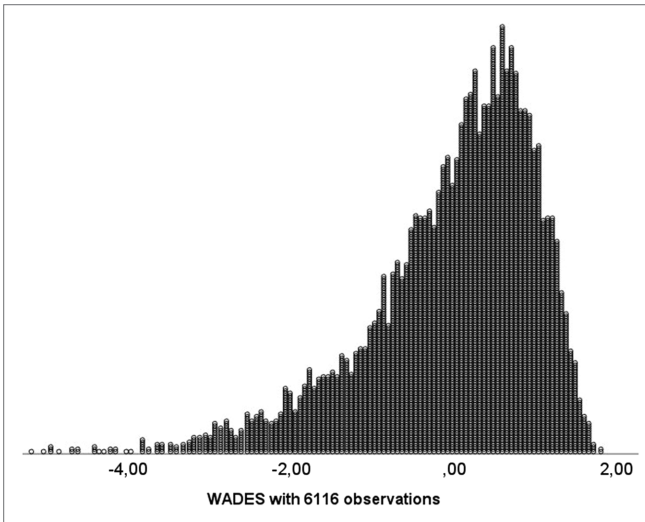


**FIGURE 2** | Distribution frequency of the optimally scaled scores (*N* = 6,116).

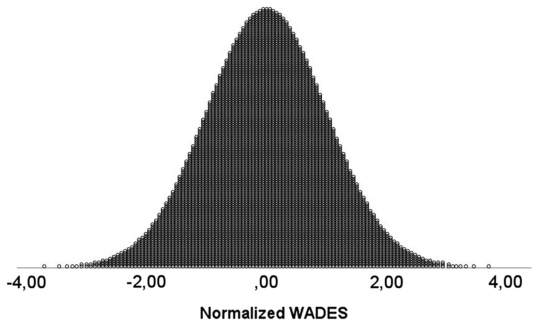


**FIGURE 3** | Smoothed scores.

of community and common good (5) conscientiousness and the ability to follow rules (6) a capacity of post-traumatic growth (7) satisfaction with life and (8) proneness to describe oneself with a questionnaire in a non-conflictual and limpid way (vs. mental reservation or reluctance). Finally, it was hypothesised that *respondability* (i.e., relevance, clarity and lack of reticence) would be lower for those respondents who are critical about lockdown or provide unwise answers: conflictual, contrasting harsh feelings or mixed feelings about lockdown and its rules were hypothesised to conflict with a clear sense of self, which entails cognitive-affective strategies to avoid feeling of uneasiness, both towards lockdown and the questionnaire that investigates reactions to the restrictions.

## Participants

Three different samples were recruited online ($N_3 = 1756$, $N_4 = 1{,}234$; $N_5 = 850$) with demographic characteristics comparable to the sample $N_2$ of Phase 2.

## Method

### *Measures*

The following questionnaires were administered:

*Brief Wisdom Screening Scale*. Glück et al. (2013) developed this scale empirically by selecting the items from three self-report measures, each aimed at measuring different facets of the wisdom construct. However, only the first 16 items were selected (which loaded highly on the first wisdom dimension). Its reliability was adequate (Cronbach's $\alpha = 0.78$, it was 0.84 in the original version of 20 items). An example of the items is: '*I am able to integrate the different aspects of my life*…'.

*Difficulties in Emotion Regulation Scale*. (Gratz and Roemer, 2004) The Italian version was administered to evaluate difficulties in emotion regulation. This scale consists of six clinically relevant aspects of a lack of emotion regulation: A lack of acceptance of emotional responses (Non-acceptance); a lack of emotional awareness (Awareness); a limited range of emotion regulation strategies (Strategies); difficulties in goal-directed behaviour when emotional (Goals); impulse control difficulties (Impulse); and a lack of emotional clarity (Clarity). The Italian scale has excellent reliability (Cronbach's $\alpha = 0.92$, Giromini et al., 2012) for the total DERS score. An item example is: '*When I'm upset, I acknowledge my emotions*'.

*The Interpersonal Reactivity Index*. The Italian version of the Interpersonal Reactivity Index (IRI; Davis, 1980; Albiero et al., 2006) assesses empathy as a multidimensional construct, in terms of social functioning, self-esteem, emotionality and sensitivity to others by means of 28 items divided into 4 subscales: Perspective Taking, as the ability to adopt the point of view of others; Empathic Concern, which measures concern and sympathy with others perceived to be unfortunate; Personal Distress assesses anxiety and uneasiness in difficult interpersonal situations. Internal consistency is good with alpha coefficients varying between 0.63 and 0.74. The Fantasy scale was deemed irrelevant to the pandemic situation and thus omitted. An item example is: '*I am usually pretty effective in dealing with emergencies*'.

*Concise Scale of Individualism–Collectivism*. By developing this scale, Chen et al. (2015) meant to explore the relationship between culture and health. Nine of the 18 items investigate the level of individualism and the other nine the level of collectivism. Owing to the length of the scale, we decided to trim it down to only four items (two related to individualism and two to collectivism). An example is '*A person must follow only his/her own ideas in relation to determining the best actions and behaviour*.'

*Conscientiousness*. We used eight items from the (Goldberg, 1999; International Personality Item Pool- IPIP, 2001; Goldberg et al., 2006). Five items refer to scrupulous and responsible behaviours: '*I make plans and stick to them*', The remaining three items refer to irresponsible actions: '*I waste my time*' and '*I escape my duties*'.

*Post-traumatic Growth Inventory*. The Italian version of the Post-traumatic Growth Inventory (PTGI; Tedeschi and Calhoun, 1996; Prati and Pietrantoni, 2014) is a 21-item scale that measures positive changes in individuals who experienced adverse events. The scores refer to five different dimensions: Relationships with others, New possibilities or purposes, Appreciation of life, Spiritual changes and Personal strength, rated on Likert scales ranging from 0 (no change) to 5 (high levels of change). The scale has an excellent internal consistency (Cronbach's $\alpha = 0.93$). In the present study, participants were asked to refer to the lockdown condition due to the COVID-19 pandemic as the adverse event. An item example is: '*I changed my priorities about what is important in life*'.

*Satisfaction With Life Scale*. The subjective perception of personal well-being comprises an emotional and a cognitive dimension (Diener, 1984). Satisfaction with one's life belongs to the cognitive sphere of personal well-being (Andrews and Withey, 1976). In this regard, Diener et al. (1985) proposed a five-item scale for the measurement of satisfaction for life in general, high scores reflect a strong appreciation of life and the impression that things are going well (Mead, 2020). On the contrary, extremely low scores suggest dissatisfaction with the present circumstances (Pavot and Diener, 2013). Cronbach's $\alpha$ of this scale is 0.83. An item example is: '*My life is close to the ideal one under several points of view*'.

*The Questionnaire to Measure Attitudes towards a Questionnaire*. (Flebus, 2007) It is a one-dimensional measurement ('Respondability') composed of three facets:

Reticence (in describing oneself), Clarity (of the meaning and the items) and Relevance (or curiosity and interest in the topic raised by the questionnaire). The current version has a good reliability (Cronbach's $\alpha = 0.78$) Example: '*I tried to respond as accurately as possible*'.

## Results

Convergent validation consisted of computing Bravais-Pearson correlation coefficients between the WADES score (computed as the sum of the 25 weights) and the various other scales administered in this study (**Table 2**).

With reference to the single scales as shown in **Table 2**, WADES proved positively correlated with the concise wisdom scale by Glück ($r = 0.22$, $p < 0.001$), suggesting a limited overlap with the construct of wisdom.

Negative correlations between the WADES and all the subscales of the Difficulties in Emotional Regulation Scale were found (ranging from −0.18 to −0.37). This suggests that individuals with high levels of wisdom had fewer difficulties in regulating emotions, achieving emotional clarity, controlling their impulses and engaging in goal-directed behaviours. The correlation with the total score was moderate ($r = -0.39$, $p < 0.001$).

The relation of the WADES with the IRI scales indicated that participants with high levels of personal distress had lower scores of wisdom, although the effect size was very small, accounting for less than 1 per cent of common variance. Empathic concern for others had the highest positive correlation with the WADES, while the ability to assume others' perspectives was also associated with wise attitudes to the pandemic, even though to a lesser extent.

The correlation between the WADES and Collectivism was significant but rather low ($r = 0.18$, $p < 0.001$), while the association with Conscientiousness was positive and moderate ($r = 0.33$, $p < 0.001$).

The association with Post-Traumatic Growth (PTG) corroborated the concept of situational wisdom during an emergency. All the PTG dimensions were positively correlated with WADES, with the highest correlation value in correspondence to Appreciation of life ($r = 0.32$, $p < 0.001$), followed by Changes in relations with others ($r = 0.30$, $p < 0.001$), Personal strength ($r = 0.23$, $p < 0.001$) and New possibilities ($r = 0.22$, $p < 0.001$), while Spiritual change only reached a value of 0.10 ($p < 0.0001$). The WADES correlation with the total score of the PTG was also moderate ($r = 0.30$, $p < 0.001$).

The correlation with Satisfaction with life ($r = 0.29$, $p < 0.001$) also confirmed the initial hypothesis. Finally, the low correlation with the Attitude towards Questionnaires Scale marginally supported the concurrent validation with modest values, equal to 0.14 ($p < 0.001$).

As far as socio-demographic variables are concerned, a significant effect size was found for gender ($\eta^2 = 0.025$, women were wiser), education level ($\eta^2 = 0.013$, situational acquired wisdom was higher in more educated individuals) and age ($R^2 = 0.096$, older people were wiser). Individuals who felt at risk of contagion (on a 1 to 7 scale) were wiser ($\eta^2 = 0.059$), religious individuals ($\eta^2 = 0.103$) and those who were impacted in their professional life ($\eta^2 = 0.013$) had more situational wisdom; the region of origin also had a small size effect ($\eta^2 = 0.021$).

## General Discussion

This study aimed to develop a new questionnaire in order to evaluate the situational or acquired wisdom arising during a collective emergency like the COVID-19 pandemic. We hypothesised that the construct is multifaceted and that it can be measured. We suggested that the easiest way to describe acquired wisdom is to report the sentences (and relative weights) that wise individuals chose to complete multiple-choice questions regarding the pandemic and lockdown.

In contrast with the maximum performance questions, in which exact responses are quantified with 1 and the inexact ones with zero, the novelty of the present scale is that responses were *unspecified, and therefore, there were no right or wrong responses. However,* an underlying continuum was hypothesised, with options ranging from low to high on a continuum of wisdom, rationality and appropriateness. The numerical weight (to be assigned to an option) was therefore not known *a priori*. Instead, the weight emerged from a comparison among the responses of all participants; individuals who were wise, rational and sensible chose wise, rational and sensible responses, and their scores helped to determine the weight for each option. The iterative process always reaches the same final result, independently from the initial hypothetical start (this is also called Guttman's Least squares method, 1950). One can wonder if the wisdom score is always appropriate and rationally founded. The statistical method prevents misattributions, as long as we assume that the majority of the items covers the specified

**TABLE 2** | Pearson correlation of scales with WADES.

| *Scale* | *r* |
|---|---|
| **Brief Wisdom Screening Scale** | 0.22*** |
| **DERS (Difficulties in Emotion Regulation Scale)** | |
| Limited access to emotion regulation strategies | –0.37*** |
| Lack of emotional clarity | –0.34*** |
| Impulse control difficulties | –0.31*** |
| Difficulty engaging in Goal-directed behaviour | –0.29*** |
| Lack of emotional awareness | –0.18*** |
| Non-acceptance of emotional responses | –0.17*** |
| Total score | –0.39*** |
| **IRI (Interpersonal Reactivity Index)** | |
| Personal distress | –0.08* |
| Empathic Concern | 0.40*** |
| Perspective Taking | 0.20*** |
| **CSIC (Concise Scale of Individualism–Collectivism)** | 0.18*** |
| **Conscientiousness** | 0.33*** |
| **PTGI (Post-traumatic Growth Inventory)** | |
| Relating to others | 0.30*** |
| Appreciation of life | 0.32*** |
| Personal strength | 0.23*** |
| New possibilities | 0.22*** |
| Spiritual change | 0.10** |
| Total score | 0.30*** |
| **SWLS (Satisfaction With Life Scale)** | 0.29*** |
| **QUAQ (attitude towards questionnaires scale)** | 0.14*** |

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

domain. At most, the risk is that a multiple-choice question has a low discriminant value (weights for all options are very similar). If that is the case, the item can be easily eliminated (see also Flebus, 1988 for a similar application). In fact, we discarded 17 items because the options did not discriminate among respondents, their weights were too similar and their contribution to the reliability of the questionnaire was too small.

It should also be noted that the number of participants who chose a certain option did not necessarily determine the numerical value of the weight: an extreme score was associated with a small group, but a small group does not inevitably entail having an extreme score.

Question 9 (see **Table 1**) exemplifies the results: for the question At bedtime, 194 individuals chose the option *I feel overwhelmed by anxiety*, whose weight was −0.802. For that option, this was also the mean of the 194 participants on the WADES score. A less extreme option was *I spend a lot of time online*, chosen by 1,241 individuals, with a weight of −0.701. The highest weight was 0.502, denoting the wisest answer (*I feel better thinking about my loved ones*) among the seven possible options (546 respondents).

The second item's stem refers to the current historical moment: #25. This period will teach us…34 participants chose the extreme, pessimistic answer… *That no one can save us*. This small number of despairing individuals had a very low mean weight (−1.755). The following group of responses was slightly more rational, with 47 individuals totalising a score of −1.477. The subsequent group was quite numerous, 1,351, with a score of −0.749. The last group, which had the wisest response, with a mean weight of 0.326, was also the most numerous, 1935. Note that we did not find very high positive weights, the extreme values were only negative. This is due to the fact that wisdom is also a common, widely shared point of view, for which a consensus can be found. In contrast, unwise attitudes and behaviours can be more diverse in nature, for example, individuals can be highly irrational, vulnerable or defiant.

Wise individuals chose wise responses, which in turn could be used to define wisdom, the following being some examples (abridged citations from the items): The situation is … *Difficult, but bearable* (0.38). For kids, being isolated with their parents, the lockdown … *Is an opportunity to know each other better* (0.64), or for kids, being isolated with their parents, the lockdown *is just great* (0.51). For their parents, it is … *An opportunity to share thoughts and rediscover values* (0.53). Beliefs … *Are helpful if they concern ethical principles and science* (0.39). Wise individuals would comment on others' losses saying … *We need to share the pain and memorie*s (0.38). The most often felt feelings are … *Concerns about the health of my loved ones* (0.47) or *A sense of solidarity and communion with others* (0.52). They will feel … *Hopeful, that this health crisis will be resolved* (0.40) and are reassured that … *My family and I are adopting all precautionary measures* (0.37). The most positive aspect of this period is … *Rediscovering values like the solidarity among people* (0.44). However, the wise feel sad when they think … *About the victims of the epidemic and their family and friends* (0.43) and find that The most distressing thought is … that *My loved ones or I can get ill* (0.38).

On the other hand, the most irrational, fearful or vulnerable respondents chose different options. I will be happy… *When people will admit it was all a joke* (−1.78) or when *I will be able to escape from this house or this city* (−1.20). They are convinced that … *People deliberately infect others* (−1.32), or *Do not care about people* (−2.48). What is most needed in this situation is… *Being able to vent and distract oneself* (−1.28). For kids, being isolated with their parents … *Is the most stressing thing at the moment* (−1.42) or *Can be sheer torture* (−1.52), whereas For parents, quarantine … *Is exhausting* (−1.49). This is the way they would make a comment To those who lost a loved one … *The lost of your loved one is just one among many others* (−1.82) or *You need to see a psychic* (−1.88).

One may wonder why the latter common sense-statement received such low weights. Although this is not an irrational statement, within the given options, it appealed to the least wise people, perhaps because it is a cliché. The general rule of the multiple-choice questions applies here: all items receive a certain weight not because they depict a wise (or unwise) response which is wise (or unwise) in itself, but because it was selected by wise (or unwise) individuals among the other available options.

Participants were most convinced that What was needed during lockdown was the belief that … *A solution would be found* (0.16) followed by *Empathy and emotional support* (0.20) and *Distractions* (−1.28). The best thing about having to stay home is … *Being able to avoid the people we dislike* (−1.30) or *Nothing* (−1.17). And further, The most positive aspect of this period is either … *Nothing positive* (−1.17), or *That they are not forced to see people* (−1.20) or *Being able to sleep* or *do absolutely nothing* (−1.43).

On the basis of our results, we propose that a wise, rational and sensible attitude towards quarantine and restrictions is a psychological dimension and that its measurement responds to the current requirements for test development. The high Cronbach alpha (0.83) suggests that the WADES is in fact a reliable measurement.

The final scale considers a number of different ways of conceiving the outcomes of pandemics and lockdowns: (1) emotional self-descriptions (#1 I'll be happy when… #10 The feelings I have had more often are…#11 When I think of the current situation, I feel… #14 The thought that I find most distressing during this period is… #16 I'm reassured by the fact that… #18 I'm very sad when I think…); (2) emotional reactions to the lockdown and to potential infections (item s09 At bedtime…#15 The best thing about having to stay home is…#19 During this crisis I ended up…); (3) behaviours (#22 The most useful thing I have done…); (4) attitudes (#13 During this period, what makes me feel better is…); (5) coping mechanisms (#20 In order to calm myself down, I…); (6) Social aspects (#02 I'm convinced that most people…#03 I'm afraid that people… #12 The most unacceptable behaviours I heard about were…); (7) Empathy or general concern for others (#04 Above all, during this period what's needed is…#08 To those who lost a loved one in this situation, I would like to say that…); (8)

The significance of close relationships (#05 For kids, being isolated with their parents…) #06 (For those who have children, being quarantined…#17 I would like the people I live with to…) as well as for neighbours (#23 When I think of my neighbours…); (9) aspects of conscientiousness and personal growth (#24 Apart from following the regulations established by authorities, it would be helpful if one could…#25 This period will teach us…#21 The most positive aspect of this period is…); and (10) Attitudes to religious beliefs: #07 At the moment I think beliefs… The full table of the 175 options should be kept at hand for a thorough comprehension of the scale.

As to the validity of the WADES, the significant correlations with the questionnaires confirm the original hypotheses. In other words, this type of wisdom entails the ability to (1) regulate emotions, consider the perspective of others, empathise with both other individuals and the wider community (2) respect temporary limitations imposed in order to diminish contagion and (3) limit personal wishes for the collective good.

Comparisons with existing measures of conscientiousness, emotion regulation, a sense of collectivism and post-traumatic growth indicated that high scores on these measures were in fact related to an ability to cope and adapt to the government-imposed limitations during the COVID-19 emergency. On the contrary, low scores on the WADES were associated with emotional dysregulation (5. When I think of the current situation, I feel … *Helpless and vulnerable*), irrationality (17. Apart from following the regulations established by authorities, it would be helpful if you could… *No longer listen to the news*), persecutory-like ideation (6. When I think of my neighbours… *I fear that they could be a source of infection*), self-accusations or paranoid attributions (18. I am convinced that most people… *Deliberately infect others*) or excess of power (21. The most unacceptable behaviour I have heard about was… *Extremely controlling behaviours on behalf of the police force*) or even *hopelessness* (3. The most positive aspect of this period is…*There is nothing positive about this nightmare*).

The multidimensional composition of the WADES construct appears to be in line with the complexity of past and current accounts of wisdom (Sternberg and Karami, 2021). In particular, concurrent validity represented a central aspect of our study and the results support the hypotheses on which the new scale was based. In fact, our WADES construct implies a spectrum of behavioural and personal responses to a previously unheard-of collective emergency. There is only a limited overlap with the concise scale by Glück which substantiates these aspects. Thus, our WADES scale is not an equivalent measure of the existing perspectives on wisdom, perhaps because of the unexpected effects of the COVID-19 pandemic. As already mentioned, our construct of acquired wisdom differs significantly from Glück's concept. The WADES intends to measure a temporary state of mind that is induced by an emergency situation. Our construct is more encompassing than the notion of wisdom since it includes the ability to react rationally and adaptively to an unforeseen threat to the individual and the community as a whole. Furthermore, the WADES considers disturbing thoughts and emotions and maladaptive behaviours as well as positive and constructive ones. This view is in line with Fowers et al. (2021) who, from the perspective of practical wisdom, underline that during the COVID-19 pandemic certain fears seem to be 'wiser' or more adaptive than others. For example, fears of death or infection may be considered to be wiser than the fear *that the quarantine will make us go insane* (Question 14, option 5) or *that the virus will destroy mankind* (Question 14, option 4) or *that in the future there will be less freedom* (Question 14, option 2). Thus, the WADES format allows for comparisons between *appropriate* and *inappropriate fears*.

Moreover, the WADES refers to dramatic and painful situations, alluded to or explicitly stated in the questionnaire for instance, *The infections are decreasing* (Question 21, option 7) or question 18: I am very sad when I think… *that the ill are dying alone in isolation.* No existing questionnaires referred to such extreme instances of life events when measuring wisdom.

Another difference is the multiple-choice format which allows comparisons between concepts that can be particularly difficult to evaluate, like fears or disturbing behaviours item 3 I am afraid that people… *are going to start breaking the law and will be dangerous* (weight − 0.47) vs. *will continue to get ill* (weight 0.15) or *have not understood how serious the situation is* (weight 0.22) and item 14 (The thought that I find most distressing during this period is…) or (Item 12: The most unacceptable behaviours I heard about were…).

On the other hand, the results relative to validity also suggest attitudes and personal perspectives that empower individuals when facing difficult circumstances. The positive correlations between WADES and the Satisfaction with Life Scale (SWLS) indicate that high levels of satisfaction with life and of self-acceptance enable individuals to cope with restrictions and to keep impulses at bay. Moreover, the positive relation between the WADES and the individualism–collectivism scale indicates that situational wisdom also implies being attentive to collective demands, even when these are in conflict with an individual's need of freedom from lockdown restraints. A similar positive relationship with the Conscientiousness scale further suggests that, as hypothesised, the ability to abide with anti-contagion prophylaxis, to respect imposed regulations and to plan one's life accordingly also play a part in situational wisdom. The same can be said about the IRI results and, in particular, in relation to empathy and taking others' perspectives. In fact, unexpected difficult times require the ability to understand how other individuals and the community are affected by the pandemic.

Pronounced self-regulation scores characterised those people who can keep their emotions and impulses at bay and are also capable of controlling their behavioural reactions. This result had also been hypothesised and is congruent with literature about wisdom and its constructive reactions to stress. The regulation of emotion is in fact widely taken into account in wisdom models (e.g., Kunzmann and Glück, 2019). The results confirmed our initial hypothesis, with high scores on the

WADES being associated with the ability to accept and be aware of emotions, the ability to implement emotion regulation strategies, control impulses and develop goals in emotional situations. The relation between the WADES and the Difficulties in Emotion Regulation Scale (DERS) of the present study is in line with those found when measuring the cognitive and affective components of the three-dimensional wisdom scale (García-Campayo et al., 2018).

The association with the Post-Traumatic Growth Questionnaire corroborated our concept of situational wisdom during a collective emergency, conceived as the ability to endure current difficulties, while developing new attitudes, values and behaviours, entailing changes in self-perception and in relationships. However, constructive reactions to the pandemic lockdown were less associated with spiritual changes. Those who had difficulties in adapting suffered the most, because they seemed to struggle with finding solutions to the imposed restrictions. Finally, the low correlation with Questionnaire to Measure Attitudes towards a Questionnaire marginally supported the concurrent validation: it can be expected that answering questions on difficult topics like the pandemic and its consequences may cause uneasiness, a defensive lack of coherence and an apparent lack of interest in the issue.

In the future, and considering that it is likely that pandemics will re-occur, the questionnaire may be helpful in identifying individuals who are particularly vulnerable, inclined to respond to these situations in a non-adaptive way, as for example, those respondents who fall in the inferior quartile (below a score of −0.67). Furthermore, an evaluation of the 175 situations summarised by the 25 items could be of interest to policy makers in order to improve interventions and increase social and individual well-being.

## CONCLUSION

A new construct (acquired or situational wisdom) was measured with a little-known scaling technique. This is a particular application of the optimal scoring method to a one-dimensional trait. Our analyses were largely exploratory because of the lack of previous data or studies on this unprecedented situation. We suggested the term 'self-calibrating scores', to emphasise the special situation in which nominal variables are scaled to measure an underlying trait, in which wise individuals are identified by wise answers, while unwise individuals are characterised by unwise responses. The sample size (a very large size for all studies), which supported the new procedure, was also a strong point. Another strength of this study was the high reliability found for the new instrument across several samples.

It should, however, be noted that the unexpected pandemic required a highly specific design of WADES, including some items which may be time and context-sensitive, such as 'I will be happy … *when a vaccine will be available*'.

A further limit of the study is that a high number of participants were mainly located in one particular region of Italy, namely, Lombardy. However, the latter region was also the one that experienced the worst initial impact of the epidemic in the western world. Another limitation was the age distribution with two modes, one corresponding to age 22 and a second to the age of their parents, around 55 years. Although we cannot speculate as to how this distribution may have affected the questionnaire structure, we believe that potential distortions were limited and irrelevant to the validity of the questionnaire.

## 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 in the **Supplementary Material**.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of the University of Milano-Bicocca. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

GF: project design and conception, data analysis, writing and critical revision of the manuscript. AT and FC: project design and conception, writing and critical revision of the manuscript. MM: data collection and writing. ED: data collection and writing. All authors contributed to the article and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

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# The Higher the Life Satisfaction, the Better the Psychological Capital? Life Satisfaction and Psychological Capital: A Moderated Mediation Model

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This study investigates the mediator role of attachment avoidance and the moderator role of rejection sensitivity on the links between life satisfaction and psychological capital (PsyCap). This study uses the Experiences in Close Relationship Scale, Rejection Sensitive Scale, Positive Psychological Capital Scale, and Life Satisfaction Scale among 999 Chinese young adults as subjects. The results presented that life satisfaction had a significant positive predictive effect on PsyCap. Mediation analysis of this study shows that attachment avoidance mediated the association between life satisfaction and PsyCap. Furthermore, moderated mediation analysis indicated that rejection sensitivity moderates the link between life satisfaction and attachment avoidance (first-stage moderation). Compared with individuals with low rejection sensitivity, individuals with high rejection sensitivity show more attachment avoidance under low life satisfaction. This study helps understand the relationship between life satisfaction and PsyCap from the perspective of rejection sensitivity theory and attachment theory and has implications for guiding college students toward strengthening PsyCap and weakening rejection sensitivity.

**Keywords: life satisfaction, psychological capital, rejection sensitive, avoidant attachment, moderated mediation model**

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## INTRODUCTION

The coronavirus disease 2019 (COVID-19) spread has led to new thinking about life and its meaning for everyone. In recent decades, there have been a growing number of studies in life satisfaction, and numerous studies have evaluated various correlations and predictors of life satisfaction. In general, life satisfaction is a cognitive evaluation of the overall quality of life based on an individual's criteria (Shin and Johnson, 1978). As an indicator of a person's quality of life and an important parameter to measure the quality of life of social people, life satisfaction is closely related to people's sense of existential value. More specifically, the degree to which people are satisfied with their lives is affected by many factors, such as lockdowns at home, national identity, psychological distance, self-esteem, and leisure nostalgia, among other factors (Diener and Diener, 2009; Cho, 2020; Hamermesh, 2020; Jaspal et al., 2020; Zheng et al., 2020). Meanwhile, life satisfaction is

related to a wide range of academic achievements and engagements (Suldo et al., 2006; Heffner and Antaramian, 2016). Also, an individual's life satisfaction plays a vital role and contributes highly to mental health problems (Lombardo et al., 2018).

Life satisfaction is a vital construct in positive psychology and a critical index of subjective well-being (Gilman and Huebner, 2003). A previous study has documented that psychological capital (PsyCap) is positively linked to higher levels of life satisfaction (Bockorny and Youssef-Morgan, 2019; Datu and Valdez, 2019). PsyCap is a kind of "individual positive psychological development state," which is malleable, developed, and promoted (Luthans et al., 2007a). PsyCap consists of four constituent elements, namely, self-efficacy (belief in self-confidence), optimism (an individual's permanent and pervasive attribution in explanatory style for good vs. adverse events), hope (a sense of effectiveness and also persistence in aim), and resiliency (the individual's ability to return to a positive or normal state after facing a significant setback or stressful situation) (Luthans et al., 2007b). From this perspective, individuals with a high level of life satisfaction would more likely to report more significant PsyCap and more excellent positive functioning. Thus, the following is the hypothesis.

> **Hypothesis 1:** Life satisfaction is positively related to PsyCap.

However, further study is needed to reveal the mediating and moderating mechanisms underlying the links to life satisfaction on PsyCap. Attachment theory offers a dynamic approach, which provides that individuals with different attachment styles have different levels of life satisfaction (Bowlby, 1980; Bartholomew, 1990). In brief, securely attached individuals think that they are self-worthy and find others trustworthy, and they are inclined to exhibit a higher level of life satisfaction. On the contrary, individuals with insecure attachment believe that they are unworthy and negative, try to avoid social situations (emotional distance from intimate relationships), and exhibit fear of rejection. They tend to report a lower level of life satisfaction and are more likely to show reactive aggression than securely people in the same situation.

Recently, attachment styles have been evaluated based mainly on two dimensions, namely, anxiety and avoidance (Brennan et al., 1998). Thus, this involves an essential dimension of attachment, namely, attachment avoidance. Individuals who experience attachment avoidance have to gain others' approval, maintain a significant social distance, have negative and unworthy self-model, and passively avoid close relationships (Blackwell et al., 2017; D'Arienzo et al., 2019).

As Fredrickson's (2004) broaden-and-build theory argues, positive emotions broaden an individual's awareness and cognition mode, flexibility, creativity, openness, and forward-looking. Over time, this expanded behavioral repertoire builds long-lasting personal resources, such as psychological resources (resilience, optimism), intellectual resources (problem-solving skills), physiological resources (physical coordination), and social resources (consolidating existing social connections, establishing new social relationships). In contrast, negative emotions, on the other hand, are narrowed an individual's way of thinking and personal resources. In this regard, an individual with attachment avoidance will reduce the construction of the individual's positive psychological resources and will negatively affect the individual's healthy mental process (Raissifar and Akhavan Anvari, 2020). Against this background, attachment avoidance may play a specific intermediary role between life satisfaction and PsyCap. Life satisfaction will have a negative and significant effect on PsyCap through attachment avoidance. Thus, the following is the hypothesis.

> **Hypothesis 2**: Attachment avoidance mediates between life satisfaction and PsyCap.

Individuals with attachment avoidance always have strong rejection sensitivity (Özen et al., 2011). Specifically, insecure participants have high rejection sensitivity groups. Rejection sensitivity is a disposition of the personality, mainly manifested as anxiously expecting, readily perceiving, and overreacting to rejection (Romero-Canyas et al., 2010). An individual with high rejection sensitivity, i.e., rejection sensitivity as a vulnerability factor, may balance this by reducing their investment in romantic social relationships to prevent anticipated rejection (Downey et al., 2000).

Rejection sensitivity is associated with the quality of life (Ng and Johnson, 2013). People have different perceptions and reactions to rejection. According to the cognitive-affective processing systems theory (CAPS; Mischel and Shoda, 1995), a person's behavior varies across situations and helps explain why different situations elicit a heightened reaction. In addition, individuals with poorer quality of life and social support are also correlated with rejection sensitivity. Thus, the hypothesis is as follows.

> **Hypothesis 3**: Rejection sensitivity moderates the relationships among life satisfaction, attachment avoidance, and PsyCap.

In summary, based on integrating attachment theory and CAPS theory, this study constructs a moderated mediation model from the perspective of positive psychology theory (refer to **Figure 1**). This study also investigates the relationship between life satisfaction, attachment avoidance, rejection sensitivity, and PsyCap. Specifically, this study aims to examine the mediating (i.e., attachment avoidance) and moderating (i.e., rejection sensitivity) mechanisms of life satisfaction in predicting the level of PsyCap. Meanwhile, it guides promoting college students to enhance PsyCap, weaken rejection sensitivity, correctly understand attachment avoidance, and improve life satisfaction.

# MATERIALS AND METHODS

## Participants

All data were collected *via* an online questionnaire. A simple random sample of 1,232 students was used for the assessment, and the respondents were college students in China. After

eliminating invalid questionnaires (questionnaires that indicate the answering time was less than 240 s and more than 1,800 s), a total of 999 valid questionnaire data were collected (334 Male; 665 Female; M ± SD = 19.45 ± 1.21).

## Measures

### The Satisfaction With Life Scale

The Satisfaction with Life Scale has five items rated on a 7-point Likert-type scale ranging from 1, disagree entirely, to 7, completely agree. Cognitive-judgmental aspects were used based on the subjects (Diener et al., 1985). The scale of this study has a high Cronbach's α value of 0.864.

### Experiences in Close Relationship Scale

The Chinese version of the Experiences in Close Relationship (ECR) Scale measures a total of 36 items (18 items for anxiety dimension and 18 items for avoidant dimension) to assess the attachment style (Li and Kato, 2006). Each item was rated on a 7-point Likert-type scale ranging from 1, disagree, to 7, agree entirely. Odd-numbered items were scored on the attachment avoidance dimension. The Cronbach's α value for this study was 0.939, and the Cronbach's α value for the attachment avoidance dimension was 0.893.

### Positive Psychological Capital Scale

The Positive Psychological Capital Scale consists of four dimensions, namely, self-efficacy, resilience, hope, and optimism, with 26 items (Zhang et al., 2010). Each topic was evaluated on a 7-point Likert-type scale ranging from 1, disagree, to 7, agree entirely. The higher the subjects' scores, the better their positive PsyCap status. The Cronbach's α value for this study was high at 0.950.

### Rejection Sensitivity Scale

The Rejection Sensitivity Scale consists mainly of 18 situations in which college students need help from others in their daily life (Downey and Feldman, 1996; Zhao et al., 2012). The subjects' response to each situation is composed of two dimensions: the degree of anxiety about rejection and the expected degree of acceptance. Each item in the degree of anxiety about rejection dimension was rated on a 6-point Likert-type scale ranging from 1, not worried at all, to 6, very worried. The higher the subjects' scores, the higher the anxiety and worry about rejection. Each item of the expected degree of acceptance dimension was rated on a 6-point Likert-type scale ranging from 1, completely impossible, to 6, very likely. The higher the subjects' scores, the higher the possibility that others will accept their request. The Cronbach's α value of this study was 0.938.

## Procedure

All data collected were recorded on a computer and processed using SPSS Statistics version 23.0 and AMOS version 22.0. Harman's factor analysis was used for common method bias, and Pearson's correlation was used to explore the correlation between the main variables. Meanwhile, we used the multiple regression method to examine the mediation and moderation effects and path analysis. To avoid possible skewness problems, the calculation of the structural equation model (SEM) adopts the bootstrapping method (Preacher et al., 2007).

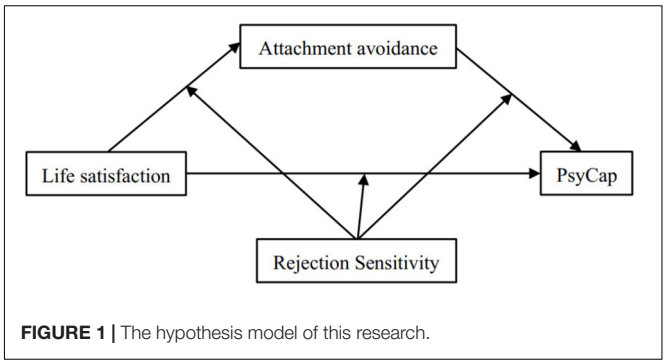


**FIGURE 1 |** The hypothesis model of this research.

## Statistical Analyses

First, descriptive and correlation statistics were conducted using IBM SPSS version 23.0. Second, the mediation effect was examined using Hayes's PROCESS macro (Model 4). Third, the full model was examined using Hayes's PROCESS macro (Model 59). The moderated mediation model was verified using the AMOS version 22.0 full model test. We used the bootstrapping method to determine whether the significance of the mediation effects is according to a moderator's value.

# RESULTS

## Common Method Bias

Two common method biases, including process control and Harman's single-factor test, are used. Using the questionnaire, we adhere to the principles of anonymity and confidentiality and the data results are only used for academic research. Harman's single-factor test found that 16 factors had eigenvalues greater than 1, and the first factor of the amount of variation explained was 16.313%, far less than 40% of the critical criterion. Thus, the common method bias in this study was not so strong to influence the relationship between variables.

## Descriptive and Correlation Statistics

**Table 1** indicates the leading research variables' means, SDs, and correlations. Correlation analyses demonstrated that life satisfaction was positively associated with PsyCap and

**TABLE 1 |** Means, standard deviations, and correlations.

| Variables | M ± SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 Attachment avoidance | 3.591 ± 0.668 | 1 | | | |
| 2 Rejection sensitivity | 4.291 ± 1.747 | 0.308** | 1 | | |
| 3 PsyCap | 4.690 ± 0.731 | −0.265** | −0.417** | 1 | |
| 4 Life satisfaction | 4.258 ± 1.091 | −0.188** | −0.339** | 0.437** | 1 |

***p < 0.01.*

**TABLE 2 |** The mediation model of attachment avoidance.

| Regression equation ($N$ = 999) | | Fitting index | | | Coefficient significance | |
|---|---|---|---|---|---|---|
| **Outcome variable** | **Predictor variable** | $R$ | $R^2$ | $F$ ($df$) | β | $t$ |
| PsyCap | | 0.437 | 0.191 | 235.012 (1) ** | | |
| | Life satisfaction | | | | 0.293 | 15.330** |
| Attachment avoidance | | 0.188 | 0.035 | 36.397 (1) ** | | |
| | Life satisfaction | | | | −0.115 | −6.033** |
| PsyCap | | 0.475 | 0.226 | 144.969 (2)** | | |
| | Attachment avoidance | | | | −0.207 | −6.681** |
| | Life satisfaction | | | | 0.269 | 14.130** |

*All variables in the model are standardized and brought into the regression equation, as follows. **$p < 0.01$.*

**TABLE 3 |** Analysis of Total effect, direct effect, and mediating effect.

| | Effect | Boot SE | Boot LLCI | Boot ULCI | Percentage of effect value |
|---|---|---|---|---|---|
| Total effect | 0.293 | 0.020 | 0.000 | 0.255 | |
| Direct effect | 0.269 | 0.019 | 0.000 | 0.231 | 91.8% |
| Mediating effect of attachment avoidance | 0.024 | 0.006 | 0.013 | 0.037 | 8.2% |

significantly negatively associated with attachment avoidance and rejection sensitivity. PsyCap was significantly negatively associated with both attachment avoidance and rejection sensitivity. Attachment avoidance has an incredibly positive relationship with rejection sensitivity.

## Results of the Mediating Effect of Attachment Avoidance

This study uses the SPSS PROCESS macro (Model 4) by Hayes (2012) to assess attachment avoidances' mediating effect in the links to life satisfaction on PsyCap. All data are processed and converted into $Z$-scores. The results (refer to **Tables 2**, **3**) indicate that life satisfaction has a significant predictor of PsyCap (β = 0.293, $t$ = 15.330, $p < 0.01$), with 95% CI of [0.255, 0.330]. In addition, the direct predictive effect of life satisfaction on PsyCap remains significant when mediating variables are included (β = 0.269, $t$ = 14.130, $p < 0.01$), with 95% CI of [0.231, 0.306].

Life satisfaction has a significant negative predictive effect on attachment avoidance (β = −0.115, $t$ = −6.033, $p < 0.01$), with 95% CI of [−0.152, −0.078]. Attachment avoidance also has a significant negative predictive effect on PsyCap (β = −0.207, $t$ = −6.681, $p < 0.01$), with 95% CI of [−0.268, −0.146]. Furthermore, the upper and lower 95% bootstrapping CI for the direct effect of life satisfaction on PsyCap and the mediating effect of attachment avoidance did not contain 0 (refer to **Table 3**). This study suggests that life satisfaction directly predicts PsyCap through the mediating effect of attachment avoidance. The direct effect was 0.269, and the mediating effect was 0.024. They accounted for 91.8 and 8.2% of the total effect (0.293), respectively.

## Results of the Moderation Mediating Model

Hayes's PROCESS macro (Model 59) assumes that the moderator affects all three paths of the mediated model, consistent with the theoretical model. The moderated mediation model of this study was examined using Model 59. The results (refer to **Table 4**) showed that rejection sensitivity has significantly moderating effect between life satisfaction and attachment avoidance (β = 0.049, $t$ = 2.793, $p < 0.01$), with 95% CI of [0.014, 0.083]. Rejection sensitivity has no significant moderating effect between attachment avoidance and PsyCap (β = 0.012, $t$ = 0.422, $p > 0.01$), with 95% CI of [−0.044, 0.068] and between life satisfaction and PsyCap (β = −0.006, $t$ = −0.348, $p > 0.01$), with 95% CI of [−0.041, 0.029]. This result suggests that rejection sensitivity can only play a moderating role in predicting attachment avoidance by life satisfaction.

To reveal more clearly how rejection sensitivity moderates the relationship between life satisfaction and attachment avoidant, rejection sensitivity was divided into high and low groups by M ± 1 SD using SPSS, and simple slope tests were performed. A further simple slope plot (Hayes and Matthes, 2009) indicated that the life satisfaction of individuals with low levels of rejection sensitivity is a stronger predictor of attachment avoidance than individuals with high rejection sensitivity (refer to **Figure 2**). Specifically, for individuals with low rejection sensitivity (M − 1 SD), life satisfaction had a significant negative predictive effect on attachment avoidance (simple slope = −0.061, $t$ = −3.140, $p < 0.001$). While for individuals with high rejection sensitivity (M + 1 SD), the negative predictive effect of life satisfaction on attachment avoidance tends to be diminished (simple slope = 0.049, $t$ = 2.793, $p < 0.001$) (refer to **Table 5**).

The omnibus test of the conditional indirect effect (IE) suggested that rejection sensitivity significantly moderated the IE of life satisfaction on attachment avoidant as the 95% CI of [0.137, 0.221]. The IE was significant at M − 1 SD with IE = −0.110, with 95% CI of [−0.163, −0.057], and the mean with IE = −0.061, with 95% CI of [−0.096, −0.023]. The IE was not significant at the M + 1 SD with IE = −0.012, with a 95% CI of [−0.062, 0.037].

**TABLE 4 |** The moderated mediation model analysis.

| Regression equation ($N$ = 999) | | Fitting index | | | Coefficient significance | |
|---|---|---|---|---|---|---|
| **Outcome variable** | **Predictor variable** | ***R*** | $R^2$ | ***F (df)*** | **B** | ***T*** |
| Attachment avoidance | | 0.331 | 0.110 | 40.914 (3)** | | |
| | Life satisfaction | | | | −0.061 | −3.134** |
| | Rejection sensitivity | | | | 0.179 | 0.214** |
| | Life satisfaction × Rejection sensitivity | | | | 0.049 | 2.793** |
| PsyCap | | 0.535 | 0.286 | 79.602 (5)** | | |
| | Attachment avoidance | | | | −0.127 | −3.950** |
| | Life satisfaction | | | | 0.216 | 11.189** |
| | Rejection sensitivity | | | | −0.198 | 0.022** |
| | Attachment avoidance × Rejection sensitivity | | | | 0.012 | 0.422 |
| | Life satisfaction × Rejection sensitivity | | | | −0.006 | −0.348 |

*$^{**}p < 0.01$.*

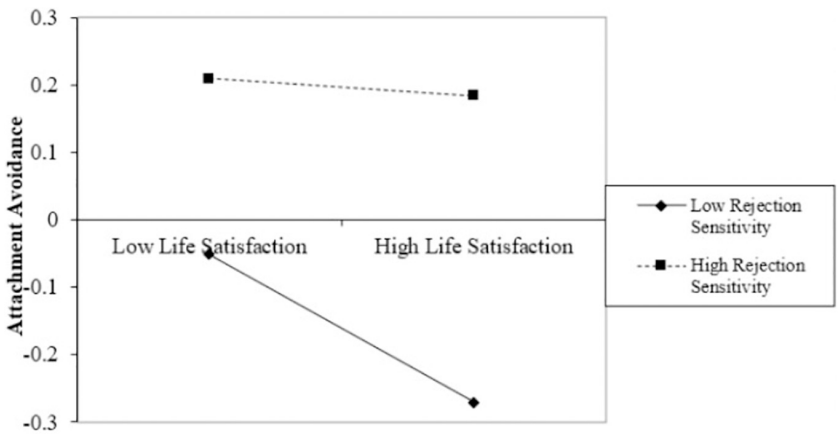


**FIGURE 2 |** The rejection sensitivity moderates life satisfaction and attachment avoidance.

**TABLE 5 |** Direct effects on different levels of rejection sensitivity.

| Rejection sensitivity | | Effect | Boot SE | Boot LLCI | Boot ULCI |
|---|---|---|---|---|---|
| Direct effect | −1 (M−1 SD) | −0.110 | 0.027 | 0.168 | 0.276 |
| | 0 (M) | −0.061 | 0.019 | 0.178 | 0.253 |
| | 1 (M+1 SD) | −0.012 | 0.025 | 0.161 | 0.259 |
| The mediating role of attachment avoidance | −1 (M−1 SD) | 0.015 | 0.007 | 0.004 | 0.031 |
| | 0 (M) | 0.008 | 0.004 | 0.002 | 0.016 |
| | 1 (M+1 SD) | 0.001 | 0.003 | −0.005 | 0.009 |

The above results found that attachment avoidance mediates between life satisfaction and PsyCap. Rejection sensitivity moderates the relationship between life satisfaction and attachment avoidance. This study indicates that PsyCap, attachment avoidance, rejection sensitivity, and life satisfaction may constitute a moderated mediation model. To verify the hypothetical model, AMOS version 22.0 was used to conduct the full model test. The bootstrapping method was used to calculate the SEM on a selected sample size of 5,000, which showed that the effect was significant when the 95% CI did not include 0.

The results (refer to **Figure 3**) reveal that the direct effect of life satisfaction on attachment avoidance was significant, with 95% CI of [−0.10, −0.02], $p < 0.01$. The IE of rejection sensitivity on the results (refer to **Figure 3**) reveal that the direct effect of life satisfaction on attachment avoidance was significant, with 95% CI of [−0.10, −0.02], $p < 0.01$. The IE of rejection sensitivity on PsyCap was significant, with 95% CI of [−0.25, −0.15], $p < 0.01$. The direct effect of rejection sensitivity on attachment avoidance was significant, with 95% CI of [0.13, 0.22], $p < 0.01$. Rejection sensitivity × life satisfaction had a significant direct effect on attachment avoidance with 95% CI of [0.01, 0.09], $p < 0.01$. The IE of life satisfaction on PsyCap was significant, with 95% I of [0.17, 0.26], $p < 0.01$. The direct effect of attachment avoidance on PsyCap was significant, with 95% CI of [0.22, 0.35], $p < 0.01$.

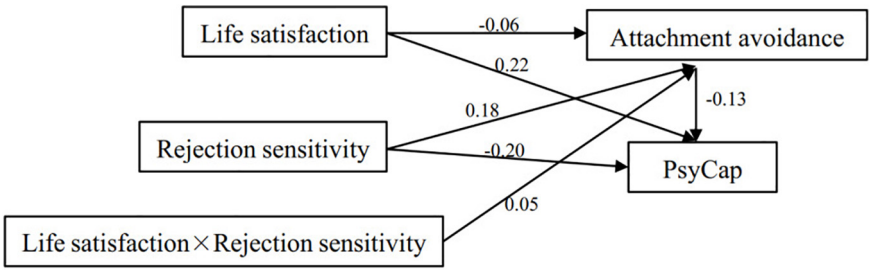


**FIGURE 3 |** The results of moderating mediating model.

The model fitting indices of the SEM were $\chi^2/df = 3.19$, goodness-of-fit index (GFI) = 0.997, comparative fit index (CFI) = 0.992, incremental fit index (IFI) = 0.992, adjusted goodness-of-fit index (AGFI) = 0.981, normed fit index (NFI) = 0.989, Tacker-lewis index (TLI) = 0.962, root mean square error of approximation (RMSEA) = 0.047, and root mean square residual (RMR) = 0.027. According to the good fitting criteria (Hou et al., 2004), the values were $\chi^2/df < 5$, RMSEA < 0.08, and NFI, CFI, and GFI > 0.90, indicating that the model is well-fitted.

## DISCUSSION

Based on previous research, attachment theory, and CAPS theory, this study constructs a moderated mediation model from the perspective of positive psychology theory. This model not only clarifies the question of "How life satisfaction affects" PsyCap but also responds to the question of under what conditions life satisfaction had a more significant impact on PsyCap. This study has specific theoretical significance for deepening the relationship between life satisfaction and individual PsyCap.

### Mediating Effects of Attachment Avoidance

Attachment influences an individual's PsyCap in a complex way, and attachment avoidance plays a critical role as an explanatory dimension of attachment style. This study explores the impact of life satisfaction, attachment avoidance, and rejection sensitivity on PsyCap. The investigation of mediating effect in this study reveals that life satisfaction could predict PsyCap through the mediating role of attachment avoidance, and the mediating effect accounted for 8.2% of the total effect. This result presents that part of the major impact of life satisfaction on PsyCap is a direct effect, and the other part is through the mediator of attachment avoidance, which is consistent with Hypotheses 1 and 2.

Notably, the direct effect of life satisfaction on PsyCap is positive, whereas the effect of attachment avoidance through the intermediary item on PsyCap is negative. This point shows that life satisfaction and PsyCap are not a simple linear relationship. In other words, the higher life satisfaction of an individual does not mean that their PsyCap is strong. Lower life satisfaction and more vital attachment avoidance traits lead to lower PsyCap construction. Therefore, the result of the mediator shows that the relation to attachment avoidance and PsyCap has two sides.

First, PsyCap also increases and constructs individuals with higher life satisfaction more quickly. PsyCap is an emerging core higher-order construct encompassing psychological resources such as optimism, self-efficacy, resilience, and hope. These psychological capacities are more substantially linked with life satisfaction (Bailey et al., 2007; Tagay et al., 2016; Martínez-Martí and Ruch, 2017).

Second, the negative mediating effect of attachment avoidance reduces the construction of PsyCap. The positive impact between life satisfaction and PsyCap is emphasized, but we cannot ignore the adverse effect between the two. Attachment avoidance is a crucial characteristic of an insecure attachment style. Drawing on attachment theory, contrary to those who have insecure attachments, those individuals with secure attachment tend to have more positive self-evaluation and others' evaluations and feel good about themselves, and trust others. Individuals with insecure attachments have lower levels of hope (Shorey et al., 2003).

Furthermore, this study also reveals a positive correlation between life satisfaction and PsyCap, which validates previous related studies (Liao et al., 2017; Choi et al., 2018; Bajwa et al., 2019). Individuals with higher life satisfaction adjust their attachment avoidance, weaken the rejection sensitivity, and enhance the construction of PsyCap in a spiral process. This view is also more consistent with the broaden-and-build theory.

### Moderating Effect of Rejection Sensitivity

This study examines the relationship of rejection sensitivity among life satisfaction, attachment avoidance, and PsyCap to verify Hypothesis 3. This study shows that rejection sensitivity moderates the relationship between life satisfaction and attachment avoidance. Rejection sensitivity does not moderate life satisfaction and PsyCap. In addition, rejection sensitivity also does not moderate attachment avoidance and PsyCap. Thus, Hypothesis 3 is partially proven.

To be more specific, this study shows that rejection sensitivity moderates the relationship between life satisfaction and attachment avoidance. Individuals with high rejection sensitivity using avoidant strategy tend to have high attachment avoidance (Feldman and Downey, 1994; Scharf et al., 2014). This viewpoint showed that it is a risk factor for undermining life satisfaction and reducing PsyCap. It seems that providing

interventions to improve attachment avoidance may be helpful for high rejection sensitivity individuals. Furthermore, rejection sensitivity was added to the defensive motivation system (DMS) (Downey et al., 2004). The DMS "helps" individuals with a high level of rejection sensitivity quickly detect rejection and react toward rejection or ambiguous clues in social situations. When faced with negative stimuli or frustration, the DMS is activated to protect oneself from possible danger. Therefore, this regulatory effect may be that individuals with high rejection sensitivity tend to have personality traits of high attachment avoidance not influenced by life satisfaction.

This study reveals that rejection sensitivity does not moderate life satisfaction and PsyCap. According to the CAPS theory, the differences exhibited by individuals in different situations reflect a stable and organic internal personality structure. The viewpoint suggests that there may be both temporary and persistent cases of rejection sensitivity.

In addition, this study has many limitations. Given the cross-sectional design of this study, issues concerning causal direction are left open and need to be explored further in a longitudinal or experimental study. The other limitation is that the empirical research paradigms that manipulate independent or mediating variables can be used to examine the effects of life satisfaction on individual PsyCap to explore the mechanisms involved deeply. Despite the limitations, this study reveals a moderated mediation model of the relationship between life satisfaction and PsyCap. It provides a deeper cognitive explanation of the internal mechanism between life satisfaction and PsyCap.

## CONCLUSION

This study makes the following conclusions:

(1) Life satisfaction has a significant positive predictive effect on PsyCap.
(2) Attachment avoidance mediates life satisfaction and PsyCap.
(3) Rejection sensitivity moderates the relationship between life satisfaction and attachment avoidance. Specifically, compared to individuals with high rejection sensitivity, this mediated pathway works more for low rejection sensitivity individuals.

## 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/s.

## 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 was obtained from all participants for their participation in this study.

## AUTHOR CONTRIBUTIONS

HS and ZI conceived the research. HS analyzed the data, tables, and figures, and drafted the initial manuscript. ZI and LF provided critical edits. All authors discussed the results and contributed to the final manuscript.

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