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Emotion regulation and mental health in older adults

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Gary Christopher and David Facal

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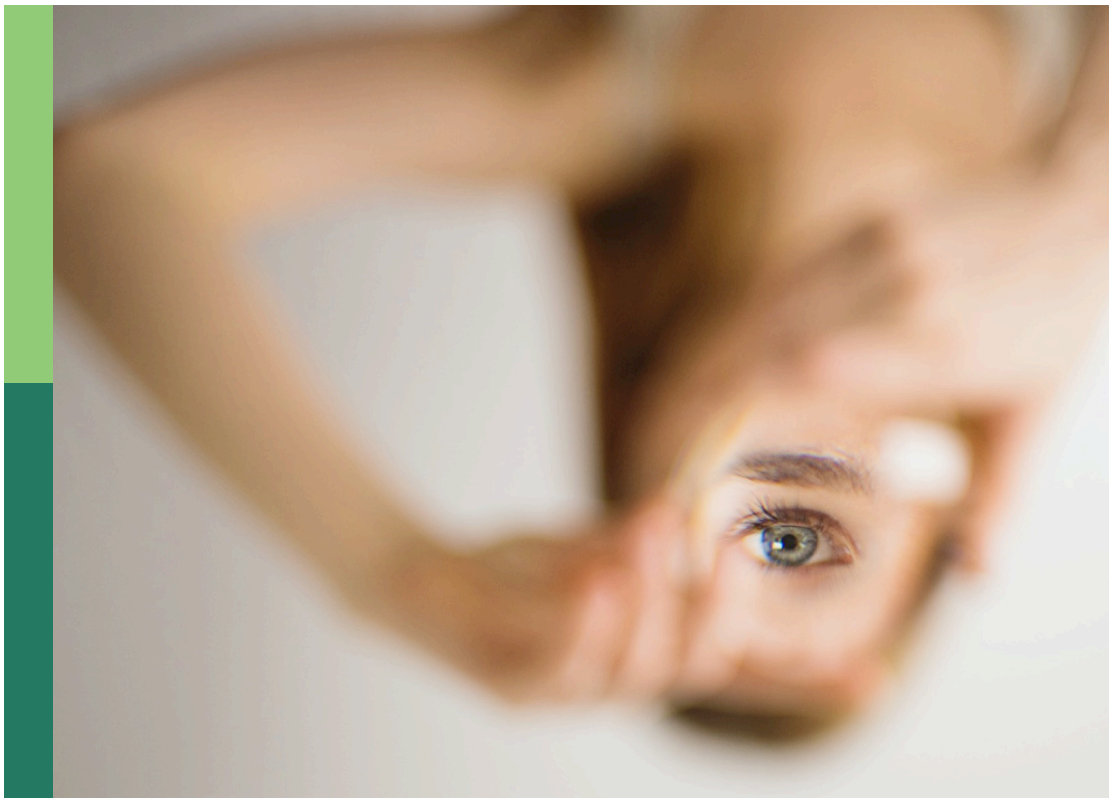

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Emotion regulation and mental health in older adults

Topic editors

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Editorial: Emotion regulation and mental health in older adults

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Editorial on the Research Topic
Emotion regulation and mental health in older adults

Emotion regulation describes a process enabling us to respond appropriately to the vicissitudes of life. Without the ability to control and harness emotions effectively, we are at the mercy of trials and tribulations of our daily lives. Because of this, poor emotion regulation is linked to several health and mental health conditions. This interplay between physical and mental health is crucial when considering the quality of life of older adults. Of interest, given that aging is generally associated with decline and loss—an inaccurate and misleading stereotype that feeds ageist assumptions—older adults tend to be more adept at regulating their emotions. This can be seen as a way to compensate for changes (Urry and Gross, 2010). This manifests in several ways, including a smaller yet more intimate social circle (Carstensen et al., 2003) and active mood repair through a bias toward positive information (Isaacowitz et al., 2008).

With a growing expectation to lead a long and healthy life, emotional resilience is of paramount importance. The papers in this issue offer a snapshot of how research into emotion regulation in later life encompasses all aspects of our lives. Pfluger et al. from Switzerland demonstrate that emotion regulation strategies mediate between exposure to complex trauma early in life and the development of internalizing mental health disorders across the lifespan, such that less adaptive strategies—in this case, emotion suppression—are associated with depression and anxiety later in life.

Sleep quality significantly influences how effectively we function in our daily lives and, in particular, how poor sleep quality negatively impacts wellbeing. We know depression and anxiety are intimately linked to perceived quality of life. We also know that sleep quality significantly impacts physical and mental health. The study by Kennair et al. shed light on the complex interrelationship between these factors using a sample of older adults from Norway. Sleep is again the focus of the paper by Zhang et al. from China. They explored the link between sleep quality and subjective wellbeing in older adults, showing a significant effect mediated by negative emotions and indirectly moderated by perceived social support.

Our perceived place in society and our roles remain significant in later life. A combination of loneliness and an absence of mutually caring relationships, a situation referred to as thwarted belongingness, is explored by Yu in the context of successful aging among older adults in China. Meaning in life acts to buffer the negative relationship *via* positive mental health. The security and solidity of relationships become increasingly significant as we age. Kieslich and Steins explore how German older adult couples who have been together for many years manage stress. They identify the need to foster emotional attachment between partners to mitigate conflict when it arises. Internet use is constantly

rising in this age group. This activity is often seen in a negative light, especially when it comes to mental health. The paper by Li and Yang adds to the complexity by exploring the role social capital plays in all this within the Chinese population.

Changes in our health require us to reconsider our self-image. Issues with continence in later life is often physically and mentally challenging, impacting negatively on quality of life in many instances. In a study from Iran, Javanmardifard et al. explore how the taboo associated with this condition can be confronted, and so encourage people to get support.

In the case of people living with dementia, such knowledge that this diagnosis brings requires much reassessment. Over time, activities which, throughout their lives, promised pleasure require increasing effort. Many things influence a person's engagement in leisure activities. A decline in physical and mental capabilities is a significant determiner for people living with dementia. Park and Kim, in a study from South Korea, identify gender as a significant predictor of the type of activity preferred. They discuss their findings in relation to activity programmes in care home settings.

Cultural differences in self-regulatory behavior mean that it is essential for measures to be appropriately validated to ensure they retain the essence of the original yet are sensitive to different beliefs and expectations. It is also crucial that such tools are relevant to specific age groups. Motamed-Jahromi et al. adapt a measure of self-regulation for Persian-speaking older adults.

Although change is inevitable, we must reconsider our assumptions about aging. The concept of healthy or successful aging is often unhelpful as such terms assume some arbitrary benchmark which, if not reached, implies failure. Instead, we need to acknowledge that later life can be associated with much that is positive, rewarding, and fulfilling. It is not about avoiding change, rather, we should embrace it and muster our psychological resources to meet the challenge head-on and build resilience. Nostalgia offers one way to boost vital psychological resources. It can help people maintain psychological wellbeing in the face of threat and offers an effective regulatory mechanism. Fleury et al. present a mini review of the literature on how feeling safe is essential to our understanding of aging, and the potential role nostalgia can play in facilitating this.

This issue brings together a range of research from different countries, offering valuable insights into the role of emotion regulation from different cultural viewpoints. This is vital as we need to understand aging from the unique perspectives of the societies in which people live. Views on aging differ. How people express emotion differs. The types and relevance of support differ. We need to move away from universal to more dynamic and adaptive assumptions about aging.

Author contributions

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

Conflict of interest

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

Publisher's note

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ORIGINAL RESEARCH
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Internet Use and Depressive Symptoms Among Chinese Older Adults: The Mediation and Suppression Effects of Social Capital

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Exploring the social factors of mental health among older adults has become a hot topic. This study aimed to examine the relationships between internet use, social capital and depressive symptoms in older adults. Our data were derived from a sample of 6,840 respondents aged 60 and over in the 2018 wave of the China Family Panel Studies. The ordinary least square (OLS) regression results showed that both Internet use characteristics (including access, emotional activities, and online time) and social capital components (including contact with adult children and trust) were protective factors for the prevention of depressive symptoms among older adults. The generalized structural equation modeling (GSEM) results displayed that Internet use not only had a negatively direct effect on depressive symptoms, but also generated a negatively indirect effect on depressive symptoms by structural social capital (i.e., contact with adult children), suggesting that structural social capital mediated the above link. Conversely, the indirect effects of internet use on depressive symptoms via cognitive social capital (i.e., interpersonal trust and institutional trust) were significantly positive, indicating that the relationship between Internet use and depressive symptoms was suppressed by cognitive social capital. These findings address the gaps in previous research on older adults' mental health and have practical implications for policy makers.

Keywords: Internet use, social capital, depressive symptoms, mediating effect, suppressing effect

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INTRODUCTION

Under the context of global population aging, mental health problems among older adults have aroused broad concern. Aging is closely associated with sensory loss, cognitive declines, and functional impairments, leading to the prevalence of late-life depression (Levy-Cushman et al., 1999). Almost 11% of older adults have depression or clinically relevant depressive symptoms (Lim et al., 2018). Geriatric depression and other health problems triggered by it, including self-harm, dementia, and suicide, not only seriously damage older adults' quality of life, but also place a heavy burden on families and countries (Luijendijk et al., 2008). Especially for older adults who live in the middle and low-income countries, their mental health could be worse due to lack of mental health resources and awareness toward the disease (Wang R. et al., 2019). For instance, studies in China found that over 90% of the older adults with noticeable depressive symptoms had never

received professional treatment, and they were also reluctant to seek medical help because of a sense of "losing face" when having mental health problems (Liu et al., 2017). Therefore, it is crucial for researchers to explore a new approach that is low in cost and more socially acceptable than the traditional medication treatment to prevent depressive symptoms.

Internet Use and Older Adults' Depressive Symptoms

As the proportion of older adults in netizens continues to rise, research into the significance of this digital technology for older adults is in the ascendant. Based on the activity theory, Internet use can mitigate the adverse effects of the lack of social activities and interactions on mental health (Lemon et al., 1972). More specifically, older adults would achieve remote communication, take part in various virtual communities, maintain their social roles in the Internet, thus enhance their sense of social connectedness and improve cognitive function, ultimately, alleviate their depression (Blit-Cohen and Litwin, 2004).

The positive role of the Internet in the mental health of older adults has been empirically tested (Cotten et al., 2014; Hofer et al., 2019). However, the precise mechanism of this relationship is not yet fully illustrated. In other words, the majority of the research mentioned above focused on the direct correlation between the two, while ignoring the mechanisms through which Internet use produced an effect on depressive symptoms.

Social Capital and Older Adults' Depressive Symptoms

Social capital has been identified as another protective factor for mental health. There are different definitions of social capital, but it mainly refers to social networks and resources within groups or local communities, including social contact, social participation, trust, and reciprocity (Coleman, 1994; Putnam, 2012). As a multifaceted concept, social capital involves diverse directions, levels, and aspects. From the direction of social capital, it covers bonding (i.e., inner groups), bridging (i.e., between groups), and linking social capital (i.e., across social status) (Woolcock, 2001). From the level of analysis, social capital includes individual resource (i.e., personal social networks) and community resource (i.e., social cohesion, norms, as well as trust within local communities) (Bourdieu, 1986). From the attribute of social capital, it consists of structural components (i.e., social network and social participation) and cognitive components (i.e., trust) (Harpham et al., 2002). The classification standard of social capital is chiefly based on the research topic. In health-related studies, social capital is usually measured by its cognitive and structural dimensions.

Older adults surrounded by various stressful events might gain additional helps through social capital, thus buffering the negative effects of stressors like retirement or physical diseases. Specifically, trust helps older adults to shape an optimistic attitude to future, diminishing their considerable anxiety about the uncertainties of life (Economou et al., 2014). Attending organizations and social activities obviously enhance self-identification and a sense of belonging, which slow down the pace of disengagement from society for older adults (Forsman et al., 2013; Inoue et al., 2019). Informal social networks like interacting with friends or adult children could provide necessary emotional support and instrumental support when older adults need (Broese Van Groenou et al., 2013; Wang et al., 2020).

Social Capital: The Mediating and Suppressing Role in the Link Between Internet Use and Mental Health

Very recently, a few of studies have discussed how Internet use affects depression by social capital. For instance, exploiting longitudinal mediation approach, Szabo found that using Internet could yield a positive effect on wellbeing among older adults in New Zealand by facilitating social activities (Szabo et al., 2019). One similar pathway has been verified in research targeting American older adults, which revealed that Internet use encourages frequency of interaction with acquaintances, ultimately promotes mental health (Yu et al., 2020). Conversely, other research pointed out that extending social capital through Internet might generate a distinct decline in subjective wellbeing of older adults, partly because the weak ties established from online social activities can not replace the important role of strong ties in maintaining mental health and are more likely to isolate older adults from reality (Sum et al., 2008a).

In addition, another challenge is highlighted because the impact of cognitive social capital has not yet been discussed in prior studies that only focused on the pathway of structural components. Actually, cognitive social capital has been considered as a more essential factor than structure social capital in promoting mental health in some literature. For example, after a detailed analysis of urban older adults, Lu revealed that cognitive social capital obviously increases self-rated health of respondents, but structural aspects do not (Lu and Zhang, 2019). Forsman and his colleagues discovered that both trust and social contact are beneficial to the improvements of depressive symptoms, however, former produces a greater effect (Forsman et al., 2012).

More importantly, the indirect effect of cognitive social capital might differ from that of structural social capital in the relationship. From the perspective of structural social capital, the Internet not only increases opportunities to interact with relatives (Hogeboom et al., 2010; Ruppel et al., 2016), but also promotes social participation such as attendance at clubs, volunteer work, and religious services (Kim et al., 2017), ultimately enhances older adults' mental health. Therefore, structural social capital might play a mediating role between Internet use and depressive symptoms.

As far as cognitive social capital is concerned, using Internet implies that individuals are easily exposed to misleading news, fraud, as well as various social scandals due to lack of effective information filtering (Sabatini and Sarracino, 2019). This prolonged exposure to online risks gradually shakes the confidence of participants in others and the authority (Guess et al., 2018), thus impairing their subjective well-beings. The adverse impact might be particularly common in older adults,

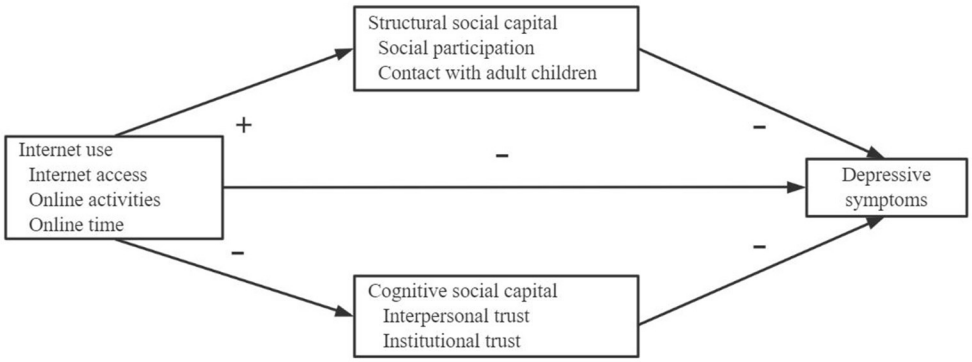

FIGURE 1 | The theoretical model.

because their cognitive abilities decline with the rising ages. Therefore, cognitive social capital may suppress the positive association between Internet use and mental health.

To address the above-mentioned gaps in previous literature, this study aims to further investigate the social mechanism between the Internet and depression among older adults. Taking into account the multiple dimensions of the Internet and social capital, this paper mainly discusses how various aspects of Internet use (i.e., Internet access, online activities, and online time) affect depressive symptoms through structural social capital (i.e., social participation and contact with adult children) and cognitive social capital (i.e., interpersonal trust and institutional trust). According to the literature review, a theoretical model is constructed (**Figure 1**) and the following hypotheses are put forward:

H1. Internet access, online activities, and online time are associated with reduced depressive symptoms in older adults.
H2. As social participation, contact with adult children, interpersonal trust, and institutional trust increase, the depressive symptoms in older adults decrease significantly.
H3. Internet use characteristics boost social participation and contact with adult children, thereby alleviating depressive symptoms; however, they impair interpersonal trust and institutional trust, which in turn exacerbate depression.

MATERIALS AND METHODS

Research Data

This study used the Wave 5(2018) survey of the China Family Panel Studies (CFPS), which was initiated by Peking University. The baseline survey of CFPS was implemented in 2010 and the respondents were tracked every 2 years. Because of its comprehensive questionnaire, this survey vividly portrays the changes in Chinese lifestyle, ideology and social structure from 2010 to 2018 (Xie and Hu, 2014). Considering that the Internet gradually became popular among older adults in China in 2018, this study focused on the data in the Wave 5 of CFPS consisting of 32,669 respondents. After excluding observations with missing data and the data of respondents aged 59 and younger, the final sample in this study was restricted to 6,840 observations.

Variables and Measurements

Depressive Symptoms

A cumulative indicator was designed to measure the degree of depressive symptoms. By a widely used scale (Briggs et al., 2018), the respondents reported the rate of depressed feelings such as insomnia, loneliness in the past week. Then we merged these responses into a new indicator, namely depressive symptoms (Cronbach's $\alpha = 0.83$). The value of this variable ranged from 0 to 24. And the larger the value was, the more serious the depressive symptoms were.

Internet Use

Internet use was indicated by Internet access, online activities and online time. Internet access was based on two direct questions asked to respondents. The first one was "Do you get on the Internet by a computer?" and the other was "Do you use mobile devices, e.g., a mobile phone, to access the Internet?" Both of the responses were dichotomous (1 = Yes and 0 = No). As long as the participants had access to the Internet, this paper assigned a value of 1 to Internet access, with 0 in other cases.

Online Activities

Online activities were categorized into emotional activities and instrumental activities. The former was measured by the average frequency of Internet use for social and entertainment purposes, and the latter was assessed by the average frequency of Internet use for work and study purposes. Responses were from 1(never) to 7(almost everyday).

Online Time

Respondents were asked how long they spend online each week (0 = 0∼7 h, 1 = 7∼14 h, 2 = 14∼21 h, 3 = more than 21 h).

Structural Social Capital

Social participation was measured with a binary variable. The older adults were asked whether they attended Labor union, religious groups or Association of workers (0 = None, 1 = at least one type); Contact with adult children was indicated by the frequency of communicating with adult children in the last 6 months. Responses were from 1 (never) to 7 (almost everyday).

TABLE 1 | Descriptive statistics ($N = 6,840$).

Variable	Mean/%	Std. Dev.	Min.	Max.
Depressive symptoms	5.72	4.46	0	24
Internet use				
Internet access	13.1%	–	–	
Emotional activities	1.49	1.47	1	7
Instrumental activities	1.13	0.64	1	7
Online time	0.16	0.58	0	3
Structural social capital				
Social participation	15.89%	–	–	–
Contact with adult children	3.20	2.10	0	6
Cognitive social capital				
Interpersonal trust	4.48	1.69	0	10
Institutional trust	6.34	2.26	0	10
Age	67.96	6.17	60	95
Gender	51.33%	–	–	–
Marriage	85.72%	–	–	–
Hukou	30.51%	–	–	–
Education				
Illiteracy	44.74%	–	–	–
Primary school	24.69%	–	–	–
Junior high school	18.93%	–	–	–
Senior high school and above	11.64%	–	–	–
Living conditions	93.39%	–	–	–
Relative income level	3.04	1.19	1	5
Living arrangements	35.38%	–	–	–

Cognitive Social Capital

Interpersonal trust could be assessed by an average score of 2 responses, which asked respondents to rate the degree of trust in neighbors and in strangers. Institutional trust was assessed by an average score of trusting in local government and doctors. Responses were from 0 (distrustful) to 10 (very trustworthy).

Control Variables

Certain personal traits and socioeconomic variables were employed in the empirical analysis. Age was measured in years; Marital status was divided into two categories (0 = Unmarried and 1 = Married); Education attainment referred to the highest education level of the respondents. It was divided into four groups: illiterate, primary school, junior high school, and senior high school and above, ranging from 0 to 3. Gender was coded into a binary variable (1 = Male and 0 = Female). Hukou, namely Chinese household registration system, was measured by a dichotomous variable (1 = Urban residents and 0 = Rural residents). Living conditions referred to whether the respondents lived alone (0 = Living alone and 1 = Living with others). Relative income level was assessed by self-rated income level of respondents, where "1" represented the lowest income and "5" represented the highest income. Living arrangements referred to whether the older adults lived with their children (0 = No and 1 = Yes).

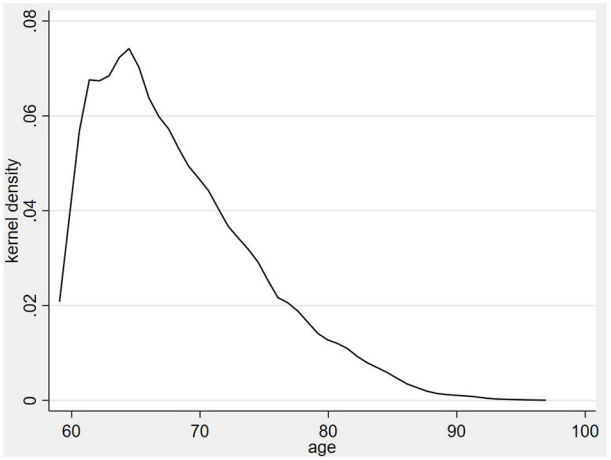

FIGURE 2 | Age distribution of the respondents.

Analytical Strategy

Given that the dependent variable was a continuous variable, we employed stepwise ordinary least square (OLS) regressions-using *reg* commend in Stata-to test the hypothesis 1 and hypothesis 2. In the first step, age, marital status, education attainment, gender, living conditions and relative income level were entered as control variables. Then, indicators of Internet use and social capital were added into the models in turn. The variance inflation factors (VIFs) values of the variables included in this study were all <1.57, which avoided the problem of multicollinearity.

In order to test the pathways between Internet use and depressive symptoms, generalized structural equation modeling (GSEM)-"gsem" commend in Stata-was used to confirm the hypothesis 3. In GSEM, responses can be continuous or binary, ordinal, count, or multinomial, which better adapted to our study data. Only AIC and BIC values of the models were presented due to no other goodness of fix indexes for GSEM.

RESULTS

Table 1 reports the basic information of the respondents. Depressive symptoms averaged 5.72. Nearly 13.1% of the respondents had access to the Internet. Older adults commonly used the Internet for emotional purposes rather than instrumental purposes. Concerning structural social capital, 16% of the older adults attended at least one social organization, and the average frequency of interaction with adult children was 3.20. With regard to cognitive social capital, the average of interpersonal trust was 4.48, which was slightly lower than that of institutional trust (6.34). The older adults in general were undereducated. Specifically, almost 89% of them had junior high school or below. <40% of older adults lived with their children. **Figure 2** shows the age distribution of the sample, which was basically in line with the age structure of Chinese older adults in 2018.

Table 2 shows the results from the OLS regressions for depressive symptoms. As indicated in Model (1), male, married

TABLE 2 | Depressive symptoms regressed on Internet use and social capital.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Gender	−1.05***	−1.05***	−1.08***	−1.09***	−1.09***	−1.08***	−1.09***
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Marriage	−1.12***	−1.11***	−1.09***	−1.07***	−1.08***	−1.07***	−1.08***
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Hukou	−1.20***	−1.14***	−1.11***	−1.18***	−1.16***	−1.22***	−1.19***
	(0.12)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Education							
Primary school	−0.85***	−0.84***	−0.77***	−0.77***	−0.77***	−0.79***	−0.78***
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Junior high school	−0.95***	−0.91***	−0.83***	−0.86***	−0.85***	−0.89***	−0.87***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Senior high school	−1.45***	−1.34***	−1.26***	−1.24***	−1.22***	−1.31***	−1.26***
	(0.19)	(0.20)	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)
Living conditions	−0.93***	−0.93***	−0.93***	−0.96***	−0.95***	−0.95***	−0.95***
	(0.25)	(0.25)	(0.25)	(0.24)	(0.24)	(0.24)	(0.24)
Relative income level	−0.44***	−0.44***	−0.44***	−0.36***	−0.36***	−0.35***	−0.35***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Living arrangements	−0.22*	−0.23*	−0.24*	−0.23*	−0.23*	−0.23*	−0.23*
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Internet use							
Internet access		−0.47**	−0.36*	−0.41*			
		(0.17)	(0.17)	(0.17)			
Emotional activities					−0.11**		
					(0.04)		
Instrumental activities						−0.10	
						(0.08)	
Online time							−0.20*
							(0.10)
Structural social capital							
Social participation			0.20	0.20	0.20	0.20	0.20
			(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Contact with adult children			−0.15***	−0.14***	−0.14***	−0.15***	−0.14***
			(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Cognitive social capital							
Interpersonal trust				−0.15***	−0.15***	−0.15***	−0.15***
				(0.03)	(0.03)	(0.03)	(0.03)
Institutional trust				−0.16***	−0.16***	−0.16***	−0.16***
				(0.02)	(0.02)	(0.02)	(0.02)
Intercept	10.59***	10.75***	11.82***	12.80***	12.95***	12.77***	12.74***
	(0.70)	(0.71)	(0.72)	(0.73)	(0.73)	(0.73)	(0.73)
N	6,840	6,840	6,840	6,840	6,840	6,840	6,840
adj. R^2	0.0959	0.0964	0.1011	0.1132	0.1136	0.1127	0.1130

*Standard errors in parentheses, *p < 0.05, **p < 0.01, ***p < 0.001.*

and urban residents showed lower levels of depression, and so did people with higher education attainment. Living with others was negatively associated with depressive symptoms. Relative income level contributed to maintaining mental health, whereby a 1-unit increase in income level resulted in a ∼0.4-unit drop in depressive symptoms.

The indicators of Internet use were sequentially entered into Model (2) to Model (7). Apparently the older adults who used Internet tended to have less depressive symptoms than those who did not access the website. Furthermore, online emotional activities and the intensity of Internet use were both negatively correlated with depressive symptoms. However, instrumental

purposes, such as online study and work, were not associated with mental health. Our first hypothesis (H1) is partially supported.

The indicators of social capital were added into Model (3) to Model (7). Then we found that social participation did not work on mental health in older adults, which seems beyond our inference. Yet, contact with adult children significantly reduced depressive symptoms. Model (4) presents the positive effects of cognitive social

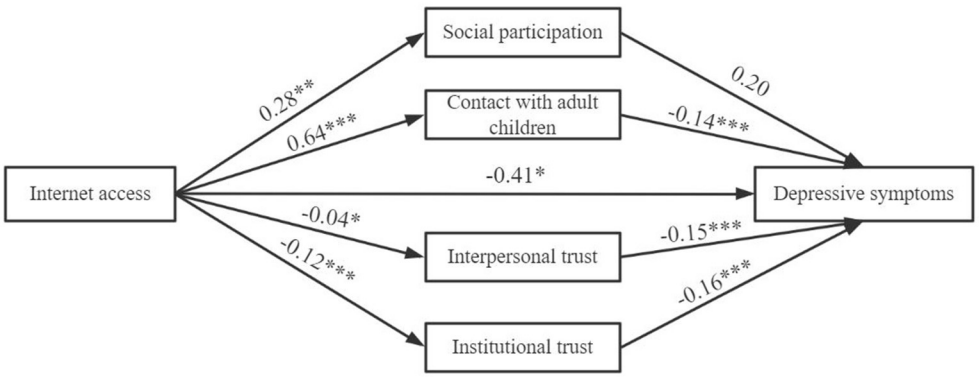

FIGURE 3 | The structural model of the effect of Internet access on depressive symptoms. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. The confounding variables had been strictly controlled. LL = −38,187.79, DF = 26, AIC = 65,503.6, BIC = 42,087.6.

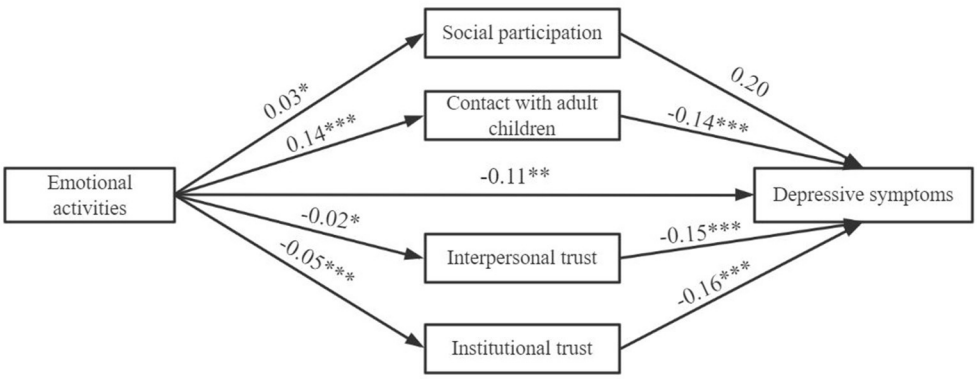

FIGURE 4 | The structural model of the effect of emotional activities on depressive symptoms. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. The confounding variables had been strictly controlled. LL = −43,957.56, DF = 26, AIC = 43,237.3 BIC = 54,059.7.

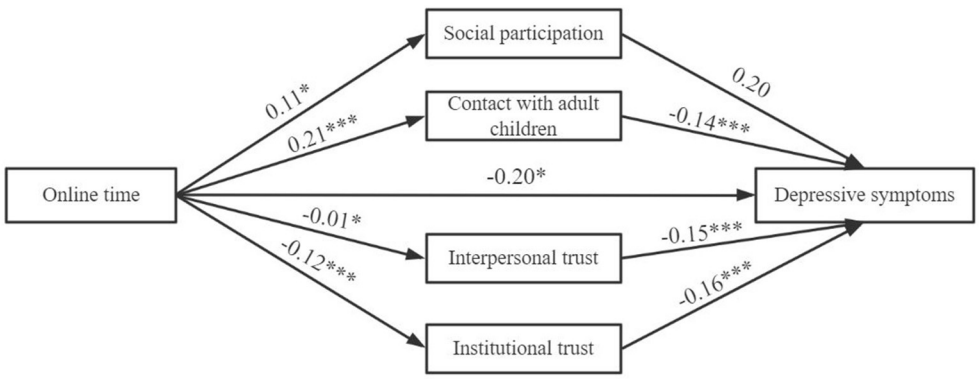

FIGURE 5 | The structural model of the effect of online time on depressive symptoms. *$p < 0.05$, ***$p < 0.001$. The confounding variables had been strictly controlled. LL = −46,583.98, DF = 26, AIC = 47,458.7, BIC = 43,705.2.

TABLE 3 | Mediation and suppression effects.

Pathway	Observe coefficient	Indirect effect with 95% CI
Internet access		
IA->SP->DEPS	0.057	[−0.007, 0.106]
IA->CAC->DEPS	−0.090	[−0.114, −0.067]
IA->IPT->DEPS	0.006	[0.061, 0.104]
IA->INT->DEPS	0.018	[0.006, 0.029]
Emotional activities		
EA->SP->DEPS	0.006	[−0.024, 0.039]
EA->CAC->DEPS	−0.020	[−0.031, −0.008]
EA->IPT->DEPS	0.003	[0.011, 0.023]
EA->INT->DEPS	0.007	[0.001, 0.006]
Online time		
OT->SP->DEPS	0.023	[−0.037, 0.085]
OT->CAC->DEPS	−0.029	[−0.046, −0.015]
OT->IPT->DEPS	0.002	[0.022, 0.064]
OT->INT->DEPS	0.019	[0.003, 0.016]

IA, Internet access; EA, emotional activities; OT, online time; SP, social participation; CAC, contact with adult children; IPT, interpersonal trust; INT, institutional trust; DEPS, depressive symptoms.

capital on mental health, where both interpersonal trust and institutional trust predicted the significant decline in depressive symptoms. Our second hypothesis (H2) is partially confirmed.

Moreover, we also noticed that the influence of Internet access on depressive symptoms in Model (2) tended to diminish in Model (3), and its coefficient changed from −0.47 to −0.36. This implies the link between Internet use and depressive symptoms was partially mediated by the indicators of structural social capital. After addition of interpersonal trust and institutional trust in Model (4), the absolute value of the coefficient of Internet access increased by 14% compared with model (3), which suggested indictors of cognitive social capital were likely to act as the suppressing role. Therefore, GSEM was performed to further test the mediating effect and suppressing effect of social capital.

Figures 3–5 display that each dimension of Internet use was not only directly related to depressive symptoms, but also exerted an indirect influence through social capital. However, the nature of the indirect effects of social participation and trust were different.

For structural social capital, Internet use predicted a significantly higher odds of social participation, but social participation was unrelated to depressive symptoms. Meanwhile, we discovered that Internet use facilitated contact with adult children, and this increase in frequency of the interaction was negatively related to depressive symptoms. Considering that the direction of direct effect of Internet use on depressive symptoms was consistent with that of its indirect effect on depressive symptoms by contact with adult children, contact with adult children could be recognized as a mediating factor in the relationship (MacKinnon et al., 2000).

For cognitive social capital, Internet use indicators impaired the respondents' interpersonal trust and institutional trust. For instance, Older adults who used the Internet decreased by 0.04-unit in interpersonal trust and 0.12-unit in institutional trust than those without Internet access. This aggregate decline of cognitive social capital resulted in more severe depressive symptoms. In view of the fact that Internet use directly improved mental health, but at the same time it indirectly aggravated depression by reducing trust, therefore, cognitive social capital could be regarded as a suppressor. Our third hypothesis (H3) is supported.

We employed a bootstrapping method to test whether the indirect effects were statistically significant (1,000 resamples). The significance of indirect effects depends on whether the 95% confidence intervals include zero. **Table 3** reports that the indirect effects of Internet use predicting depressive symptoms by social participation were not significant, while the mediation pathways of contact with adult children were significantly negative. For components of cognitive social capital, Internet use had positive indirect effects on depressive symptoms by interpersonal and institutional trust. Based on bootstrapped indirect effects and direct effects, we discovered that indicators of social capital partially accounted for the impact of Internet use on depressive symptoms.

DISCUSSION

Using the 2018 CFPS survey, this study examined the underlying mechanisms between Internet use, social capital and depressive symptoms in Chinese settings. In line with hypothesis 1, after controlling for demographic variables, we found that Internet access, emotional activities and screen time could effectively reduce depressive symptoms, in support of the previous findings (Cotten et al., 2014). Nevertheless, we did not discover a significant association between online instrumental activities and mental health. Potential reasons may be attributed to the functional disparities of various online activities and the influence of family culture on the behaviors of older adults. From the use and gratifications perspective, online emotional activities can strengthen private relationships, providing emotional support and improving life satisfaction, and online instrumental activities are regarded as a functional participation that helps to enhance self-identity and obtain useful information. On these grounds, we can make a preliminary inference that the effect of Internet use on mental health among older Chinese adults mainly depends on affective regulation and emotional support, rather than information acquisition and instrumental value.

Partly consistent with hypothesis 2, our results showed interaction with adult children and trust might predict a significant decline in depressive symptoms. However, current study failed to observe a negative effect of social participation in depressive symptoms, which contradicts the findings that social participation helps to relieve depression (Wang W. et al., 2019). A possible explanation for this divergence is the defect of our measurement of social participation. Due to restrictions on data, social participation in current study only involved religious

groups, labor union, and association of workers, all of which are not common activities for Chinese older adults. Thus, we did not have sufficient samples to reject the null hypothesis.

Hypothesis 3 has been verified. To our best knowledge, these findings furnish the first evidence that social capital has a dual role, carrying mediation and suppression effects in the link between Internet use and mental health.

In terms of structural social capital, the Internet could break the constraints of space and physical inactivity for older adults (Oishi, 2010), and establish more positive and time-efficient interactions than face-to-face communication (Mellor et al., 2008; Sum et al., 2008b). This remote communication is important for Chinese older adults to keep mental health. For one thing, Industrialization and urbanization have prompted increasing adult children to leave their hometowns, leading to old age empty-nest families. For another, private family relationships construct older adults' life meaning and self-esteem in Confucianism culture (Wang W. et al., 2019). Thus, using Internet to enhance the interactions with their adult children is of great practical value and theoretical significance for older adults to mitigate depression.

In terms of cognitive social capital, the Internet might bring blurred information for older adults, which exerts a bad influence on their behaviors and attitudes including trust. The potential reason is that negative and misleading contents in websites would lead to a decline in recognition of shared values and undermine the deference to authority (Im et al., 2014), then threaten older adults' trust. This decrease of interpersonal trust and institutional trust represents a pessimistic view (e.g., insecurity and anxiety) on their living environment, exacerbating mental health problems in older adults. Therefore, the positive association between Internet use and mental health is suppressed by cognitive social capital.

Besides, it is notable that the indirect effect of contact with adult children was greater than that of trust, which might be interpreted by the notion of the socioemotional selectivity theory (STT). The SST suggests that actual time left in life, to some extent, determines relative importance of different life events (Carstensen, 2006). For younger people, they prioritize long-term goals such as obtaining new information and achieving personal value. For older adults, they prioritize short-term events such as interacting with families and gaining emotional support, rather than expanding horizons. In consequence, the beneficial influence of increased contact with adult children caused by internet use was much stronger compared to the adverse effect of decreased trust on mental health in older adults.

This study had several limitations. First, although GSEM was conducted to examine how the Internet affects depressive symptoms by social capital, endogeneity may still exist due to cross-sectional data. Second, there was a deficiency in the validity of the measurement of social participation. Under the constraints of data, social activities such as square dancing and mahjong that Chinese older adults are passionate about were not reflected in the research. Third, since the role of internet use may be different for older adults with diagnosed depressive disorders, we identified the older adults with depression by cut-off point widely used in previous studies (Briggs et al., 2018). And then we found that the relationship between Internet use and depressive symptoms was robust regardless of depression among older adults. Nonetheless, the measurement of depressive symptoms was based on self-reported scores rather than medical diagnosis, which may pose a threat to the accuracy of mental health assessment. Fourth, compared with Internet access or online time, a more nuanced insight of internet use, such as WeChat and Tiktok use, is necessary for future studies. Therefore, more detailed data should be employed to deepen our research.

CONCLUSION

Taken together, this study provides fresh evidence for the limited studies on the health implications of the Internet in older adults. Our results displayed the Internet could promote structural social capital, which in turn reduced depressive symptoms. Meanwhile, Internet use also destroyed older adults' cognitive social capital, then consequently exacerbated depressive symptoms. This dual role of social capital indicates that the mechanism through which Internet affects depressive symptoms is complicated and diverse. Therefore, in order to promote older adults' mental health in a low-cost way, we call for not only improvement in network infrastructure construction, but also related Internet training courses for older adults.

DATA AVAILABILITY STATEMENT

Publicly available datasets were analyzed in this study. This data can be found at: http://www.isss.pku.edu.cn/cfps/sjzx/gksj/index.htm.

ETHICS STATEMENT

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

AUTHOR CONTRIBUTIONS

MY: conceptualization and methodology. ZL: data analysis and writing. Both authors contributed to the article and approved the submitted version.

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frontiers in Psychology

BRIEF RESEARCH REPORT
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Activity Preferences Among Older People With Dementia Residing in Nursing Homes

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The study aimed to examine the influence of personal characteristics on activity preferences using decision tree analysis and examine the effects of the variables using conventional approaches (logistic regression analysis). A descriptive study was conducted with 251 nursing home residents with dementia in Korea (76.9% female) to examine the relationship between their personal characteristics and activity preferences. Decision tree analysis was used to classify participants' activity preferences, and preference levels were examined using logistic regression analysis. Activities were classified as either physical and social activities or cognitive and affective activities. This model showed an accuracy rate of 85.7% for positively predicting physical and social activity preference and 30.3% for positively predicting cognitive and affective activity preference. Gender was the strongest determinant of activity preference. The odds of preferring physical and social activities were 3.179 times higher among women, while the odds for preferring cognitive and affective activities were 0.412 times higher among men. Notably, cognitive and affective activity preference increased to 58.8% for married male participants. This study's findings can contribute to the development of programs to decrease behavioral and psychological symptoms among older people with dementia residing in nursing homes and provide scientific evidence for integrating these activities into long-term services for this population.

Keywords: decision tree, older people, dementia, nursing homes, activity preferences

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INTRODUCTION

A major problem related to dementia is cognitive decline, which makes it difficult for people to maintain their usual activities (Nygård, 2004; Van Der Roest et al., 2007; O'Sullivan and Hocking, 2013). People with dementia tend to be less involved in leisure activities due to the loss of their physical and cognitive abilities, which could lead to feeling isolated from friends and family, depressive mood, and boredom (Engelman et al., 1999; Feliciano et al., 2009). In particular, boredom and loneliness are common among people with dementia who reside in nursing homes (Cohen-Mansfield et al., 1992, 2017). Several studies have reported that environmental stimuli can increase behavioral and psychological symptoms and decrease positive affect among people with dementia (Cohen-Mansfield and Werner, 1997; Cohen-Mansfield et al., 2010a, 2011). Further, various activities, including physical activities, have the potential to improve the quality of life of people with severe mental health disorders (Richardson et al., 2005b).

Patients with dementia prefer positive stimuli and close social relationships over superficial encounters with institutional staff during their daily treatment (Mark, 2012). Socioemotional

selectivity is a theory of life-span development grounded in the uniquely human ability to monitor time. The preferences, social networks, and emotional experiences of patients with dementia could be informed by the theory of life-span development. The emphasis on individual strengths and personal resilience is likely to be especially appealing to older people (Carstensen, 2021). Patients with cognitive impairments also have normal human psychological needs, including comfort, identity, attachment, occupation, and inclusion (Kitwood, 1997). Strategies for accessing the internal experiences of patients with dementia may be useful to understand them as individuals. However, only limited knowledge is available about the experience of those with dementia due to the deleterious effects of the stereotypes regarding individuals afflicted with it (Mast, 2009).

Both personal and group activities, including those involving families, have been found to be important for people with dementia (Chester et al., 2018; Roberts et al., 2018). Moreover, maintaining social contact and participating in family activities could increase older people's life satisfaction and self-esteem and their perception of having continuity across their life course (Vikström et al., 2008; Cruz et al., 2013; Jøranson et al., 2016; Olsen et al., 2019). Physical activity interventions for those with mental health disorders must be tailored to individual preferences, which can also be beneficial for leisure and activities of daily living (Richardson et al., 2005a). For patients with dementia, activity is perceived as important, and while person-centered approaches are expected to contribute to activity promotion, individualized activities are often not provided for these patients (Van't Leven et al., 2018).

According to Cohen-Mansfield et al. (2017), contributing factors that affect activity participation can be categorized as personal, environmental, or stimulus. Dementia patients' endorsed activities were affected by gender and physical or cognitive function. Individualized support should be provided considering personal preferences and characteristics, such as stage of dementia, physical function, and health status (Ablitt et al., 2009; Peeters et al., 2010; Van Mierlo et al., 2010). These activity preferences were also affected by other personal factors, such as past experiences (Cohen-Mansfield, 2017). In addition, patients' needs may be impacted by culture, and health care professionals need to show continuous cultural sensitivity to patients' needs. This information is important for planning activities and intervention programs that are closely related to endorsement of or engagement in activities. However, few studies have examined the activity preferences of older people with dementia residing in nursing homes. Decision trees based on real-word data have been used to create rules for activity preferences, as they can detect previously unknown interactions among various items of clinical information and reveal relationships between assessment outcomes and patient characteristics. This technique can identify data patterns that distinguish between preferred activities and other activities, revealing potentially complex relationships among individual characteristics (Myles et al., 2004).

A preference assessment could guide health care professionals in providing reinforcements to patients to increase the future probability of a behavior. A preference assessment is defined as a process to identify reinforcers that will motivate an individual at a specific point in time (Chen and Chen, 2005). Identifying factors that may function as positive stimuli and environments is important, as results of previous research indicate that a tailored intervention is more efficacious than treating patients as a homogenous group (Vollmer et al., 1994). Although there is a substantial need to assess activity preferences among patients with dementia, limited cognition and a lack of verbal responsiveness can be barriers to fully discerning their preferences (Mast, 2009).

This descriptive study examined personal characteristics within the context of preferred activities among nursing home residents with dementia. The study aimed to examine the influence of personal characteristics on activity preferences using decision tree analysis and examine the effects of the variables using conventional approaches (logistic regression analysis).

METHODS

A secondary analysis was conducted that aimed to identify the activity preferences of older people with dementia residing in nursing homes in Korea.

Data

The source of the data was a large-scale research project which focused on the behavioral and psychological symptoms of patients with dementia to develop an intervention program to improve their quality of life. The project obtained approval from the Institutional Review Board of Catholic University of Korea (MC18QNSI0055). Details of the sampling process have been reported elsewhere (Park et al., 2019). Data were collected from six nursing homes selected at random in the Seoul and Gyeonggi regions of Korea after explaining the purpose of the study and obtaining approval from the directors and nurse managers. Participants were recruited by an ad posted in the approved facilities for 2 weeks, and patients willing to participate in the study who met inclusion criteria were selected. When older people with dementia expressed their willingness to participate, a mental health expert at the facility confirmed the patient's ability to consent. If they agreed, the researchers then contacted the participants and their legal guardians to obtain written consent.

The researchers surveyed the patients in person upon consent from the patient and their family. The inclusion criteria were being 65 years of age or older with a diagnosis of dementia, a resident or daycare visitor with dementia, and ability to respond to questions about activity preferences. The exclusion criteria included having other mental disorders, neurological disorders, or metabolic disorders. Among the 325 recruited participants, 70 participants who either did not report preferred activities or whose caregivers did not report such activities on their behalf were excluded. Only 4 participants were excluded due to having another diagnosed mental disorder. Ultimately, 251 participants were included and 74 participants were excluded from the study.

The minimum data size required for classification matrix research using data mining is calculated as follows: 6 × number of groups for the output variable × number of variables

(Delmater and Hancock, 2001). For the number of groups for the output variable, the preferred activities among patients with dementia were classified into two types, and there were seven variables (gender, age, education level, marital status, religion, use of assistive devices, and ability for self-expression), which resulted in a minimum data size of 140.

Data Collection

Data were collected by trained researchers from medical records or by interviewing patients with dementia regarding gender, age, education level, marital status, religion, use of assistive devices, and ability for self-expression. To examine patients' preferred activities, an open-ended question was used: "What kind of activities do you like to do?" If the patients could not answer the question, their caregiver, who had provided care for the patient for at least 4 weeks, answered for them as a proxy. The question about the ability to express one's opinions to others was also answered by the caregiver if the patient could not answer. A trained researcher asked the patients the questions directly using a structured questionnaire and recorded their responses.

The recorded activities were classified according to the criteria described below. Activities such as taking a stroll, participating in activities offered at the facility, talking to people, participating in religious activities, meeting with family, and talking to someone on the telephone were classified as physical and social activities (activities usually involving other people). Activities such as watching television, playing traditional games, doing puzzles, reading picture books, drawing, and singing were classified as cognitive and affective activities (activities usually performed alone). Two independent researchers (A and B) performed the classification.

TABLE 1 | Characteristics of patients with dementia (n = 251).

Characteristics	n	%
Gender		
Male	57	22.7
Female	193	76.9
Missing	1	0.4
Age		
Below 84	122	48.6
Above 85	124	49.4
Missing	5	2.0
Presence of spouse		
Yes	69	27.5
No	182	72.5
Religion		
Yes	66	26.3
No	185	73.7
Education level		
Below middle school	148	59.0
Above middle school	90	35.9
Missing data	13	5.2
Use of assistive device		
No	184	73.3
Yes	57	22.7
Missing data	10	4.0
Degree of self-expression		
High	160	63.7
Low	79	31.5
Missing data	12	4.8

Statistical Analysis

A decision tree analysis was performed in this study. A decision tree is a data mining technique that explores, identifies, and models relationships, patterns, and rules within a dataset. Decision tree analysis graphs decision-making rules in a tree-like structure and performs classification and prediction. One of the benefits of decision tree analysis is that it expresses the processes of classification and prediction through induction rules according to the tree structure; thus, it is easier for the user to understand these processes compared to neural network analysis, discriminant analysis, or regression analysis (Kim et al., 2006). A decision tree can be used to identify the variables needed for analyses, such as discriminant analysis or regression analysis, and the interaction effects to be included in the model, and a decision tree itself can be used as a classification or predictive model (Ablitt et al., 2009). A decision tree features a tree structure consisting of nodes.

Decision tree analysis was performed according to the following steps. First, a tree structure was formulated by designating the appropriate split criterion and stopping rule according to the purpose of the analysis and data structure. In this study, as the target attribute was discrete, splitting occurred based on the frequency of data for each category of the target attribute, based on which a classification tree was built. The stopping rule was set to maximum tree depth = 5, minimum number of cases for parent node = 30, and minimum number of cases for child node = 10. To develop an ideal model using data mining, it is desirable to create various predictive models from a single dataset and comparatively analyze them (Song and Ying, 2015). Thus, the entire dataset was divided into training data and test data, and a model was created using the training data and verified using the test data. Hence, in this study, the ratio of training data to test data was set to 1:1.

For the decision tree analysis, the most universally used Classification and Regression Trees (1984; CART) algorithm was applied. The relationships between the characteristics of patients with dementia and their activity preferences were analyzed using logistic regression. SPSS 25.0 software was used for statistical analysis.

The dependent variable was the preferred activity, and it was divided into physical and social activities and cognitive and affective activities for analysis. Predictors could be divided into (a) demographic characteristics and (b) ability outcomes. Demographic characteristics included gender, age, education level, marital status, and religion, and ability outcomes included the use of assistive devices for mobility and ability for self-expression, defined as the ability to express one's opinions to others. Marital status was recorded as either married or not married. Individuals were considered not married if they were widowed, single, or divorced. Religion was coded as either "yes"

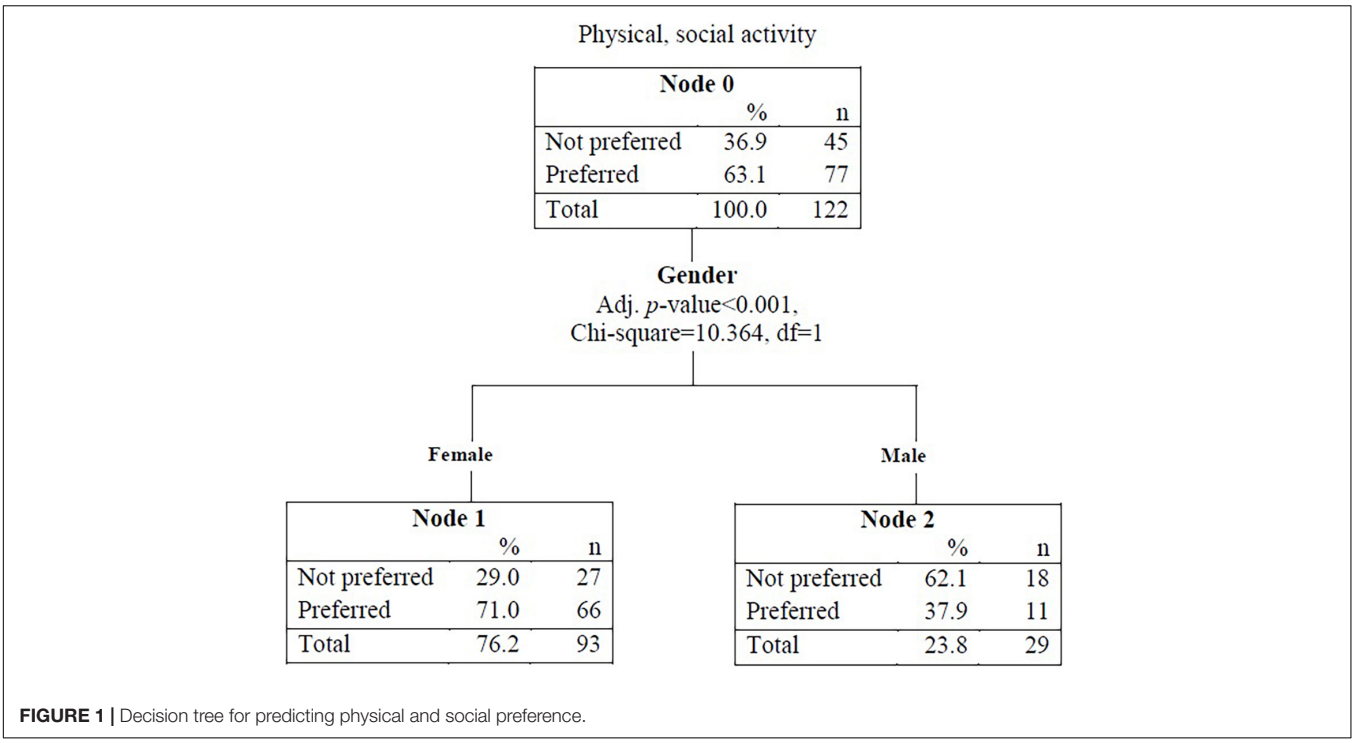

FIGURE 1 | Decision tree for predicting physical and social preference.

or "no," and the use of assistive devices for mobility referred to the use of devices such as crutches, wheelchairs, or canes.

RESULTS

Participant Characteristics

A total of 251 participants were included in the analysis. The sample was 76.9% female and 22.7% male, and 49.4% were aged 85 years or older. Of the participants, 72.5% were not married and 26.3% were religious. The most common education level was middle school graduation or lower (59.0%), and 22.7% of the participants used an assistive device for mobility. Each participant's level of self-expression was recorded as either high (63.7%) or low (31.5%) (**Table 1**).

Predictors of Physical and Social Activity Preference

The results of the decision tree used to predict physical and social activity preference among participants are illustrated in **Figure 1**. The strongest discriminant of physical and social activity preference was patient gender. Specifically, 63.1% of the entire sample preferred physical and social activities; however, when participants were stratified by gender, this increased to 71.0% for female participants and decreased to 37.9% for male participants (**Figure 1**).

This model showed an accuracy rate of 40.0% for predicting those who did not prefer physical and social activities (18 out of 45 patients) and an accuracy rate of 85.7% for predicting those who did prefer physical and social activities (66 out of 77) (**Table 2**). The influence of patient characteristics such as gender, age, education level, marital status, self-expression, use of assistive devices, religion, and children are shown in **Table 3**. Gender was identified as a significant predictor of physical and social activity preference [$B = 1.157$, S.E. = 0.388, Exp (β) = 3.179, $p = 0.003$]. The odds of preferring physical and social activities were 3.179 times higher among women than men.

Predictors of Cognitive and Affective Activity Preference

The results of the decision tree for predicting cognitive and affective activity preference are illustrated in **Figure 2**. The most potent discriminant of cognitive and affective activity preference was patient gender. Specifically, 25.4% of the entire sample preferred cognitive and affective activities; however, when stratified by gender, this decreased to 19.6% for female participants and increased to 42.4% for male participants. The second discriminant was marital status. The

TABLE 2 | Classification matrix of CHAID for physical and social activities.

Classification matrix		Prediction			Forecasting	
		Not preferred	Preferred	Total	Accuracy measures	%
Training data	Not preferred	18	27	45	Specificity	40.0
	Preferred	11	66	77	Sensitivity	85.7
	Total	29	93	122	Overall accuracy	68.9

CHAID, Chi-squared automatic interaction detection.

preference for cognitive and affective activity increased to 58.8% among male participants with a spouse. This model showed an accuracy rate of 92.8% for predicting those who did not prefer cognitive and affective activity (90 out of 97) and an accuracy rate of 30.3% for predicting those who did prefer cognitive and affective activities (10 out of 33) (**Table 4**).

TABLE 3 | Summary of logistic regression analysis for the preference of physical and social activities.

Variable	B	S.E.	df	Exp (β)	−95% CI	+95% CI	*p*
Gender[a]	1.16	0.39	1	3.18	1.49	6.80	0.003
Age[b]	−0.06	0.31	1	0.94	0.51	1.73	0.834
Education level[c]	−0.11	0.32	1	0.90	0.48	1.69	0.735
Presence of spouse[d]	−0.32	0.36	1	0.73	0.36	1.46	0.372
Degree of self-expression[e]	0.37	0.33	1	1.45	0.76	2.76	0.261
Use of assistive device[f]	−0.65	0.34	1	0.52	0.27	1.02	0.056
Religion[g]	−0.17	0.34	1	0.84	0.43	1.64	0.614
Children[h]	1.51	0.83	1	4.54	0.90	22.99	0.068

[a]*Dummy variables (Reference = female).*
[b]*Dummy variables (Ref = above 85).*
[c]*Dummy variables (Ref = below middle school).*
[d]*Dummy variables (Ref = no).*
[e]*Dummy variables (Ref = low).*
[f]*Dummy variables (Ref = no).*
[g]*Dummy variables (Ref = no).*
[h]*Dummy variables (Ref = no).*

The influence of patient characteristics, such as gender, age, education level, marital status, self-expression, use of assistive device, religion, and children, on cognitive and affective activity preference are shown in **Table 5**. Gender [$B = -0.886$, S.E. = 0.405, Exp (β) = 0.412, $p = 0.029$] and education level [$B = 0.797$, S.E. = 0.354, Exp (β) = 2.219, $p = 0.024$] were identified as significant predictors of cognitive and affective activity preference. The odds for preferring cognitive and affective activities were 0.412 times higher among men than women and 2.219 times higher among middle school graduates or higher than their less educated counterparts.

DISCUSSION

This study aimed to examine the influence of personal characteristics on activity preferences using decision tree analysis and examine the effects of personal characteristics using logistic regression analysis. Engaging in activities

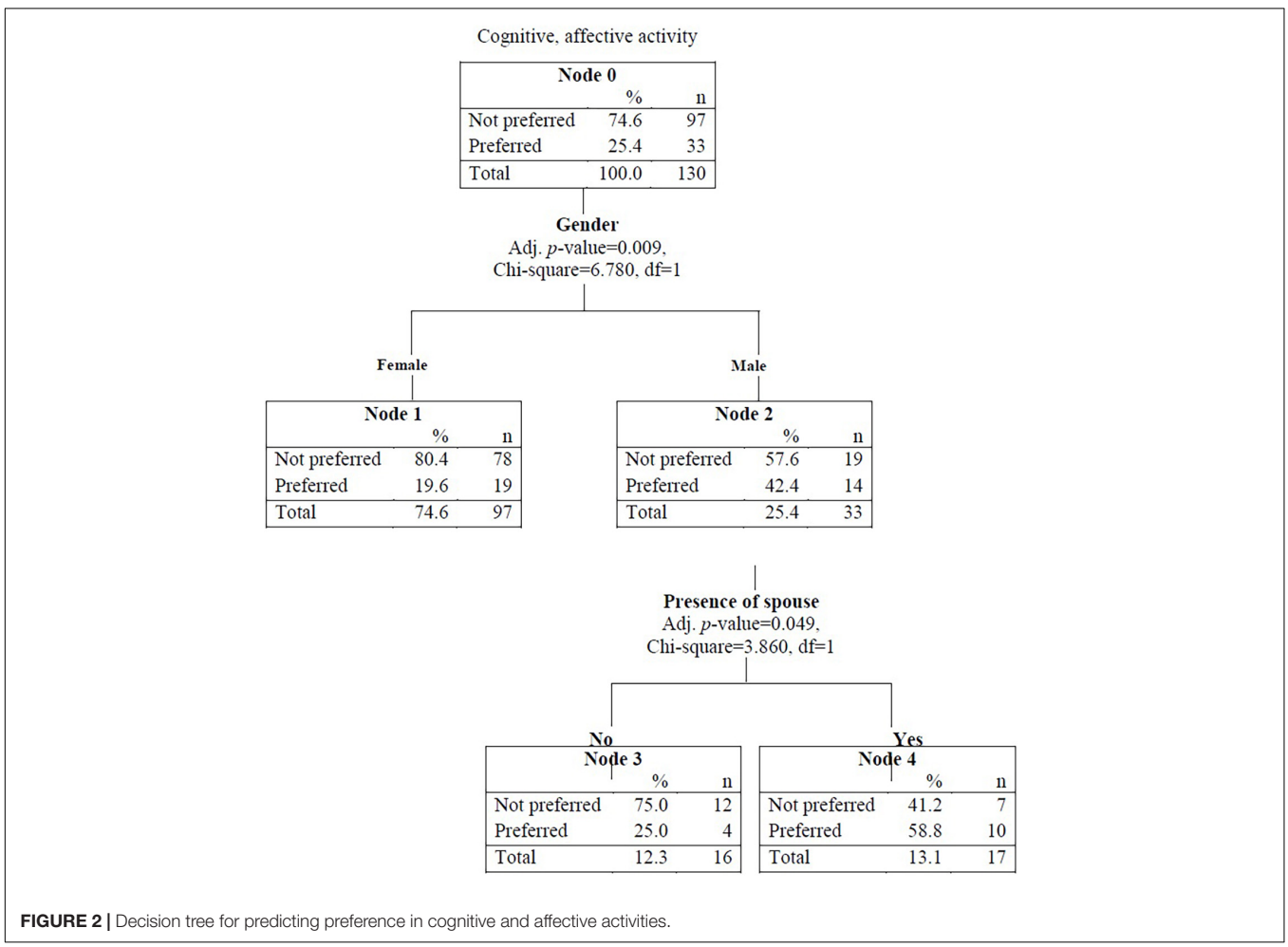

FIGURE 2 | Decision tree for predicting preference in cognitive and affective activities.

TABLE 4 | Classification matrix of CHAID for cognitive and affective activities.

Classification matrix		Prediction			Forecasting	
		Not preferred	Preferred	Total	Accuracy measures	%
Training data	Not preferred	90	7	97	Specificity	92.8
	Preferred	23	10	33	Sensitivity	30.3
	Total	113	17	120	Overall accuracy	76.9

CHAID, Chi-squared automatic interaction detection.

TABLE 5 | Summary of logistic regression analysis for preference of cognitive and affective activities.

Variable	B	S.E.	df	Exp (β)	–95% CI	+95% CI	*p*
Gender[a]	–0.87	0.41	1	0.41	0.19	0.91	0.029
Age[b]	0.51	0.36	1	1.66	0.82	3.36	0.160
Education level[c]	0.80	0.35	1	2.22	1.11	4.44	0.024
Presence of spouse[d]	–0.30	0.38	1	0.74	0.36	1.55	0.425
Degree of self-expression[e]	0.01	0.36	1	1.01	0.50	2.05	0.982
Use of assistive device[f]	–0.11	0.38	1	0.90	0.43	1.89	0.771
Religion[g]	0.49	0.40	1	1.63	0.75	3.53	0.220
Children[h]	–0.16	0.76	1	0.86	0.19	3.76	0.835

[a]*Dummy variables (Reference = female).*
[b]*Dummy variables (Ref = above 85).*
[c]*Dummy variables (Ref = below middle school).*
[d]*Dummy variables (Ref = no).*
[e]*Dummy variables (Ref = low).*
[f]*Dummy variables (Ref = no).*
[g]*Dummy variables (Ref = no).*
[h]*Dummy variables (Ref = no).*

alleviates boredom among patients with dementia residing in nursing homes and helps to evoke positive emotions (Cohen-Mansfield et al., 2010a, 2011).

The first predictor of activity preference was gender. In this study, older women were found to prefer physical and social activities, while older men were found to prefer cognitive and affective activities. Caregiving, which is typically considered to be a role for women, strengthens their interactions with others. Furthermore, women tend to be more relationship-oriented than men (Boyle, 2017), and thus seem to have demonstrated a higher preference for social activities. Other studies have documented that older women with dementia prefer cooking or baking (Menne et al., 2012; Cohen-Mansfield et al., 2019). Owing to the perception of traditional gender roles, in which women are expected to engage in housework and caregiving (Kyungsoon Park, 2018), activity preferences may differ between genders. Gender roles are learned over a prolonged period, and may therefore influence patients with dementia (Boyle, 2017). Further, older people with dementia have been reported to show consistent leisure activity preferences from the past to the present (Lepper et al., 2020) and more actively participate in activities when given a similar simulation to what they were used to in the past (Cohen-Mansfield et al., 2010b; Lopes et al., 2016). Thus, gender-specific activities should be planned for older people in nursing homes.

Despite the fact that men are traditionally seen as being engaged in physical labor (Kyungsoon Park, 2018), older men showed a low preference level for physical and social activities. This may be related to the characteristics of patients with dementia. In general, weakened physical functioning leads to patients with dementia being more sedentary than the general population, and studies have reported that walking, as opposed to more vigorous activities, is the most common physical activity among these patients (Daumit et al., 2005; Richardson et al., 2005b). Previous research reported that older women with dementia score various activities as more important than their male counterparts (Roberts et al., 2018), which supports our findings. A lack of periodic social contact is correlated with physical inactivity and lethargy (Daumit et al., 2005; McDevitt et al., 2006) and low self-efficacy (Trost et al., 2002). Thus, programs that promote physical and social activities in older men with dementia are also needed.

The higher preference for cognitive and affective activities among men in this study is similar to previous findings that men demonstrated a higher preference for games such as brain games (Ivory, 2006) and that older men like games (Menne et al., 2012; Cohen-Mansfield et al., 2019). A prior study also found that older men with dementia tend to be more individualistic and logical compared to their female counterparts (Boyle, 2017). Further, our results showed that the preference for cognitive and affective activities increased to 58.8% among older men with a spouse. According to Roberts et al. (2018), married individuals prefer activities such as bonding with family more than unmarried individuals; thus, continued attachment with a spouse seems to increase individuals' preferences for these activities.

Multiple regression analysis confirmed that the odds of preferring cognitive and affective activities were higher among more highly educated individuals when adjusting for age, marital status, ability for self-expression, use of assistive devices, religion, and children. Education level seems to have affect preference levels, as cognition-based activities stimulate overall cognitive function through games, maps, and discussions and include concentration, memory, and problem-solving ability training (Kim, 2019).

In this study, we determined the hierarchy of personal characteristics of activity preferences using decision tree analysis and the effects of personal characteristics using logistic regression analysis. There is a difference between the data mining tools used for classification and logistic regression analysis. The logistic regression model serves to determine which variables predict treatment status and contribute to predicting preferred activities (Chatterjee and Hadi, 2015). However, data mining algorithms find the best fitting model through automated processes that search through the dataset to detect patterns. These patterns may include interactions between variables, as well as interactions within subsets of variables (Linden and Yarnold, 2016).

This study examined the relationship between personal characteristics and activity preferences of patients with dementia. The results of this study provide evidence to support the need for patients with dementia to be involved in activities and for nursing homes to provide these patients with a variety of activity programs. A tailored intervention program should be designed

to meet the dementia patient's preferences by securing their emotional immersion and engagement in accordance with their gender and marital status. Also, subsequent studies should also assess other psychosocial variables found to have a key role in activity involvement, such as self-efficacy, perceived social support, motivation, and pleasure.

This study's findings can contribute to the development of programs to decrease the behavioral and psychological symptoms among older people with dementia residing in nursing homes and provide scientific evidence for integrating these activities into long-term services for this population.

Future research should explore valid methods to confirm the preferences of patients with cognitive impairments. As incomplete questionnaires were excluded from the analysis, it will be necessary to investigate the preferred activities of patients with relatively high cognitive levels and high activity, for example, patients with mild cognitive impairment. As reliability between proxy responses and those of patients with dementia were not confirmed, these methodological issues may have affected the interpretation of our data. Additionally, more long-term studies are needed to examine the relationship between these variables because the activity itself may be important, regardless of cognitive function and age (Roberts et al., 2018).

This study has some limitations. As this was a cross-sectional study, prospective studies with larger patient samples that consider various patient subgroups are needed in the future. In addition, we used caregivers' responses for some measures and did not examine actual attendance duration and engagement in activities among patients with dementia. Because our study excluded the participants who did not report preferred activities and those who were diagnosed with other mental disorders, there are limitations regarding generalization to patients with dementia residing in nursing homes.

Nevertheless, we classified the activity preferences of older people with dementia residing in nursing homes using a decision tree and examined their preference levels through logistic regression analysis. Decision trees provided an effective method of decision making because it allowed us to create rules for activity preferences. Thus, information about patients' activity preferences was useful for predicting whether they will commit to an activity and may offer knowledge relevant to providing person-centered care.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Institutional Review Board of Catholic University (MC18QNSI0055). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

J-HK contributed to the conception of the study, interpretation of the data, and drafted the manuscript. E-YP conducted the statistical analyses and interpreted the data. Both authors read and approved the final manuscript.

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Thwarted Belongingness Hindered Successful Aging in Chinese Older Adults: Roles of Positive Mental Health and Meaning in Life

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Aging of population has brought great challenges to many regions throughout the world. It has been demonstrated that interpersonal relationship is closely related to the experiences of aging for older adults. However, it still remains unknown how and under what conditions thwarted belongingness links to successful aging. This study examined the relationship between thwarted belongingness and successful aging and tested the mediating role of positive mental health and the moderating role of meaning in life. Community-dwelling older adults (n = 339) aged 60–75 years recruited in Chongqing, China completed self-measures of thwarted belongingness, successful aging, meaning in life, and positive mental health. Correlation analyses showed that successful aging was associated with less thwarted belongingness, better positive mental health, and higher levels of meaning in life. Positive mental health was found to totally mediate the negative effect of thwarted belongingness on successful aging. Moderated mediation analyses further revealed that two components of meaning in life (present of meaning and search for meaning) attenuated the indirect effect of thwarted belongingness on successful aging *via* positive mental health. This study highlights the protective roles of positive mental health and meaning in life and addressed cultural aspects in the process of successful aging among Chinese older adults.

Keywords: thwarted belongingness, successful aging, meaning in life, positive mental health, older adults

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INTRODUCTION

At present, the population aging is increasing with an irresistible trend, which is a huge challenge for many regions. China is one of the countries with the fastest growing population aging in the world (Huang, 2020; Luo et al., 2020). According to the data of the Chinese seventh national census (National Bureau of Statistics of China, 2021), China's population aged 60 and over was 264.02 million, accounting for 18.70% of the population. Among them, the population aged 65 and over was 190.64 million, accounting for 13.50%. The acceleration in the population aging would produce a series of problems, such as the decline of labor supply, the weakening of consumer demand, as well as the decline of household savings and economic growth (Dollar et al., 2020; Huang, 2020). Meanwhile, it can increase the pressure on social security and public services (Wang and Zhou, 2020). "Better with age," that is, successful aging, has become a hot issue in the field of

aging research. Successful aging is defined as an individual's perception of favorable adaptation to the cumulative physiological and functional alterations associated with the passage of time, while experiencing spiritual correctness and a sense of meaning and purpose in life (Flood, 2002; Troutman et al., 2011b).

Thwarted Belongingness, Positive Mental Health, and Successful Aging

According to the MacArthur's theory (Rowe and Kahn, 2015; Jang and Kim, 2021), successful aging encompasses three principal components: low risk of disease and disease-related disability, maintenance of high mental and physical function, and continued engagement with life, which includes relations with others and productive activity. It has been demonstrated that interpersonal relationships are closely related to the experiences of aging for older adults (Shiovitz-Ezra and Litwin, 2012; Ye and Zhang, 2021). Due to the changes of social status and functional limitations, older people are more vulnerable to social isolation and relationship breakdown than others (Stoeckel and Litwin, 2016). It is of great importance to pay attention to older adults' interpersonal needs, which reflect their sense of self-worth and belongingness. According to the finding by Van Orden et al. (2010), interpersonal needs consist of two related but independent components: thwarted belongingness and perceived burdensomeness. Thwarted belongingness is a lack of social relationships, which is accompanied by loneliness. Perceived burdensomeness is the thought that one is a burden upon one's loved ones and is accompanied by self-hatred. Insufficient interpersonal needs may make individuals feel pain due to lack of connection with others, thereby resulting in non-adaptive behaviors (Kwon et al., 2020). Widely recognized by researchers, a high degree of frustration of interpersonal needs is considered to be an important indicator for suicide ideation (Park and Kim, 2019; Kyron et al., 2021).

However, few studies to date have directly examined the relationship between interpersonal needs and successful aging. Nevertheless, the link between interpersonal needs and the living quality of aging people was also evidenced. A recent study on community-dwelling older adults showed that interpersonal needs had a great impact on attitude toward aging (Jang and Kim, 2021). A sense of belongingness helps individuals to express their identity, promote emotional well-being in their relationships, and enhance physical and mental health (Shields, 2008). On the contrary, low senses of belonging and perceived psychological or emotional burdens are considered to be risk factors of mortality in older adults due to psychological problems such as loneliness, hopelessness, and depression (Van Orden et al., 2012). Previous studies found that older adults scored significantly higher on thwarted belongingness than on perceived burdensomeness assessed by the Likert scale (Eades et al., 2019; Kinory et al., 2020). This indicated that thwarted belongingness is a more common psychological experience than perceived burdensomeness for most older adults. Accordingly, only thwarted belongingness was examined in this study. We speculate that thwarted belongingness would influence older adults' positive mental health, and further affect quality of aging (i.e., successful aging). In this study, the impact of positive feelings and positive functioning of older adults on successful aging was examined. Therefore, the term of "positive mental health" proposed by Keyes (2002) was used.

The Moderating Role of Meaning in Life

As a cognitive coping resource, meaning in life is an important protective factor when people face major setbacks (Zhong et al., 2019; Yu et al., 2021). Meaning in life refers to an innate drive to find meaning and significance in individuals' lives (Steger et al., 2006). Ego integrity is the core issue that a person faces in his/her late life (Erikson, 1982). Bueno-Pacheco et al. (2021) demonstrated that trying to find meaning and reconciling life events can facilitate the achievement of ego integrity. Finding and maintaining meaning and purpose in one's life (i.e., meaning in life) has been demonstrated to play an important role in the relationship between stressful events and mental health. Researchers revealed that interventions aimed at increasing meaning and purpose in life can improve individuals' health and well-being in older adults (Gellis et al., 2020). An empirical study on 588 older adults showed that higher levels of meaning and goal could buffer the impacts of interpersonal stressful events on depressive symptoms and life satisfaction (Lee et al., 2022). Conversely, reduced meaning in life was found to be a crucial predictor to the feeling of loneliness (Macià et al., 2021). Accordingly, we hypothesized that meaning in life would moderate the relationship between thwarted belongingness, positive mental health, and successful aging in older adults, which will be tested in the current study.

To date, the most widely used self-report instrument to assess the meaning of life is the Meaning in Life Questionnaire (MLQ) developed by Steger et al. (2006). It has two factors: presence of meaning (MLQ_P) and search for meaning (MLQ_S). Previous studies hold generally consistent viewpoints on the effect of MLQ_P and addressed its importance in facilitating mental health, promoting life functioning, and reducing emotional distresses (Steger et al., 2009; Yang et al., 2019). By contrast, the impact of MLQ_S on mental health outcomes is controversial. Some researchers asserted that search for meaning is painful, which is usually positively correlated with depression, anxiety, depression, and negative self-concept (Steger et al., 2006). Search for meaning may lead to increased depression and anxiety as well as a stronger sense of loss in the late life (Davis et al., 2000). However, several studies in Eastern countries found that the relationship between search for meaning and mental health outcomes was non-significant or even positive (Liu and Gan, 2010; Jin et al., 2016; Yang et al., 2019).

This phenomenon may be due to culture difference. Steger et al. (2008) found people in Eastern countries usually hold a dialectical way of thought, and regard the continuous process of searching for meaning as essential to acquire desired outcomes. Therefore, in our study, the moderating roles of MLQ_P and MLQ_S were tested, respectively. We speculate that both of these two components act as beneficial factors in facilitating older adults' mental health outcomes in the Chinese context.

The Current Study

Due to gaps in these existing literature (i.e., little research with older adults about thwarted belongingness, positive mental health, meaning in life, and successful aging), the current study sought to clarify how and under what conditions thwarted belongingness links to successful aging, and also test the roles of positive mental health and meaning in life among Chinese older adults. Based on the MacArthur's theory and existing evidence, a framework was developed in the current study (see **Figure 1**). The specific hypotheses were as follows:

Hypothesis 1: Successful aging would go along with less thwarted belongingness, better positive mental health, and more meaning in life in Chinese older adults.
Hypothesis 2: Positive mental health would mediate the relationship between thwarted belongingness and successful aging.
Hypothesis 3: Presence of meaning (MLQ_P) and search for meaning (MLQ_S) would serve as beneficial factors and moderate the pattern of relationships between thwarted belongingness, positive mental health, and successful aging.

MATERIALS AND METHODS

Participants and Procedures

The investigation was conducted from February to October, 2021. Authorization for the data collection was obtained from the Ethics Committee of Sichuan International Studies University. The inclusion criteria of participants in this study were (1) aged between 60 and 75; (2) living in communities rather than nursing institutions; (3) no history of serious psychiatric or neurological illness; and (4) no evidence of substance abuse or dependence in the past 3 months. Through flyers and advertisements, a total of 362 older adults were recruited from 4 communities in Chongqing, China. Before investigation, the inclusion criteria and the study goals were explained to all participants. After signing the written informed consent, all participants completed self-reported measures of background information, thwarted belongingness, successful aging, meaning in life, and positive mental health. For the participants who could not read or understand questionnaires independently, the investigators read questions one by one and helped them fill in the questionnaires.

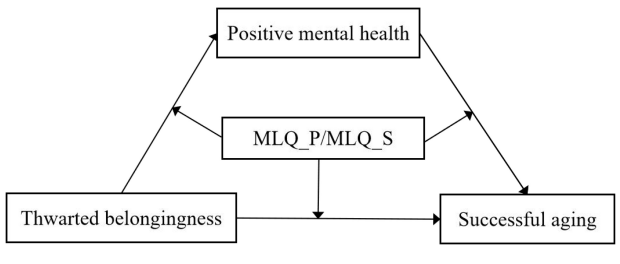

FIGURE 1 | The moderation mediation model showing the relationships among thwarted belongingness, positive mental health, meaning in life, and successful aging. MLQ_P, presence of meaning; MLQ_S, search for meaning.

After excluding 23 incompletely filled questionnaires, a total of 339 valid questionnaires were obtained. The final samples consisted of 133 males and 206 females. The mean age of valid participants was 65.32 (SD = 3.43). **Table 1** provides the demographic characteristics of older adults in the current study.

Study Measures

Thwarted Belongingness

The thwarted belongingness subscale of Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2012; Lai and Boag, 2021) was adopted to assess what extent the respondent feels connected to others. Nine items are presented on a 7-point scale, ranging from 1 (not at all true for me) to 7 (very true for me). For example, "these days, other people care about me." It has been demonstrated adequate reliability and validity in the Chinese samples (Lai and Boag, 2021; Wang et al., 2021). The Cronbach's alpha value for the thwarted belongingness subscale in our sample was 0.71.

Successful Aging

The 20-item Successful Aging Inventory (SAI; Troutman et al., 2011b; Cheng, 2014) was used to measure older adults' level of successful aging. For example, "I feel interest in/concern for the next generation." Participants were asked to rate the items on a 5-point Likert-type scale from 0 (never) to 4 (always). This scale has been demonstrated adequate reliability and validity in the Chinese sample (Cheng, 2014). The Cronbach's alpha value for the total scale was 0.89 in our sample.

Meaning in Life

The 10-item MLQ was developed (Steger et al., 2006) to measure individuals' perceived meaning in life. It consists of two 5-item factors: presence of meaning (labeled MLQ_P, e.g., "I have a good sense of what makes my life meaningful") and search for meaning (labeled MLQ_S, e.g., "I am seeking a purpose or mission for my life"). Participants were asked to rate the items on a 7-point Likert-type scale from 1 (absolutely untrue) to 7 (absolutely true). The MLQ has been demonstrated adequate reliability and validity in the Chinese samples (Wang and Dai, 2008). In this study, the Cronbach's alpha values for the Presence subscale, the Search subscale, and the total scale were 0.74, 0.81, and 0.87, respectively.

TABLE 1 | Demographic characteristics of participants.

Variables	*N* (%)	Variables	*N* (%)
Gender		Education level	
Male	133 (39.2)	Less than junior middle school	63 (18.6)
Female	206 (60.8)	Junior middle school	142 (41.9)
Economic status		High school	103 (30.4)
Poor	28 (8.3)	College/bachelor degree or above	31 (9.1)
A little poor	160 (47.2)	Marital status	
A little rich	134 (39.5)	Single	15 (4.5)
Rich	17 (5.0)	Married	283 (83.3)
		Window/divorced	41 (12.2)

Mental Health

The 14-item Mental Health Continuum-Short Form (MHC-SF; Keyes, 2002; Yin and He, 2012) integrates three components (emotional well-being, psychological well-being, and social well-being) as indicators to evaluate positive mental health. Participants were asked to rate how often they felt a certain way during the past month, on a 6-point scale from 0 (never) to 5 (every day). For example, "I am good at managing the responsibilities of daily life." The higher the score, the better the individual's mental health is. This scale has been proved to have good reliability, acceptability, and validity (Yin and He, 2012). Total score of MHC-SF was used in the current study. The Cronbach's alpha value for the total scale of MHC-SF was 0.92 in this sample.

Data Analyses

According to Podsakoff et al.'s (2003) suggestions, Harman's one-factor test was adopted to test the potential common method biases for all research items. Nine distinct factors with eigenvalue greater than 1 were obtained, with the largest factor accounting for 34.94% of the variance (<40%, the threshold level). Therefore, the common method variance was limited in the current study. Descriptive analyses were used to describe the values of study variables. Independent sample *t*-test and one-way ANOVA were performed to test the effects of gender and marital status on successful aging. Pearson correlation analyses were conducted to explore the associations of study variables. Hierarchical linear regression analyses were used to examine whether positive mental health mediated the link of thwarted belongingness and successful aging in older adults. PROCESS macro for SPSS with bootstrapping (Hayes, 2017) was performed to examine the moderating roles of MLQ_P and MLQ_P in the relationship between thwarted belongingness, positive mental health, and successful aging. Considering the significant correlations with successful aging, education level and physical health were controlled as covariates in the statistical analyses. All continuous variables were centered before testing the hypothesized moderated mediation model. SPSS 26.0 was used for data analyses in the current study.

RESULTS

The Characteristics and Correlations of Study Variables

Means, standard deviations, and possible ranges were calculated for main study variables in the current study. Independent sample *t*-test was performed and the results showed that no gender difference was found in successful aging between men and women (52.73 ± 12.15 vs 51.78 ± 12.06, $t = 0.70$, $p = 0.482 > 0.05$). One-way ANOVA showed that the effect of marital status on successful aging did not reach statistical significance [$F_{(2,336)} = 1.354$, $p = 0.260 > 0.05$]. A series of Pearson correlation analyses were conducted to explore possible associations among main study variables. Results in **Table 2** showed that there was no significant relationship between age, economic status, and successful aging ($ps > 0.05$). However, successful aging was found to be related to higher levels of education ($r = 0.26$, $p < 0.001$) and better physical health ($r = 0.25$, $p < 0.001$). As predicted, successful aging was negatively related to thwarted belongingness ($r = -0.52$, $p < 0.001$) and positively related to MLQ_P, MLQ_S, and positive mental health ($r = 0.57$–0.83, $ps < 0.001$). Accordingly, the initial Hypothesis 1 was well supported.

Testing for the Mediation Model With Positive Mental Health as the Mediator

Hierarchical linear regression analyses were used to test whether positive mental health served as a mediator in the link of thwarted belongingness and successful aging. Model 1 regressed positive mental health on thwarted belongingness after controlling for education level and physical health. Model 2 regressed successful aging on thwarted belongingness with education level and physical health as covariates. The results indicated that thwarted belongingness had a significant negative influence on older adults' positive mental health ($\beta = -0.52$, $t = -11.43$, $p < 0.001$) and successful aging ($\beta = -0.46$, $t = -9.75$, $p < 0.001$). Model 3 regressed successful aging on thwarted belongingness and positive mental health after controlling for education level and physical health. Our results revealed that thwarted belongingness did not significantly predict successful aging ($\beta = -0.05$, $t = -1.46$, $p = 0.146 > 0.05$) after positive mental health was entered into the regression model, while positive mental health exhibited a positive impact on successful aging ($\beta = 0.78$, $t = 20.98$, $p < 0.001$). The mediation model can explain 70.2% of successful aging variance. Accordingly, positive mental health totally mediated the effect of thwarted belongingness on successful aging. Therefore, our initial Hypothesis 2 was supported.

Testing for the Moderated Mediation Model With MLQ_P as the Mediator

Hayes's (2017) PROCESS macro with Model 59 was applied to test whether presence of life (MLQ_P) could moderate the relationships between thwarted belongingness, positive mental health, and successful aging. As shown in **Table 3**, after controlling for education level and physical health, thwarted belongingness negatively predicted positive mental health ($b = -0.67$, $t = -8.20$, $p < 0.001$), and this effect was moderated by MLQ_P ($b = 0.04$, $t = 3.39$, $p < 0.001$). Consistent with the results of the above mediation model, thwarted belongingness could not directly predict successful aging ($b = -0.11$, $t = -1.65$, $p = 0.099 > 0.05$), while positive mental health positively predicted successful aging ($b = 0.69$, $t = 19.09$, $p < 0.001$). In addition, the link between positive mental health and successful aging was moderated by MLQ_P ($b = 0.02$, $t = 2.14$, $p = 0.001 < 0.05$). Therefore, MLQ_P served as a mediator in the relationship between thwarted belongingness and positive mental health (the first stage of the mediating effect) as well as the relationship between positive mental health and successful aging (the second stage of the mediating effect).

Furthermore, the conditional indirect effect analysis showed that the indirect effect of thwarted belongingness on successful

TABLE 2 | Descriptive statistics and correlations between variables.

	Mean ± SD	TB	MLQ_P	MLQ_S	Positivemental health	Successful aging
TB	30.64 ± 7.70	1				
MLQ_P	23.29 ± 4.47	−0.52***	1			
MLQ_S	24.91 ± 5.34	−0.39***	0.66***	1		
Positive mental health	46.36 ± 12.72	−0.57***	0.58***	0.61***	1	
Successful aging	52.15 ± 12.09	−0.52***	0.57***	0.65***	0.83***	1
Age	65.32 ± 3.43	−0.01	−0.10	−0.13*	−0.04	−0.01
Economic status		−0.12*	0.15**	0.05	0.09	0.06
Education level		−0.21***	0.27***	0.21***	0.22***	0.26***
Physical health		−0.22***	0.22***	0.14*	0.28***	0.25***

*n = 339. TB, thwarted belongingness; MLQ_P, presence of meaning; MLQ_S, search for meaning. *p < 0.05; **p < 0.01; ***p < 0.001.*

TABLE 3 | Testing the moderated mediation effect (MLQ_P as a mediator).

Dependent variables	Predictors	*b*	SE	*t*	R^2	*F*
Positive mental health					0.467	58.391***
	Education level	0.28	0.59	0.48		
	Physical health	1.74	0.58	3.02**		
	TB	−0.67	0.08	−8.20***		
	MLQ_P	0.95	0.14	6.92***		
	MLQ_P × TB	0.04	0.01	3.39***		
Successful aging					0.716	119.315***
	Education level	0.78	0.41	1.89		
	Physical health	0.04	0.41	0.10		
	TB	−0.11	0.06	−1.65		
	Positive mental health	0.69	0.04	19.09***		
	MLQ_P	0.31	0.10	2.99**		
	MLQ_P × TB	0.03	0.12	2.85**		
	MLQ_P × positive mental health	0.02	0.01	2.14*		
Conditional indirect effect analysis		MLQ_P value	Effect	Boot SE	BootLLCI	BootULCI
		18.82	−0.52***	0.08	−0.71	−0.38
		23.29	−0.46***	0.07	−0.60	−0.33
		27.76	−0.37***	0.09	−0.54	−0.19

*The b values are unstandardized coefficients. TB, thwarted belongingness; MLQ_P, presence of meaning. *p < 0.05; **p < 0.01; ***p < 0.001.*

aging *via* positive mental health was moderated by MLQ_P (**Table 3**). For older adults with low levels of MLQ_P, thwarted belongingness exhibited a negative impact on successful aging through decreased positive mental health ($b = -0.52$, $p < 0.001$). For older adults with high levels of MLQ_P, this indirect effect remained significant, but to a weaker degree ($b = -0.37$, $p < 0.001$).

According to Holmbeck's (2002) guidelines, we examined simple slopes at 1 SD above and below the mean MLQ_P level to test the significant effect of the MLQ_P × thwarted belongingness interaction on positive mental health. As shown in **Figure 2A**, at low levels of MLQ_P (<18.82), thwarted belongingness exhibited a significant and negative impact on positive mental health ($\beta = -0.51$, $t = -7.74$, $p < 0.001$). At high levels of MLQ_P (>27.76), thwarted belongingness could also significantly predict positive mental health ($\beta = -0.29$, $t = -5.60$, $p < 0.001$). These results indicated that thwarted belongingness had a stronger impact on positive mental health for older adults having lower levels of present of meaning, compared with those reporting higher levels of present of meaning. To illustrate the moderating effect of MLQ_P in the relationship between positive mental health and successful aging, another simple slope test was performed. As shown in **Figure 2B**, at low levels of MLQ_P, positive mental health exhibited a significant and positive impact on successful aging ($\beta = 0.64$, $t = 12.13$, $p < 0.001$). At high levels of MLQ_P, positive mental health could also significantly successful aging ($\beta = 0.81$, $t = 14.36$, $p < 0.001$). The results revealed that the effect of positive mental health on successful aging was weaker for older adults with lower levels of present of meaning, as compared to those who had higher levels of present of meaning.

Testing for the Moderated Mediation Model With MLQ_S as the Mediator

The same procedure was performed to test the moderating role of search for meaning (MLQ_S). As shown in **Table 4**, thwarted belongingness could negatively predict positive mental

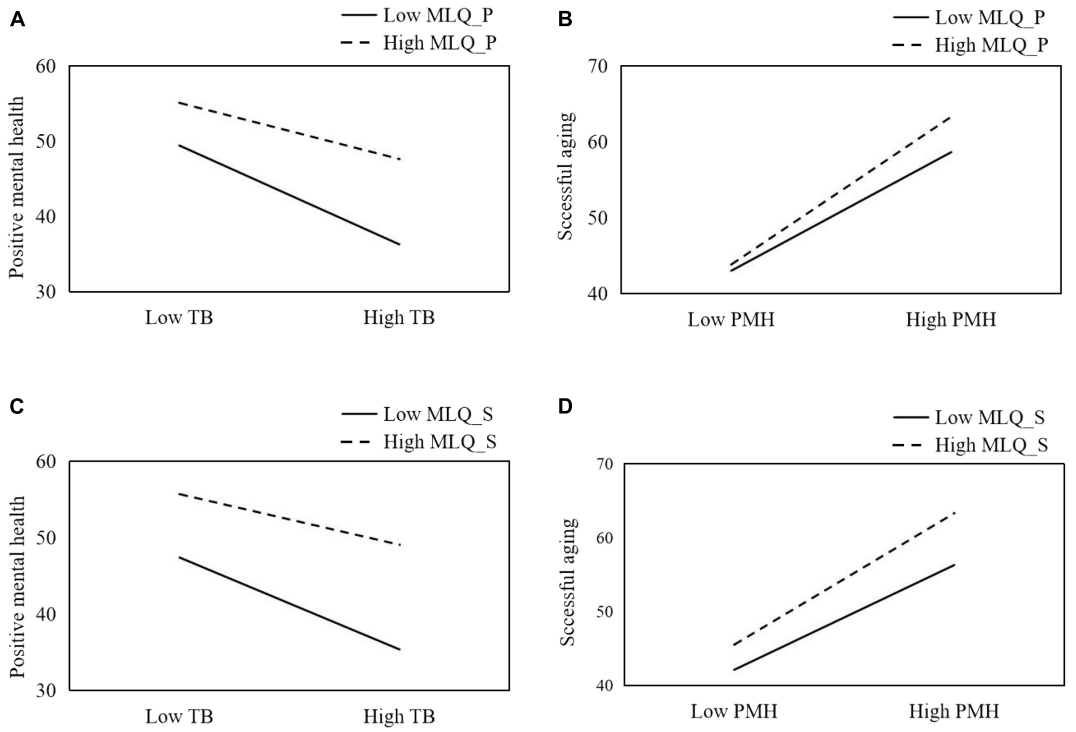

FIGURE 2 | MLQ_P and MLQ_S moderated the pattern of relationships between thwarted belongingness, mental health, and successful aging. **(A)** The moderating effect of MLQ_P on the link between thwarted belongingness and mental health; **(B)** the moderating effect of MLQ_P on the link between mental health and successful aging; **(C)** the moderating effect of MLQ_S on the link between thwarted belongingness and mental health; **(D)** the moderating effect of MLQ_S on the link between mental health and successful aging. TB, thwarted belongingness; MLQ_P, presence of meaning; MLQ_S, search for meaning; PMH, positive mental health.

TABLE 4 | Testing the moderated mediation effect (MLQ_S as a mediator).

Dependent variable	Predictor	*b*	SE	*t*	R^2	*F*
Mental health					0.53	76.03***
	Education level	0.31	0.55	0.56		
	Physical health	2.07	0.54	3.81***		
	TB	−0.61	0.07	−8.80***		
	MLQ_S	1.03	0.10	10.49***		
	MLQ_S × TB	0.03	0.01	3.04**		
Successful aging					0.74	131.22***
	Education level	0.86	0.39	2.18*		
	Physical health	0.10	0.40	0.25		
	TB	−0.08	0.06	−1.46		
	Mental health	0.63	0.04	15.97***		
	MLQ_S	0.49	0.08	6.01***		
	MLQ_S × TB	0.013	0.011	1.23		
	MLQ_S × mental health	0.013	0.006	2.13*		
Conditional indirect effect analysis		MLQ_S value	Effect	Boot SE	BootLLCI	BootULCI
		19.57	−0.44***	0.07	−0.58	−0.31
		24.91	−0.38***	0.05	−0.48	−0.28
		30.26	−0.30***	0.07	−0.44	−0.17

*The b values are unstandardized coefficients. TB, thwarted belongingness; MLQ_S, search for meaning. *p < 0.05; **p < 0.01; ***p < 0.001.*

health ($b = -0.61$, $t = -8.80$, $p < 0.001$), and this effect was moderated by MLQ_S ($b = 0.03$, $t = 3.04$, $p = 0.003 < 0.01$). Thwarted belongingness could not directly predict successful aging ($b = -0.08$, $t = -1.46$, $p = 0.146 < 0.001$). Successful aging could be positively predicted by positive mental health ($b = 0.63$, $t = 15.97$, $p < 0.001$) and this effect was moderated

by MLQ_S ($b = 0.013$, $t = 1.23$, $p = 0.034 < 0.05$). These results indicated that MLQ_S moderated the relationship between thwarted belongingness and positive mental health (the first stage of the mediating effect) and it also moderated the relationship between positive mental health and successful aging (the second stage of the mediating effect).

Furthermore, the conditional indirect effect analysis showed that the indirect effect of thwarted belongingness on successful aging *via* positive mental health was moderated by MLQ_S (**Table 4**). For older adults with low levels of MLQ_S, thwarted belongingness exhibited a negative impact on successful aging through decreased positive mental health ($b = -0.44$, $p < 0.001$), although this indirect effect was still significant but became weaker ($b = -0.30$, $p < 0.001$) for older adults with high levels of MLQ_P.

The simple slope tests shown in **Figure 2C** revealed that when low MLQ_S was reported by older adults, the linkage of thwarted belongingness and positive mental health was significant ($\beta = -0.46$, $t = -8.75$, $p < 0.001$). When MLQ_S was high, thwarted belongingness could also predict positive mental health but became weaker ($\beta = -0.25$, $t = -4.30$, $p < 0.001$). As illustrated in **Figure 2D**, the relationship between positive mental health and successful aging was weaker ($\beta = 0.59$, $t = 11.44$, $p < 0.001$) for participants reporting lower levels of MLQ_S, compared to those reporting higher levels of MLQ_S ($\beta = 0.75$, $t = 12.79$, $p < 0.001$).

Together, the above results substantiated our Hypothesis 3 that MLQ_P and MLQ_S serve as beneficial factors and moderate the pattern of relationships between thwarted belongingness, positive mental health, and successful aging.

DISCUSSION

Previous studies have indicated the close relationship between interpersonal relations and successful aging (Van Orden et al., 2012; Jang and Kim, 2021). Based on the MacArthur's theory, the current study extends the previous finding by identifying the mechanisms connecting thwarted interpersonal needs to successful aging. Our study generally supported initial three hypotheses. Specifically, the results revealed that successful aging was related to less thwarted belongingness, better positive mental health, and more meaning in life in Chinese older adults. Positive mental health can fully mediate the relationship between thwarted belongingness and successful aging. The indirect effect of thwarted belongingness on successful aging through positive mental health was moderated by two factors of meaning in life (i.e., presence of meaning and search for meaning).

Older adults in the current study exhibited higher levels of thwarted belongingness and poorer quality of successful aging. Specifically, single-sample *t*-tests showed that the mean total score of thwarted belongingness reported by older adults in our study (30.64 ± 7.07) was significantly higher than the findings reported by Eades et al. (2019) (19.87 ± 12.04, $t = 25.78$, $p < 0.001$, Cohen's $d = 1.06$) and Shim et al. (2021) (22.76 ± 9.29, $t = 18.85$, $p < 0.001$, Cohen's $d = 0.92$). The mean total score of successful aging in our sample was significantly lower than the results reported by Troutman et al. (2011a) (52.15 ± 12.09 vs 63.48 ± 11.23, $t = -17.25$, $p < 0.001$, Cohen's $d = -0.97$). These results indicated that older adults in the current study generally had frustrated interpersonal needs and poor quality of successful aging. Our study revealed that most of socio-economic variables (age, gender, economic status, and marital status) had no significant association with successful aging, consistent with the previous finding (Kim and Park, 2016). Education level and physical health were found to have positive associations with successful aging in our study. This is understandable since education acts as a proxy for other factors such as social resources, coping style, etc. (Bluth et al., 2020; Yu and Xiao, 2021). The higher the education level, the better the positive mental health and quality of life for older adults will be. Meanwhile, good physical function and health conditions help older adults to expand activity space and enrich their social life, thereby archiving successful aging in later life (Kim and Park, 2016). Conversely, severe physical diseases or function limitations can affect individuals' social activities and hinder the process of successful aging (Fingerman et al., 2021).

In line with previous studies (Jang and Kim, 2021; Ye and Zhang, 2021), our results of correlation analyses clearly supported the Hypothesis 1 that successful aging is closely attached to less thwarted belongingness, better mental health, and more meaning in life in Chinese older adults. Regarding the relationship between thwarted belongingness and successful aging, our finding lends support to the MacArthur model (Rowe and Kahn, 2015), which addressed that successful aging is closely associated with maintenance good relations with others. The close relationship between successful aging, positive mental health, and meaning in life is also easily understandable, since meaning in life relates to one's interpretation of their experiences (Lee et al., 2022), protects individuals against boredom and emptiness (Melton and Schulenberg, 2007), and improves psychological well-being and life satisfaction (Zhou and Xu, 2019).

Researchers have emphasized the importance of relationships for quality of life in aging by stating that social interaction can promote the exchange of feelings capable of enhancing or mitigating the offer and receipt of assistance related to health maintenance (Soares et al., 2021). Conversely, negative social interaction and interpersonal conflict often have a great impact on older adults' psychological well-being (Hupkens et al., 2018; Lee et al., 2022). In line with previous studies, mediation analyses in the current study revealed that the effect of thwarted belongingness on successful aging was totally carried by the reduction of positive mental health. Accordingly, positive mental health played an important role in interpreting why and how thwarted belongingness is associated with poorer quality of successful aging. Therefore, initial Hypothesis 2 in our study was well supported.

Moderation analyses showed that meaning in life emerged as a moderator in the relationship between thwarted belongingness and positive mental health. In our study, pursing (searching for meaning) and maintaining meaning in life (presence of meaning) could attenuate the indirect effect of thwarted belongingness on successful aging *via* positive mental health. This is congruent with the previous finding that meaning in life works following

the protective-protective model (Cohen et al., 2003; Yang et al., 2019). Specifically, our results demonstrated that presence of meaning buffered the link between thwarted belongingness and positive mental health, therefore the protective-attenuating role of presence of meaning was confirmed. Besides that, presence of meaning strengthened the link between positive mental health and successful aging, indicating the protective-enhancing role of presence of meaning was also revealed. Highly consistent with the role of presence of meaning, searching for meaning also works following the protective-protective model. These results confirmed the existential theory that an increased sense of meaning and purpose in life is often linked to greater stress coping capacity (Frankl, 1984; Macià et al., 2021) and better outcomes on a range of health and well-being (Yang et al., 2019). Therefore, thwarted belongingness exhibited less adverse effects on positive mental health and the protective effect of positive mental health on successful aging was strengthened for older adults with actively finding and maintaining meaning and purpose. Consequently, these results well supported our Hypothesis 3 that presence of meaning and search for meaning serve as beneficial factors and moderate the pattern of relationships between thwarted belongingness, positive mental health, and successful aging.

Previous studies in Western countries (Cohen and Cairns, 2011; Gellis et al., 2020) have asserted that for older persons, an ongoing search for meaning in life is linked to negative outcomes than a perception of existing meaning in life. However, our study underlines the beneficial role of search for meaning in the process of successful aging, which is consistent with the studies conducted in Eastern countries (Steger et al., 2008; Jin et al., 2016; Yang et al., 2019). Therefore, the value systems and cultural aspects should be considered in the process of successful aging (Hyun Cha et al., 2012). For older adults who actively seek goals and meaning in life, they may regard thwarted belongingness as momentary and controllable. They are more inclined to regulate their activities to establish new beliefs and goals rather than immersing themselves in the negative experiences.

Limitations

Some limitations of this study should be noted. Firstly, due to the cross-sectional design, the causal relationship of main study variables should be further confirmed in future studies. Secondly, older adults with 60–75 years old were recruited in our study. They still have better psychical and mental functions to find new goals and values of life. Therefore, these conclusions in our study can not be applied to people who aged above 75 years old. Meanwhile, the limited age range of older adults in this study prevented us from clarifying the relationship between age and successful aging. Thirdly, the sample of 339 older adults is indeed a small one which may limit the generalization of the results. The findings in the current study need to be further verified in larger samples. Finally, there might be sampling bias in this study. It is hardly accessible to recruit those who have more serious social isolation and thwarted belongingness due to severe physical limitations.

CONCLUSION

The present study illustrates how and under what conditions thwarted belongingness exhibits the negative effect on successful aging. First, we demonstrated that thwarted belongingness hindered the process of successful aging by decreased positive mental health. Second, it was found that both presence of life and search for meaning moderate the indirect negative effect of thwarted belongingness on successful aging through positive mental health, with this negative effect being weaker for individuals with higher levels of meaning in life. Accordingly, promoting older adults' meaning and purpose in life may be an effective avenue to ameliorate the negative experiences of thwarted belongingness and enhance the process of successful aging. These findings have significant implications for the development of successful aging, which may offer useful guidance on professional counseling for Chinese older adults.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

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

AUTHOR CONTRIBUTIONS

YY designed the study, collected and analyzed the data, and wrote the manuscript independently. The author contributed to the article and approved the submitted version.

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Psychosocial Experiences of Older Women in the Management of Urinary Incontinence: A Qualitative Study

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Introduction: Urinary incontinence is a prevalent disorder amongst older women. Identifying the psychosocial experiences of older women in disease management can improve the patient care process. Hence, the present study aimed to determine the psychosocial experiences of older women in the management of urinary incontinence.

Methods: This qualitative study was conducted using conventional content analysis. The study data were collected via unstructured in-depth face-to-face interviews with 22 older women suffering from urinary incontinence selected via purposive sampling. Sampling and data analysis were done simultaneously and were continued until data saturation. The interviews were recorded, transcribed, and analyzed using the method proposed by Graneheim and Lundman.

Results: The results indicated that the older people with urinary incontinence had various psychosocial experiences while living with and managing this disease. Accordingly, four main themes were extracted from the data as follows: "problem incompatibility with the disease," "mental impasse," "facing social restrictions," and "concealment and social escapism."

Conclusion: The findings demonstrated that older people with urinary incontinence experienced significant psychosocial pressures while living with this disorder, which affected their psychosocial well-being. Thus, paying attention to these psychosocial experiences while supporting and taking care of these patients can positively impact their psychosocial health and quality of life.

Keywords: urinary incontinence, women, psychosocial, qualitative research, older

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INTRODUCTION

Urinary incontinence has been defined as any involuntary urine leakage (Batmani et al., 2021) and is common in older adults. The prevalence of this disorder has been found to increase with age (Davis et al., 2020; Shaw and Wagg, 2021). Additionally, most epidemiological studies have reported the prevalence of urinary incontinence at 25–45% in females and 5–35% in males (Grant and Currie, 2020; Shaw and Wagg, 2021). In a study conducted in Middle Eastern countries, the prevalence of urinary incontinence was reported as 52%. In the studies conducted in different regions of Asia, the prevalence of urinary incontinence was estimated as 13% in older adults (Kaşıkçı et al., 2015; Khan et al., 2017; Batmani et al., 2021). Another study conducted in Iran indicated that the prevalence of urinary incontinence was 62.2% among women over 60 years of age (Morowatisharifabad et al., 2015).

Along with the relatively high prevalence of this problem among older adults, urinary incontinence causes changes in all aspects of older people's lives, and it has many physical, psychological, and social effects, affecting their quality of life (Goforth and Langaker, 2016; Saboia et al., 2017; Javadifar and Komeilifar, 2018). Evidence has indicated that older adults with urinary incontinence have lower perceived health than healthy ones (Murukesu et al., 2019). In fact, due to the limitations associated with the disease, as well as the need for continuous care under different conditions, these patients encounter a variety of psychological and social problems (Higa et al., 2008; Grant and Currie, 2020), causing tension and affecting their identity, emotional balance, self-satisfaction, feeling of efficiency, social interaction, and interpersonal relationships (Afrasiabifar et al., 2010; Stickley et al., 2017).

Previous studies have shown that urinary incontinence was associated with depression, stress, and self-esteem. Accordingly, women with urinary incontinence reported significantly higher levels of depression and stress and lower self-esteem levels than those without this problem (Lee et al., 2021). On the other hand, the findings of another study on the psychosocial impacts of urinary incontinence on women's quality of life showed that the psychosocial effects of urine leakage like anxiety, isolation, low self-esteem, and depression could worsen the symptoms of urinary incontinence. Therefore, it could adversely affect the quality of life of the affected women (Omu et al., 2020).

How the older adults cope with this disease, and attitudes about this disease are very important in the older adults and the society in which the older adults live (Avery et al., 2013) and can affect their psychosocial health as well as their quality of life (Alshammari et al., 2020). Evidence has demonstrated that older women handle these hurdles depending on their social and cultural backgrounds. In other words, each disease is caused, experienced, and managed differently by different people based on the social and cultural backgrounds of the society they live in van den Muijsenbergh and Lagro-Janssen (2006), Andersson et al. (2008), Hayder and Schnepp (2010), Gjerde (2012), Shirazi et al. (2014), Özkan et al. (2015), Heidari et al. (2021), Shakery et al. (2021). Thus, to determine the psychosocial effects of urinary incontinence on older women, their sociocultural backgrounds should be considered (Sinclair and Ramsay, 2011; Laganà et al., 2014; Alshammari et al., 2020). On the other hand, regarding each society's sociocultural backgrounds, identifying the experiences of older women suffering from urinary incontinence, finding the strategies they use for the management of the disease, and determining the effects of those strategies on various health dimensions, particularly psychosocial health, can help nurses and other healthcare team members identify and evaluate this problem amongst older women and take measures to provide these patients with training and healthcare services. In this way, they will promote their psychosocial health and improve their quality of life (Pintos-Díaz et al., 2019). In this context, qualitative studies should be conducted based on the sociocultural features of the society where the intended older people live (Shirazi et al., 2016).

Considering Iran's specific cultural, social, and religious backgrounds, high prevalence of urinary incontinence among older women, and lack of qualitative studies in this field, the present study aims to determine the psychosocial experiences of older women regarding the management of urinary incontinence.

MATERIALS AND METHODS

Aim

The present study aimed to determine the psychosocial experiences of older women in the management of urinary incontinence.

Study Design

This qualitative research was conducted via conventional content analysis. Content analysis refers to the process of perception, interpretation, and conceptualization of the inner meanings of qualitative data (Graneheim and Lundman, 2004). In this method, categories are inductively extracted from textual and verbal data (Cho and Lee, 2014).

Participants

This study was conducted on Persian-speaking older women aged >60 years who were clinically diagnosed with one type of urinary incontinence, were suffering from the disease for at least 6 months, had no history of mental disorders, were utterly conscious, and were willing to take part in the research and share their experiences of disease management. The participants were selected via purposeful sampling from the older women referred to comprehensive health centers in Ahvaz from November 2019 until May 2020. In order to achieve maximum variation among the participants, older women with various education levels, marital statuses, and financial statuses were enrolled in the research. In other words, the researcher interviewed older adults with a suitable economic status (P: 2, 13) as well as those with moderate (P: 1, 7) or poor (P: 14, 19) economic statuses. She also interviewed older adults with a desirable literacy level (P: 9, 12) as well as illiterate ones (P: 6, 11). Interviews were also conducted with older adults living alone (P: 5, 10) as well as those living with their families (P: 3, 4) or spouses (P: 8, 17). Older women with urinary incontinence were interviewed until data saturation was achieved. After all, 22 participants were selected and interviewed.

Data Collection

The study data were collected via unstructured in-depth face-to-face interviews in comprehensive health centers affiliated to Ahvaz Jundishapur University of Medical Sciences from November 2019 until May 2020. It should be noted that the time and place of the interviews were arranged with the participants. The interviews were begun with general questions like "what psychosocial problems has urinary incontinence created for you" and "what do you do to overcome these problems" and were continued using probing questions like "can you explain more," "please give an example," "how did you feel under those conditions," and "what did you do when you encountered this problem." The first interview was treated as preliminary and was used to identify the potential areas of interest or concern. The interviews lasted for 40–60 min and were recorded using a digital recorder (made by Sony). Purposive sampling was continued until data saturation was achieved and the collected information confirmed the previously gathered points. Overall, 24 interviews were conducted with 22 participants (two patients were interviewed twice). While analyzing the interviews, the researchers encountered some issues, which required further probing and follow-up. Therefore, two participants were interviewed twice in order to achieve richer data. After each interview, its content was transcribed verbatim in the shortest time possible.

Data Analysis

The study data were analyzed based on the method proposed by Graneheim and Lundman (2004), which included the following stages: (1) immediate transcription of interviews, (2) reading the whole text for gaining an overall perception, (3) determination of the units of meaning and initial codes, (4) classification of the similar initial codes in more broad categories, and (5) determining the hidden content in the data (Graneheim and Lundman, 2004). Therefore, in the present study, the contents of the interviews were immediately transcribed, typed, and read several times. In this way, the meaning units were extracted from the words, sentences, and paragraphs and were coded. Afterward, a constant comparison was made, and the codes were categorized based on their similarities. Then, the initial codes were merged in order to create more abstract categories and the themes were identified. Categorization and analysis of the data were carried out using the MAXQDA 10 software.

Ethical Considerations

After gaining permission from the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1398.604, proposal No. NCRCCD-9825) and acquiring the necessary licenses, data collection was started. It should be noted that the participants' oral and written informed consent was also obtained before data collection. In addition, the interviews were carried out such a way that the participants' comfort and privacy were respected. Besides, the participants were given nicknames to ascertain the anonymity and confidentiality of their information. The participants were also assured that they could withdraw from the study without any negative impacts on their treatment processes. After all, the interviews were transcribed word by word, and the codes were extracted exactly from the points mentioned by the participants.

Trustworthiness

In order to ensure the trustworthiness of the data, use was made of the criteria proposed by Guba and Lincoln (1994), i.e., credibility, transferability, confirmability, and dependability. In order to determine the credibility of the collected data, use was made of prolonged engagement (10 months). In addition, the codes, categories, and themes were continuously investigated and reviewed by the research team. The initial codes were also returned to the interviewees to be confirmed. In order to determine dependability, the research team was involved in the study process, and the results were presented to several external observers to explore the process of data analysis. In order to achieve confirmability, all research processes, particularly data collection and analysis, as well as the formation of the main themes, were approved by the external observers. Finally, maximum diversity was observed in the selection of the participants to enhance transferability.

RESULTS

This study was conducted on 22 older women with a mean age of 66.54 $\pm$ 5.76 years who suffered from urinary incontinence. Among the participants, 72% were married, and 28% were widowed. In addition, 9.18% of the participants had an academic education, 59.01% had diplomas and below diploma degrees, and 31.81% were illiterate. The participants had been suffering from urinary incontinence for 2–20 years.

The results revealed that the participants had various psychosocial experiences while living with and managing this disease, which affected their health and quality of life. Data analysis showed four main themes and 13 categories. The main themes included "problem incompatibility with the disease," "mental impasse," "facing social restrictions," and "concealment and social escapism." The main themes, categories, and the participants' direct quotes have been presented in **Table 1**.

Problem Incompatibility With the Disease

The life experiences of older adults women with urinary incontinence showed their problems incompatibility with the disease. Despite using various strategies, they were not able to control their urination under sensitive circumstances. Therefore, they frequently faced failures in combating the disease and felt helpless in this regard. On the other hand, their inability to control their disease disrupted their daily lives, created numerous problems for them, and disturbed their tranquility, eventually leading to a feeling of dissatisfaction with life.

Helplessness Against the Disease

Despite using various strategies such as restricting the consumption of fluids, eating specific types of food, consuming medications, and reducing the activities that increased the

intra-abdominal pressure, the participants were not able to control their disease under sensitive conditions including the times they were at parties, out of the house, or with others. This caused them to feel helpless in disease management. They also stated frequently that they were defeated by the disease.

> *"When I suddenly sneeze or laugh at a party, the urine leaks unintentionally, and I cannot control it"* (P. 9).

> *"I feel that I have been defeated. I have had enough. I feel helpless"* (P. 1).

Problems in Daily Life

This disease disrupted the patients' everyday life processes, leading to an imbalance in their lives. In other words, the participants' activities of daily living were affected by the disease.

> *"This disease has affected my life. It has disturbed my tranquility"* (P. 8).

> "*Ever since I had this problem, I have faced problems in doing my religious affairs because I can't keep myself clean*" (P. 4).

> *"From people's perspective, this is not an acceptable disease. All people love cleanliness. If individuals are not clean or can't keep themselves clean, their lives will be disrupted"* (P. 10).

Dissatisfaction With Living With the Disease

The limitations and problems associated with the disease resulted in the feeling of dissatisfaction with life among the participants. In other words, the participants frequently mentioned their dissatisfaction with living with this disease.

> *"It has created many problems in my life. Living with this disease is like a nightmare. I do not enjoy my life. I am not satisfied with living with this disease*" (P. 4).

Mental Impasse

While living with urinary incontinence, the participants suffered a lot. On the other hand, the ineffectiveness of their measures for managing the disease resulted in their disappointment with the treatment. Moreover, they felt ashamed and blamed themselves for suffering from the disease. They were also tired of thinking about the disease and controlling it all the time. Furthermore, they constantly feared while living with this disease, fear of being judged and rejected. These multifaceted mental pressures put them in a mental impasse.

Suffering Due to the Disease

In addition to the disease, the older participants suffered from getting wet frequently, frequent purification, and foul urine smell.

> *"It is hard to tolerate the disease. It bothers the patient a lot"* (P. 12).

> *"I am annoyed since I get wet frequently, and I need to purify myself"* (P. 5).

Disappointment With the Treatment

Frequent failures in the treatment and control of the disease and facing the peers' negative experiences created a feeling of discouragement and disappointment among the older women.

> *"I have done everything to treat the disease, but I was not successful. I have become disappointed"* (P. 15).

Feeling of Shame

Since the participants considered urinary incontinence a taboo, they felt ashamed of suffering from this disease. The experiences of unintentional urine leakage further stimulated this feeling at inappropriate times and places and in the presence of other individuals.

> *"When you get wet in front of your family, friends, and even children, you feel ashamed"* (P. 3).

Self-Blame

The participants frequently blamed themselves for suffering from the disease. In this respect, they believed that the disease resulted from their lack of self-care. They also stated that the lack of timely follow-up of the disease caused the intensification of the condition.

> *"When I get wet, I just blame myself because I did not care for the problem to solve it sooner"* (P. 18).

Continuous Mental Involvement With the Disease

The participants emphasized that they thought about their disease all the time. In other words, they lived with these mental ruminations. They believed that they had to be careful about their problem to manage it to the extent possible.

> *"I think about my disease all the time. It does not get out of my mind even for a second. I have to be careful to avoid problems"* (P. 14).

Fear, as a Constant Companion

The participants lived with a constant fear resulting from their inability to control their urinations and the intensification of the disease over time.

> *"I am afraid of the intensification of my conditions with aging"* (P. 11).

The participants were also frightened to unveil their disease because they feared facing their acquaintances' inappropriate behaviors. They were also afraid of others' judgments and attitudes toward the disease. They thought that their family and friends would not be willing to have relationships with them due to their disease.

> *"I am afraid of changes in others' behaviors, not being accepted by others. They may not be willing to have relationships with me. I am afraid of being rejected"* (P. 16).

Facing Social Restrictions

The older women with urinary incontinence faced various social restrictions, including lack of access to sanitation facilities, which reduced their social activities.

Insufficient Access to Sanitation Facilities in the Society

The majority of the participants complained about the lack of sanitation facilities in the society. They maintained that they did not have access to public restrooms in

some places. The inability to use Iranian toilets was yet another problem mentioned by the participants. Moreover, they did not have access to bathrooms, particularly in religious places, to purify themselves if necessary. They could not also find a place to change their wet clothes while they were out.

"There are no public restrooms on many streets, and if there are, they are very dirty" (P. 5).

"When I get wet out of my house, I can't find a safe place to clean myself and change my clothes" (P. 8).

Limitation of Outdoor Activities

Considering the participants' inability to control their urination and their insufficient access to sanitation facilities in society, they were obligated to limit their outdoor activities. Therefore, they avoided leaving the house or going to places without sanitation facilities to the extent possible. In other words, they only referred to places with public restrooms and had limited social activities.

"I do not go anywhere to the extent possible. I leave the house only for work because I am afraid of not finding a public restroom" (P. 19).

"I have limited my recreational activities with my family and friends" (P. 10).

Concealment and Social Escapism

The study participants tended to conceal their disease. They emphasized that this condition was a personal problem, which caused them to escape from society to hide their disease.

Concealing the Disease

Although the disease had negative impacts on the participants' social activities, mental health, and well-being, they were not willing to talk about their problem with their families, friends, and even the healthcare team due to the nature of the disease and in order to prevent social stigma. To hide their disease, some participants deprived themselves from forging social relationships with others and preferred to escape from society rather than unveiling their disease.

"I have hidden my problem from my family and friends" (P. 6).

"I do not like to talk about it with others. I do not like others to be aware of my problem. I hide it from everyone" (P. 17).

Living a Private Life With the Disease

The participants considered their disease a personal issue and avoided the engagement of others, even their family members, in their problem. They tended to manage and treat their disease on their own. They believed that talking to their family and friends about the disease did not help them solve the problem and resulted in sadness and sensitivity.

"I consider this disease a personal problem. I do not like to involve my family in this issue" (P. 18).

"I tell myself that I have to shoulder the burden of this problem" (P. 20).

DISCUSSION

This study aimed to determine older women's experiences regarding the management of urinary incontinence. The findings demonstrated that the participants experienced numerous mental pressures and social restrictions, which were effective in their psychosocial health. Totally, four main themes were extracted from the data as follows: "problem incompatibility with the disease," "mental impasse," "facing social restrictions," and "concealment and social escapism."

Urinary incontinence is accompanied by psychosocial consequences in older adult women, which are sometimes even more harmful than physical consequences. This disease exerts vast effects on daily living activities, social interactions, perception of health status, and quality of life, eventually resulting in limitations whose degree depends on society's cultural background. These limitations, in turn, affect women's mental and social health. Previous studies also indicated that the incidence of psychosocial complications was associated with urinary incontinence. Accordingly, older people with urinary incontinence had a weaker psychosocial health status (Chiu et al., 2020; Omu et al., 2020; Lee et al., 2021).

Similarities seem to exist in the psychosocial meanings of urinary incontinence amongst older women living in different cultures, ethnic groups, and social conditions. However, this disease can be accompanied by more problems in societies with specific religious backgrounds. Evidence has indicated differences in disease management experiences of the older women living in such communities compared to those in other societies. For instance, in Islamic communities, urinary incontinence can have more negative psychosocial effects on older adults people due to the cultural-religious atmosphere ruling the society (Karlowicz, 2010; Avery and Stocks, 2016; Jaberi et al., 2019; Batmani et al., 2021). This disease has also been associated with being reserved, isolated, and low self-esteem among Muslim women (Jokhio et al., 2013).

In the present study, facing unexpected and uncontrollable disease conditions resulted in the participants' helplessness and dissatisfaction with life due to disrupting their natural life processes. This was to some extent affected by the society's sociocultural background and represented helplessness incompatibility with the disease, which led to numerous psychosocial consequences for the older adults. In the same line, Hägglund and Ahlström (2007) disclosed that the inability to control urination resulted in the feeling of incompetence in disease management and reduced self-esteem amongst older women with urinary incontinence. This eventually led to psychosocial problems like isolationism, anxiety, and depression (Hägglund and Ahlström, 2007). Consistently, Berges et al. (2014) and Kinsey et al. (2016) reported that urinary incontinence disrupted the patients' activities of daily living, disturbed their normal life processes, and increased tensions in their lives. Other studies have also revealed dissatisfaction with life among older women with urinary incontinence. Accordingly, this disease negatively affected the patients' quality of life (Sinclair and Ramsay, 2011; Cerruto et al., 2013; Saboia et al., 2017).

TABLE 1 | Main themes, categories, and quotations identified through the interviews.

Main themes	Categories	Quotes
Problem in compatibility with the disease	- Helplessness against the disease - Problems in daily life - Dissatisfaction with living with the disease	- I feel that I can do nothing and I can't control it - I'm helpless. I have done anything you can think of, but I haven't been successful in - Wherever I am, if I reach the WC late, I get wet and I can't control myself - This disease has disrupted my life. You have this problem at home and outside. It disturbs your daily life - It disrupts the normal life. You can't live comfortably - Ever since I had this disorder, I haven't been satisfied with my life - When people have this problem, they don't enjoy their lives
Mental impasse	- Suffering due to the disease - Disappointment with the treatment - Feeling of shame - Continuous mental involvement with the disease - Self-blame - Fear, as a constant companion	- This disease destroys the patients' mood and annoys them - I am suffering in my life. It bothers the patient - It disturbs the patient mentally. It bothers me a lot - I'm disappointed with the treatment - I did what was necessary, but it was not successful. I have lost hope in treatment - I feel ashamed because of suffering from this disease - I can't tell my son that I have this problem and I have to undergo operation; I feel ashamed - When I attend a party, I feel ashamed because of going to WC frequently - You should be careful all the time, so that no problems will occur. These thoughts do not leave me alone even for a second - I think about this problem all the time. I always seek for ways to solve my problem - I always blame myself, because I didn't care for myself when I was young and I put a lot of pressure on myself and now I have this problem - I'm sorry for myself, because I didn't pay attention to my disease and didn't do anything for its treatment - I'm afraid of going out or going to a party. I'm afraid of not controlling myself and losing my reputation - I'm afraid of being noticed by others - I'm afraid of being labeled inappropriately by others
Facing social restrictions	- Insufficient access to sanitation facilities in the society - Limitation of outdoor activities	- I always have problems for finding restrooms out of the house - There is no bathroom in the mosque and I can't purify myself in case I get wet - I can't find a place to change my wet clothes out of my house - I rarely go to mosques or other religious places. I'm afraid of not being able to control my urination - I haven't gone on a trip for a long time, because there are few sanitation facilities on the roads and they are not clean - I don't go to parties, I don't go shopping
Concealment and social escapism	- Concealing the disease - Living a private life with the disease	- You can't tell your family or friends about your disease. It is better to be kept secret - I tell myself that I have to keep this problem in my heart. I don't like to talk about it with others - I don't like others to be aware of my disease - I prefer to follow up my treatments alone - Each person has a problem in one's life. I also have this problem and I have to take care of it. I shouldn't engage others in this problem

This disease causes psychological complications in older adults (Avery et al., 2013). Based on the current study findings, such complications as shame, fear, self-blame, disappointment, and constantly thinking about the disease put the older adults in a mental impasse, negatively affecting their mental well-being. The majority of studies in this field have also shown the feeling of shame among older patients with urinary incontinence (Hägglund and Wadensten, 2007; Nicolson et al., 2008). Moreover, patients considered this disease as a kind of stigma (Elstad et al., 2010). This attitude is frequently detected amongst Asian women, specifically South Asian ones, and affects discussions about the disease and reception of the related care services. On the other hand, concealing the inconveniences associated with the disease due to being shameful exerts a negative impact on patients' mental health (Higa et al., 2008; Chiu et al., 2020). Furthermore, since urine is considered dirty in the Islamic culture and urinary incontinence is regarded as uncleanliness, older adults' women with this disease have a constant fear from the way others may treat them. Previous studies also indicated that patients with urinary incontinence were constantly afraid of getting wet in front of others (Lim, 2016; Spencer et al., 2017), others' behaviors and judgments about the problem (Avery et al., 2013), and being rejected by others (Andersson et al., 2008). In the same vein, Doshani et al. (2007) stated that these patients were afraid of losing their relationships with others due to their disease, which significantly impacted their mental health.

Self-blame is also among the psychological disorders detected in older people suffering from urinary incontinence

(Senra and Pereira, 2015; Toye and Barker, 2020). Iranian women frequently sacrifice themselves, pay less attention to their health status, and prioritize other issues in their lives. This worsens their health problems, eventually leading to regret and self-blame. In the present research, the participants frequently blamed themselves for not having paid attention to the primary symptoms of the disease, not having taken timely measures for treating the disease and not having cared for themselves in this respect. Various studies have also revealed self-blame among patients with urinary incontinence, which was effective in their mental health (Mason et al., 1999; Teunissen et al., 2006; Avery et al., 2013; Senra and Pereira, 2015; Lee et al., 2021).

Other psychological problems mentioned in the current study included discouragement and disappointment of treatment, which affected their treatment process. Which agreed with the results of the research carried out by Nicolson et al. (2008). They found hopelessness together with anxiety and depression amongst patients with urinary incontinence. In their study, older women were also disappointed with urinary incontinence treatment and refused to seek treatment (Nicolson et al., 2008). In the current investigation, the participants were tired of thinking about controlling their disease under various circumstances. They could not stop thinking about the disease. Similarly, Hemachandra et al. (2009) reported that patients with urinary incontinence were tired of constantly thinking about the disease and controlling the conditions to avoid urine leakage, which harmed their mental health. Thus, the incidence of psychological disorders was considered an obstacle against mental well-being, accompanied by a mental burden among older women suffering from urinary incontinence (Sinclair and Ramsay, 2011; Avery et al., 2013).

The current study participants experienced significant social restrictions that affected their social functions and fulfillment of their social roles, eventually leading to social isolation. Therefore, it can be said that older people with urinary incontinence do not have a proper level of social health. Because social health encompasses individuals' social skills, social function, and ability to consider themselves as a part of society. Therefore, the social health of older women with urinary incontinence is impaired due to their inability to interact effectively with others and society and their inability to establish satisfactory social relationships and play their social roles (Babanejad et al., 2013; Saeid et al., 2019).

Older people need social support and welfare facilities to participate in society and participate in social activities; therefore, lack of appropriate social support for older people with urinary incontinence and paucity of sanitation facilities in the society restrict the presence of these individuals in the society, disrupt the fulfillment of their social roles, and lead to social isolation, thereby affecting their social health (Avery et al., 2013). Other studies also demonstrated that insufficient social support for older people and lack of welfare amenities in society were among the main problems that reduced their social participation (Darvishpoor Kakhki et al., 2010; Saeid et al., 2019). On the other hand, when urinary incontinence is considered uncleanliness in a society with a specific cultural and religious background, purification facilities have to be sufficiently provided in the society so that older adults' individuals with this disease can use them if necessary. Hence, in this study, the lack of these facilities in the society has been mentioned as a limitation for the presence of older adults in the community and for their performance of social activities. In this respect, Hosseini et al. (2021) stated in their study that lack of social support for older people and lack of the required facilities, decreased their presence in society and affected their health and well-being.

On the other hand, older adults' involvement in social networks such as family, friends, and neighbor networks is considered a source of support, helping them achieve appropriate mental and social health and supplying their other health dimensions (Javanmardifard et al., 2020; Hosseini et al., 2021). However, although the older women in our study suffered from urinary incontinence and needed support in many dimensions, they were doubtful about talking to others, even the healthcare team and family, and were willing to conceal their disease and escape from society and social networks. They regarded the disease as a secret in their lives and insisted on hiding it from others and managing it on their own. Other studies also indicated that older people were doubtful about unveiling their disease, which implied their deprivation from receiving help to facilitate the disease management (Hemachandra et al., 2009; Elstad et al., 2010; Jokar et al., 2020). Thus, if older patients deprive themselves of taking part in these social networks due to their unwillingness to unveil their disease, their mental and social health will be affected (Avery et al., 2013).

Since the emphasis of older women in our study on escaping from society, hiding their disease, and depriving themselves from the existing support sources like family, friends, and healthcare team resulted in their escape from society, which led to social isolation and affected their social health. In this respect, Thomas and Liu (2017) referred to the importance of older people's close relationships with their families, which helped them receive beneficial support and tolerate and manage their health problems. However, they stated that the participation of older adults in social networks decreased with age. Therefore, favorable family relationships play a more important role in their well-being and help them cope better with various stresses of this period and have healthier behaviors. This can, in turn, increase their self-esteem and exert a positive effect on their psychosocial health (Thomas and Liu, 2017).

Therefore, it is important to provide the facilities needed by these older adults in the community and also to provide conditions for the older adults with urinary incontinence to share their problems more easily with others, especially the family and health care team, to use the available support resources for better management of their disease; otherwise, it makes older women more exposed to the psychosocial effects of the disease.

CONCLUSION

Even though urinary incontinence is not a life-threatening condition, it can considerably impact the mental and social health

of older women suffering from the disease. These individuals face numerous mental and social challenges for their disease management, which affect their psychosocial well-being and quality of life. Paying attention to the psychosocial health of older adults with urinary incontinence based on the society's cultural and religious background and providing them with psychosocial support on the part of the healthcare team, families, and friends can help them desirably manage their disease.

IMPLICATIONS

Considering the growth of aging and the sociocultural background of the societies where older people live, it is necessary to pay attention to psychosocial health amongst older people suffering from urinary incontinence, examine these patients regarding the psychosocial complications of the disease, and find the origins of their problems. Besides, healthcare team members have to make genuine attempts to solve these problems. For instance, they are suggested to encourage such older patients to share their experiences with their peers, which can help break the associated taboos and promote treatment-seeking behaviors among these patients. Furthermore, the facilities needed by older adults' individuals with urinary incontinence are recommended to be provided in society to be able to actively participate in the community. This will eventually affect their physical, mental, and social health and their quality of life.

DATA AVAILABILITY STATEMENT

The data analyzed in this study is subject to the following licenses/restrictions: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1398.604, Proposal No. NCRCCD-9825). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

SJ, MG, FS, KZ, and FG were involved in the study conception and design, contributed to the data collection and analysis, critically revised the manuscript for important intellectual content, provided administrative and technical support, and supervised the work. SJ, MG, FS, and KZ drafted the manuscript. All authors contributed to preparing the manuscript and approved the submitted version.

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The Impact of Sleep Quality on Subjective Wellbeing Among Older Adults With Multimorbidity: A Moderated Mediation Model

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Background: Studies have found that poor sleep quality is negatively associated with subjective wellbeing in older adults, but the mechanisms underlying are unclear. In this study, we aimed to examine the mediating role of negative emotions and the moderating role of perceived social support in the relationship between sleep quality and subjective wellbeing in older adults with multimorbidity.

Methods: A multi-stage random sampling method was used to select a sample of 3,266 older adults aged 60 years and older. The Memorial University of Newfoundland Scale of Happiness (MUNSH), Pittsburgh Sleep Quality Index (PSQI), Depression Anxiety Stress Scales-21 (DASS-21), and Perceived Social Support Scale (PSSS) were used to assess subjective wellbeing, sleep quality, negative emotional states, and perceived social support, respectively. The moderated mediation models were examined using SPSS PROCESS Version 3.3 software.

Results: Sleep quality had a significant direct effect on subjective wellbeing in older adults ($\beta = -0.997$, $t = -11.783$, $p < 0.001$). Negative emotions partially mediated the effect of sleep quality on subjective wellbeing ($ab = -0.608$, 95%CI: −0.728, −0.497). The indirect effect was moderated by perceived social support ($\beta = -0.038$, 95%*CI*: −0.062, −0.014, $p < 0.001$; $\beta = -0.002$, 95%*CI*: −0.004, −0.01, $p = 0.008$).

Conclusion: Negative emotions increased the negative association between sleep quality and the subjective wellbeing of older adults with multimorbidity, and perceived social support played a moderating role. Psychological and behavioral interventions should be implemented as early as possible to promote mental health and enhance social support level of older adults with multimorbidity, and ultimately improve the subjective wellbeing of older adults.

Keywords: older adults, multimorbidity, subjective wellbeing, a moderated mediation model, negative emotions

INTRODUCTION

The aging process does not always imply a decline, but rather, as a multidimensional process; aging outcomes appear to be different for different individuals. With the growth of age, the physiological function of older adults may gradually decline, followed by the increasing risk of chronic diseases (Fortin et al., 2012). Multimorbidity, commonly defined as the presence of two or more chronic diseases (Nunes et al., 2016). Because of population aging and the association of chronic diseases with advanced age, multimorbidity has been identified as a big challenge for patients and health systems worldwide (Seo et al., 2017). In the United States, data from the household survey section of the 1987 National Medical Expenditure Survey (NMES) show 45.0% of the general population and 88% of the population aged 65 years and above was troubled by one chronic condition or more and that over 75.0% of healthcare expenditures was related to the treatment of chronic conditions (Hoffman et al., 1996). According to the data research released by China Health and Retirement Longitudinal Study (CHARLS) in 2015, 68.81% of the people (age 45 and above) suffered from one chronic disease, while 41.5% had two or more at the same time (Cheng et al., 2019). Furthermore, previous studies have shown that multimorbidity leads to an increased risk of disability and death in older adults, and as the number of diseases increases, patients' physical function scores and psychological composite scores tend to decrease, which seriously affects their functional status and quality of life (Yan et al., 1996). It can be seen that chronic diseases have become an important risk threatening older adults, and multimorbidity is also becoming a norm rather than the exception. Focusing on multimorbidity of the older adults is of great significance to alleviate the aging of the population.

Originated in positive psychology and health psychology, "subjective wellbeing" is an indicator of an individual's level of wellbeing based on his or her subjective evaluation of life, including judgments of life satisfaction and feelings. Subjective wellbeing and health are closely related. Studies have shown that subjective wellbeing is an important factor influencing life expectancy in middle-aged and older adults (Iwasa et al., 2005). People with chronic diseases tend to report lower levels of wellbeing (Parks et al., 2020). Compared with older adults sicked with one chronic illness or none, those with multimorbidity not only suffer from multiple illnesses, but also have greater financial stress, which may lead to worse subjective wellbeing (Pang, 2016). Improving subjective wellbeing can promote healthy psychological, work, and social relationships of individuals, thus significantly improving their quality of life (Diener, 1984; Ryan and Deci, 2001). Thus, enhancing the subjective wellbeing is vital to a happy later life of older adults with Multimorbidity.

Currently, interest in subjective wellbeing of older adults has gained momentum. With the increase of age, the aging stereotype will continue to be internalized into the individual's self-cognition of aging, that is, the aging self-stereotype. Aging self-stereotype has an important impact on individual physical and mental health in old age (Xu et al., 2021). Older adults' subjective wellbeing is influenced by multiple factors, such as educational attainment, income level, health status, marital status, social class, stressful events, etc. (An et al., 2008). Sleep quality, among others, is particularly important. As older adults age, the depth and length of sleep decreases, and they become susceptible to sleep disorders (National Institutes of Health, 2005). Sleep disorder is independently and strongly associated with deterioration of subjective wellbeing (Yokoyama et al., 2008). Although not life-threatening, in the long run, it can impair the immune system of older adults, lead to physical illness and reduce subjective wellbeing (National Institutes of Health, 2005).

In addition to the research on the direct relationship between variables, some scholars are committed to the research on the interaction mechanism among variables. Socio-economic status (SES) is a complex phenomenon predicted by a broad spectrum of variables that is often conceptualized as a combination of financial, occupational, and educational influences (Winkleby et al., 1992). For example, researchers have roughly divided the intermediate mechanism of the relationship between SES and health into four categories (Huang and Yin, 2013): Material or structure mechanism, which mainly considers income-related medical and health accessibility, the quality of medical services, and the impact of exposure to harmful living and working environments; lifestyle mechanism, which mainly discusses the effects of diet, sports activities, and smoking and drinking; Social psychological mechanism, considering the influence of pressure and negative emotions; the mechanism of the interaction between the neighborhood environment of the community and the above factors (Adler and Stewart, 2010; Prus, 2010). In this study, we aimed to verify if sleep quality has an indirect impact subjective wellbeing through other factors.

Previous studies have shown that sleep disorder is associated with increased stress sensitivity and self-reported negative emotions (Guerrero and Crocq, 1994; Minkel et al., 2012). The negative effects of impaired sleep on physical and mental wellbeing of older adults have recently been recognized by health care professionals (Luyster et al., 2015). Sleep deprivation may impair the effectiveness of emotion regulation strategies, creating undesirable consequences as to emotional wellbeing (Zhang et al., 2019). Studies have found that poor sleep quality in older adults is associated with negative emotions, such as anxiety and depression (Wolkove et al., 2007). At the same time, negative emotions are strongly associated with subjective wellbeing in older adults.

Perceived social support refers to the emotional experience and satisfaction that individuals feel respected, supported, and understood from the society (Brissette et al., 2002). It might be used to interpret the mechanism of psychological or mental health problems (Brissette et al., 2002). Social support may influence one's health behaviors through two main hypotheses. One is the direct effect (main effect) model, which proposes that social environments can help regulate health behaviors by providing resources directly. The other is the stress buffering hypothesis, which suggests that social support can provide resources to buffer the negative effect of stress and difficulties on health which finally maintain and improve an individual's

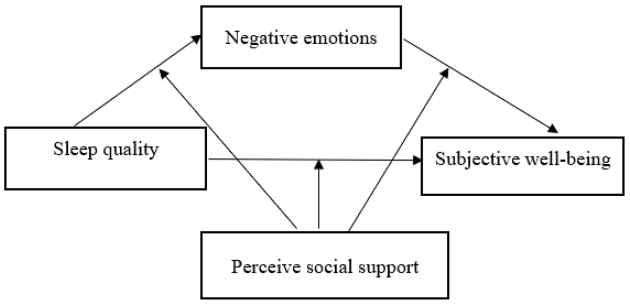

FIGURE 1 | Theoretical model: a moderated mediation model.

health outcomes (Lu et al., 2019). Early studies have found that perceived social support can have a significant positive effect on subjective wellbeing in older adults (Schulz and Decker, 1985; Farriol-Baroni et al., 2021).

Therefore, we hypothesized that negative emotions mediated the association between sleep quality and subjective wellbeing, and the associations were moderated by perceived social support (**Figure 1**).

MATERIALS AND METHODS

Study Design and Participants

This cross-sectional study was conducted by means of a questionnaire in 11 cities in Shanxi Province, central China. Participants were selected through a multi-stage random sample. Firstly, each district (county) in every city was numbered according to the order of districts (counties) on the government's website. Secondly, two (districts) counties in each city were selected using a random number table; two communities (administrative villages) were drawn from each district (county) in the same way. Then, we selected one or two residential communities (natural villages) from each community (administrative village), taking into account the different population size of each community (administrative village). Finally, among the residential communities (natural villages) selected, we randomly selected older adults who met the criteria in this study.

The inclusion criteria for this study were age 60 years and above; and clear cognitive and unimpeded communication skills. Those with communication difficulties were excluded. A total of 3,266 questionnaires were distributed in the study and 3,250 valid questionnaires were returned, with a valid response rate of 99.51%. All study procedures were approved by the university ethics committee. All research subjects were informed of the purpose of the investigation and signed informed consent forms. After providing consent, the participants were invited by trained investigators to respond to questionnaires, which were used to collect data.

In total, 3,250 individuals were recruited and 985 (425 male and 560 female) older adults with multimorbidity were included in the analysis, with a mean age of 71.37 ($SD = 7.08$) years old, and mean number of chronic diseases 2.80 ($SD = 1.13$).

Measures

Self-Administered Demographic Characteristics Questionnaire

Demographic data of participants included gender, age, BMI, living area, education level, marital status, monthly income, empty nest status, smoking status, and drinking status, whether they have chronic diseases, and the number of chronic diseases.

Multimorbidity is a condition where a person has two or more chronic diseases at the same time (Nunes et al., 2016). Respondents were therefore considered to be suffering from multimorbidity when they answered that they had two or more chronic diseases. Although the measure of chronic diseases was made in the form of self-reporting by the respondents in the study, it required a medical record with a clear diagnosis or a doctor's prescription certificate from a hospital in the county or above. Questionnaire on prevalence of chronic diseases includes 26 chronic diseases diagnosed by doctors, including obesity, hypertension, diabetes, coronary heart disease, stroke, arrhythmia, atherosclerosis, tuberculosis, respiratory diseases, Parkinson's disease, chronic obstructive Pneumonia, sciatica, rheumatoid or rheumatoid arthritis, hypothyroidism, hyperthyroidism, gout, osteoporosis, hearing impairment, eye disease, hepatitis, chronic nephritis, tuberculosis, mental illness, dementia, digestive system diseases, and cancer.

Subjective Wellbeing

Participants' subjective wellbeing was measured by the Memorial University of Newfoundland Scale of Happiness (MUNSH). It developed by Kozma et al., it was first applied in Newfoundland in 1980 to people aged 65–95 years in urban, rural, and older adults' apartments. The reliability and validity of the scale were high (Martín-María et al., 2021). This scale can be used to assess the subjective wellbeing of older people in China (Zhang et al., 2021). The MUNSH contains 24 items, structured into four subscales, namely positive affect (PA) and negative affect (NA) with five items for each, positive experience (NE), and negative experience (PE) with seven items for each (Liu and Gong, 1999). The total score is equal to the positive and negative factor scores ranging from −24 to +24. For calculation purposes, the constant 24 is added, and the score range is 0–48. The higher the score, the higher subjective wellbeing. According to MUNSH evaluation criteria, the total score: ≥36 indicates high subjective wellbeing level, ≤12 indicates low subjective wellbeing level, and in between is medium subjective wellbeing level (Zhang et al., 2017). The Cronbach's α for the four sub-dimensions of the MUNSH scale in this study were 0.790, 0.827, 0.746, and 0.810, with a KMO coefficient of 0.936, indicating good reliability.

Pittsburgh Sleep Quality Index

Sleep quality was measured by Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). The PSQI is a self-report questionnaire that assesses quality of sleep during the previous month. It contains 19 self-rated questions yielding seven dimensions: the total score of each dimension is accumulated as the total PQSI score, which ranges from 0 to 21 (Buysse et al., 1989), higher scores suggest poorer sleep quality (Liu et al., 2017).

Negative Emotions

The short-form version of the Depression Anxiety Stress Scales (DASS-21) has 21 items used to measure three negative emotional experiences with seven items for each: depression (Diener, 1984; Winkleby et al., 1992; Guerrero and Crocq, 1994; An et al., 2008; Huang and Yin, 2013; Seo et al., 2017; Cheng et al., 2019), anxiety (Hoffman et al., 1996; Iwasa et al., 2005; Yokoyama et al., 2008; Adler and Stewart, 2010; Minkel et al., 2012; Nunes et al., 2016; Pang, 2016), and stress (Yan et al., 1996; Ryan and Deci, 2001; National Institutes of Health, 2005; Prus, 2010; Fortin et al., 2012; Lu et al., 2018; Parks et al., 2020; Xu et al., 2021). A four-point scale was used (0 = not at all, 1 = partially, 2 = mostly, and 3 = fully), with higher scores indicating stronger negative emotional experience (Lu et al., 2018).

Perceived Social Support

Perceived Social Support Scale (PSSS) is an individual self-understanding, self-PSSS for family support, friend support, and other support, and the total score reflects the total degree of social support felt by the individual from family, friends, and others. The scale contains three dimensions: family support, friend support, and other support. A seven-level scoring method was used, with the score of all entries combined ≤36 for as low support status, ≥61 as high support status, and the rest as intermediate support status (Wei et al., 2016).

Data Analyses

As this study used self-reported data, which may lead to a common method bias effect, Harman's one-way analysis was used to test. Correlation analysis between variables was realized by Pearson Product–Moment Correlation. Mediation and moderation were tested using the SPSS macro program PROCESS developed by Hayes (2013). If the 95% CI of the mediation effect did not contain zero, then the effect would be significant at the 0.05 level. The macro allowed for calculating and testing direct effects, the total effect, and indirect effects. Based on the bootstrap moderating and mediation effect tests, our calculations were carried out in two steps. Model 4 examines the mediating role of negative emotions in the effect of sleep quality on subjective wellbeing. Then, Model 59 examines the moderating role of perceived social support in the relationship between sleep quality and negative emotions on subjective wellbeing. The bias-corrected percentile Bootstrap test was used to extract 10,000 repetitions to calculate the 95% CI. IBM SPSS version 26 was used for data analysis.

Common Method Deviation Test

In Harman one-way analysis of factors test, items were subjected to unrotated principal component factor analysis. The results showed that the first factor explained 23.65% of the variance, less than 40%, indicating that the data in this study did not produce a serious common method bias.

RESULTS

Descriptive Analyses

The mean, SDs, and correlations of all variables were presented in **Table 1**. Sleep quality ($r = -0.387$, $p < 0.01$) and negative emotions ($r = -0.603$, $p < 0.01$) were negatively correlated with subjective wellbeing. Perceived social support was positively related to subjective wellbeing ($r = 0.492$, $p < 0.01$) and negatively related to negative emotions ($r = -0.350$, $p < 0.01$). Sleep quality was positively correlated with negative emotions ($r = 0.434$, $p < 0.01$).

Mediation Effect Analysis

Control variables included gender, age, BMI, living area, educational level, marital status, monthly income, empty nest status, smoking status, and drink status. Model 4 in PROCESS program was adopted to test the mediating effect of negative emotions on sleep quality and subjective wellbeing. **Table 2** presented that sleep quality had a direct predictive effect on the subjective wellbeing ($\beta = -0.997$, $t = -11.783$, $p < 0.001$). Sleep quality was a positive predictor of negative emotions ($\beta = 2.360$,

TABLE 2 | Mediating effects of negative emotions between sleep quality and subjective wellbeing.

Regression equation	Goodness of Fit		Coefficient significance		
Outcome variables	**Process**	R^2	***F*-value**	**β-value**	***t*-value**
Subjective wellbeing	Sleep quality	0.195	21.380	−0.997***	−11.783
Negative emotions	Sleep quality	0.215	24.234	2.360***	14.032
Subjective wellbeing	Sleep quality	0.406	55.393	−0.388***	−4.875
	Negative emotions			−0.258***	−18.604

***$p < 0.001$.

TABLE 1 | Results of descriptive statistics and correlation analysis for each variable ($n = 3{,}250$).

Variables	*M*	*SD*	1	2	3	4
1 Sleep quality	5.08	3.44	1	-	-	-
2 Negative emotions	19.14	20.57	0.434**	1	-	-
3 Perceived social support	66.15	13.69	−0.240**	−0.350**	1	-
4 Subjective wellbeing	33.65	10.15	−0.387**	−0.603**	0.492**	1

M, mean, SD, standard deviation. A higher sleep quality score indicates a more serious sleep quality problem, (same below).
**$p < 0.01$.

$t = 14.032$, $p < 0.001$). After adding the negative emotion' score as a mediating variable, negative emotions still had a negative prediction effect on the subjective wellbeing ($\beta = -0.258$, $t = -18.604$, $p < 0.001$), and sleep quality also had a negative predictive effect on the subjective wellbeing ($\beta = -0.388$, $t = -4.875$, $p < 0.001$). In addition, on bias-corrected percentile bootstrap analysis, **Table 3** showed that the mediation effect of negative emotions on the relationship between sleep quality and subjective wellbeing was significant ($ab = -0.608$, 95% CI −0.728 to −0.497), and accounted for 61.00% of the total effect. Therefore, negative emotions partially mediated the relationship between sleep quality and subjective wellbeing.

Moderating Effect Analysis

Moderated mediation effect analysis was performed using model 59 (Wei et al., 2016) in the PROCESS program (in **Tables 4–6**). **Table 4** showed that the effect of the interaction term of sleep quality and perceived social support on the negative emotion's score was statistically significant ($\beta = -0.038$, $t = -3.081$, $p < 0.01$), which indicates that the relationship between sleep quality and subjective wellbeing was moderated by perceived social support. Additionally, the effect of the interaction term of negative emotions and perceived social support on the subjective wellbeing was statistically significant ($\beta = -0.002$, $t = -2.645$, $p < 0.01$). This result indicated perceived social support moderated the relationship between negative emotions and subjective wellbeing. However, the effect of the interaction term of sleep quality and perceived social support on subjective wellbeing was not statistically significant ($\beta = -0.006$, $t = -1.046$, $p = 0.296$).

The results of the simple slope test (see **Table 5** and **Figure 2**) further suggest that when perceived social support is low, sleep quality is positively associated with the negative emotions ($\beta_{simple} = 2.534$, 95% CI 2.070–2.997). Moreover, in older adults with high perceived social support, the association between sleep quality and negative emotions was still significant ($\beta_{simple} = 1.503$, 95% CI 1.044–1.962). These results indicate that the relationship between sleep quality and negative emotions became weaker with an increase in perceived social support. Thus, perceived social support is a protective factor that can effectively alleviate the adverse effects of poor sleep quality on negative emotions.

The results of the simple slope test (see **Table 6** and **Figure 2**) further suggest that when perceived social support is low, negative emotions are negatively associated with subjective wellbeing ($\beta_{simple} = -0.485$, 95% CI −0.654 to −0.333). Moreover, in older adults with high perceived social support, the association between negative emotions and subjective wellbeing was still significant ($\beta_{simple} = -0.389$, 95% CI −0.551 to −0.258). These results indicate that the relationship between negative emotions and subjective wellbeing became weaker with an increase in perceived social support. Thus, perceived social support is a protective factor that can effectively alleviate the adverse effects of negative emotions on subjective wellbeing.

TABLE 3 | Total effect (Fortin et al., 2012), direct effect (Nunes et al., 2016), and mediation effect (Seo et al., 2017).

Items	Effect size	*SE*	95% CI	Relative effect value
1	−0.997	0.085	(−1.163，−0.831)	
2	−0.388	0.080	(−0.545，−0.232)	39.00%
3	−0.608	0.060	(−0.728，−0.497)	61.00%

TABLE 5 | The impact of sleep quality on negative emotions at different levels of perceived social support.

PSS	Effect size	Bootstrapped *SE*	Bootstrapped *LICI*	Bootstrapped *UICI*
M–SD	2.534	0.236	2.070	2.997
M	1.923	0.168	1.594	2.252
M+SD	1.503	0.234	1.044	1.962

TABLE 6 | The impact of negative emotions on subjective wellbeing at different levels of perceived social support.

PSS	Effect size	Bootstrapped *SE*	Bootstrapped *LICI*	Bootstrapped *UICI*
M–SD	−0.485	0.083	−0.654	−0.333
M	−0.445	0.056	−0.563	−0.343
M+SD	−0.389	0.075	−0.551	−0.258

TABLE 4 | Mediating effect analysis with moderation.

Regression equation	Goodness of Fit	R^2	*F*-value	*β*-value	*t*-value	*p*	95%*CI*
Outcome variables	**Predictive variables**						
Negative emotions		0.282	31.870***				
	Sleep quality			1.991	12.045	<0.001	1.666, 2.315
	Perceived social support			−0.443	−9.122	<0.001	−0.538, −0.347
	Sleep quality × Perceived social support			−0.038	−3.081	0.002	−0.062, −0.014
Subjective wellbeing		0.488	66.047***				
	Sleep quality			−0.291	−3.902	<0.001	−0.437, −0.145
	Negative emotions			−0.227	−16.023	<0.001	−0.255, −0.199
	Perceived social support			0.251	11.807	<0.001	0.210, 0.293
	Sleep quality × Perceived social support			−0.006	−1.046	0.296	−0.018, 0.005
	Negative emotions × Perceived social support			−0.002	−2.645	0.008	−0.004, −0.001

***$p < 0.001$.

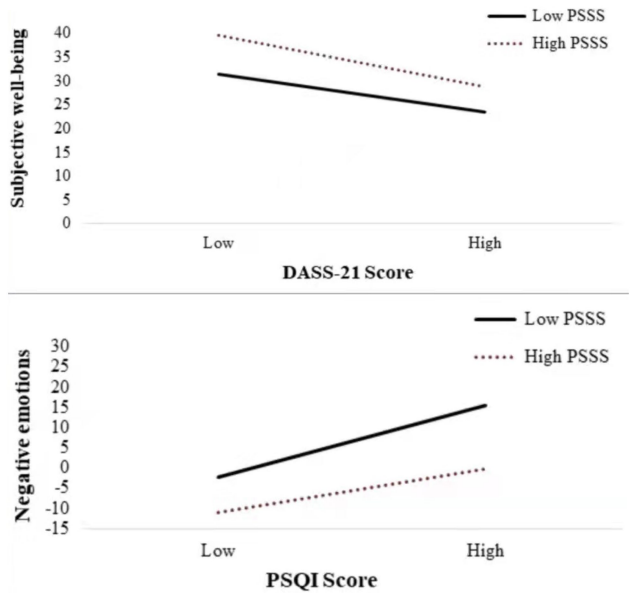

FIGURE 2 | Moderation of perceived social support to sleep quality and negative emotions and moderation of perceived social support to negative emotions and subjective wellbeing.

DISCUSSION

In this study, we found that poorer sleep quality and higher negative emotions were partly responsible for poorer subjective wellbeing in older adults with multimorbidity. The indirect effect was moderated by perceived social support. The indirect effect was stronger in older adults with multimorbidity who had higher levels of perceived social support. These findings help to elucidate the potential causes of low subjective wellbeing and help to develop targeted interventions to improve subjective wellbeing in older adults with multimorbidity.

Consistent with previous studies, sleep duration is associated with subjective sleep quality and subjective wellbeing (Lemola et al., 2013). Highly optimistic people with high social support show more positive emotions and higher levels of subjective wellbeing (Quevedo and Abella, 2010). Our results showed that, both sleep quality and negative emotions were associated with subjective wellbeing in older adults with multimorbidity. Meanwhile, poor sleep quality was found to be associated with anxiety and depression in older adults (Wolkove et al., 2007). The mediation analyses also revealed a significant mediating effect of negative emotions on the association between sleep quality and subjective wellbeing. One possible explanation is that poor sleep quality has a negative impact on the physical and psychological aspects of older adults with multimorbidity. Depression and stress were also associated with poor physical health (Lee and So, 2019). Therefore, poor sleep quality may increase negative emotional problems in older adults with multimorbidity, thereby decreasing their subjective wellbeing. Subjective wellbeing of older adults is lower when sleep quality is poorer and accompanied by negative emotions. These findings suggest that the effect of sleep quality on subjective wellbeing is partially regulated by negative emotions.

In addition, perceived social support moderated the negative effect between negative emotions and subjective wellbeing. Good perceived social support promotes and maintains the individual's mental health and reduces the generation and development of anxiety (Lu et al., 2018). Perceived social support is negatively and significantly associated with sleep quality. People with higher levels of perceived social support feel more respect, understanding, and support from others. People with a low perception of social support feel more negative emotions, such as loneliness, helplessness, and despair (Chen, 2018). More importantly, our moderating mediator analysis showed that perceived social support not only moderated the effect of sleep quality on negative emotions, but also the association between sleep quality and subjective wellbeing through negative emotions. We found that poor sleep quality can reduce an individual's subjective wellbeing. People with poor sleep quality and lower levels of perceived social support experience more negative emotions, which further reduce subjective wellbeing. This is consistent with related research that a highly variable sleep schedule may provoke sleep problems and poor subjective wellbeing (Hayes, 2013).

Our study found that older adults with multimorbidity have lower level of subjective wellbeing. Low sleep quality and negative emotions combined can exacerbate the negative effects of subjective wellbeing. But perceived social support was found to improve sleep quality and ease negative emotions while buffering this negative effect. It is suggested that the community should take the initiative in providing monitoring services to improve sleep quality of older adults, focus on the mental health status of older adults with multimorbidity, including negative emotions, such as anxiety, depression, and stress, and encourage older adults to go outdoors, participate in public activities and communicate with friends, and promote family care for them. In addition to, we suggest that through multiple efforts to improve the subjective wellbeing of older adults with multimorbidity, thereby improving their compliance and chronic disease treatment outcomes, and laying the foundation for improving the health of the older adults.

Limitations

It is difficult to draw from cross-sectional data causal inferences between the identified factors and subjective wellbeing. Longitudinal studies should be designed in the future to explore the causal relationship between sleep quality and subjective wellbeing.

CONCLUSION

In conclusion, negative emotions increased the negative association between sleep quality and the subjective wellbeing of older adults with multimorbidity, and perceived social support played a moderating role. The increased effect was greater in older adults with multimorbidity whose perceived social support is at higher levels. Sleep quality had a significant direct effect on subjective wellbeing in older adults. The better the quality of sleep, the higher the subjective wellbeing of older adults. To improve the subjective wellbeing of older adults with multimorbidity, negative

emotions interventions should be implemented as early as possible to reduce negative emotions and increase social support from family, friends, and others. Psychological and behavioral interventions should be implemented as early as possible to promote mental health and enhance social support level of older adults with multimorbidity, and ultimately improve the subjective wellbeing of older adults and achieve healthy aging.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of Shanxi Medical University. 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

CZ and FD conceived the idea. BX and JZ participated in data collection and statistical analysis. FD drafted the manuscript. LS and WO edited the paper. XZ and YX gave many valuable comments on the draft and polished it. All authors contributed to the article and approved the submitted version.

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Depression, Anxiety, Insomnia, and Quality of Life in a Representative Community Sample of Older Adults Living at Home

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Background: The aim of the study was to explore symptoms of anxiety and depression, insomnia, and quality of life in a Norwegian community sample of older adults.

Methods: A representative sample (*N* = 1069) was drawn from home-dwelling people of 60 years and above, living in a large municipality in Norway (Trondheim).

Results: Based on established cut-off scores, 83.7% of the participants showed no symptoms of anxiety/depression, 12% had mild symptoms, 2.7% moderate symptoms, 1.5% showed severe symptoms of anxiety/depression. A total of 18.4% reported insomnia symptoms. Regarding health-related quality of life, few participants reported problems with self-care, but pain and discomfort were common (59%). Depression/anxiety, insomnia, and health-related quality of life showed moderate to strong associations.

Discussion: The results suggest a close interplay between anxiety/depression, insomnia, and health-related quality of life in older adults.

Keywords: anxiety, depression, insomnia, quality of life, mental health

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INTRODUCTION

Depression and anxiety are common psychological problems throughout the life span, and are typically comorbid (Byers et al., 2010). Anxiety and depressive disorders are in danger of being overlooked in the older population (Royal College of Psychiatrists, 2018), as other somatic conditions tend to become more pronounced with increasing age. Large-scale longitudinal epidemiological studies in Norway suggest an increasing prevalence of anxiety and depression in older age cohorts (Stordal et al., 2001; Solhaug et al., 2012). This is a case for concern, because such comorbidity is associated with poorer treatment outcome, cognitive impairments, and increased risk of suicide (Lenze et al., 2000; DeLuca et al., 2005).

The estimated point prevalence of major depressive disorder (MDD) for people above 65 years of age is 4–5% for women and about 2% for men in North American and European studies (Steffens et al., 2000; Sjöberg et al., 2017). The 12-month prevalence rates for MDD in older adults range from 0.3 to 10.2% in the United States, which is lower than common estimates of 10% in younger

adults and 8–9% in middle-aged adults (Kessler et al., 2010). A recent study in the United Kingdom found no increase in prevalence of depression with higher age, however, but the study reported a marked increase in the use of antidepressant medication in older age groups (Arthur et al., 2020). Systematic reviews of anxiety disorders in older adults estimate the prevalence to be 1–15%, while the prevalence rate for anxiety symptoms is estimated to be significantly higher, between 15 and 52% (Bryant et al., 2008; Grenier et al., 2019).

Symptoms of anxiety and depression are also typically intertwined with insomnia, and there appears to be a bidirectional relationship between anxiety and depression with insomnia (Jansson-Fröjmark and Lindblom, 2008). Furthermore, reduced sleep quality is associated with increasing age, making insomnia more prevalent in older cohorts (Neubauer, 1999). Approximately 50–70% of all seniors report sleep difficulties (Fok et al., 2010; Jaussent et al., 2011; Smagula et al., 2016). Related research has also suggested that worry is a predictor of sleep problems (Pallesen et al., 2002), while a systematic review found female gender, depressed mood, and physical illness as risk factors for future sleep disturbances (Smagula et al., 2016).

It has been suggested that sleep quality acts as a mediator between depression and quality of life in older adults (Becker et al., 2018). Further, health problems and quality of life are associated with both anxiety and depression, and there might be an adverse effect of social isolation on the sleep quality of older adults (Yu et al., 2018). An important consequence of increased levels of symptoms such as anxiety, depression, insomnia, and reduced function in older cohorts, is an increased demand for health services with associated socioeconomic costs. More knowledge related to rates of such symptoms is therefore important when considering and designing interventions to reduce anxiety and depression among older adults. In this context, it is highly relevant to consider the interplay of these associated mental health problems.

There were several aims of this study. First, we wanted to investigate the self-reported symptoms of anxiety/depression and insomnia in a representative population of older adults living at home. Second, we wanted to explore health-related quality of life (including mobility, self-care, keeping up with one's usual activities and pain/discomfort) in the sample. Third, we wished to investigate the associations between symptoms of anxiety and depression, and quality of life. Finally, the study set out to explore unique predictors of anxiety, depression, insomnia, and quality of life in older adults.

MATERIALS AND METHODS

Participants and Procedure

The design was cross-sectional and used a representative sample of adults in Trondheim municipality aged 60 years and older, living at home. Trondheim has approximately 205.000 inhabitants, of which about 32.000 (16.8%) are aged 60 or above. The sample was drawn from the General Population Registry of Norway based on gender, age (60+), and area of residence (Trondheim Municipality).

Participants were invited to take part in a survey concerning anxiety, depression, quality of life, and sleep problems. There was no other specific inclusion- or exclusion criteria for participation. All individuals first received a postal invitation letter with information about the study and the questionnaires. A reminder was sent in the mail after two weeks to those who had not responded. We sent invitations to participate to 3,001 people and received 1069 (35.6%) responses.

The mean age of people not responding to the survey was 68.4 (SD = 5.6) compared to 68.9 (SD = 5.4) for responders. Regarding gender, 64.7% of women and 63.2% of men did not respond to the survey. No other information was available for people not responding to the survey.

The gender distribution in the sample that responded to the questionnaires was equal (50.2% women). Women reported more symptoms of anxiety/depression and insomnia than men, however, the effect sizes were small. Women also scored slightly lower on health-related quality of life (but not on the 0–100 VAS-scale). Mean age was 69.0 (SD = 5.3), and age was clustered in this distribution; 24.3% were between ages of 60–64, 28.2% were 65–69, 29.1% were 70–74, and 18.4% were 75 and older. Most of the sample were married/cohabitant (73%), 9.1% were divorced/separated, 8.5% were widows/widowers, 5.6% were single, and 3.5% had a romantic partner. Regarding education, 17% had completed compulsory school, 28% high school, 31% had a bachelor's degree, and 24% had a master's degree. With respect to work status, 19% were still working while 60% were retired. Ten percent had part-time work and 13% received social welfare benefits (note that the numbers do not add to a perfect 100% as some participants were both retired and engaged in part-time work). There were significantly more widows than widowers in the sample. In addition, more men reported to have completed higher education than women. A summary of the sample's demographic characteristics is displayed in **Table 1**.

Ethical approval for the study was obtained from the Regional Ethical Committee for Medical Research (ref.nr. 2016/2265). Participants were anonymous for the research group, but invited participants were given contact information to the principal investigator if they had concerns related to the survey and the topics covered.

Instruments

Different self-report instruments were used in this study and are described in detail below. Demographic variables such as sex, age, relationship status, living situation, number of children, level of education, work status, and whether one had received treatment for mental health-related problems were also collected. Self-reported treatment options were defined as: psychotherapy, GP, pharmacological, inpatient, and electroconvulsive therapy (ECT).

Symptoms of anxiety and depression were measured with the Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS; Kroenke et al., 2016). The PHQ-ADS is a joint measure for symptoms of anxiety and depression, which is computed by summing the scores of the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) and the

TABLE 1 | Demographic characteristics of the sample (*N* = 1069).

	Total	Women	Men	*d*
Age	69.02 (5.43)	68.76 (5.57)	69.29 (5.27)	
Number of children	2.15 (1.05)	2.16 (1.03)	2.13 (1.08)	
PHQ-ADS	5.11 (6.68)	6.20 (7.68)	4.08 (5.39)*	0.32
ISI	5.01 (5.29)	5.50 (5.55)	4.58 (5.01)*	0.17
Quality of life—EQ	6.55 (2.18)	6.80 (2.42)	6.30 (1.89)*	0.23
EQ VAS (0-100)	77.95 (18.99)	77.46 (19.92)	78.43 (18.03)	
				p
Relationship status*		%		<0.001
Married/cohabitant	73.2	61.8	84.5	
Single	5.6	5.9	5.4	
Widow/widower	8.5	14.4	2.8	
Girlfriend/boyfriend	3.5	4.0	3.0	
Divorced/separated	9.1	14.0	4.3	
Education*				<0.001
Compulsory school	16.5	20.7	12.5	
High school	27.9	30.2	26.0	
University bachelor	30.8	33.1	29.0	
University master or more	24.0	16.0	32.4	
Work status				
Full-time work	19.3	15.8	22.7	
Part-time work	10.1	10.3	9.9	
Retired	60.0	59.4	60.5	
Social welfare	13.0	14.8	11.2	
Other	3.4	3.8	3.0	
Treatment				
Previously treated for anxiety/depression	17.8	23.7	12.1*	<0.001
Type of treatment				
GP	10.6	14.5	6.7	
Pharmacological	9.4	11.8	7.1	
Psychotherapy	10.8	13.3	8.2	
Admitted to hospital	3.0	3.9	2.0	
ECT	0.3	0.2	0.4	

*Thirty-four participants were both retired and engaged in part-time work. GP, general practitioner; ECT, electroconvulsive therapy; PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; ISI, Insomnia Severity Index, *p < 0.01. Cohen's d calculated using pooled standard deviations.*

Generalized Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006). The scores range from 0 to 48, with higher scores indicating more severe symptoms. Cut-off scores of 10, 20, and 30 are reported to correspond to mild, moderate, and severe levels of distress (depression/anxiety). The PHQ-ADS has proven to be a reliable and valid measure with satisfactory psychometric properties (Kroenke et al., 2016, 2019; Chilcot et al., 2018). Cronbach's alpha for the PHQ-ADS in the current study was 0.95.

The Insomnia Severity Index (ISI; Morin et al., 2011) assesses symptoms of insomnia using seven items scored on a 0–4 scale. Cut-off scores can be interpreted as follows: absence of insomnia (0–7); sub-threshold insomnia (8–14); moderate insomnia (15–21); and severe insomnia (22–28). A cut-off score of 10 has been suggested as optimal for detecting insomnia in community samples (Morin et al., 2011). Cronbach's alpha for ISI in the current study was 0.93.

The EuroQoL-5 Dimensions (EQ-5D-5L; Herdman et al., 2011) is a generic instrument commonly used for measuring health-related quality of life. The questionnaire can be used to compare health-related quality of life across persons with different disorders. The instrument is highly feasible with only five items (mobility, self-care, usual activities, pain or discomfort, and anxiety/depression). The EQ-5D-5L may be preferred to more extensive measures due to its brevity, easy administration, higher completion rates, sensitivity to change, and the ability to assess economical aspects (e.g., cost-effectiveness) of treatment (Holland et al., 2004). However, the measure could ignore relevant aspects such as existential or spiritual matters (Siette et al., 2021). The EQ-5D has been established as a feasible instrument in elderly, but most of the research has been conducted using the 3-point rating scale rather than the 5-point scale (Marten et al., 2021).

The five items are scored using a 1–5 scale (from no problems to extreme problems). Scores can be combined into a 5-digit code that describes the patient's health state profile. The EQ-5D-5L also includes a visual analogue scale (VAS) which assesses health on a 0 (the worst health you can imagine) to 100 (the best health you can imagine) scale. Cronbach's alpha for the five items in the current study was 0.79.

Statistics

Descriptive statistics and cut-offs were used to describe symptoms of depression/anxiety, insomnia, and quality of life in the sample. Gender comparisons were conducted using *t*-tests and one-way ANOVAs. Correlation analyses were used to investigate the relationship between symptoms of depression/anxiety, insomnia, and health-related quality of life. Regression analyses explored unique predictors of health-related quality of life using the same variables. These analyses were conducted using SPSS version 28. Missing data was not imputed. Therefore, sample size for the regression analyses was 920. Finally, a SEM-analysis with PHQ-ADS and ISI predicting EQ-5D-5L was performed in Mplus version 8.6 (Muthén and Muthén, 2006). Full-information maximum likelihood was used with robust estimation (MLR) due to non-normality to make use of all available data. Model fit was evaluated with the following indices: Standardized Root Mean Square Residual (SRMR) (Browne and Cudeck, 1993) values less than 0.08 and values and Root Mean Square Error of Approximation (RMSEA) (Hu and Bentler, 1999) equal to or less than 0.06 indicate a good fit. For a Comparative Fit Index (CFI) and a non-Normed Fit index (NNFI; aka TLI) values greater than 0.95 indicate a good fit and values equal to or higher than 0.90 indicate an acceptable fit (Hu and Bentler, 1999).

RESULTS

Symptoms

The mean score on PHQ-ADS was 5.11 and 5.00 on the ISI, indicating low levels of anxiety/depression, and

insomnia for the sample in general. Women scored significantly higher than men on all symptom measures and quality of life, except for the 0–100 VAS of health-related quality of life. More women than men had received treatment for anxiety and depression, and 18% of the total sample had been treated for any kind of mental health-related problem. The most typical treatment was psychotherapy (11%) and GP (11%), followed by pharmacological treatment (9%), inpatient treatment (3%), and ECT (0.3%). The most common combination treatment was GP + pharmacotherapy (5.4%), followed by GP + psychotherapy (4.4%), while 2.8% had GP + pharmacotherapy + psychotherapy.

Cut-off values for anxiety/depression on the different instruments were used to explore rates in more detail, both for the total sample and for each gender separately. With respect to anxiety/depressive symptoms, 83.7% showed no symptoms of anxiety/depression, 12% had mild symptoms, 2.7% moderate symptoms, and 1.5 showed severe symptoms of anxiety/depression. Women showed more symptoms of anxiety/depression than men. For insomnia, 18.4% scored above the suggested cutoff, while 73.2% showed no signs of sleep problems. There were 21.5% of women scoring above cut-off compared to 15.6% of men. See **Table 2** for more detailed information.

Quality of Life

Health-related quality of life scores (EQ-5D-5L) were examined according to the five dimensions to reveal how different aspects of quality of life and health were reported. Participants had few problems with mobility, however many experienced problems with pain and discomfort. Only 41.1% reported no problems with pain/discomfort. However, there were not that many with severe pain problems, as most reported only some problems with pain. Regarding anxiety and depression, 78.6% reported no such problems while 4.4% reported moderate to severe problems. The EQ-5D-5L profile was quite similar for men and women.

For the quality of life VAS scores, the majority (72.3%) reported a score of 75 or higher, while 1.7% reported very poor quality of life with scores of 24 or less. There was no significant gender difference on the VAS-scale, $t(1038) = 0.83$, $p = 0.41$. A summary of the EQ-5D-5L scores is displayed in **Table 3**.

The five digits EQ-5D-5L profiles were examined in order to reveal the most common health-related quality of life profiles. The most common profile for both men and women was a 1-1-1-1-1 profile, indicating no problems within any of the five categories. A summary of the most frequent EQ-5D-5L profiles is displayed in **Table 4**.

Relationship Between Anxiety, Depression, Insomnia, and Quality of Life

EQ-5D-5L consists of five items where the fifth item measures anxiety/depression. This particular item was therefore excluded from the correlational and regression analyses because it conceptually overlaps with other symptom measures used in this study. The correlations between the study variables ranged from non-significant to strong. Moderate to strong correlations were observed among symptom variables (PHQ-ADS and ISI), as well as between symptom measures and EQ-5D-5L. A summary of the correlational analyses is displayed in **Table 5**.

TABLE 2 | Rates of distress, insomnia, and health-related quality of life in the sample.

	Anxiety/depression		
	Total	**Men**	**Women**
None (0–9)	83.7	88.2	79.0
Mild (10–19)	12.0	9.2	15.0
Moderate (20–29)	2.7	2.0	3.4
Severe (30+)	1.5	0.6	2.5
	Insomnia		
None (0–7)	73.2	76.9	69.1
Subthreshold (8–14)	19.1	17.0	21.5
Moderate (15–21)	6.8	5.4	8.4
Severe (22–28)	0.9	0.7	1.0
Cut-off 10	18.4	15.6	21.5
	Quality of life (0–100)		
0–24	1.7	1.3	2.1
25–49	4.9	4.4	5.4
50–74	21.1	20.4	21.8
75–100	72.3	73.9	70.7

Numbers reported are percentages.

TABLE 3 | Quality of life among older adults.

	Mobility	**Self-care**	**Usual activities**	**Pain/ discomfort**	**Anx/depr**
Total sample					
No problems	82.8	95.7	85.1	41.1	78.6
Some problems	11.2	3.4	10.9	43.8	16.9
Moderate problems	3.7	0.6	2.7	11.1	3.4
Severe problems	2.1	0.3	1.1	3.2	0.9
Unable to/extreme	0.2	0.1	0.1	0.8	0.1
Women					
No problems	81.2	95.5	81.5	39.3	72.5
Some problems	11.7	3.0	13.2	42.1	22.1
Moderate problems	3.9	0.8	3.4	14.2	4.0
Severe problems	3.0	0.6	1.7	3.6	1.1
Unable to/extreme	0.2	0.2	0.2	0.8	0.2
Men					
No problems	84.5	95.9	88.8	42.9	84.6
Some problems	10.8	3.7	8.6	45.5	11.8
Moderate problems	3.4	0.4	2.1	8.0	2.8
Severe problems	1.1	0.0	0.6	2.8	0.7
Unable to/extreme	0.2	0.0	0.0	0.7	0.0

Anx/depr, anxiety and depression. Numbers reported are percentages. Variables scored as "unable to" = unable to walk (mobility), unable to wash/dress (self-care), unable to do my usual activities (usual activities), extreme pain/discomfort (pain/discomfort), extremely anxious/depressed (anx/depr).

TABLE 4 | Most frequent quality of life profiles.

EQ profile	Description	Total	Men	Women	60–64	65–69	70–74	75+
11111	No symptoms	36.3	40.6	31.9	38.6	35.6	36.2	34.4
11121	Some pain	27.5	31.1	23.9	25.1	27.8	28.6	28.7
11122	Some pain + some anxiety/depression	6.3	4.3	8.2	5.4	7.5	6.9	4.6
11131	Moderate pain	3.4	2.8	4.0	5.4	3.4	2.6	2.1
11112	Some anxiety/depression	3.1	0.9	5.4	3.5	3.1	3.3	2.6
21121	Some mobility + some pain	3.1	3.4	2.9	1.5	3.1	3.0	5.6
11132	Moderate pain + some anxiety/depression	1.4	0.8	2.1	0.8	2.0	1.6	1.0
11221	Usual activities + some pain	1.2	0.6	1.9	2.7	1.4	0.0	1.0
21221	Mobility + usual activities + pain	1.0	0.8	1.3	0.4	1.4	1.3	1.0

Numbers reported are percentages. First digit, mobility; 2nd, self-care; 3rd, usual activities; 4th, pain/discomfort; 5th, anxiety/depression.

TABLE 5 | Correlations between demographic variables, symptoms measures, and quality of life.

	1	2	3	4	5	6	7	8
1. Gender								
2. Age	0.06							
3. Widow/er	0.21**	0.18**						
4. Lives alone	0.24**	0.07*	0.49**					
5. Working	0.07*	0.54**	0.12**	0.08*				
6. EQ-5D-5L	0.08*	0.04	0.06*	0.11**	0.16**			
7. EQ-5D-5L VAS	0.01	0.04	0.08*	0.12**	0.14**	0.61**		
8. ISI	0.09**	0.02	0.06	0.12**	0.10**	0.48**	−0.48**	
9. PHQ-ADS	0.16**	−0.05	0.07*	0.11**	0.08*	0.55**	−0.49**	0.71**

**p < 0.05, **p < 0.01. PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; ISI, Insomnia Severity Index. EQ-5D-5L scores are without the fifth item, which assesses depression/anxiety. Spearman's Rho reported for categorical variables.*

TABLE 6 | Predictors of health-related quality of life.

	EQ-5D-5L* (adj. R^2 = 0.33)			EQ-5D-5L VAS (0–100) (adj. R^2 = 0.29)		
	β	*t*	*p*	β	*t*	*p*
Gender	−0.01	−0.37	0.714	0.06	2.04	0.042
Age	0.04	1.31	0.190	0.01	0.24	0.814
Widow/er	−0.01	−0.37	0.709	0.00	0.08	0.940
Lives alone	0.08	2.65	0.008	−0.08	−2.33	0.020
Working	−0.08	−2.45	0.015	0.08	2.40	0.017
ISI	0.25	6.58	< 0.001	−0.30	−7.51	< 0.001
PHQ-ADS	0.34	8.70	< 0.001	−0.26	−6.35	< 0.001

*PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; ISI, Insomnia Severity Index. *EQ-5D-5L total score used without item 5 (anxiety/depression). Coding of dichotomous variables: Gender (Male = 1, Female = 2), Widow/er (Yes = 1, No = 0), Lives alone (Yes = 1, No = 0), Working (Yes part/full time = 1, No = 0).*

Linear regression analyses used an enter method, with all predictors (age, gender, symptom measures, and socio-demographic variables) entered in the same step. In two independent analyses, the EQ-5D-5L total score (without the anxiety/depression item) and the VAS scale were entered as dependent variables. The total explained variance (adjusted *R* square) was 33% for EQ-5D-5L and 29% for the 0–100 VAS scale. When repeating the regression using all five items of the EQ-5D-5L, the amount of explained variance increased from 0.33 to 0.47. Symptoms of anxiety/depression and insomnia were significantly associated with health-related quality of life. Age and being a widow/widower did not predict quality of life, and there were no clear gender differences. However, having part/full time work was associated with better health-related quality of life. Multicollinearity was not a problem in these regression analyses, as VIF ranged from 1.1 to 2.1. A summary of the regression analyses is displayed in **Table 6**.

The fit for the initial SEM-model was not within acceptable range (χ^2 = 1674.723, *df* = 347, $p < 0.001$; RMSEA = 0.074; CFI = 0.832, TLI = 0.817), and modification indices indicated that two items were problematic. One item from the PHQ-9 measures sleep related problems and had strong residual variance with ISI. One item in the EQ-5D-5L measure assesses symptoms related to anxiety and depression and had strong residual variance with both GAD-7 and PHQ-9. These two items were taken out of the model. The revised model opened for residual correlation between ISI item 5 and 6. For the model in **Figure 1**, the results were acceptable, χ^2 = 883.127, *df* = 295, $p < 0.001$; RMSEA = 0.054; CFI = 0.916, TLI = 0.907. The results showed that levels of anxiety/depression and insomnia predict levels of subjective well-being in this elderly sample and explain 30.7% of the variance.

DISCUSSION

Regarding prevalence rates, the mean scores on the symptom measures suggested low levels of anxiety/depression and insomnia for the sample in general. In fact, the sample reported less symptoms of anxiety/depression compared to younger age groups from the same community (e.g., Solem et al., 2015). However, age was not a significant predictor of quality of life in the regression analyses. Whereas women scored consistently higher than men on all symptom measures used in this survey, female gender was not a stable predictor of health-related quality of life. Despite reporting overall low levels of symptoms, approximately one fifth of the sample had been in treatment for mental health problems. Insomnia, anxiety/depression, and

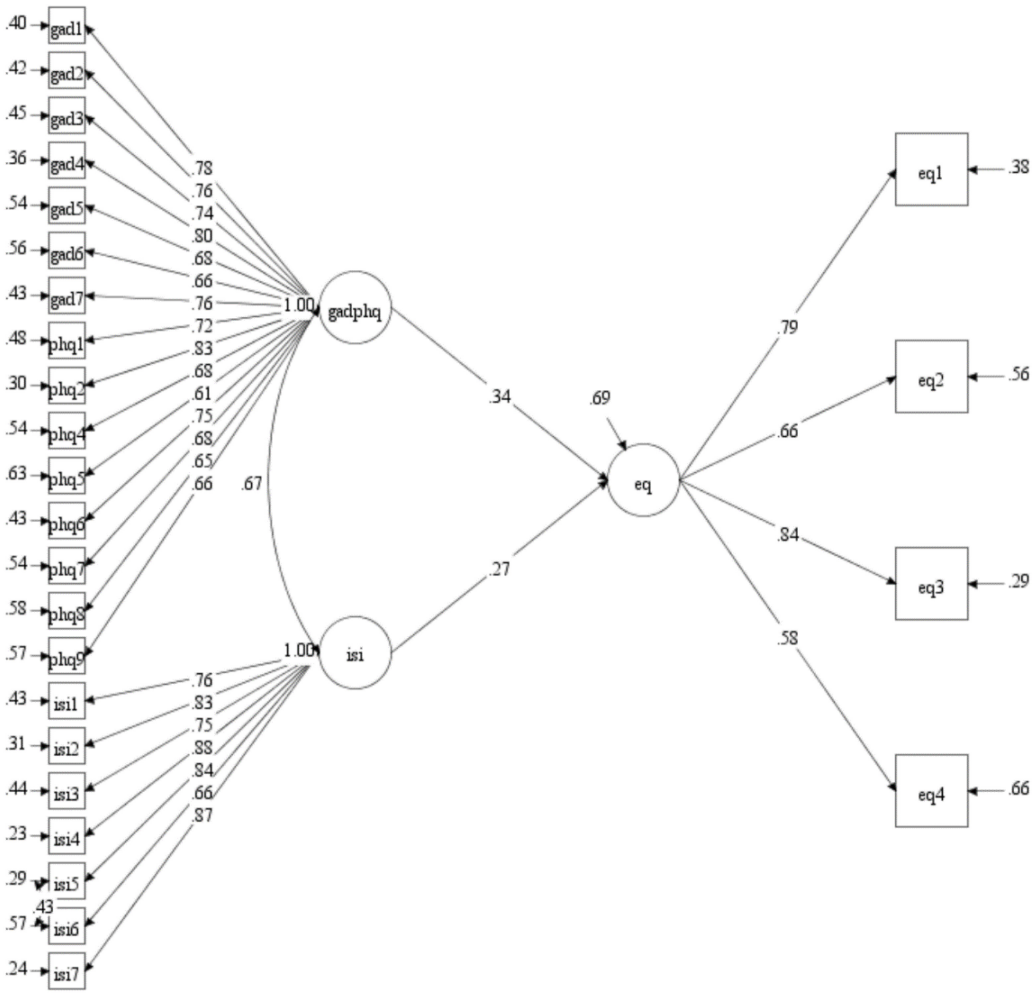

FIGURE 1 | The SEM analysis with PHQ-ADS and ISI predicting health-related quality of life.

health-related quality of life showed a close relationship to each other. Finally, the most common complaint reported in this sample of older adults living at home, was a somewhat reduced health-related quality of life due to pain/discomfort.

One of the aims of the study was to explore symptoms related to anxiety/depression and insomnia in a representative sample of older adults living at home. In our sample, 4.2% showed moderate to severe symptoms of anxiety/depression. Previous research has suggested a point prevalence of depression of 4.4% for women and 2.7% for men (Steffens et al., 2000). As for anxiety, Bryant et al. (2008) and Grenier et al. (2019) found prevalence rates ranging from 1 to 15% in their studies. Our results are thus in line with prevalence rates from other studies on older populations.

With respect to sleep disorders, studies have found that approximately 50% or more of seniors' report sleep difficulties (Fok et al., 2010; Jaussent et al., 2011). In the current study, the figure for insomnia ranged from 7.7 to 18.4%, which is significantly lower. A possible explanation could be that other studies have investigated sleep problems in a broader sense, whereas our study focused on problems related specifically to insomnia. However, a Swedish study found that 13% of older adults without pain scored above 15 points on the ISI (Dragioti et al., 2017). In comparison, 7.6% in the current sample scored above this cutoff, again suggesting that symptoms of insomnia were quite low in our study sample.

Regarding health-related quality of life, few participants reported problems with self-care, but pain and discomfort were common (59% in the sample). It is important to note though, that this is a sample of older adults living at home, and there should be no surprise that self-care is not a major problem in such a population. The proportion of participants that reported perfect health (36%; with the 1-1-1-1-1 profile on the EQ-5D-5L) was comparable to rates from the general population in countries such as Poland (39%) and United States (35%) (Golicki and Niewada, 2017). The mean 0–100 score of 78 was also comparable to older age groups in Australia where scores ranged from 73 to 79 (McCaffrey et al., 2016), and close to that of Germany with scores from 80 to 90 (Hinz et al., 2014). Working part or full time was associated with better quality of life, which

suggests that work may serve as a protective factor for health-related quality of life in the elderly population. Furthermore, the results showed that being a widow or widower was not associated with poorer health-related quality of life, whereas to live alone without a partner was a significant predictor of reduced quality of life. The protective factor of both work and living with a partner may possibly be explained by the fact that both work and living with someone serve as important parts of a persons' social network, which in turn is a well-known contributor to improved health, both physically and mentally. Importantly, to have social relations may buffer against loneliness, which is associated with poorer quality of life in the elderly (Jakobsson and Hallberg, 2005).

The structural equation model showed that quality of life was predicted by anxiety/depression and sleep disturbances. The final model gained an acceptable fit to the data, explaining about 30% of the variance in quality of life. If the fifth item (anxiety and depression) of the EQ-5Q-5L was included, the explained variance increased to 47%. However, the fifth item was excluded from the main analysis to avoid extensive overlap between predictor variables and the EQ-5Q-5L. However, removing this item did not influence the significance of the predictor variables. The only difference observed was that gender became significantly associated ($p = 0.042$) with EQ-5Q-5L when the full scale was used.

In summary, the results suggest that anxiety/depression, insomnia, and quality of life are intertwined. Therefore, it is difficult to know what the primary or secondary problems are. The results from the SEM model supported the notion that comorbidity could decrease quality of life (Lenze et al., 2000; DeLuca et al., 2005). However, there were large amounts of unexplained variance in the model. Other potential predictor variables could have been included to increase explanatory power. It is likely that adding factors such as financial situation, somatic comorbidity, and social networks could have increased our understanding of the participants quality of life (Netuveli et al., 2006). When interpreting the results, it is important to keep in mind that the sample reported relatively low levels of symptoms, which may indicate that their health-related quality of life largely depend on matters not measured in this study. For example, even though the EQ-5D-5L is a well-established measure of health status in the elderly (Holland et al., 2004), this instrument does not capture personal circumstances, which may be of importance for the perceived quality of life in older adults (Siette et al., 2021).

Findings from the current study were not in perfect correspondence with those of a large epidemiological study from rural areas of Norway (Stordal et al., 2001). In contrast to our findings, they found that symptoms of depression *increase* with age and that there are no clear gender differences. There may be different reasons for these incompatible results such as study design (e.g., sample size and response rate), sample characteristics (e.g., urban vs. rural; living at home vs. general older adult population), and choice of measurements (PHQ-9 vs. the Hospital Anxiety and Depression Scale; HADS). Our study was representative of the older population in general except for lower participation among the 75+ group. It should also be noted that the HADS scale has been subject to serious criticism due to poor psychometric properties (e.g., Cosco et al., 2012; Coyne and van Sonderen, 2012a,b). In contrast, the current study used the PHQ-ADS to assess anxiety/depression, and the correlation between HADS and PHQ-9 is only low-moderate (Hansson et al., 2009). However, our results corroborate those of Arthur et al. (2020) who did not find an increase in depression prevalence rates with older age.

Regarding gender differences, our findings mirror statistics from the Norwegian Prescription Database and Statistics Norway in that women more frequently visit their GP for matters relating to mental health and are prescribed more antidepressants than men. This gender difference occurs irrespectively of age. Furthermore, the results speak to the complexity of mental health in older age and observed increases in anxiety/depressive symptoms could occur in the context of medical comorbidity rather than represent an independent effect of aging (Wu et al., 2012).

Limitations and Suggestions for Future Research

The current study used a cross-sectional design, and we cannot conclude that any of the associations found between the variables considered in this study are causal. Thus, future longitudinal studies are warranted for considering any causal pathways between these constructs. The drawing of a representative sample is a strength of the current study, however, the response rate of 35% raises questions regarding eligible participants who chose not to take part in the study. People suffering from depression/anxiety or insomnia might be less interested in participating in research thus resulting in a selection bias. However, when comparing the samples with statistics collected from population-based registries, the sample seemed quite representative of the general older population with a gender distribution of 50.2% women. The group over 75 years was underrepresented. A major limitation relates to the use of only self-report measures, as no clinician-based diagnostic assessments were undertaken.

The current findings suggest that interventions are warranted to reduce suffering among older adults with anxiety/depressive symptoms. The close connection between insomnia, anxiety/depression, and health-related quality of life also needs to be investigated further. Correlations between study variables were moderate to strong, suggesting that there may be shared pathways. Therapeutic interventions that may reduce suffering in one area may therefore influence overall symptomatology. Transdiagnostic treatments that could address all these problems simultaneously would therefore be highly advantageous, since this would likely reduce the levels of distress and increase quality of life.

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 Regional Ethical Committee for Medical Research (Mid-Norway). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

LK, RH, OH, and SS collected the data in this survey. All authors have contributed equally in writing up the manuscript and approved the submitted version.

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Feeling Safe and Nostalgia in Healthy Aging

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The population of older adults worldwide is growing, with an urgent need for approaches that develop and maintain intrinsic capacity consistent with healthy aging. Theory and empirical research converge on feeling safe as central to healthy aging. However, there has been limited attention to resources that cultivate feeling safe to support healthy aging. Nostalgia, "a sentimental longing for one's past," is established as a source of comfort in response to social threat, existential threat, and self-threat. Drawing from extant theory and research, we build on these findings to position nostalgia as a regulatory resource that cultivates feeling safe and contributes to intrinsic capacity to support healthy aging. Using a narrative review method, we: (a) characterize feeling safe as a distinct affective dimension, (b) summarize the character of nostalgia in alignment with feeling safe, (c) propose a theoretical account of the mechanisms through which nostalgia cultivates feeling safe, (d) highlight the contribution of nostalgia to feeling safe and emotional, physiological, and behavioral regulatory capabilities in healthy aging, and (e) offer conclusions and direction for research.

Keywords: feeling safe, emotion regulation, intrinsic capacity, healthy aging, healthy aging and wellbeing

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INTRODUCTION

The population of older adults worldwide is growing disproportionately. The number of people aged 60 years and older constitute 13% of the global population and is expected to double by 2050 (World Health Organization, 2020). Healthy aging, the development and maintenance of functional ability consistent with well-being in older age, is a public health priority and the primary goal of aging research (Friedman et al., 2019; Aronson, 2020). Functional ability refers to being and doing things of value, pursuing meaningful objectives, and fulfilling one's potential with dignity (Rudnicka et al., 2020). Functional ability is determined by intrinsic capacity, the emotional, physiological, and behavioral regulatory capabilities of older adults in interaction with their environment (Cesari et al., 2018).

Theory and empirical research converge on feeling safe as essential to intrinsic capacity in healthy aging (Slavich, 2020; Porges, 2021; Thayer et al., 2021). However, there has been limited attention to resources that cultivate feeling safe to support healthy aging (Epel, 2020). Nostalgia is established as a source of comfort in response to social threat (Sedikides and Wildschut, 2019), existential threat (Sedikides and Wildschut, 2018), and self-threat (Sedikides et al., 2015). Drawing from extant theory and empirical research, we build on these findings to position nostalgia as a regulatory resource that cultivates feeling safe and contributes to intrinsic capacity

to support healthy aging. Relying on a narrative review method, we: (a) characterize feeling safe as a distinct affective dimension to support healthy aging, (b) summarize the character of nostalgia in alignment with feeling safe as a distinct affective dimension, (c) propose a theoretical account of the mechanisms through which nostalgia cultivates feeling safe, (d) highlight the contribution of nostalgia to feeling safe and emotional, physiological, and behavioral regulatory capabilities to support healthy aging, and (e) offer conclusions and direction for research.

FEELING SAFE

Gilbert (2009) has proposed a tripartite model of affect comprised of negative affect, positive affect, and safeness, evolved in the context of specific environmental stimuli. Negative affect alerts to threat or danger, positive affect energizes seeking resources, and safeness reduces activation for calm and restoration. Feeling safe is characterized by warmth and affiliative connection (Gilbert, 2009, 2015). Compared with positive affect, feeling safe predicts unique variance in perceived stress, perceived social support, and depressive symptoms (McManus et al., 2019; Armstrong et al., 2021). In the autonomic nervous system, feeling safe is characterized by increased parasympathetic activity and inhibition of sympathetic response, indexed as higher vagally mediated heart rate variability (vmHRV), a measure of the parasympathetic regulation of the heart *via* the vagus nerve (McCraty, 2017; Mather and Thayer, 2018). Resting vmHRV represents the physiological and emotional regulatory capabilities of older adults in response to environmental challenges (Thayer and Lane, 2009; Thayer et al., 2012). Relevant to healthy aging, higher vmHRV is associated with improved cognitive performance (Ottaviani et al., 2019), greater capacity for emotion regulation (Mather and Thayer, 2018), and attenuated inflammation and oxidative stress (Liguori et al., 2018; Virani et al., 2020).

Feeling safe relies on learned safety cues uniquely associated with protection from threat, found in familiar patterns and coherence, continuity in sense of self and relationships, and reliable close connections (Brosschot et al., 2018). Safety cues represent sources of predictability, protection, comfort, soothing, and connection (Gee and Cohodes, 2021). From the perspective of social engagement, cues of safety include caring facial expressions, soft eye contact, warmth, and prosody of voice (Porges, 2007; Geller, 2018). Safety cues and experiences of feeling safe serve emotional and physiological regulatory functions across the lifespan (Cho et al., 2021; Gee and Cohodes, 2021). In middle-aged and older adults, memories of warmth and safeness are associated with better self-rated health and lower depressive symptoms over intervals of approximately 6 and 18 years (Chopik and Edelstein, 2019). Memories of warmth and safeness contribute to psychological and social well-being (Matos et al., 2013; Ferreira et al., 2021). In addition, memories of warmth and safeness are linked to safe affect and lower levels of anxiety and stress symptoms (Capinha et al., 2021; Steindl et al., 2021).

NOSTALGIA

Nostalgia, "a sentimental longing or wistful affection for the past" (*The New Oxford Dictionary of English*, 1998, p. 1266), aligns with feeling safe as a distinct affective dimension. Nostalgia is experienced across the lifespan (Hepper et al., 2021) and across cultures and ethnicities (Hepper et al., 2012; Jenkins, 2016; Viladrich and Tagliaferro, 2016; Orr, 2017). Nostalgia is felt as positive and bittersweet, with a calming physiological and emotional response, consistent with feeling safe (Sedikides and Wildschut, 2018; Vaccaro et al., 2020). Also, nostalgia is a positively valenced, approach-oriented, and low arousal emotion, consistent with feeling safe as a distinct affective dimension (van Tilburg et al., 2018; Sedikides and Wildschut, 2020; Leunissen et al., 2021). Further, nostalgia is highly social: nostalgic memories depict the individual as having a central place in relevant events, albeit surrounded by close others (Sedikides and Wildschut, 2019). The social nature of nostalgia aligns with the affiliative emotion regulation system, that is, detecting and responding to safety cues by increasing parasympathetic response to facilitate calm and quiescence (Abeyta et al., 2020). Moreover, multidimensional scaling analyses emphasize the similarity of nostalgia to prosocial emotions such as self-compassion (van Tilburg et al., 2018), which is associated with higher vmHRV (Di Bello et al., 2020).

Nostalgia entails a sense of coherence, fostering predictability and close connections (Synnes, 2015). Sense of coherence is a key determinant of well-being and reduced distress in older adults (del-Pino-Casado et al., 2019). Furthermore, nostalgia promotes self-continuity, a connection between past and present selves (Sedikides et al., 2016), which is essential for positive function in later life (Löckenhoff and Rutt, 2017). Among older adults with mild to moderate levels of dementia, nostalgia improves the recall and recognition of self-referent information (Ismail et al., 2018). Moreover, nostalgia strengthens social connection and re-experiencing relational bonds in close relationships (Juhl et al., 2020), and offsets loneliness by increasing perceived social support (Frankenbach et al., 2021; Zhou et al., 2021; Wildschut and Sedikides, 2022).

MECHANISMS OF ACTION

Nostalgia engages safety cues, thereby cultivating feeling safe and contributing to regulatory capabilities to support healthy aging. Prefrontal-subcortical inhibitory pathways in the brain enact the regulatory response to threat and safety and are linked to the heart *via* the vagus nerve (Thayer and Lane, 2009; Thayer et al., 2012). The neural circuits in the regulatory response to threat and safety include the amygdala, which detects emotionally salient stimuli in the environment; the hippocampus, which is involved in learning and memory; and the medial prefrontal cortex (mPFC), which regulates reactivity of the amygdala (Thayer et al., 2012; Dolcos et al., 2017; Eichenbaum, 2017; Gee and Cohodes, 2021). Brosschot et al. (2018) propose that the default response in humans is threat or defense, with prolonged sympathetic nervous system activity and associated chronic

illness (Thayer and Lane, 2009; Thayer et al., 2012). The threat response is active absent recognized safety; safety cues inhibit the default threat response (Brosschot et al., 2018). Engaging safety cues inhibits the amygdala through the input of the ventromedial prefrontal cortex (vmPFC) and hippocampus, with increased parasympathetic activity and higher vmHRV, consistent with feeling safe (Thayer et al., 2009; Brosschot et al., 2018). Higher vmHRV in feeling safe contributes to emotional, physiological, and behavioral regulatory capabilities (Smith et al., 2017; Mather and Thayer, 2018).

FEELING SAFE AND NOSTALGIA IN HEALTHY AGING

Healthy aging reflects the emotional, physiological, and behavioral regulatory capabilities of older adults in interaction with their environment (Cesari et al., 2018). For most adults, aging is associated with changes in the brain and the heart which limit regulatory capabilities in response to environmental challenges (Thayer and Lane, 2009; Thayer et al., 2012). Concomitant changes in the brain and the heart with aging appear to be associated with a decrease in PFC inhibition of the default threat response, autonomic imbalance, and associated chronic illness (Thayer and Lane, 2009; Thayer et al., 2012). Thus, approaches which support the brain-heart regulatory response to threat and safety in older adulthood are essential (Thayer et al., 2021). While research addressing nostalgia in older adults is limited, nostalgia may be especially relevant in older age given its potential to cultivate feeling safe and contribute to regulatory capabilities.

EMOTIONAL REGULATORY CAPABILITIES

Nostalgia contributes to emotional regulatory capabilities that may support healthy aging. Among older adults, nostalgia provides a safe haven in the face of adversity (Madoglou et al., 2017). Nostalgia augments comfort and security (Walls, 2021), and maintains psychological well-being when confronted with limited time horizons (Hepper et al., 2021). During COVID-19 pandemic restrictions, nostalgic memories provided solace to older adults in the context of uncertainty and change (Huntley and Bratt, 2022). In those with dementia, engaging in nostalgia increased self-esteem, meaning in life, and positive affect (Ismail et al., 2018). Similarly, an intervention evaluating the psychological benefits of nostalgic conversations in people living with mild-to-moderate dementia and their partners reported improved self-esteem, personal growth, meaning in life, and social connectedness, with the strongest evidence for improvement shown in personal growth for the person with dementia (Dodd et al., 2021). Among older adults near the end of life, nostalgia supports affective meaning and fosters a sense of being loved and protected (Synnes, 2015). Further, nostalgic memories engender restoration, a soothing sense of being at home (Missel et al., 2022).

PHYSIOLOGICAL REGULATORY CAPABILITIES

Nostalgia contributes to physiological regulatory capabilities to support healthy aging. Wu and Chang (2017) evaluated the effects of recalling a nostalgic memory relative to a recent general memory on emotional and autonomic response in older adults. Compared with the control condition, older adults recalling a nostalgic memory showed a pattern of autonomic inhibition with increased parasympathetic activity. Fu et al. (2018) evaluated the effects of discussing nostalgic smells, relative to discussing general themes on emotional and physiological outcomes among older adults in long-term care. Compared with the control condition, older adults discussing nostalgic smells showed decreased symptoms of anxiety and depression and increased HRV. Also, Suenaga et al. (2018) evaluated the effect of nostalgic, relative to general images on vmHRV in older adults. Nostalgic images increased feelings of relaxation and increased vmHRV. Rasmussen et al. (2021) used nostalgic films to elicit involuntary episodic memories and emotional response in older adults with Alzheimer's disease and healthy controls. Older adults with Alzheimer's disease experienced relatively more episodic memories and greater emotional response to nostalgic films. These findings align with research evaluating the psychological and physiological response associated with odor-evoked nostalgia in younger adults, in which odor-evoked nostalgic memories elicited greater positive affect, reduced symptoms of anxiety and depression, decreased heart rate, inhibited systemic inflammation, when compared with control odors (Matsunaga et al., 2011, 2013).

BEHAVIORAL REGULATORY CAPABILITIES

Nostalgia contributes to behavioral regulatory capabilities that support healthy aging. Nostalgia strengthens motivation to promote or maintain social and physical functioning essential for well-being in later adulthood. Nostalgia provides a context for social interaction, which may be particularly important for socially isolated older adults. In older adults with mild-to-moderate dementia in long term care, nostalgia fostered social connections and inter-personal communication (Irmanti and Wardono, 2021). These findings align with research in younger adults, in which nostalgia increased commitment to approach-oriented social goals such as getting closer to friends, repairing relationship conflicts, and meeting new people (Abeyta et al., 2015). Nostalgia fosters motivation for physical activity in older adults by linking the past to the present. For example, in older adults with cognitive impairment, nostalgic memories supported the intention to engage in a program of social dance (Thøgersen-Ntoumani et al., 2018). Nostalgic memories of past gardens and gardening with parents and grandparents were evoked through the touch and smell of plants, soil, and herbs, and enacted through gardening as a means of tradition, remembrance, and connection (McFarland et al., 2018; Scott et al., 2020).

DISCUSSION

The population of older adults worldwide is growing, with an urgent need to develop and maintain intrinsic capacity to support healthy aging (Friedman et al., 2019). Theory and empirical research converge on feeling safe as essential to intrinsic capacity in healthy aging (Slavich, 2020; Porges, 2021; Thayer et al., 2021). However, there has been limited attention to resources that cultivate feeling safe (Epel, 2020). Drawing from extant theory and empirical research, we position nostalgia as a regulatory resource that cultivates feeling safe and contributes to intrinsic capacity to support healthy aging.

As an approach to intervention supporting healthy aging, nostalgia may have promise across older adult populations. Nostalgia aligns with feeling safe as a distinct affective dimension, providing a novel perspective on cultivating sources of safety in older adulthood rather than managing sources of threat. Cognitive-behavioral, reappraisal, or coping interventions are focused on managing the "why" of threats to feeling safe, mobilizing the default response, with increased sympathetic nervous system activity and risk of chronic illness (Thayer and Lane, 2009; Thayer et al., 2012). In contrast, nostalgia is focused on the experiential "what" of feeling safe, calming physiological and emotional response. A theoretical account of the mechanisms through which nostalgia cultivates feeling safe reinforces the potential for nostalgia as a regulatory practice. Consistent with the proposed mechanisms of action, engaging safety cues in nostalgia may enhance functional connectivity between the vmPFC and the amygdala and strengthen inhibition of the default threat response, with cumulative effects of preserving intrinsic capacity and long-term well-being.

Nostalgia contributes to emotional, physiological, and behavioral regulatory capabilities; this regulatory quality may be vital in distinguishing nostalgia from traditional autobiographical approaches in gerontology. Nostalgia may be especially relevant as an approach to intervention in older adulthood, given its potential to support the brain-heart regulatory response in the context of threat and safety.

Several issues deserve empirical consideration. For example, research is needed to determine the amount and duration of nostalgia necessary to cultivate feeling safe and contribute to regulatory capabilities. Longitudinal research is needed to determine if changes in emotional, physiological, or behavioral regulatory capabilities in response to nostalgia are sustained. Comparative effectiveness trials can establish which approaches to nostalgia induction are most effective, for whom, and under what conditions. Given the emphasis on healthy aging, future studies might test whether changes in neural and autonomic function with age introduce variability in response to nostalgia.

Nostalgia is a precious resource for older adults, as it can be accessed at any time, even when social opportunities are limited (Hepper et al., 2021). Older adults face physical and emotional challenges in pursuit of healthy aging. However, many also possess rich nostalgic memories to cultivate feeling safe in support of healthy aging. In nostalgia, older adults navigate the future by reflecting on the past. By doing so, they find safety in sources such as familiar patterns and coherence, continuity in the sense of self or relationships, and affectionate close bonds.

AUTHOR CONTRIBUTIONS

JF, DWC, and PK: conceptualization. JF, CS, and TW: methodology, analysis, and writing initial drafts. JF, CS, TW, DWC, and PK: review and editing. All authors contributed to the article and approved the submitted version.

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Internalizing Mental Health Disorders and Emotion Regulation: A Comparative and Mediational Study of Older Adults With and Without a History of Complex Trauma Exposure

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Individuals with complex trauma exposure (CTE) in early life (i.e., childhood/adolescence) are at heightened risk for developing problems in various domains of functioning. As such, CTE has repeatedly been linked to internalizing mental health disorders, such as depression and anxiety, as well as emotion dysregulation across the lifespan. While these correlates of CTE are comparatively well studied up to middle adulthood, they are insufficiently studied in older adulthood. Therefore, this study aimed to (a) compare Swiss older adults with and without a CTE history regarding current and lifetime internalizing mental health disorders and emotion regulation strategies; and (b) to examine the potential mediating role of emotion regulation in the mental health disparities between these groups. A total of $N = 257$ participants (age = 49–95 years; 46.3% female) were assessed in a retrospective, cross-sectional study, using two face-to-face interviews. The CTE group ($n = 161$; $M_{age} = 69.66$ years, 48.4% female) presented with significantly more current and lifetime internalizing mental health disorders than the non-affected (nCTE) group ($n = 96$; $M_{age} = 72.49$ years, 42.7% female). The CTE group showed significantly higher emotion suppression and lower emotion reappraisal compared to the nCTE group. Mediation analysis revealed that the two emotion regulation strategies were significant mediators between CTE history and internalizing mental health disorders. Findings emphasize the relevance of emotion (dys-)regulation in understanding mental health disparities in older age and deciding about treatment strategies. Research and practice should pay more attention to the needs of this high-risk group of older individuals.

Keywords: anxiety, complex trauma exposure, childhood, depression, emotion regulation, mental health, older adults, adolescence

INTRODUCTION

Potentially traumatic or adverse events in childhood and adolescence, such as child maltreatment, are common worldwide. Global self-report estimates suggest that up to 363 out of every 1,000 individuals may have experienced at least one type of maltreatment during childhood or adolescence (Stoltenborgh et al., 2015). Such child maltreatment often occurs within the caregiving system (i.e., both, familial and formal caregiving systems; e.g., Pinheiro, 2006). In addition, many affected minors do not experience only a single type of maltreatment (e.g., physical abuse, emotional neglect), but are exposed to multiple types of abuse and neglect (Scher et al., 2004; Green et al., 2010). This accumulation of maltreatment experiences within the caregiving system has been referred to as complex trauma exposure (CTE; Kisiel et al., 2009; Greeson et al., 2011), and will henceforth be used to describe exposure to at least two types of maltreatment in childhood and/or adolescence.

Exposure to complex trauma in childhood and/or adolescence has been associated with a range of negative health correlates across the life-course, including the development of mental health disorders (e.g., Cook et al., 2005; Spinazzola et al., 2005; Kisiel et al., 2009). Furthermore, ample evidence indicates that CTE in childhood and/or adolescence is associated with (the onset of) internalizing mental health disorders, such as depressive and anxiety disorders, across the lifespan. For instance, in the *short-term* (i.e., up to adolescence), children and adolescents with a CTE history have been shown to present with significantly high(er) rates of internalizing mental health problems, including depressive and anxiety symptoms, major depression, separation anxiety disorder, generalized anxiety disorder, panic disorder, and phobic disorders (e.g., Ford et al., 2010; Choi and Oh, 2014; Kroska et al., 2018; Haahr-Pedersen et al., 2020; Lewis et al., 2021). Additionally, in a comparative study of adolescents living in foster care, a history of CTE was found to increase the odds of having internalizing mental health problems in youth by 60% compared to those with other traumatic backgrounds (Greeson et al., 2011).

Similarly, existing studies on the *mid-term* (i.e., up to middle-age) mental health sequelae of CTE also indicate a high mental health burden due to clinically relevant internalizing mental health problems. Adults formerly affected by CTE have been shown to present with significantly high(er) rates of depressive and anxiety symptoms, as well as major depression, minor depression, dysthymia, generalized anxiety disorder, panic disorder, and phobic disorders (e.g., Chapman et al., 2004; Green et al., 2010; Putnam et al., 2013; Huh et al., 2017; Giraldo Gallo et al., 2018). For instance, a meta-analysis of 184 studies showed that adults who experienced one type of child maltreatment were 2.81 times more likely to develop a depressive disorder in adulthood; whereas for those with a CTE history, the odds increased to 3.61 (Nelson et al., 2017). In addition, a prospective, population-based cohort study investigated mental health disorders in adults with cumulative and single childhood trauma experiences. Between all of the investigated mental health disorders, odds for internalizing mental health disorders were among the highest for adults with a cumulative childhood trauma history: 1.7 for depressive disorders and 1.4 for anxiety disorders compared to 1.5 for any mental health disorder (Copeland et al., 2018). Moreover, a longitudinal 25-year study on the association between child maltreatment and internalizing mental health disorders across adulthood revealed a significantly elevated risk for individuals with a CTE history, compared to those with no or low child maltreatment history (Rapsey et al., 2019). This finding provides evidence for a long-lasting vulnerability and emphasizes the need to also consider CTE mental health sequelae from a *long-term* (i.e., in older adulthood) and a *lifespan* (i.e., lifetime disorders) perspective.

However, research on the long-term mental health correlates of CTE in older adults is scarce and there is a lack of studies focusing on internalizing mental health disorders in older adults with and without a history of CTE. Nonetheless, some studies have investigated the association between child maltreatment and mental ill-health in older samples. For instance, a review by Maschi et al. (2013) found that depressive and anxiety symptoms and disorders in older age are among the most often documented long-term correlates of child maltreatment. However, the studies in this review did not explicitly examine cumulative child maltreatment. Nevertheless, based on such related research, it could be assumed that CTE may also be linked to an elevated risk for internalizing mental health disorders in older adulthood. However, further research is needed to investigate this in older adult samples. In addition, research is also needed on the potential underlying processes involved in the development of internalizing mental health disorder in CTE survivors.

One potential process underpinning the lasting mental health effects of CTE may be the dysregulation of emotions. Emotion regulation refers to the ability to recognize, monitor, express, and modify emotional reactions in a way that facilitates adaptive functioning (Gratz and Roemer, 2004). Applying a developmental perspective, several studies indicate that emotion regulation strategies develop in the early stages of life and primarily within the context of an emotional relationship, such as the caregiving context (e.g., *via* observation; parenting practice, such as the validation of emotions; or the emotional atmosphere at home; Morris et al., 2007; Ehring and Quack, 2010). However, in a family environment of child maltreatment, children are exposed to caregivers who cannot satisfy this educational task appropriately. Child maltreatment, and CTE in particular, may therefore lead to emotion regulation difficulties by hampering the development of adaptive strategies (e.g., distraction, reappraisal, acceptance), while fostering the development of maladaptive strategies (e.g., self-devaluation, suppression, withdrawal; Cook et al., 2005; Spinazzola et al., 2005; D'Andrea et al., 2012). In support of this, research has repeatedly documented medium to high correlations between cumulative child maltreatment and emotion regulation difficulties in samples of diverse ages (for children/adolescents examples, see Dunn et al., 2018; Hébert et al., 2018; Haselgruber et al., 2021; for adults examples, see Carvalho Fernando et al., 2014; Jennissen et al., 2016; Dutcher et al., 2017). In addition, recent evidence comes from a comparative study on emotion regulation in adolescents and young adults (aged 12–22 years). Results showed that emotion regulation difficulties in CTE survivors significantly differed (i.e., more emotion regulation difficulties) from no or low maltreatment survivors (Henschel et al., 2019). However, as no

existing studies focus solely on an older sample, it remains unclear whether differences in emotion regulation difficulties between individuals with and without a CTE history are also evident into older adulthood. This is particularly relevant, as previous research has not only emphasized the high relevance of emotion regulation in older age (Carstensen et al., 1999), but has also provided empirical evidence on changes in the use of emotion regulation strategies across adulthood and into older age (e.g., Urry and Gross, 2010; Eldesouky and English, 2018), such as an age-related increase in emotion reappraisal (e.g., Masumoto et al., 2016).

With regard to the potential underlying mechanism, emotion regulation has repeatedly been found to mediate the relationship between child maltreatment and subsequent psychopathology (e.g., Aldao et al., 2010; Kim and Cicchetti, 2010; Knefel et al., 2019; Weissman et al., 2019); including various internalizing mental health problems (e.g., Choi and Oh, 2014; Heleniak et al., 2016; Cloitre et al., 2019). For instance, a clinical study assessed adults (aged 18–65 years) diagnosed with at least one internalizing mental health disorder (Huh et al., 2017). Results found that maladaptive emotion regulation mediated the relationship between child maltreatment and depressive and anxiety symptomatology (investigated as two distinct variables). Furthermore, in one of the few to include both adaptive and maladaptive emotion regulation, Haselgruber et al. (2020) showed both emotion regulation strategies to mediate the relationship between cumulative child maltreatment and internalizing mental health symptoms. While the existing studies provide valuable insight into this mediating role of emotion regulation, some aspects of this interplay have been overlooked. For instance, existing studies have mainly used a specific type of child maltreatment (i.e., childhood sexual abuse; for example, see Choi and Oh, 2014) or have included child maltreatment as a continuous variable in the mediation model (i.e., mediation analysis focusing on whether a mediator variable may explain a continuous relationship between two variables, considering variables as a whole; for examples, see Hopfinger et al., 2016; Huh et al., 2017). As such analyses do not aim to address the comparison of two specific groups which are differentially affected by child maltreatment, previous studies do not provide sufficient empirical evidence that differences in emotion regulation can explain disparities in internalizing mental health problems between individuals with and without a CTE history (i.e., CTE used as a dichotomous variable). Furthermore, existing mediation studies have mainly focused on a single mental health disorder category (i.e., either depressive or anxiety symptoms/disorders), assessed within a particular life stage, such as childhood (Hébert et al., 2018). In doing so, this approach neglects a combined perspective of several developmental stages (i.e., lifetime disorders), as well as a group of mental health disorders (i.e., internalizing mental health disorders). These considerations are crucial, given the relatively high comorbidity of depressive and anxiety disorders across the lifespan (Kaufman and Charney, 2000; Cummings et al., 2014).

Taken together, research is lacking on the long-term correlates of CTE in childhood and/or adolescence for mental health and emotion regulation. Given the repeated evidence of these correlates in the short- and mid-term and the significant role of emotion regulation for wellbeing in older adults, as suggested by the socioemotional selectivity theory (Carstensen et al., 1999) and the wellbeing paradox (Hansen and Slagsvold, 2012), it is of utmost importance to (further) include the steadily growing population of older adults into this research. Yet, it is unclear to what extent the above-described age-related changes in emotion regulation relate to potential CTE-related changes in emotion regulation up to older adulthood and what this may imply regarding the development of internalizing mental health disorders in older age. Both, amplification, and mitigation processes are possible. Furthermore, by focusing on internalizing mental health disorders, valuable information can be obtained on a dominant mental health disorder category in older age (e.g., Mühlig et al., 2015) as well as a leading cause of the global burden of disease (Whiteford et al., 2013). Moreover, combining this research with a lifespan perspective could provide knowledge on the still insufficiently understood topic of mental health disparities in older age (e.g., Thoma et al., 2021). Finally, despite the broad consensus between researchers and practitioners for a dose-response relationship of child maltreatment and psychopathology (Cook et al., 2005; Putnam et al., 2013), comparative studies are scarce (e.g., Lewis et al., 2021; Pfluger et al., 2021). Further comparative evidence is needed, particularly on the long-term correlates of CTE, to coherently integrate findings into the existing trauma literature.

Therefore, the current study aimed to examine long-term sequelae of CTE in childhood and/or adolescence in comparison to a control group of older adults with only single or no trauma exposure in childhood and/or adolescence. Specifically, these two groups will be compared with regard to current and lifetime internalizing mental health disorders, as well as adaptive and maladaptive emotion regulation strategies. Regarding the latter, the focus relies on emotion reappraisal and emotion suppression, as two of the most often investigated emotion regulation strategies (Preece et al., 2021). It is expected that individuals with a CTE history in childhood and/or adolescence will report more current and lifetime internalizing mental health disorders and more difficulties with emotion regulation (i.e., more suppression and less reappraisal) compared to the control group. This study further aims to examine the potentially mediating role of emotion regulation in the relationship between CTE history and internalizing mental health disorders. It is expected that the emotion regulation strategies suppression (i.e., negative effect) and reappraisal (i.e., positive effect) will both significantly mediate the relationship between CTE history (no/yes) and internalizing mental health disorders later in life.

MATERIALS AND METHODS

This study was conducted as part of a larger project on differential aging trajectories in high-risk individuals with past experiences of early adversity (see, Thoma et al., 2021). The study protocol is in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Faculty of Arts and Social Sciences at the University of Zurich (ID: 19.4.3).

Recruitment

Adults aged 50 years (i.e., born in 1969) and older and with Swiss German as their native language were recruited between July and December 2019 via study flyers. Flyers were distributed at places specifically aimed at older citizens (e.g., senior leisure clubs), as well as at various public places (e.g., supermarkets, pharmacies) in the German-speaking region of Switzerland. In addition, flyers were also sent to individuals from a study pool of the affiliated University Research Priority Program, Dynamics of Healthy Ageing of the University of Zurich. Recruitment also aimed to include a particular sample of Swiss older adults, who were affected by compulsory social measures and/or placements (CSMP) during their childhood and/or adolescence. Research has indicated that survivors of such child welfare practices in the last century have an increased risk of exposure to (complex) traumatic experiences in childhood/adolescence (e.g., Ferguson, 2007; Thoma et al., 2021). These individuals were mainly recruited using a contact list provided by the Swiss Federal Office of Justice (2020). Additional recruitment methods for this high-risk group included word-of-mouth recommendations and contacting publicly active CSMP survivors.

Procedure

Eligible participants took part in two assessments, each lasting a maximum of 120 min and conducted by trained interviewers at the university or, if preferred, at the participant's home. Written informed consent was obtained from all participants before starting the first assessment, which consisted of a structured clinical interview to assess current and lifetime mental health disorders. The second assessment was scheduled within 1 week of the first assessment and collected data on traumatic experiences in childhood and adolescence, lifetime traumata, current PTSD symptomatology, and various psychological resources. Between the two assessments, participants also completed questionnaires covering a range of topics, such as demographic information and emotion regulation. After completing the second assessment, all participants were reimbursed for their participation. For a more extensive description of the study procedure, see Thoma et al. (2021).

The mental health data of this study has been previously used in other publications. The publication by Thoma et al. (2021) investigated mental health disparities in a risk group of older CSMP survivors compared to a non-affected control group. The publication by Pfluger et al. (2021) investigated overall psychopathology and stress coping in older individuals with and without a history of CTE.

Measures

A broad set of psychometric measures were assessed in the larger project. The following section presents those relevant for the current study regarding complex trauma, emotion regulation, internalizing mental health disorders, and covariates.

Complex Trauma Exposure History

CTE in childhood and/or adolescence was assessed with the German version of the Childhood Trauma Questionnaire (CTQ; Bernstein and Fink, 1998; Gast et al., 2001). The CTQ is a self-report questionnaire that assesses types of abuse (emotional, physical, and sexual) and neglect (emotional and physical). The five subscales consist of five items each, rated on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very often*). Subscale scores range from 5 to 25, with higher scores indicating more traumatic or adverse experiences in childhood and/or adolescence. The severity of each trauma/adversity type was calculated as proposed by Häuser et al. (2011), with each trauma/adversity type considered present if the level or higher was indicated. To build groups with and without a CTE history, CTE was operationalized as the presence of at least two interpersonal traumatic/adverse experiences in childhood and/or adolescence at an actionable level (i.e., severity ratings moderate to extreme; for example, see Kisiel et al., 2009). In the present study, all five subscales showed high internal consistency (emotional abuse: $\alpha = 0.83$; physical abuse: $\alpha = 0.83$; sexual abuse: $\alpha = 0.96$; emotional neglect: $\alpha = 0.88$; physical neglect: $\alpha = 0.78$).

Emotion Regulation Strategies

Emotion regulation strategies were assessed with the German version of the Emotion Regulation Questionnaire (ERQ; Gross and John, 2003). The ERQ is a self-report questionnaire assessing the emotion regulation strategies suppression (e.g., "*I keep emotions to myself*") and reappraisal (e.g., "*I control my emotions by changing the way I think about the situation I am in*"), with four and six items, respectively. Items are rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Subscale scores range from 4 to 28 for emotion suppression and from 6 to 42 for emotion reappraisal. In the present study, both subscales showed high internal consistency (suppression: $\alpha = 0.75$; reappraisal: $\alpha = 0.81$).

Internalizing Mental Health Disorders

To assess internalizing mental health disorders, the German structured clinical interview for diagnosing mental health disorders was used (DIPS; Margraf et al., 2017a,b). The DIPS allows for the diagnosis of current and lifetime (i.e., at any time in the past adult life) mental health disorders according to the DSM-5. The individual level of current and lifetime internalizing mental health disorders was computed, as well as an index score (i.e., total number of current and lifetime mental health diagnoses). By including both, current and lifetime mental health disorders, the study aimed to present a full(er) picture of the mental health burden across the adult lifespan of older individuals. The following internalizing mental health disorders were assessed: Anxiety disorders (separation anxiety, panic disorder, agoraphobia, social phobia, specific phobia, generalized anxiety disorder) and depressive disorders (dysthymia, major depression). The index score ranges from 0 to 16, with higher scores indicating more mental health disorders.

Covariates

Lifetime Trauma

Lifetime trauma was assessed using a list of 18 potentially traumatic experiences across the lifespan included in the PTSD section of the DIPS (Margraf et al., 2017a,b). For each of the 18 traumatic experiences (e.g., sexual violence in adulthood, serious accident), participants indicated whether they had experienced it

(yes = 1) or not (no = 0). The score ranges from 0 to 18, with higher scores indicating more lifetime trauma.

PTSD Symptomatology

Current PTSD symptomatology was assessed using the German version of the International Trauma Questionnaire (ITQ; Cloitre et al., 2018). The ITQ is a self-report questionnaire that assess ICD-11 PTSD symptomatology, with six items rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Scores range from 0 to 24. The present study showed high internal consistency ($\alpha = 0.87$).

Data Analysis

All statistical analyses were conducted with IBM Statistical Package for Social Sciences (SPSS) version 26 (IBM Corp, 2020). Pre-processing of the data involved missing values analyses, descriptive analyses, and bivariate correlation analysis between all variables of interest. An expectation maximization imputation algorithm with 25 iterations was used to replace missing values (<1% for each questionnaire).

One-way analyses of covariance (ANCOVA) were then conducted to compare levels of internalizing mental health disorders and emotion regulation strategies between groups with and without a CTE history. Taking into account the repellent literature on gender differences in internalizing mental health disorders (e.g., Boyd et al., 2015; Salk et al., 2017), gender was included to the analysis, but only as a side aspect. To exploratively investigate a potential gender effect, the above-mentioned analysis on internalizing mental health disorders was re-run as a two-way ANCOVA with CTE (no/yes) and gender (male/female) as independent variables and CTE* gender as an interaction term. In addition, group differences in the included mental health disorders (both current and lifetime) were tested using Pearson's Chi-squared test.

Finally, a mediation analysis was run to investigate if the effect of CTE on internalizing mental health disorders was mediated by emotion suppression and emotion reappraisal. Both potential mediators were included in the same model, as they were only slightly correlated ($r = 0.058$). Parallel mediation analysis (model 4) was performed using the PROCESS version 3.0 macro for SPSS (Hayes, 2013), which uses ordinary least squares regression, yielding unstandardized path coefficients for total, direct, and indirect effects. Confidence intervals and standard errors for all parameter estimates were produced using 5,000 bootstrapped

TABLE 1 | Sample characteristics.

	Total sample (*N* = 257)	CT (*n* = 161)	nCT (*n* = 96)	Group comparison
Age (*M*, *SD*)[a]	70.72 (11.08)	69.66 (11.34)	72.49 (10.46)	$t(255) = 1.992$, $p = 0.047$
Sex (female) (%)	46.3	48.4	42.7	$X^2 = 0.797$, $p = 0.372$
Relationship status (%)				
Single	12.5	13.0	11.5	$X^2 = 10.661$, $p = 0.059$
In a relationship	11.3	13.0	8.3	
Married	41.2	36.6	49.0	
Separated	1.9	3.1	0	
Divorced	20.2	23.6	14.6	
Widowed	12.8	10.6	16.7	
Employment status (%)				
Employed	21.4	24.8	15.6	$X^2 = 5.044$, $p = 0.283$
Unemployed	2.7	3.1	2.1	
Retired/pension	58.0	53.4	65.6	
Voluntary work	11.7	10.6	13.5	
Highest level of education (%)				
No education	2.3	3.1	1.0	$X^2 = 19.849$, $p = 0.006$
Primary school	3.9	5.0	2.1	
Upper secondary school	10.5	13.7	5.2	
Secondary/High school	2.3	1.9	3.1	
Vocational job training	39.3	42.9	33.3	
Higher professional training	14.8	14.9	14.6	
University level	21.8	14.3	34.4	
Income class (per month) (%)				
<2001 Swiss Francs	15.2	20.5	6.3	$X^2 = 26.612$, $p < 0.001$
2001–3330 Swiss Francs	19.8	25.5	10.4	
3331–4670 Swiss Francs	16.7	16.8	16.7	
>4670 Swiss Francs	46.7	35.4	65.6	

[a] *Range = 49–95 years.*

CT, complex trauma group; nCT, no complex trauma group; M, mean; SD, standard deviation; X^2, Pearson's Chi-squared test; t, two-sided t-test comparing complex trauma group with no complex trauma group; p, p-value.

TABLE 2 | Trauma history analysis and PTSD symptomatology.

	Range	CTE ($n = 161$)	nCTE ($n = 96$)
Overall number of childhood/ adolescence trauma *M* (*SD*)[a]	0–5	3.55 (1.03)	0.41 (0.49)
Number of types of childhood/adolescence trauma *n* (%)[a]			
No traumatic experience			57 (59.4)
One type of trauma			39 (40.6)
Two types of traumata		28 (17.4)	
Three types of traumata		53 (32.9)	
Four types of traumata		43 (26.7)	
Five types of traumata		37 (23.0)	
Number of lifetime trauma *M* (*SD*)[b]	0–18	5.94 (3.15)	4.46 (2.53)
PTSD symptomatology *M* (*SD*)[b]	0–24	6.27 (6.17)	2.57 (4.57)

[a]*Assessed with the CTQ, Childhood Trauma Questionnaire.*
[b]*Assessed with the ITQ, International Trauma Questionnaire; CTE, Complex trauma exposure group; nCTE, No complex trauma exposure group.*

samples. Effects were deemed significant when the confidence interval did not include zero.

Age, the number of lifetime trauma, and current PTSD symptomatology were included as covariates throughout the analyses on emotion regulation. Including the number of lifetime trauma and PTSD symptomatology allowed for the controlling of the potential confounding effect that emotion regulation would be higher due to an elevated number of lifetime trauma and PTSD symptomatology (for example, see Ehring and Quack, 2010; Shepherd and Wild, 2014). Including age allowed for the controlling of the potential confounding effect that group differences in emotion regulation would be biased by an age-related adaptation of emotion regulation strategies sometimes observed in older adults (for example, see Eldesouky and English, 2018). In addition, age and the number of lifetime trauma were also included as covariates in the analyses on internalizing mental health disorders as well as on the potential mediating role of emotion regulation. This allowed for the controlling of the potential confounding effect that differences in mental health would be higher due to higher age and an elevated number of lifetime trauma (e.g., Dulin and Passmore, 2010).

RESULTS

Sample Characteristics

The following sample characteristics were assessed: demographics and trauma history.

Demographical Analysis

The study sample consisted of $N = 257$ participants aged 49–95 years ($M_{age} = 70.72$ years, $SD = 11.08$, 46.3% female). A total of 161 participants (62.7%) met the criteria for CTE and 96 participants (37.3%) did not meet these criteria (the nCTE group). The two groups were comparable with regard to the demographics of sex, relationship status, and employment status; but differed significantly ($p < 0.05$) with respect to age, education, and income (see **Table 1** for sample characteristics).

Trauma History Analysis

On average, individuals in the CTE group reported $M = 3.55$ ($SD = 1.03$, range = 2–5) potentially traumatic experiences in childhood and/or adolescence. Within the CTE group, emotional neglect (93.8%) was the most prevalent trauma type, followed by physical neglect (85.7%), emotional abuse (59.0%), sexual abuse (58.6%), and physical abuse (58.4%). **Table 2** displays the combined number of childhood and/or adolescence trauma, the number of lifetime trauma, as well as current PTSD symptomatology, separately for the CTE and nCTE groups. Groups significantly differed regarding the number of lifetime trauma ($t(255) = -3.911$, $p < 0.001$), and current PTSD symptoms ($t(253) = -5.076$, $p < 0.001$).

Group Comparisons of Internalizing Mental Health Disorders

Tables 3, **4** display detailed information on current and lifetime internalizing mental health disorders for the total sample, as well as separately for both groups. Across both groups, 29.7% of older adults presented with a current internalizing mental health disorder (CTE group: 36.9%; nCTE group: 17.7%); whereas 52.7% of older adults presented with a lifetime internalizing mental health disorder (CTE group: 60.0%; nCTE group: 40.6%). The most common *lifetime* mental health disorders in both groups were depressive disorders (i.e., major depression and dysthymia). The most common *current* mental health disorders in both groups were anxiety disorders (i.e., specific phobia and separation anxiety). Overall, 43.0% of the total sample had never experienced any of the assessed internalizing mental health disorders. Across both groups, females presented with higher (although not significant) prevalence rates for current and lifetime internalizing mental health disorders compared to males (females: 34.7% current, 61.0% lifetime; males: 25.4 % current, 45.7 % lifetime). For detailed prevalence rates for the CTE and nCTE groups, and separately for male and female participants, see **Tables 3**, **4**.

Regarding the overall level of internalizing mental health disorders (i.e., the index score), the one-way ANCOVA showed a significantly higher mean score of internalizing mental health disorders in the CTE group ($M = 2.15$, $SD = 2.62$) compared to the nCTE group ($M = 0.98$, $SD = 1.41$; $F(1,252) = 8.273$, $p = 0.004$, $\eta_p^2 = 0.032$). In addition, both of the included covariates showed a significant positive effect on internalizing mental health disorders (number of lifetime trauma: $F(1,252) = 6.747$, $p = 0.010$, $\eta_p^2 = 0.026$; age: $F(1,252) = 48.680$, $p < 0.001$, $\eta_p^2 = 0.162$). Together, these results suggest that having a history of CTE, being of higher age, and reporting a higher number of lifetime trauma was associated with higher levels of internalizing mental health disorders. The two-way ANCOVA did not show a significant interaction effect between CTE history and gender on internalizing mental health disorders ($F(1,251) = 1.749$, $p =$

TABLE 3 | Current internalizing mental health disorders (diagnosis) and group comparisons.

Current diagnosis, *n* (%)	CTE (*n* = 161)			nCTE (*n* = 96)			Group comparison[a]	
	Total	Female	Male	Total	Female	Male	X^2	*p*
Anxiety disorders								
Separation anxiety	21 (13.0)	12 (15.4)	9 (10.8)	4 (4.2)	2 (4.9)	2 (3.6)	7.129	**
Panic disorder	5 (3.1)	3 (3.8)	2 (2.4)	3 (3.1)	1 (2.4)	2 (3.6)	0.001	1[b]
Agoraphobia	14 (8.7)	10 (12.8)	4 (4.8)	1 (1.0)	1 (2.4)		6.508	*
Social phobia	19 (11.8)	12 (15.4)	7 (8.4)	3 (3.1)	1 (2.4)	2 (3.6)	5.904	*
Specific phobia	22 (13.7)	14 (17.9)	8 (9.6)	7 (7.3)	5 (12.2)	2 (3.6)	4.697	*
Generalized anxiety	18 (11.2)	7 (9.0)	11 (13.3)	4 (4.2)	3 (7.3)	4 (7.3)	3.877	*
Depressive disorders								
Dysthymia	16 (9.9)	9 (11.5)	7 (8.4)	2 (2.1)	1 (2.4)	2 (3.6)	5.801	*
Major depression	14 (8.7)	8 (10.3)	6 (7.2)	1 (1.0)		1 (1.8)	6.508	*

[a]*Group comparison between the total number of each group.*

[b]*Computed using Fisher's exact test.*

*CTE, complex trauma exposure group; nCTE, no complex trauma exposure group; X^2 = Pearson's Chi-squared test; p, p-value; *p < 0.05; **p < 0.01; ***p ≤ 0.001.*

TABLE 4 | Lifetime internalizing mental health disorders (diagnosis) and group comparisons.

Lifetime diagnosis, *n* (%)	CTE (*n* = 161)			nCTE (*n* = 96)			Group comparison[a]	
	Total	Female	Male	Total	Female	Male	X^2	*p*
Anxiety disorders								
Separation anxiety	24 (14.9)	14 (17.9)	10 (12.0)	6 (6.3)	1 (2.4)	5 (9.1)	4.501	*
Panic disorder	16 (9.9)	7 (9.0)	9 (10.8)	8 (8.3)	3 (7.3)	5 (9.1)	0.206	0.650
Agoraphobia	13 (8.1)	8 (10.3)	5 (6.0)	3 (3.1)	2 (4.9)	1 (1.8)	2.589	0.108
Social phobia	25 (15.5)	13 (16.7)	12 (14.5)	7 (7.3)	2 (4.9)	5 (9.1)	3.868	*
Specific phobia	20 (12.4)	12 (15.4)	8 (9.6)	4 (4.2)	3 (7.3)	1 (1.8)	4.958	*
Generalized anxiety	17 (10.6)	9 (11.5)	8 (9.6)	7 (7.3)	3 (7.3)	4 (7.3)	0.805	0.370
Depressive disorders								
Dysthymia	35 (21.7)	17 (21.8)	18 (21.7)	9 (9.4)	5 (12.2)	4 (7.3)	6.690	**
Major depression	65 (40.4)	35 (44.9)	30 (36.1)	25 (26.0)	14 (34.1)	11 (20.0)	5.782	*

[a]*Group comparison between the total number of each group.*

*CTE, complex trauma exposure group; nCTE, no complex trauma exposure group; X^2, Pearson's Chi-squared test; p, p-value; *p < 0.05; **p < 0.01; ***p ≤ 0.001.*

0.187, $\eta_p^2 = 0.007$), suggesting that the association between CTE and internalizing mental health disorders did not differ between female and male participants.

Group Comparisons of Emotion Regulation Strategies

Results of the one-way ANCOVA showed a significantly higher mean subscale score for emotion suppression in the CTE group ($M = 17.07$, $SD = 5.26$) compared to the nCTE group ($M = 15.21$, $SD = 5.67$; $F(1, 250) = 7.739$, $p = 0.006$, $\eta_p^2 = 0.030$). Results also showed a significantly lower mean subscale score for emotion reappraisal in the CTE group ($M = 26.38$, $SD = 7.36$) compared to the nCTE group ($M = 29.19$, $SD = 6.92$; $F(1, 250) = 4.129$, $p = 0.043$, $\eta_p^2 = 0.016$). From the included covariates, age and current PTSD symptomatology showed a significant effect on both dependent variables, while the number of lifetime trauma did not show a significant effect on suppression ($p = 0.07$) nor on reappraisal ($p = 0.60$).

Association Between Emotion Regulation and Internalizing Mental Health Disorders

The parallel mediation analysis showed that emotion suppression and emotion reappraisal fully mediated the relationship between CTE history and internalizing mental health disorders (current and lifetime). A significant total effect of CTE history on internalizing mental health disorders (i.e., the index score) was observed ($b = 0.777$, $t = 2.876$, $p = 0.004$), explaining 49.5% of the variance. When the two emotion regulation strategies (suppression and reappraisal) were included as (parallel) mediators in the model, a non-significant direct effect emerged ($b = 0.385$, $t = 1.445$, $p = 0.150$), explaining a greater percentage of the variance (57.2%). A significant indirect effect *via* both suppression ($b = 0.204$, 95% CI [0.060; 0.340]) and reappraisal ($b = 0.188$, 95% CI [0.035; 0.414]) was also observed, indicating that the two emotion regulation strategies significantly mediated the association between CTE history and internalizing mental health disorders. See **Figure 1** for

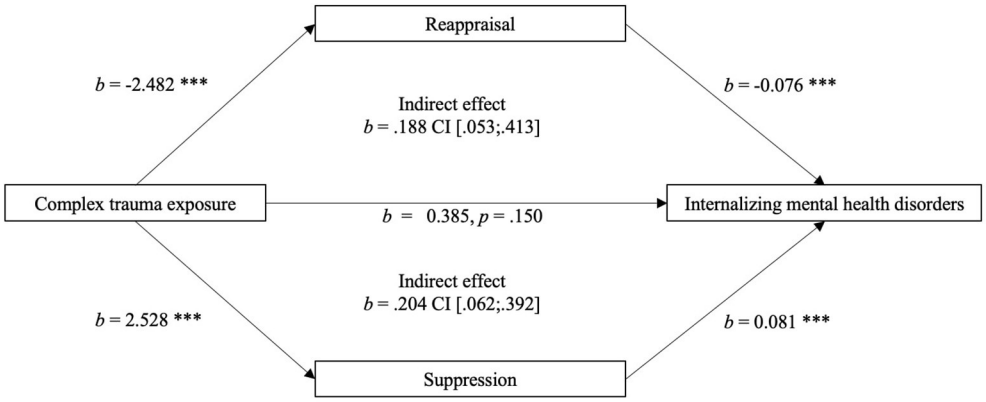

FIGURE 1 | Parallel mediation model of the relationship between complex trauma exposure (Predictor) and internalizing mental health disorders (Outcome Variable), significantly mediated by emotion suppression and reappraisal (Mediators); with age and number of lifetime trauma as covariates.

the full mediation model. The comparison of the standardized regression coefficients of both mediators showed a comparable effect on the association between CTE history and internalizing mental health disorders (suppression: $\beta = 0.088$; reappraisal: $\beta = 0.081$).

DISCUSSION

The present study examined the prevalence of current and lifetime internalizing mental health disorders and emotion (dys-)regulation in a sample of older adults with and without a history of CTE in childhood and/or adolescence. It further aimed to investigate the mediating role of emotion suppression and emotion reappraisal in the relationship between CTE in childhood and/or adolescence and internalizing mental health disorders later in life. Results showed that individuals with a history of CTE presented with a higher mental health burden regarding current and lifetime internalizing mental health disorders. Individuals affected by CTE also reported more disadvantageous emotion regulation than non-affected individuals, with higher levels of maladaptive emotion regulation and lower levels of adaptive emotion regulation. Both emotion regulation strategies significantly mediated the relationship between CTE history and internalizing mental health disorders, suggesting a potential underlying process for how early-life exposure to complex trauma may translate into mental ill-health over the life span.

Internalizing Mental Health Disorders in Individuals With and Without a Complex Trauma Exposure History

In the present study, individuals with a history of CTE in childhood and/or adolescence showed a high(er) mental health burden, with meaningfully higher prevalence rates in various current and lifetime internalizing mental health disorders, compared to individuals with no CTE history. These included separation anxiety, social phobia, specific phobia, dysthymia, and major depression, as well as a significantly higher index score (i.e., total number of internalizing mental health disorders). The high(er) rates of current and lifetime internalizing mental health disorders in the CTE group were expected and corroborate existing literature on comparable, but younger, samples (e.g., Greeson et al., 2011; Nelson et al., 2017; Copeland et al., 2018). Moreover, the high prevalence rates within the CTE group emphasize the importance of not only considering trauma-related disorders in the context of (complex) trauma exposure (e.g., PTSD), but also specifically considering internalizing mental health disorders (e.g., Ford et al., 2010; Kroska et al., 2018; Humphreys et al., 2020). Given the comparatively high prevalence of *current* internalizing mental health disorders in this CTE group of older adults (i.e., 36.9%), this consideration is particularly relevant when investigating the relationship between (complex) trauma exposure and mental health from a lifespan perspective.

Regarding gender-related differences in mental health, comparisons revealed both within- and between-group differences. In the total sample, as well as in the two groups, females presented with more current and lifetime internalizing mental disorders than males. This finding is in line with existing literature on younger participants that shows a higher likelihood for females to develop internalizing mental health disorders and symptoms (e.g., Boyd et al., 2015; Salk et al., 2017). In the current study, gender differences in the prevalence rates of current and lifetime internalizing mental health disorders were smaller in the nCTE group than in the CTE group. This may suggest that particularly for females, a history of CTE can increase the probability of developing an internalizing mental health disorder. This is in line with a systematic review and meta-analysis by Giraldo Gallo et al. (2018), which found a tendency for a gender differences in the effect of childhood maltreatment on adulthood depression and anxiety. Future

research should aim to build on these findings by using prospective longitudinal study designs to investigate incidence, recurrence, and comorbidity of internalizing mental health disorders in the aftermath of CTE.

Emotion Regulation in Individuals With and Without a Complex Trauma Exposure History

The present study provides evidence for emotion dysregulation in older adult CTE survivors by identifying significant group differences with respect to emotion suppression and emotion reappraisal. Individuals with a history of CTE used significantly more suppression and significantly less reappraisal than individuals without such a history. These findings align with the few existing studies on emotion regulation in comparable, but younger, samples that depict emotion dysregulation as a part of the complex pattern of posttraumatic sequelae in CTE survivors (e.g., Hopfinger et al., 2016; Jennissen et al., 2016; Henschel et al., 2019). Thus, the present findings provide empirical evidence to suggest that difficulties in emotion regulation in CTE survivors may be identified up to old age (i.e., long-term sequelae). This finding is strengthened by two aspects: First, group differences were observed after controlling for potential confounding variables reported to impact emotion regulation, such as the number of lifetime trauma and current PTSD symptomatology (Ehring and Quack, 2010). Second, the mean subscale scores for emotion reappraisal and emotion suppression in the nCTE group was comparable with existing studies using the ERQ in older adult samples (e.g., Brady et al., 2019). This comparability suggests that the significant group differences observed in the current study were not due to a hyper-regulated control group. Taken together, there is evidence to assume that emotion dysregulation after CTE in childhood and/or adolescence can affect individuals of all ages, including older adulthood.

However, given the study's cross-sectional design, the data do not provide any information about emotion (dys-)regulation earlier in life. Given the research showing that emotion regulation patterns may change across adulthood (Eldesouky and English, 2018; Preece et al., 2021), particularly the age-related increase in emotion reappraisal (Masumoto et al., 2016); it could be that the group differences in the current study were more or less pronounced earlier in life than in older adulthood. To investigate this, longitudinal studies are needed to compare emotion regulation in individuals with and without a CTE history across several developmental stages. This would enhance understanding on the stability of emotion (dys-)regulation after CTE and potential variability over the life course. Beyond that, such longitudinal data could also provide further insight into the context-related effectiveness of emotion regulation strategies (i.e., each emotion regulation strategy can be either adaptive or maladaptive in different contexts, see Webb et al., 2012). Lastly, future research on the long-term emotional sequelae of CTE should also focus on potential alterations of emotion regulation flexibility, as this seems to be an integral component of healthy functioning and long-term adjustment (Bonanno et al., 2004; Eldesouky and English, 2018).

The Mediating Role of Emotion Regulation in the Relationship Between Complex Trauma Exposure History and Mental Health

The investigated emotion regulation strategies, suppression and reappraisal, fully mediated the relationship between CTE history and current and lifetime internalizing mental health disorders (i.e., the index score). As the mediation analysis was run with the grouping variable as the independent variable, the results suggest that differences in suppression and reappraisal may help to explain the mental health disparities between individuals with and without a CTE history. This finding is in line with previous research in younger samples, emphasizing the relevance of emotion (dys-)regulation in the understanding of internalizing mental health problems in the aftermath of cumulative childhood trauma (e.g., Huh et al., 2017; Cloitre et al., 2019; Haselgruber et al., 2020). Furthermore, both mediators were comparably substantive and showed the expected associations: Suppression showed positive associations, and reappraisal showed negative associations with internalizing mental health disorders. However, as a composite index score of current and lifetime internalizing mental health disorders was applied in the current study, a potential obverse effect might have been disguised due to the elevated variable complexity. Therefore, future research is needed to evaluate whether a potential age-related alteration (i.e., a decrease) in the association of emotion suppression and reappraisal and mental health in individuals with a CTE history could exist or not.

Strengths and Implications

The current study extends existing literature in several ways. First, the study adds to the limited body of research on the long-term correlates of CTE in childhood and/or adolescence and mental health in older adulthood (e.g., Pfluger et al., 2021). Specifically, this study builds on the literature by focusing on internalizing mental health disorders, a highly prevalent category of mental health disorders in the older adult population (Mühlig et al., 2015). Second, the study expands on the knowledge of emotion (dys-)regulation in the context of CTE history by adding a lifespan perspective. Extending this research into older adulthood is vital not only to enhance understanding of the potential (emotional) burden of individuals with a CTE history, but also the potential duration of vulnerability. Third, by comparing two groups of older adults, the study adds to the limited number of comparative studies on individuals with and without a history of CTE (e.g., Greeson et al., 2011; Lewis et al., 2021). As children and adolescents still face situations where CTE occurs (e.g., Stoltenborgh et al., 2015), this research is crucial in order to better understand the particular vulnerabilities and emotion regulation abilities of individuals with a CTE history compared to those with other or no traumatic experiences in

childhood and/or adolescence. This knowledge would be highly relevant for preventive and therapeutic measures.

The study findings also have meaningful implications for clinical practice. For instance, the results support the notion of integrating detrimental childhood experiences into the understanding of the development of mental health disorders later in the life course. However, this link may not be obvious in every case and could become more difficult to distinguish with higher age (i.e., more distance from childhood/adolescence). Therefore, therapists can help patients to understand and navigate the connection between CTE experienced in childhood and/or adolescence and potential manifestations as depressive or anxiety disorders in older age. In addition, the study findings on the relevance of emotion regulation for internalizing mental health disorders also has connotations for clinical practice. For example, emotionally dysregulated trauma survivors could benefit from emotion-stabilization work before beginning trauma-focused treatment (e.g., Cloitre et al., 2012). This treatment approach could be applied to work with older patients with internalizing mental health disorders.

Limitations

The current study also has some methodological limitations that must be noted. First, the retrospective assessment, particularly with distal experiences in an older sample, such as child maltreatment, may be affected by memory recall and retrieval bias (Sheikh, 2018). As group assignment was based on this retrospective data, this could also have led to an assignment bias. Furthermore, the cross-sectional study design prevents statements on causal inference. In addition, while a broad range of diagnoses were included in the larger project, the presence of comorbid diagnoses was not analyzed in the current study. This may be a relevant consideration, as recent research has shown that emotion regulation processes are involved in the co-occurrence of major depressive disorder and PTSD in individuals with traumatic experiences (Post et al., 2021). This cumulative perspective should be examined in future research. An additional limitation was that only two emotion regulation strategies were included in this study. Thus, only limited insight can be provided into the broad and multi-faceted construct of emotion regulation (e.g., Gratz and Roemer, 2004).

CONCLUSION

Child maltreatment, and particularly CTE, is an extremely detrimental experience that has a high potential to affect mental health and self-regulation abilities across the life span (e.g., Cook et al., 2005; Pfluger et al., 2021). The present study investigated the long-term correlates of CTE in childhood and/or adolescence by focusing on internalizing mental health disorders and emotion regulation in two groups of Swiss older adults (i.e., a CTE group and a control group). Comparative analyses revealed a significantly higher current and lifetime mental health burden, as well as significantly more difficulties in regulating emotions, in survivors of CTE. Moreover, results suggest that differences in emotion regulation may provide a potential explanation for the mental health disparities found in the current study. Altogether, the study findings provide more elaborated insights into a highly vulnerable group of older adults that is often neglected in the research on complex Trauma exposure and mental health.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Faculty of Arts and Social Sciences at the University of Zurich (ID:19.4.3). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MT and SR conceived the idea for the study and were responsible for the conception and design of the study, managed the data collection. VP and CE were involved in data collection. Data analysis was performed by VP. The first draft of the manuscript was written by VP and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Psychometric Validation of the Persian Version of Short Form Self-Regulation Questionnaire in Community-Dwelling Older Adults

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The aim of this study was to examine the validity and reliability of the Persian version of the Short Form Self-Regulation Questionnaire (SSRQ) among Iranian community-dwelling older adults and to determine its optimal cutoff point. In Shiraz, Iran, a cross-sectional study of 500 older adults ≥ 60 years was conducted in two steps. The forward–backward method was used for translation. Psychometric properties, such as the face and content validity, based on the point of view of experts, construct validity based on exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), convergent validity by assessing the relationship with the Generalized Self-Efficacy Scale (GSE-10), and reliability based on Cronbach's α were examined. A receiver operating characteristic curve (ROC) was plotted to confirm the cutoff point. Validity of both the face and the content was confirmed. The first stage of construct validity was performed using the kurtosis test and the EFA, and finally, only 20 items in four subscales were loaded with 76.34% of the total variance. The CFA indicated a good fit to the data (root mean square error of approximation (RMSEA) = 0.059; comparative fit index (CFI) = 0.92; and goodness of fit index (GFI) = 0.89). Cronbach's α coefficient of the SSRQ-20 increased to 0.87. A significant positive correlation was found between the SSRQ-20 and the GSE-10 (r = 0.44), indicating acceptable convergent validity. The optimal cutoff score for differentiating older adults in terms of self-regulation was 71. This study demonstrates that the Persian version of the SSRQ, which contains 20 items, is a valid and reliable tool for assessing self-regulation in Iranian community-dwelling older adults.

Keywords: Persian, self-regulation, validity, psychometric, scale, older adult

INTRODUCTION

The progressive aging of our society is a significant issue in this era. Aging is a natural process that may be experienced by people at different times; however, the World Health Organization (WHO) defines aging as being over 60 years of age (World Health Organization [WHO], 2007). According to the WHO, there are currently 600 million older people worldwide, which is projected

to double by 2025 and reach 2 billion (World Health Organization [WHO], 2020). Iran is also facing an increase in the number of older adults, and according to UN statistics in 2006, the number of people over 60 years of age in Iran accounted for 6% of the total population, i.e., a population of 4,562,000. According to forecasts, this figure will reach 263,930,000 people by 2050, which is a population equivalent to 26% of the total population (Mehri et al., 2020).

Aging is a phenomenon that needs to be managed because older people often experience changes that can sometimes lead to physical, mental, and social limitations that overshadow their quality of life (Samarakoon et al., 2011; McPhee et al., 2016). Self-care, as a health-promoting behavior, can help older people manage the consequences of these changes (Callaghan, 2005). Self-care must be planned to meet all the needs of old people (Goes et al., 2020). Self-regulation is a mechanism that can help implement effective self-care (Koch and Nafziger, 2011). It is a goal-oriented process that increases the capacity for planning to initiate appropriate behavior and control inappropriate behavior (Mann et al., 2013; Wehmeyer and Shogren, 2017).

There is a controversy among scientists about self-regulatory steps. Bandura proposed that self-regulation consists of three steps: self-observation, judgment, and self-response (Bandura and Jourden, 1991). Kanfer proposed a three-step theory that includes self-monitoring, self-evaluation, and self-reinforcement (Kanfer, 1970). Miller and Brown defined self-regulation in seven dimensions, which include information input, self-monitoring, triggering change, searching for options, planning, implementation, and assessing the plan's effectiveness (Miller and Brown, 1991).

Because measuring the level of self-regulation in older adults is necessary for self-care planning, it is beneficial to use an appropriate questionnaire based on the self-regulation steps and tailor it to the older population. According to our search, several questionnaires, such as the Beaufort Self-Regulatory Questionnaire and the Barnard Self-Regulatory Learning Questionnaire, measured only one aspect of self-regulation, namely self-regulated learning (Taghizade et al., 2020; Tahmasbipour et al., 2021). Fortunately, one of the oldest and most common questionnaires in accordance with our goal was the 31-item Short Form Self-Regulatory Questionnaire (SSRQ), which is derived from the 63-item Self-Regulatory Questionnaire (SRQ; Brown et al., 1999). This questionnaire can measure older adults' general ability to regulate behavior and has been extensively validated across different populations and cultures (Garzon Umerenkova et al., 2017; Chen and Lin, 2018). Carey et al. extracted the SSRQ from the SRQ and considered one dimension that indicated overall self-regulatory capacity (Carey et al., 2004). In 2005, Neil and Carey assessed the psychometric properties of the SSRQ, and two dimensions, including impulse control and goal setting, were introduced through factor analysis (Neal and Carey, 2005). In 2009, Potgieter and Botha conducted a study on students and identified seven factors: monitoring, decision-making, learning from mistakes, mindful awareness, perseverance, creativity, and self-evaluation (Potgieter and Botha, 2009).

It has been suggested that the dimensions of self-regulation may differ among population groups and different cultures (Garzon Umerenkova et al., 2017; Chen and Lin, 2018). Therefore, it was necessary to conduct an independent and purposeful study for the psychometrics of this questionnaire in Iran. Zeinali et al. (2011), in the section "Materials and Methods" of one study in several lines, briefly reported the psychometric properties of the SSRQ for use in Iranian adolescents and proposed a 28-item version. As the participants in our study were older adults, this tool had to be tailored to their culture and abilities. According to our search, the psychometric properties of SSRQ for measuring self-regulation in Iranian older adults had not been evaluated. In addition, no cutoff point was reported in various versions. The evidence indicated that determining the cutoff point is important because it acts as a classification boundary and provides a boundary for interpreting scores above and below that point (Carle et al., 2011). Therefore, the main objectives of this study were to assess the psychometric properties of the SSRQ in Iranian older adults, identify subscales based on the constructs of self-regulation theory, and finally determine optimal cutoff point.

MATERIALS AND METHODS

This cross-sectional study was conducted in Shiraz from November 2020 to March 2021, and 500 older adults over the age of 60 were selected using a two-stage convenience sampling method (stage 1, $n = 250$; stage 2, $n = 250$). Due to the lack of access to the initial participants, the use of two samples prevented the effect of being familiar with the first questionnaire when completing the second questionnaire and as a better questionnaire response after reducing items. Community-dwelling older adults were recruited using two types of convenience sampling techniques including grab approach and snowball sampling. Due to the epidemic, in a grab sampling approach, we visited nursing homes and urban health centers and, after checking medical records, contacted eligible older adults, and invited them to participate in the study and fill out an online questionnaire *via* WhatsApp or a link. We used the snowball technique to send questionnaires *via* WhatsApp to older people who were introduced by their peers after testing their cognitive status with questions from the researcher. The inclusion criteria invovled community-dwelling adults aged 60 and older with at least an elementary level of literacy, a smartphone, and internet access. The exclusion criteria included older adults who had persistent severe psychological problems and were reluctant to participate in the study.

Tools

Short Form Self-Regulation Questionnaire

We used the questionnaire developed by Carey et al. (2004) to assess self-regulation behavior in older adults. This self-reported questionnaire contains 31 items, each item was scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire scores ranged from 31 to 155, with higher scores indicating better self-regulation behavior.

Generalized Self-Efficacy Scale

The Generalized Self-Efficacy Scale (GSE-10) is a 10-item scale developed by Schwarzer and Jerusalem in 1979. It was rated on a four-point Likert scale ranging from not at all true = 1 to completely true = 4. The total self-efficacy score was obtained by summing the item score and ranges from 10 to 40 (Singh et al., 2009). This scale was translated into Persian in 1996 (Nezami et al., 1996), then Rajabi and Moeini et al. verified its validity and reliability and reported Cronbach's α of the scale as 0.82 and 0.81, respectively (Rajabi, 2006; Moeini et al., 2008). Moreover, the present study obtained a Cronbach's α of 0.75 for the Persian version of GSE-10 among older adults.

Procedure

First, permission was obtained from the original questionnaire's developer (Dr. Kate B Carey affiliated with Brown University School of Public Health, Providence, United States). This research was then divided into two stages: the first stage included tool translation technique and cultural adaptation. The second stage involved evaluating the psychometric properties of the tool to examine its validity (face, content, construct, and convergent validity). In the first step, the SSRQ was translated into Persian using the standard forward–backward technique (Wild et al., 2005). To determine face validity, SSRQ was completed through interviews with 10 subjects to ensure linguistic and conceptual equivalence of translations. Based on the opinions of the research team, the tool was modified and the final questionnaire was created. To calculate the qualitative content validity, 10 health psychologists who were familiar with the psychometric process were asked to comment on the position and the grammar of the items, and the use of appropriate words in the phrases. In addition, the content validity ratio (CVR) and the content validity index (CVI) were examined to calculate the quantitative content validity of the questionnaire. To determine CVR, 10 experts (in the fields of health education, psychology, nursing, public health, and gerontology who were familiar with the subject matter) were asked independently to rate items using a three-point ranking scale (necessary, helpful but unnecessary, and unnecessary). According to the Lawshe table, the minimum agreed CVR value based on evaluations of 10 experts should be greater than 0.62 (Lawshe, 1975). Finally, the mean CVR value of all SSRQ items was determined to be 0.84, and the CVR value of each questionnaire item was higher than the minimum acceptable range.

TABLE 1 | Demographic characteristics of the older adults in samples 1 and 2.

	Sample 1 (*n* = 250) *N* (%)	Sample 2 (*n* = 250) *N* (%)
Gender		
Men	98 (39.2)	95 (38)
Women	152 (60.8)	155(62)
Age		
60–70	189 (75.6)	213 (85.2)
70–80	49 (19.6)	31 (12.4)
80^{+}	12 (4.8)	6 (2.4)
Marital status		
Single	25 (10)	11 (4.4)
Married	198 (79.2)	210 (84)
Divorced/Separated/Widow	27 (10.8)	29 (11.6)
Education		
High school grade(diploma) or less	209 (83.6)	226 (84.4)
Academic education	41 (16.4)	54 (15.6)
Medical history		
Healthy	91 (36.4)	108 (43.2)
Diabetes	80 (32)	70 (28)
Hypertension	55 (22)	44 (17.6)
Depression	12 (4.8)	9 (3.6)
Other	12 (4.8)	19 (7.6)
Living arrangement		
With family or relatives	203 (81.2)	231 (92.4)
Living alone	47 (18.8)	19 (7.6)

The CVI score of each item was calculated using Waltz and Bausell's method (Waltz and Bausell, 1981). Therefore, experts were asked to determine the degree of relevance, clarity, and simplicity of each item using a four-part spectrum. Then, the number of experts who chose options three and four was divided by the total number of experts. Lastly, the CVI of SSRQ was calculated using the mean of the CVI scores for the entire item (0.90).

To assess construct validity, in the first step with 250 participants, the kurtosis test and data normality were determined (Garson, 2012). Then, the SSRQ factor structure was determined using exploratory factor analysis (EFA) through SPSS version 23. The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test for sphericity were used to determine sampling adequacy and the appropriateness of the factor analysis. Then, principal component analysis in promax rotation was performed to extract latent factors and appropriate items from the factors. Each item was assigned to a factor based on communalities greater than 0.3 (Samuels, 2017). In the next step, the confirmatory factor analysis (CFA) was performed on the second sample data (n = 250) using structural equation modeling with AMOS 24. Therefore, first- and second-order models were designed, and fit indices based on cutoff values were reported.

Convergent validity is one of the issues related to construct validity and a study that tests with similar constructs should have an acceptable correlation (Hopkins, 2017). To acquire convergent validity, Pearson's correlation was used between the components of the SSRQ and the total score of GSE-10. Reliability was examined based on the Cronbach's α coefficient, and the receiver operating characteristic (ROC) curve was performed to estimate the optimal cutoff point using SPSS version 23. It is worth noting that SPSS software calculates the area under the curve (AUC) value, sensitivity, specificity, p-value, and confidence interval as well as Youden's J, K-index, and DIFF using the formula.

RESULTS

Participants

A total of 500 older people participated in the study in two stages. Most of the older adults were women (n = 307; 61.4%),

were married (n = 408; 81%), were between the ages of 60 and 70 years (n = 402; 80.4%), and had a high school diploma or less (n = 435; 87%). The majority of participants reported that they were living with family (n = 434; 86.8%). **Table 1** presents the characteristics of the study population in samples 1 and 2.

Construct Validity

Kurtosis values for 3, 8, 11, 16, and 31 items in the first sample were −1.12, −1.11, −1.16, −1.09, and −1.09, respectively, so these items were omitted. A normality test was done, and five outlier participants were excluded from the analysis based on the boxplot (with numbers: 49, 51, 68, 86, and 88).

Results of Exploratory Factor Analysis

Good results of Bartlett's test of sphericity (χ^2 = 2,358.792; $p < 0.001$) and the KMO test (KMO = 0.791) showed sampling adequacy and provided minimum standards for conducting a factor analysis (Kaiser, 1974; Field, 2013). Therefore, the 26-item questionnaire was subjected to principal component analysis estimation using the promax rotation. Here, six items (1–6–9–15–23–26) were removed due to absolute value < 0.3, and finally, 20 items were left. EFA extracted four factors. Using the self-regulatory theory as a reference framework, a panel of experts from the fields of health promotion, gerontology, and psychology named four factors. They were categorized as follows: self-awareness (six items), goal setting (two items), action planning (six items), and self-monitoring (six items; see **Table 2**).

Results of Confirmatory Factor Analysis

In this step, the EFA result was confirmed by performing CFA on the second sample (n = 250). The first- and second-order CFA models were modified using AMOS software proposed correction command, and satisfactory fit indices were found. **Table 3** presents a comparison of the fit indices of second-order CFA to the first-order model, and **Figure 1** shows the path analysis of modified first- and second-order models.

Convergent Validity

The results of Pearson's correlation demonstrated a significant positive correlation between the SSRQ-20 and its subscale

TABLE 3 | Fit indices for the SSRQ among older adults.

Indexes	χ2/df	Sig.	RMSEA	CFI	GFI	IFI	PRATIO	PCFI
First-order model	3.41	<0.001	0.08	0.79	0.82	0.79	0.86	0.68
Modified first-order model	1.87	0.07	0.05	0.92	0.89	0.92	0.84	0.78
Second-order model	3.62	<0.001	0.09	0.80	0.80	0.75	0.85	0.64
Modified second-order model	2.05	0.05	0.06	0.90	0.86	0.90	0.80	0.77

TABLE 2 | The four factors of the Short Form Self-Regulatory Questionnaire (SSRQ) in the Iranian older adults and their factor loadings (n = 250).

20-Items		Factor loading			
		Self-awareness	Goal setting	Action planning	Self-monitoring
Q2	I have trouble making up my mind about things.	0.778			
Q4	I don't notice the effects of my actions until it is too late.	0.852			
Q5	I am able to accomplish goals I set for myself.		0.833		
Q7	It's hard for me to notice when I've "had enough" (alcohol, food, sweets).				0.845
Q10	I have trouble following through with things once I've made up my mind to do something.			0.693	
Q12	I can stick to a plan that's working well.			0.661	
Q13	I usually only have to make a mistake one time in order to learn from it.				0.805
Q14	I have personal standards, and try to live up to them.				0.523
Q17	I have a lot of willpower				0.342
Q18	When I'm trying to change something, I pay a lot of attention to how I'm doing.			0.521	
Q19	I have trouble making plans to help me reach my goals.			0.775	
Q20	I am able to resist temptation.	0.746			
Q21	I set goals for myself and keep track of my progress.		0.316		
Q22	Most of the time I don't pay attention to what I'm doing.	0.832			
Q24	I can usually find several different possibilities when I want to change something.			0.705	
Q25	Once I have a goal, I can usually plan how to reach it			0.570	
Q27	Often, I don't notice what I'm doing until someone calls it to my attention.	0.800			
Q28	I usually think before I act				0.339
Q29	I learn from my mistakes	0.734			
Q30	I know how I want to be				0.320

Total variance: 76.34%

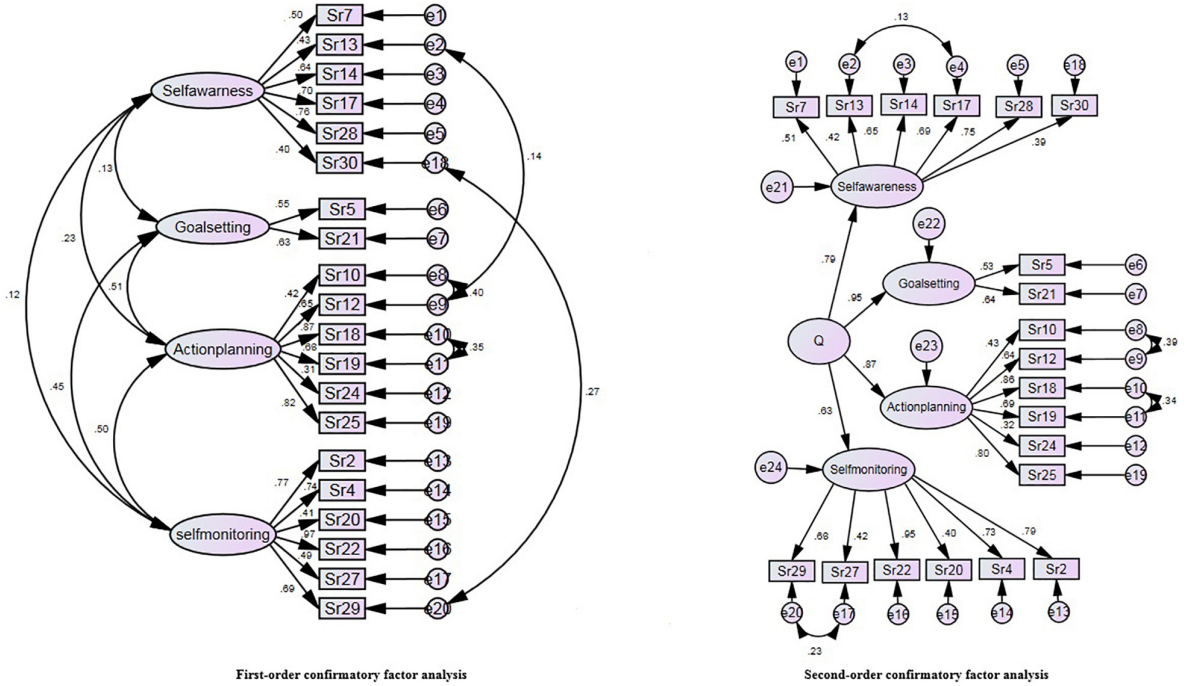

FIGURE 1 | Modified first- and second-order models.

scores and the GSE-10 ($p < 0.01$). These findings demonstrated acceptable convergent validity. The interscale correlation between SSRQ-20 subscales was also significantly positive, which further confirmed the construct validity (**Table 4**).

Reliability Analysis

The reliability of the 31-item SSRQ and our final 20-item scale in older adults was estimated to be 0.82 and 0.87, respectively, *via* Cronbach's α coefficients.

TABLE 4 | Pearson's correlation between the components of SSRQ and the Generalized Self-Efficacy Scale (GSE-10) in older adults.

	Mean (SD)	1	2	3	4	5	6
1. GSE-10	32.28(3.69)	1					
2. SSRQ, Self-awareness	21.32(3.78)	0.38**	1				
3. SSRQ, Goal setting	7.83(1.75)	0.32**	0.58**	1			
4. SSRQ, Action planning	22.99(4.03)	0.44**	0.68**	0.70**	1		
5. SSRQ, Self-monitoring	21.24(3.73)	0.34**	0.63**	0.67**	0.70**	1	
6. SSRQ, Total	73.40(11.54)	0.44**	0.85**	0.80**	0.90**	0.88**	1

***p ≤ 0.01.*

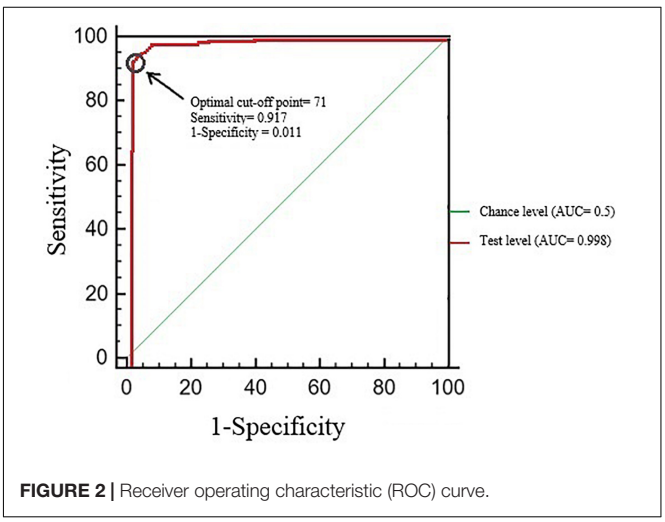

FIGURE 2 | Receiver operating characteristic (ROC) curve.

Scoring, Receiver Operating Characteristic Curve, and Cut-Off Points

The total score represented the sum of the points of each item. The item scores ranged between 1 and 5; thus, the total scores ranged from 20 to 100. The cutoff point of SSRQ-20 was determined using the ROC curve distribution. The mode score of the 20-item scale (mode = 71) was assigned as the cutoff point due to an excellent AUC (**Figure 2**), high sensitivity, and high specificity. Youden's J index (J) is a coefficient that maximizes the sensitivity and specificity of the cutoff point (Perkins and Schisterman, 2006). As Youden's J index (J) was ≥ 0.60 and

TABLE 5 | AUC value, sensitivity, and specificity of ROC curve for 20-item SSRQ.

Scale	AUC	95% CI		*P*-value	Cut-off Point	Sensitivity	1-Specificity	Youden's J	Distance Sqrt. (K-Index)	DIFF
		Lower Bound	Upper Bound							
SSRQ	0.998	0.995	1	0.000	71	0.917	0.011	0.993	0.002	0.003

$p \leq 0.05$; AUC = area under curve; CI = confidence interval; DIFF = abs (sensitivity– specificity); D Value or K-Index = Sqrt [(1 - Sensitivity)^2 + (1 - Specificity)^2; Kallner, 2018)].

DIFF $\leq$ 0.2, the specified cutoff point of SSRQ-20 is optimal (**Table 5**). In the second sample, 157 (62.8%) participants scored higher than 71.

DISCUSSION

The three main objectives of this study were to assess the validity and reliability of the SSRQ in an Iranian older adult population sample and to identify subscales and cutoff points. We used precise methods based on psychometric criteria to confirm the validity and reliability of the Persian version of the SSRQ, and we obtained a questionnaire with four subscales and 20 items. With proper fit indices, the final SSRQ was shorter than the original. Similar to our study, Chen and Lin found that, while validating the SSRQ in Taiwanese students, the number of questionnaire items was reduced to 22 items and a shorter questionnaire was obtained (Chen and Lin, 2018). It seems that a decrease in the number of questionnaire items compared to the original one may be related to cultural, environmental, and population group differences. On the other hand, we believe that the shortness of the questionnaire is a good feature of a measure for use in the older population because it is much faster to complete and more practical due to vision dysfunction and reading problems of older people. Bowling et al. proposed that the use of short scales in older adults can improve measurement accuracy (Feizi and Heidari, 2020).

In this study, we obtained four subscales for the SSRQ in Iranian older population including self-awareness, goal setting, action planning, and self-monitoring. The subscales were named based on the content of their subitems and using the constructs of the self-regulation theory. These subscales are somewhat consistent with the Bandura self-regulatory stages (Bandura and Jourden, 1991). Bandura proposed that self-observation as the first step of self-regulation is a process that involves the awareness of thoughts and feelings to determine the goal (Bandura, 1991). Therefore, self-observation is nearly synonymous with self-awareness and goal-setting sub-scales. In our study, action planning is a unique concept that is defined as a stage after goal setting to create behavior (Ogden, 2019). Action planning is the process of transforming people's strategies and goals into action (Gagné, 2018). In Bandura's theory, judgment and self-response are also consistent with the self-monitoring subscale. Self-monitoring is a behavior change technique that includes the ability to monitor and regulate one's emotions and behaviors in response to changes and problems (Bruhn et al., 2015). According to the evidence, other researchers have identified a variety of dimensions for SSRQ (Neal and Carey, 2005; Potgieter and Botha, 2009). This could be due to the diversity of researchers' viewpoints and participants responses.

Regarding convergent validity, the GSE-10 for Iranian older adults demonstrated a positive and significant correlation with SSRQ total score and subscales, which displays the expected convergent validity. Convergent validity was not used in previous similar studies (Potgieter and Botha, 2009; Garzon Umerenkova et al., 2017; Chen and Lin, 2018). The reason for using the GSE-10 for convergent validity in our study was that it is a short scale that can be filled out more easily by old people and also is developed to measure self-beliefs to meet a variety of difficult situations (Lazić et al., 2021). Therefore, the contents of both scales pursue almost the same goal, which is to measure self-efficacy and self-regulation as Bandura's significant constructs for predicting behavior to improve self-care (Luszczynska et al., 2005; Pillay et al., 2022).

According to the results, the "mode" score is an optimal cutoff point for the SSRQ-20. Therefore, people who scored higher than 71 have better self-regulatory behavior, and those who scored below indicate poor self-regulatiory behavior. It should be noted that the cutting point of the SSRQ has not been identified in previous studies, hence this is one of the highlights of the present study.

Strengths and Limitations

The strengths of this study include the adaptation and validation of the Persian version of the SSRQ in older people, the use of separate samples for EFA and CFA, and the development of a cutoff point for the scale. There are several limitations in this study. The sample size might be relatively small, and we clinically assessed the cognitive status in older people using several questions and without using objective tools. In addition, the Iranian population consists of different ethnic groups, and the present study was conducted on the Fars ethnicity, which is the largest ethnicity in Iran. Therefore, caution should be exercised when generalizing the findings to other ethnic minorities, such as Kurds, Turkmen, and Baloch. On the other hand, this study was conducted during the COVID-19 outbreak; therefore, it took longer to fill out the questionnaires than expected. Also, as the questionnaires were sent electronically or *via* WhatsApp to the participants, it was not possible to reach the poor, illiterate, marginalized, rural people, and those without smartphones.

CONCLUSION

In the Iranian context, the short version of the SSRQ with 20 items demonstrated acceptable psychometric properties and

a good factor structure for measuring self-regulation in older adults. Due to features such as good reliability and validity, the design of subscales based on the self-regulatory theory, on filling of the forms in a short period of time by older adults, and the determination of the cutoff point, it seems that the SSRQ-20 is a suitable tool for planners to use in designing interventions aimed at improving self-regulation in older adults.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of Shiraz University of Medical Science (Ref. no: IR.SUMS.REC.1398.1365). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MK conceptualized the study project, supervised the implementation process, and edited the manuscript. MM-J participated in study development, data collection, data analysis, and wrote the manuscript. AM contributed to data collection and edited the manuscript. AA helped in data analysis and edited the manuscript. All authors have read and approved the final manuscript.

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Long-term couple relationships - stress, problems and coping processes in couple counseling: Insights based on five case studies with five long-term couples

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In the course of demographic change, the proportion of older people in many countries is rising continuously and more and more people are experiencing a long time together as a couple. In old age, subjective wellbeing and health aspects are associated with partners' satisfaction with couple relationship. The need for couple counseling in old age is growing in parallel with demographic developments. However, empirical studies on couple therapy with older people in long-term couple relationships exist to date only to a limited extent. The present contribution deals with this knowledge gap. In an explanative two phases design, research has been conducted with long-term couples in couple counseling of which we would like to present here the central qualitative study. The aim is to be able to describe details of these factors. Older couples who have lived in long-term couple relationships were interviewed after using standardized questionnaires concerning the individual and couple-related stress factors and problems at the beginning ($N = 62$) and the end ($N = 36$) of their couple counseling process. Five couples from this study were the interviewees for the following study. The couples were interviewed separately. In this interview study and central part of this contribution, the stress factors, problem areas and coping processes of the older couples were examined. The results serve as a suggestion for further research and can only be interpreted with caution due to the small sample of five case studies: The central results of the study are summarized in a circular process model and are discussed in the light of relevant theoretical approaches. The culmination of massive chronic and acute strains and losses associated with feelings of excessive demands and desperation gave rise to emotional alienation of the partners. In the course of couple therapy, the partners mutually opened their thoughts and emotions and modified their previous dysfunctional pattern of interaction. Thus, emotional and physical rapprochement of the partners was fostered with the effect that subjective load of the partners and dissatisfaction of the couple relationship decreased, and subjective emotional wellbeing increased. To prevent negative emotions and destructive conflicts with their spouse, some of the interviewed partners

actively used avoidance strategies in couple interactions. Upon completion of couple therapy changes in the couple relationships appeared instable as soon as overcharging stress factors occurred again. The results suggest that an approach to couple therapy for older people in long-term couple relationships should prioritize emotional safeness and attachment in couple relationship to facilitate constructive conflict management. The couple therapy process should emphasize emotion regulation strategies based on age-related strengths and consider age-related vulnerabilities. Moreover, long-term couples may benefit from catamnestic consultation appointments to consolidate the developed changes.

KEYWORDS

couple counseling, long-term couple relationships, coping processes, problem areas, stress factors

Introduction

In Germany, as in other countries, the increasing life expectancy means that more and more people are spending a long time together as couples. In its report, the German Centre for the Aging (DZA) gives development trends on the lifestyles and couple relationships of older people (Nowossadeck and Engstler, 2013). Due to increased life expectancy, a longer cohabitation of couples can be observed among those aged between 70 and 85. The post-parental phase, i.e., the time spent together as a couple after the children have grown up, has now become the longest phase in the life course. The need for couple counseling in old age is growing simultaneously with the demographic development (Ehe-, Familien- und Lebensberatung im Bistum Münster, 2022). The proportion of clients who are older than 60 years is up to 15% in institutional counseling centers under Catholic sponsorship. Empirical studies on couple therapy with older people in long-term couple relationships, however, only exist to a limited extent. The study presented here deals with the phenomena of older age, individual stress factors, problem areas in long-term couple relationships and corresponding coping processes in the context of couple counseling. With this study, we intend to gain a deeper understanding of the dynamics of coping processes through a detailed insight into the perceived problems of ten people from five couples. In the following, we elaborate on the requirements and the theoretical background for our research.

Interventions that have proven successful in couples counseling with younger couples sometimes turn out to be less effective in counseling with long-term couples. In older age, the transition to retirement is a critical transition phase requiring to reorganize distance and closeness as a couple. Riehl-Emde (2016a) names further essential development tasks: increasing emotional dependence on each other, facing age-related limitations and experiences of loss, mutual care and shared stimulating experiences. These phenomena require the counseling approaches and couple therapy interventions to be tailored for this target group and developed accordingly (Riehl-Emde, 2016b).

Theoretical background

Predictors of psychological wellbeing and life satisfaction in old age are the subjective state of health, namely, the presence of a partner with whom there is a bonding relationship, and satisfaction with one's own social relationships (Martin et al., 2000). In view of declining problems like physical strength, health restrictions, psychological stress and withdrawal from professional roles, the couple relationship is important as a stabilizing factor in old age. On the one hand, since the relationship with a partner is the most important attachment relationship in adulthood, a long history as a couple should be seen as a resource. On the other hand, the transition to the old age phase brings new challenges for the individual and the couple system which are associated with very specific development tasks. In older age, critical life events or human borderline situations are more likely to occur (Staudinger and Dittmann-Kohli, 1994). Among other things, couples aged 55 and older are faced with the task of coping with various physical and psychological stress factors and limitations as well as role changes in the private and professional spheres. In the sense of self-organization processes in social systems (Haken and Schiepek, 2006; Schiersmann and Thiel, 2012), long-standing couples in old age are challenged to form qualitatively new organizational structures in their couple system (*cf.* Theory of self-referential systems, Luhmann, 2021).

The approach of lifespan developmental psychology (Brandtstädter and Lindenberger, 2007) offers a suitable theoretical framework for looking at the self-regulatory processes and abilities of individuals as well as dyadic processes in shaping long-term couple relationships in older age. Mainly relevant here are the theoretical approaches and research findings on action

motivation and emotion regulation in older people in long-term couple relationships (Carstensen and Lang, 2007; Charles and Hong, 2016; Carstensen, 2021).

Emotional goals become more important in older age in connection with the maintenance of subjective wellbeing. Familiar and meaningful relationships such as the couple relationship are preferred and less meaningful social contacts are reduced (Carstensen and Charles, 1998). Recent models of socio-emotional selectivity theory address age differences in specific areas of emotional and cognitive functioning by combining the developmental domains of meaning and emotion. Here, socio-emotional strengths of older people, for example, emotion regulation competencies and emotional ambiguity tolerance, which are particularly evident in couple and close family relationships are addressed. At the same time, these models take into account the vulnerabilities of older people, which become apparent when stress and emotional arousal persist. In such situations, older people can only downregulate their arousal with a time delay due to age-related changes in physiological processes (Charles, 2010; Charles and Luong, 2013). In order to avoid negative affect and escalation on the couple level, and to maintain subjective wellbeing, older people use different interactional and problem-solving strategies in close relationships than younger people (Holley et al., 2013).

Integrative theoretical models that address the intersection of couple relationships, emotions and health provide a constructive framework for studies with long-term couples (Christensen et al., 2006, 2015). Corresponding research findings show that the interaction and relationship processes of couples are linked to the biological mechanisms in the partners, which are in constant alignment. Both components in turn, affect the individual health of the partners (Ryff et al., 2001; Uchino, 2013). These reciprocal or synchronous patterns in couple relationships have a clear impact on the health status of the partners (Butler, 2011). In stressful life situations, both mutual supportive behavior and tensions in the long-term couple relationship can be understood as the results of such complex interpersonal patterns of emotion regulation.

The approach of lifespan developmental psychology also offers a suitable theoretical framework for reflecting on the processes of couple counseling with older people in long- term couple relationships. Older people are characterized as active shapers of their life span and their relevant relationships, especially when facing age-related limitations and experiences of loss.

The present research

Little is known about the specifics of couple design and problem solving in the context of couple therapy processes in the life phase of old age. The research presented here aims to help fill this gap. The focus of our research is predominantly on the self-regulatory abilities of individuals with regard to various stresses as well as dyadic processes in the shaping of long- term couple relationships in old age. The research is explorative in character, focuses on the content of the couple relationship and consistently focuses on the subjective perspective of people aged 55 and older who live in long-term couple relationships and have received couple counseling. The structuring aspects of the study are the stress factors, problem areas and coping processes of the study's participants.

Following a dyadic approach, the present study is particularly interested in the couple interaction patterns that emerge in the assessment, coping and adaptation to various physical and psychological stress factors and limitations as well as role changes in the private and professional sphere in the context of couples counseling. With this study, we intend to gain a deeper understanding of the dynamics of coping processes through a detailed insight into the perceived problems of ten people from five couples. Through interviews, we try to learn more details about problem-solving dynamics through subjective approaches. Although we know from international research about some problem areas that are more likely to occur (such as experiences of loss) and we know about changes in emotion regulation strategies with increasing age (see Theoretical part), we do not know so much about the dynamics of problem solving. It may also be necessary to strongly contextualize the approach to the issue; it is likely that problems and problem-solving dynamics vary with cultural, economic and other factors. Therefore, the aim of the study presented here is a very limited and small one, namely to start *via* the intensive and systematic processing of interviews with a very selective sample. We think the results are interesting for all researchers who deal with coping strategies of long-term couples and also therapists who have long-term couples as clients will certainly benefit from the results for the design of the therapeutic process.

Key results of a previous questionnaire study with long-term couples show that over the period of couples counseling, the subjective health complaints of the individual persons reduced and the overall burden on the couple relationship decreased. However, dissatisfaction with affective communication and emotional intimacy in the relationship with the partner as well as dissatisfaction with the areas of aggression and problem solving in the couple relationship had increased from the beginning to the end of the couples' consultation.

The subsequent qualitative study presented here has a predominantly exploratory character and is intended to provide an insight in stress factors, problem areas and coping processes in the context of counseling with older people in long-term couple relationships. This is not a purely evaluative procedure with regard to the results of counseling. The focus of the study is on content aspects that move couples in long-term relationships to seek out couple counseling. The questions and topics from the previous questionnaire study are to be deepened (Mayring, 2001).

The study includes qualitative individual interviews with a small sample of couples aged 55 and older. The study focuses on the clients' subjective experiences and assessments of their individual stresses and strains and the quality of their couple relationship during the period of couple counseling. The reasons

for couple counselling, the concerns and expectations of the partners regarding the couple counselling process, their individual burdens, their assessment of the quality of their couple relationship, the problem and conflict areas and the development and coping processes at the individual and couple level.

Materials and methods

From the proven pool of methods used in qualitative research, individual interviews were conducted with guiding questions in the background, which are open and narrative (Mey and Mruck, 2011; Kruse, 2015). Qualitative interviews are suitable for capturing the inner view of the interviewees on an area of experience and getting to know their thoughts, feelings, evaluations and intentions in a closer and more differentiated way (Patton, 2015, p. 423 ff.). In this study, our interest is focused on those seeking advice in long-term relationships as actors in the couple counseling process. There were three different couple counselors in five couple counseling processes. Three processes were carried out by the same couple counsellor. The study uses 10 qualitative individual interviews with 10 partners from five long-term couples to examine the subjective perspective in the context of couple counseling. The study comprises 10 participants from the pool of the antecedent questionnaire study, so we have a base of five case studies for our analysis.

Hildenbrand cites aspects of a "theory of professional action in counseling and therapy" (Hildenbrand, 2008, p.38), which are based on the Grounded Theory research style (Strauss, 1991). The central elements of this theory are taking the perspective of the person seeking advice and then to use it as a starting point in order to gain new aspects for the processes in the counseling context and in the real life of the person seeking advice through asking questions. Through the active participation of those seeking advice, data are generated which enable a true-to-life, concrete picture of their perceptions, interpretations and processes of change in the period of their couple counseling.

The following specific questions arise: What is the subjective view of the clients on their personal situation and their couple relationship at the start of couple counseling? What was the reason to ask for counseling at this particular time? In retrospect, what changes do the interviewees perceive over the period of the couple counseling, in relation to themselves, their partner and the quality of the couple relationship? How do they assess the quality of their couple relationship during the period of couple counseling and after the counseling process has ended? What else was important to the clients during the couple counseling process with regard to themselves and their partners? From the subjective point of view of the interviewees, what led to probable changes in the relationship with the partner and in the patterns of interaction as a couple? Sexual (dis)satisfaction in the couples' relationships, the quality of time spent together and the relationships between generations can be relevant topics in the interviews.

The interviewer

The interviewer was 53 years old at the time of the interviews and is herself a psychologist in couple counseling. The interviewer had direct background information regarding the interviewed clients in six of the 10 interview situations as she had completed a couple counseling process with them as well. The relationship based on trust with these interviewees already existed due to the previous joint counseling process and did not have to be established at the beginning of the interview. On the other hand, respondents may have censored their observations on the counseling process and the relationship with the counsellor in terms of social desirability if the interviewer was also the former counsellor (Crane et al., 2002). The interviewer's experience during the interviews showed that the interviewees tended to treat the interviewer as a neutral authority.

Sample

The sample studied consisted of $N = 10$ clients, five wives and five husbands in five different heterosexual relationships. All 10 persons interviewed had received counseling in the couple setting within the framework of marriage, family and life counseling in various cities in Germany. They were between 55 and 72 years old at the time of the interview. The couples were all in their first marriage and the duration of the marriage was between 24 and 48 years. All couples have adult children aged between 20 and 45 years. Four of the couples had received counseling in a couples' setting, one couple had first participated in a couples' group and then received counseling as a couple. All the couples volunteered to participate in the study after asking for information *via* the various counseling centers.

Conducting the interviews

The 10 interviews were held in the premises of the respective counseling center where the clients had previously received couple counseling. The environment was therefore familiar to the people interviewed. The interviews were conducted individually with the partners. A partially standardized procedure was chosen for the interviews. The interview questions were formulated largely openly in accordance with the grounded theory approach (Strübing, 2004). With the exception of the opening and closing questions, the order of the questions was not fixed and was flexibly adapted to the course of the survey in order not to interrupt the flow of the interviewees' speech (Mayring, 2002, p. 66). The interviews were designed in the continuum between structuring and openness in the direction of narrative interviews with guiding questions in the background. The agreement to the audio recording of the interview and notes by the interviewer was clarified in each case. Consent to the anonymized use of the interview content within the framework of the scientific

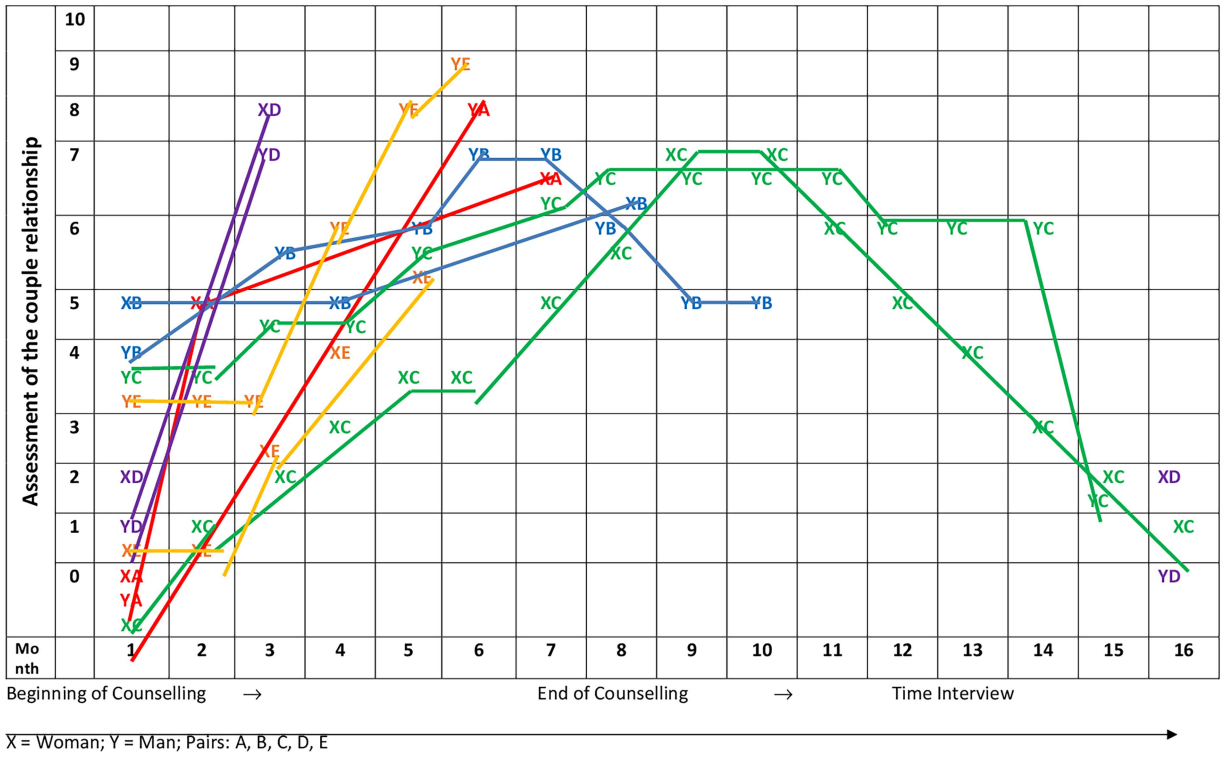

FIGURE 1
Satisfaction with the couple's relationship step by step. From the beginning of the counseling session, over the course of time until the end of the counseling session.

investigation was obtained in writing (primary and secondary use of the audio data). The approximate duration of the interview was announced.

The length of the interview was determined on the one hand by the narrative flow of the interviewee and on the other hand by the demands of the interviewer, which resulted from the interview guidelines. The interviews lasted 31 min in the shortest interview and 88 min in the longest. The average duration was 49.5 min.

The interview

The narrative interview type was chosen, modified by a demand orientation (Helfferich, 2011, p.16). The interview guideline is not very structured and begins with a rather broad narrative challenge. The demands listed below were introduced when the interviewees did not spontaneously comment on the topic complexes, whereby the immanent demands listed in the guide were used among others.

In doing so, the narrative of the interviewees was poorly controlled. Introduction: "I would like to talk to you about your very personal experiences during the period of couple counseling in the marriage, family and life counseling center; Request for a narrative:" You have registered for counseling together with your wife / husband. How did it come about, please tell us!"; Immanent requests: "What were the problems about?," "Can you tell us about the situation in more detail?," "Is there an explanation?"

Immanent enquiries: "What concerns and expectations brought you to the counseling session with?," "What has happened between you and your husband/wife during the counseling period?," "What is your personal impression of your development as a couple during this period?," "Were there turning points, outstanding events, changes?," "I notice that you did not mention whether the events and changes in your couple's relationship were linked to your experiences in couple counseling. Can you say anything more about this?," "What did you use the counseling for and how did you use it?," "What was beneficial or detrimental to you during the counseling process?"; Balancing: "Which of the things you have described was particularly important for you?"

Visualization parallel to the interview

During the course of the interview, the interviewees were asked to mark their own satisfaction with the couple's relationship step by step (Figure 1) at the beginning of the counseling session and over the course of time until the end of the counseling session. The X-axis represents the times of the counseling process, the Y-axis offers a scale from 0 (lowest satisfaction with relationship) to 10 (highest satisfaction with relationship), on which the subjectively perceived quality of the couple relationship is to be assessed. During the interview, the timeline was repeatedly referred to and the respondents were asked for their retrospective assessment of

the subjective quality of the couple's relationship at the respective time mark. The interviewees themselves marked the blank coordinate template with crosses. We then connected these crosses with lines for a course. Some crosses were made on the line, some in between. We tried to include this in the picture in order to clarify the heterogeneity of the subjective perspectives (Figure 1).

An example of a case study

At this point we list a summary description of a case study so that it becomes very clear what individual wealth of detail already exists in the problem of a single couple. We have chosen couple E for this presentation.

Case study: Couple E. "He was talking to the dog before. And now he talks to me."

Mr. E. was 59 years old at the time of the interview, Mrs. E. 60. They had been married for 37 years and had three adult children aged 36, 32 and 28. The youngest daughter moved out during the year in which the couple counseling took place. Contact with the two older adult children was described as good by both. The youngest daughter was at times involved in her parents' conflicts.

Mr. E. used to work full time in the accounting department of a company and was retired at the time of the couple counseling. Mr. E. had been an authorized accountant in a company for a long period of time. He enjoyed the trust of his boss and his colleagues, was committed to a considerable extent in his field of work and helped to build up the company. After the company was taken over by another owner, he could not find an equivalent position in the new system, which hurt him very much and at the same time triggered existential fears in him. In connection with these stresses and legal disputes about his job, he developed a depressive illness. Due to massive physical complaints–several herniated disks–he was granted a severe disability which enabled him to leave his job prematurely. Mr. E. had been in psychotherapeutic treatment for depression for several years before the couples counseling process began. Almost at the same time as the youngest daughter moved out, another personal experience of loss occurred. The dog that had lived in the family for a long time had to be put down. Mr. E. had developed a special relationship with the dog, as it was a helpful resource for him during the phase of his depressive symptoms.

Mrs. E. was employed part-time in the administrative area of a hospital ward. She also suffered from various health restrictions. Approximately 5 years before the couples counseling started, she had been suffering from depression. She had made use of psychological psychotherapy and had good experiences. As a result of a gynecological operation, Mrs. E. experienced chronic problems and pain during sexual intercourse, which led her to avoid intimate contact with her husband. In the year prior to the couples counseling process, she suffered a double-sided hearing loss, which caused her to have chronic hearing loss. Due to her hearing loss, Mrs. E. had great problems at her workplace.

She was also burdened as a carer for her mother, who was in need of care due to dementia. Attempts to care for her mother in a home environment failed. Therefore, Ms. E. had to organize a place for her in a nursing home. With her income, she herself was not able to cover the costs. Mrs. E. was burdened by the prospect of having to draw on the joint savings that her husband and she had set aside in the near future to finance the care place for her mother.

At the time of registration at the counseling center, couple E. had an accumulation of stresses due to physical and mental illnesses. Their own individual and couple-related coping options were exhausted. Their roles had changed due to Mr. E.'s early retirement due to illness so that the regulation of distance and closeness had to be done anew. As a result of the negative stress, Mrs. and Mr. E. increasingly withdrew from emotional contact with each other and thoughts of separation arose. Their sexual relationship was disturbed. Several experiences of loss occurred in quick succession. Both saw the newly developed open communication about contentious issues and the design of joint activities as decisive steps in the couple counseling process. Mr. E. emphasized his change of perspective with regard to his wife and her life achievements as his personal relevant change. By consciously turning toward her, Mr. E. was able to get closer to his wife again. He was able to recognize and appreciate the support he had received from his wife and children during the crisis.

Especially the suggestion in the couple counseling sessions to talk openly about problematic issues in the couple relationship seemed threatening to him at first. He feared that quarrels between him and his wife at home might increase, without any positive effect. Mr. E. experienced a turning point in this regard in the further course of the couple counseling. He had the impression that he and his wife had found a new way of dealing with difficult situations within the couple relationship.

For Mrs. E. it was significant that her husband was now genuinely interested in her and understood her perspective. He had opened up emotionally to her in the couple sessions and talked about his thoughts and feelings. In turn, Mrs. E. changed her interaction strategy in potential conflict situations by not pursuing long-known disagreements and conflictual differences between herself and her husband and instead reacting with composure. She did not address certain aspects in various situations, which made her feel "looser" herself. What was not addressed during the couple counseling sessions was shared sexuality. Mrs. E. brought this topic up on her own in her individual interview.

The counseling took place exclusively in a couple setting over eight sessions, each lasting 90 min. The counseling sessions took place at intervals of about 2 weeks and the counseling process lasted 4 months. The interviews took place 2 weeks after the end of the couple counseling, one after the other, on 1 day at the counseling center.

Qualitative content analysis

The approach to the interview texts was based on the qualitative content analysis. The aim is to analyze the interview statements of the interviewees, which were fixed *via* transcripts,

and to draw conclusions in order to answer the research questions. In this way, the complex material is filtered and structured with regard to the aspects relevant to this study. Due to the exploratory nature of the study, we are most likely to refer to the content-structuring variant, the aim of which is to record topics in the present material (Kuckartz, 2012). Deductive and inductive steps are often combined (Kuckartz, 2007; Schreier, 2014). Deductively derived from the research literature and theoretical models, categories that relate to potential individual and couple-related stress factors and problem areas in old age emerge, such as chronic diseases or normative crises like the departure of adult children and the beginning of retirement.

Patton refers to the approach of "grounded theory" (Glaser and Strauss, 1979; Strübing, 2004) and recommends immersing oneself in the data material at an early stage of content analysis in order to reveal its inherent meaning.

In preparation for the categorization, the complete transcribed text material was carefully read, important text passages were marked with the help of the QDA software MAXQDA and memos with comments and ideas for codes were prepared. In a first coding step, sense segments in the text were selected as coding units, to which different codes were assigned. In the spirit of "open coding" (Patton, 2015, p. 542) all text elements were included. In the text segments, this results in partial overlaps, i.e., different codes are assigned to a segment of meaning. A total of 673 codings were made. Some segments of meaning in the transcripts were assigned to several codes as the statements contain different aspects. The main coding of all text material was done by the first author herself. In addition, five persons (all with professional psychological-pedagogical knowledge) were available to evaluate the category system. They independently checked the fit on different text extracts and in some cases made their own suggestions for further codes. Based on the feedback from the co-coders and discussions, the category system was revised and supplemented.

In a further evaluation step, codes were grouped into superordinate categories. Common to the approaches of deductive and inductive categorization is that the text material is described and ordered on the basis of certain characteristics. These descriptive criteria are called categories in qualitative content analysis (Kuckartz, 2007, p. 57). According to Schreier (2014) the relevant aspects of meaning of the material form the categories of a category system. Some of these categories were derived from references to theoretical models and empirical research results, e.g., loss experiences or normative and non-normative life transitions in old age. Another part of categories was resulted from the questions of the interview guide. The latter categories include the burdens and problems as an example. In further steps, additional categories have been developed that relate to unexpected aspects or reflect developmental aspects of the individual partners and at the couple level during the counseling process (Flick, 2010).

Central results

Because the results are very detailed and complex, we will first list the most important central findings in keywords and then explain them in detail:

- The reason for counseling was the aggravation of massive stress factors and experiences of loss, combined with subjective overstrain and despair, resulting in emotional alienation from the partner.
- Reciprocal emotional self-opening and change of perspective in the couples counseling process break through the dysfunctional patterns of couples.
- Emotional and physical rapprochement at the couple level, increased dissatisfaction with the couple relationship decreased and subjective wellbeing increased.
- Some respondents use avoidance or distancing for interpersonal problems in order to maintain harmony in the couple system and subjective wellbeing.
- Changes at the couple level after the end of couple counseling are not stable as soon as overwhelming stressors occurred again.

The last two sub-results suggest that communication about stressors may increase perceived stress, especially for partners who tend to use avoidant conflict resolution strategies; this could explain why increasing communication may well increase dissatisfaction in a partnership.

Respondents' statements can be grouped under three broad thematic headings or clusters: Stress factors, problem areas and coping processes. These three thematic clusters follow, in the order given, the chronological sequence of the couple counseling processes as described in the interviews and are in a circular relationship. They are illustrated in Figure 2.

Stress-factors – Here, the bio-psycho-social limitations and couple-related difficulties are addressed that the interviewees experienced with regard to their long-term couple relationships. Burdening factors were found both in the occasions of registering for couple counseling and in connection with the topics at the beginning of the couple counseling process.

Problem areas – This category addresses the individual and couple-related aspects that the couples had to deal with and solve within the framework of couple counseling. In the course of the counseling process, the clients' perspectives on the problem areas and dysfunctional interaction patterns within their couple relationship changed and expanded. The respondents reported that they developed a differentiated view of individual and couple-related aspects.

Coping processes – This category refers to the corresponding changing steps of the individual and the couple system. Various forms of coping with the burdensome factors and problems led to changes in the individuals and the couple system in the course of the couple counseling process.

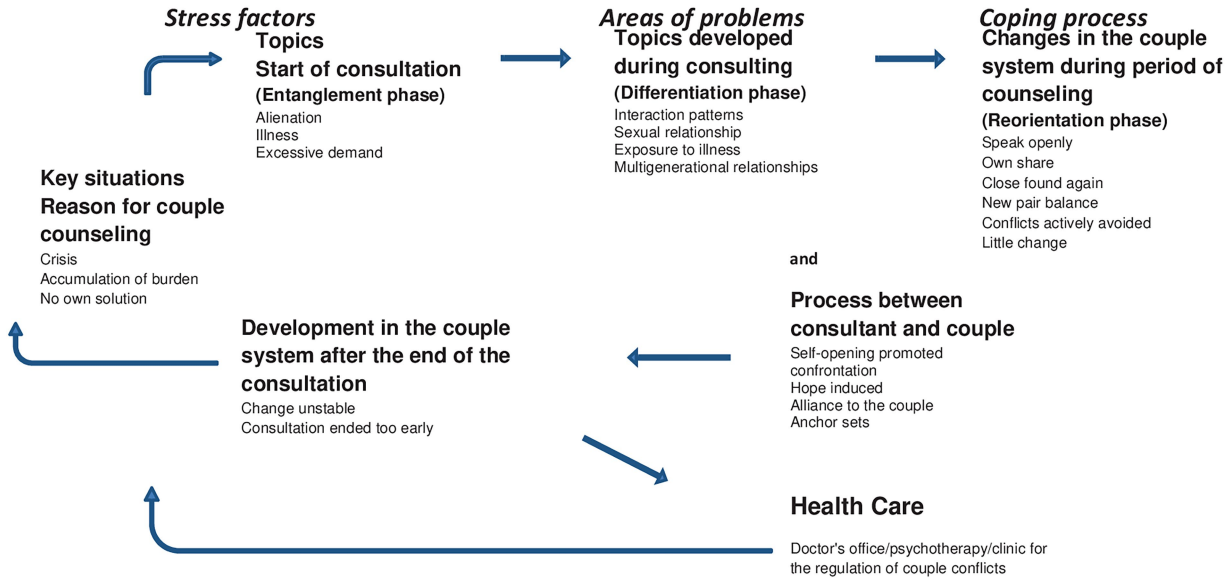

FIGURE 2
Long-term couple relationships-stress, problems and coping processes in couple counseling: A circular process model.

The qualitative analysis of the interviews resulted in five main categories. The five main categories are named as follows: Key situations - reasons for couple counseling; Issues of the clients at the beginning of the couple counseling; Developing themes from clients' responses during the couple counseling; Changes in the couple system during the counseling period; Development in the couple system at the end of counseling.

On the basis of the individual case analyses of the 10 interviews, it became apparent that it makes sense to categorize the interview statements along the time course of the couple counseling process, because the interviewees described a process with successive steps regarding couple counseling and the development of their couple relationship quality.

Similar to the three superordinate sections of the study, the phase model of systemic couple counseling according to Jellouschek and Kohaus-Jellouschek (1993) outlines ideal-typical chronological developmental steps that couples (can) go through in a joint therapy. These steps are the phases of entanglement, differentiation and reorientation.

At the beginning, the couple is in the so-called entanglement phase, which is perceived as a dead end.

In the study, this corresponds to the naming of the stress factors as reasons for couple counseling and the topics at the beginning of counseling. Table 1 gives an overview of the topics mentioned by the men and women at the beginning of counseling. Since this is a small sample, the percentages only serve as an overview for this small group and cannot be generalized.

The interviewees did not see any possibilities of coping with these burdens and sought out couple counseling. The fact that the couples were confronted with their dysfunctional interaction patterns on the couple level in the counseling setting, and focused on their individual parts of the couple interaction pattern opens up the possibility for them to change into the so-called differentiation phase, in which they became aware of their entanglements on the couple level, exchanged information with their partner and subsequently came closer emotionally.

TABLE 1 Overview of the topics mentioned by the men and women at the beginning of counseling. Percentage of mention of this problem for *N*=10.

Categories	%
Emotional alienation of the couple	90
Massive health impairment	80
Despair/overstrain	80
Experience of loss	50
Problematic relationship with adult children	50

Characteristics of the differentiation phase can be found in the qualitative evaluation in the superordinate category "problem areas" which is classified as "topics developed by clients during couple counseling." According to Jellouschek and Kohaus-Jellouschek (1993), couples succeed in solving destructive interactional cycles on the one hand by the partners individually (re)gaining more self-responsibility and on the other hand by the partners opening up to each other and showing their feelings. This brings movement into the solidified couple dynamics and the problematic issues can be worked on and overcome in the following "phase of restructuring" (or reorientation) in the context of couple counseling. In the main category "Changes in the couple system during the counseling period" there are corresponding cognitive, emotional, and behavioral aspects that the interviewees retrospectively named as relevant changes (Table 2). This phase can end with the couple either finding a new basis for the couple relationship or deciding to separate.

TABLE 2 Categories for which changes were reported during the consultation process.

Categories	*f*	%
Recognizing one's own share	32	18.08
Talking openly with each other	29	16.38
Actively avoiding conflicts	26	14.69
Emotional closeness rediscovered	23	12.99
Change of perspective	19	10.73
Turning point	15	8.47
No change in the couple problem	14	7.91
Shared past as a resource	13	7.34
Physical rapprochement	6	3.39

In all 10 interviews, the respondents also spontaneously reported the development of satisfaction in their couple relationship after the end of the couple counseling. Satisfaction with couple relationships thus increased more or less markedly during the counseling period and decreased again after the end of the couple counseling.

Statements about the relationship with the counselor were also made by all respondents. The further seventh category is based on the statements made by the respondents regarding their contact with health care facilities. These two categories can be assigned to the category "coping processes."

Discussion

In this section, the central results of the study are presented and discussed in the systematics of the developed main categories, placed in a circular context (Figure 2)?

Both the results of the antecedent questionnaire study and those of the present study provide clues to the interlinking of the processes in the couple system with the emotions of the partners and with the state of health of the partners. Integrative theoretical models, which start at the interface of the areas of couple relationship, emotions and health, therefore provide a constructive framework for studies with long-term couples Uchino (2013). They show how specific components in couple relationships, for example basic social relationship processes and coordinated biological mechanisms interact in the partners and affect the individual state of health. In the process of emotion regulation, feelings, cognitions, evaluations, behaviors and (neuro) physiological components work together (Ochsner and Gross, 2007).

Key situations/occasion

According to the subjective assessment of the interviewees, there had been problematic developments in the run-up of the counseling for quite some time. In older age, critical life events or human border situations are more likely to occur (Staudinger and Dittmann-Kohli, 1994). These include health restrictions, illnesses and experiences of loss of various kinds, which challenge the elderly to develop forms of coping and to comprehensively reconstruct their own life plan and personal sense system. At the time of application for couple counseling, the burdens in the couple system had either reached a "critical mass" and/or a current change in the couple and family system had occurred which gave the impetus to seek support through couple counseling ("key situation"). In this context, stressful events are to be understood as normative and non-normative critical life events (Filipp, 1990), e.g., chronic somatic and psychological illnesses (one's own as well as those of the partner), the loss of one's job or the exit from working life marked by unfavorable circumstances and subjective experiences of loss due to the departure of adult children. The stress factors were very heavy and powerful which in some cases persisted for years. The interviewees had previously tried in vain to cope with this negative stress without any external support which ultimately increased the strain. Attempts made by the individual, the couple and the help from their social environment had not brought relief and solutions therefore, professional help was then sought through couple counseling. This phenomenon is known as the cascade model (Bodenmann, 2000; Widmer Rodríguez Betancourt, 2001).

Studies have shown indications of the quality of relationships as a moderator for the physiological co-regulation of couples (Pietromonaco et al., 2013). Low levels of couple satisfaction increase the likelihood of developing a connection or transmission of negative moods and individual arousal between the partners. Couples who showed a high level of agreement in physiological arousal tended to be more likely to "infect" each other emotionally and to respond to stress and negative states of the other with their own arousal increase (Saxbe and Repetti, 2010). This is mediated *via* the HPA axis (hypothalamic–pituitary–adrenal cortex axis; McEwen, 2000). This important stress response system of the body is activated when stress is subjectively felt. It has cortisol as its end product and is considered a reliable predictor of stress. Results of two studies by Wrzus et al. (2013) support the hypotheses on overload and the connection with emotion regulation in older age. When older people are confronted with complex unpleasant events that affect several areas of their lives, they show more pronounced psychological and cardiovascular reactions than younger people.

In summary, it can be said that the key situations in which the couples chose external support through couple counseling were life situations in which the burdens and challenges of the couple's relationship accumulated and the partners' previous own coping capacities were no longer sufficient. These were the current worsening of a chronic conflict and/or a subjectively perceived crisis climax due to the accumulation of several prolonged burdens, in which the partners' own coping abilities were exhausted. In some cases, additional acute stressful events occurred in the life context.

Themes of clients at the beginning of couple counseling

The life situations that led the interviewed couples to turn to a counseling center include losses and limitations in the health sphere, i.e., somatic and psychological impairments and illnesses, as well as the loss of the job of one of them. At the same time, these are the issues that the interviewees recall in retrospect as their concerns in their couple life at the beginning of counseling. In the interviews, the spouses reported feelings of despair and being overwhelmed. In connection with this, a subjectively negative relationship quality increasingly developed in the run-up of the couple counseling. The topics at the beginning of counseling that were mentioned in the interviews largely correspond to the pre-concepts that can be found in the literature of the problem areas that people above 55 have: Experiences of loss, illnesses, insults and excessive demands as well as transitional situations such as retirement or the so-called "empty-nest situation" (Freund et al., 2014; Riehl-Emde, 2014, 2015). Massive health impairments due to physical and mental illnesses and symptoms were the most frequently mentioned category at the beginning of the couple counseling process. These were, for example, chronic somatic and psychological illnesses and limitations of one or both partners, which are sometimes accompanied by permanent pain, physical and long-term psychological consequences of a serious somatic illness, depression, anxiety disorders or an addiction of one partner. Experiences of loss were also frequently mentioned, especially the loss of a job or bullying experiences, but also the departure of the adult children and thus the farewell to the active role as parents. It became clear that these were cumulative experiences of loss, i.e., successive or simultaneously occurring stresses that exceeded the coping possibilities of the individual partners and the couples in the social environment. Situations of overstrain and feelings of despair were described: "And it went on like that for 5 years and then our family doctor - I complained again and again, and then he said 'Yes, yes, Mrs. A., you must be glad that your husband is still alive at all!' I say, yes, of course I'm glad he's alive, I say, but that's not life any more. I say I'm more likely to die from it than he is."

These stresses and experiences of excessive demands were accompanied by "emotional alienation" at the couple level: "So these were concentrated situations that came in our way and we grew more and more apart. He was always in his space and I was in my space." This category captures the couple's lack or loss of emotional contact. "He was always in such a glass bell," is how one respondent describes her impression of her husband. Experience of emotional alienation from the partner is taken up in stress research in connection with the effects of stressful situations on close relationships (Karney et al., 2005).

The approach of developmental psychology of the lifespan (Brandtstädter and Lindenberger, 2007) offers a suitable theoretical framework for considering the self-regulatory processes and abilities of individuals as well as dyadic processes in the design of the long-term couple relationship in older age. Research results on action motivation and emotion regulation in older people in long-term couple relationships are mainly relevant here (Carstensen and Lang, 2007; Charles and Carstensen, 2007). With decreasing remaining life time, emotion-related goals are prioritized (Carstensen et al., 1999, 2011), i.e., the quality of social relationships - especially the couple relationship - becomes more significant in older ages. The basic need for closeness and acceptance in the couple relationship is thus given a special importance. If the bond with the partner appears to be at risk, it can trigger considerable stress. The close relationship with the partner therefore influences health by changing the health-relevant physical reactions of the partners in the process of couple interaction, which arise as correlates of their emotions (Sbarra and Coan, 2018).

At the beginning of counseling, the partners described themselves as being emotionally distant from each other. "Emotional alienation" in the sense of loss of intimacy and access to the partner combined with feelings of isolation were consistently mentioned as a phenomenon by the interviewees: "Everyone had lived his or her own life… we had not lived as a couple at all over the years."

This experience of emotional alienation from the partner is taken up in stress research in connection with the effects of stressful situations on close relationships (Karney et al., 2005). Neff and Karney (2004) studied the "stress spillover" effect. According to this, couple-external stress causes negative perceptions to occur in the couple relationship and the partners' constructive handling of these critical perceptions is severely limited. When stress is high, the partners' cognitive resources are overtaxed and they cannot differentiate between external stress and relationship dissatisfaction. One interviewee described her situation as follows: "… I soon had a nervous breakdown. I screamed in the middle of the night that the whole house must have heard everything. From despair and not being able to do it anymore."

According to Bodenmann (2013), a close, sustainable and binding couple relationship fulfills the basic human need for attachment. The threat of losing the couple bond can trigger anxiety. Mentalization-based approaches in couple therapy indicate that in stressful and threatening situations in which fear of loss of attachment is experienced, the attachment system undergoes considerable activation. In threatening situations, the partner-related attachment has the adaptive advantage that the proximity of the partner secures support and helps to reduce fear (Rohmann et al., 2006). In parallel, the partners' ability to mentalize may be (temporarily) limited. One of the interviewees described her spouse as follows: "He was actually always in a glass bell jar. So, you could not get close to him at all." This leads to misinterpretations and dysfunctional reactions in the couple interaction, which in turn activates anger and withdrawal reactions in the other (Plitt, 2017). Here, the concept of mentalization seems to be relevant. The concept of mentalization goes back to the working group around Fonagy (Fonagy et al.,

2002) and includes "the ability to appropriately imagine inner states such as motives, feelings and beliefs in one's own self as well as in other people" (Rottländer, 2017, p.24). However, mature mentalizing skills promote joint problem solving as a couple. Mentalization is conceived as a stress-dependent process (Kirsch et al., 2016). Especially in the case of strong emotions, e.g., fear or anger, which are accompanied by high arousal in the partners, the risk is high that–temporarily–the ability to mentalize appropriately cannot be maintained. According to the dual stress processing model (Luyten et al., 2011), arousal increases under stress and leads to a switch from cortical (prefrontal cortex) to subcortical systems (posterior cortex and limbic system) (Schultz-Venrath, 2015). For reflective problem solving with low to medium arousal, cortical systems are needed. With high arousal, subcortical services enable rapid information processing, but these are associated with a decline in mentalizing ability. Explicit, controlled mentalization processes decrease with increasing arousal. Implicit, automatic mentalization processes take their place. In the neurobiological stress-dependent model, the individual switching point from an explicit to an implicit mentalization mode is related to the extent of attachment stress and individual coping strategies (Kotte and Taubner, 2017). Stress and attachment activation in the couple relationship is closely linked, because the switching point from explicit to implicit mentalization is related, among other things, to the extent of attachment stress and the individual coping strategies. A sufficient mentalizing ability promotes constructive handling of one's own emotions and those of the partner and makes it possible to regulate the central conflicts in the couple relationship.

In summary, the issues that the respondents were aware of at the beginning of counseling were massive health burdens and various experiences of loss. This was associated with feelings of being overwhelmed in both partners and, as a consequence, emotional alienation as a couple. In the case of over-demanding stress experiences, mature forms of mentalization competence may break down in the partners. This leads to misperceptions and dysfunctional experiences in the couple relationship (Bark et al., 2016). The attachment relationship of the partners was in danger at the time of enrolment in couples counseling which due to the high priority of emotionally significant relationships among older people, means that emotional security in the couple relationship was no longer available to them as a resource.

Themes developed by clients during the counseling process

This category differs from the category "Themes of the clients at the beginning of the couple counseling" in that during the course of the counseling process the clients took a closer look at certain aspects or background themes of their strained couple relationship and their own share in the problems and opened up to them. This changed the couples' perspectives. Instead of the topics at the beginning of the couple counseling, which they had described more in terms of external stress factors, the focus was on internal concerns and needs of the interviewees. This change of focus can possibly already be seen as a result of the couples counseling. In current couples therapy research, it is assumed that the approaches whose effectiveness has been proven evidence-based have common factors of action (Davis et al., 2012). Thus, non-specific mechanisms of change are identified in couples therapy, which can be summarized in three categories: "changing the doing, changing the thinking, and changing the feeling" (Davis et al., 2012, p.42).

The topics of the interviewees largely coincide with the topics listed in the literature as counseling themes of older couples in couples therapy (Riehl-Emde, 2014, p.15). The interviewees described interactional dysfunctional patterns within the couple relationship that had developed, for example, as a consequence of the changed situation following the termination of employment or due to an illness: "… and, that was clear to us relatively quickly that this is already a big point with us that is simply not okay. Because everyone says, listen, I cannot do this and that because the other person is not well. From both sides, this consideration was just too much of a thing."

The relationship with the adult children and the empty-nest situation as well as their effects on the quality of the couple relationship became relevant themes for the interviewees in the course of couple counseling. Relationships with family members, especially ties with one's own children and grandchildren, are an essential source of quality of life and wellbeing throughout the life cycle (Mahne and Huxhold, 2017). Adult children who lived in the parental household until recently had a regulative function in the couple system. For example, they were confidants of a partner and compensated for emotional deficits in the couple relationship: "It was positive, I could always talk to her (the daughter, author's note), which I could not do with my husband." This compensation possibility had been lost in the life situation of the interviewees before the start of counseling, so that the couples were challenged to find new regulation mechanisms for distance and closeness in their contact.

In their role as parents, the couples were concerned with the lifestyle of their adult children and were emotionally engaged in this respect: "And that's how I am again now. I try, the negative is there, the worry about the daughter is there, in order not to get broken by it, because the doctor himself already said when she gave us, when she once made such a scene to me, that I had not taken care of her, with problems in her marriage."

The imbalance in the couple relationship due to illness or the biographical burden of a partner was also addressed in the counseling process. For example, it was about the unequal distribution of responsibility: "That goes too far. Then I also say, why do not you do it this way, and why do not you do it that way. Because then I'm already somewhere in this stupid feeling of responsibility and then of course I overshoot the target…" Maladaptive strategies of the partner toward the patient - e.g. overprotection - cause one's own negative stress level to increase (Coyne and Fiske, 1992).

The organization of physical contact between the partners and the disruption of their sexual relationship was related to health problems, emotional alienation from each other or power struggles within the couple relationship. In a Canadian longitudinal study of nearly 400 elderly couples living at home on their own, common sexuality was predominantly positively related to couple quality and seen as a source of satisfaction (Trudel et al., 2014). According to the interviewees, sexuality was only addressed in some couple counseling processes. In the interviews almost all respondents addressed the - missing – physical contacts, tenderness with each other and the sexual relationship as a couple. The topics of "distance and closeness" and "attachment and autonomy" within the couple relationship played a role. Interaction behavior of a partner that was perceived as possessive or emotionally distant was sometimes answered by the fact that the other partner avoided sexual contact: "And then you really noticed, no, that: 'If I kiss now, then maybe he'll get me'. No! That's when she called it a day. As if she was closing down. She's pissed now. The basic sourness, I would say, prevents her from letting go and saying, 'Oh, come on!'" In one couple, both interviewees explicitly spoke of "punishing" the other by refusing to engage in sexual activity. There are many indications that satisfaction with the sexual relationship is not mainly determined by whether sexual intercourse takes place, but whether a couple is able to exchange information about their individual wishes and needs and to agree on the design of their common sexuality (Baas and Schmitt, 2010).

In addition to the stressful aspects, the respondents explicitly named resources of their couple relationship. Mutual solidarity, continuity in the bond with the partner and common values were evaluated as the basis of the couple relationship and as stabilizing factors. Here, the focus was on the long duration of the couple relationship and the value of "staying together" due to the common life story. "We have always been a couple. And I do not know, I do not give up so easily either. And neither does my husband, I guess. Our marriage, our family actually has a very different basis or goal than the young people of today." In the concept of commitment, which includes the conscious decision to bind to the partner and continuity over time, similar characteristics can be found (Sternberg, 1986; Acker and Davis, 1992; Bodenmann, 2013).

In summary, it can be said that in the course of the counseling process, the respondents became aware of their dysfunctional interactional cycles as a couple and their own contribution to these patterns in their couple relationship. In this respect, the differentiation of the topics for couple counseling, taking into account dysfunctional patterns in couple interaction, is already a significant mentalizing achievement that contributes to the couple's ability to solve problems (Plitt, 2017). An imbalance in the distribution of roles due to illness, restriction or biographically determined vulnerability of one partner was addressed as well as the upcoming developmental tasks in the relationship with the adult children in the sense of a detachment from the joint parental role. Discrepancies in the couple's physical/sexual relationship came up in some of couples counseling processes. Addressing the partnership problems at the beginning of the couple counseling process caused both partners to develop a greater awareness of the tensions and unresolved issues in the couple relationship.

Changes in the couple system during the counseling period

Changes are understood here as coping processes of the partners. The changes described in the interviews concerned the couple relationship and the interviewees' *per se*. These changes took place within and outside the couple counseling sessions. The following experiences in the couple's interaction process within the counseling sessions were relevant for the interviewees.

The open exchange about their thoughts, feelings, experiences, problems and perspectives in relation to their partner was mentioned very often: "One has, one has been more open with oneself. They talked more about themselves personally. You also said your own wishes in public sometimes. And that went down very well." One woman interviewed emphasized that in the counseling situation she was able to listen to her husband and take in his impulses: "And then I say, you hurt me even more when I sit there now and suddenly hear something from you that I could have tolerated before, but did not hear. And that astonished me, made me a little angry. But I never got up and went out, because somewhere, somewhere it was perhaps also interesting."

Studies on general effective factors in couple therapy identify the following overarching therapeutic processes: changing the couple's view of the named problem toward objectivity, contextual involvement at couple level, reducing emotion-driven dysfunctional behavior, promoting previously avoided expression of emotions and constructive communication patterns (Benson et al., 2012). The degree of openness and relatedness to the partner may influence the effect of stress on the HPA axis (Slatcher et al., 2010).

Recognizing one's own part in couple's problems was a decisive step for the interviewees: "No, actually just as, uh, insecure or that I know that ultimately I have to take the steps. Um - yes, and I'm just too cowardly to say, okay, it's not the way we imagine a marriage to be. And, uh, yes, no one can change inwardly like that, that's not possible at all…" Inspired by the counseling, more than half of the interviewees changed their perspective on the couple relationship: "Well, by trying to approach the man, my partner, and trying to see it through different eyes." Research on couple therapy shows that therapeutic processes that initiate changes at the emotional, cognitive and behavioral levels in parallel, prove effective (Greenberg and Johnson, 1986; Christensen, 1988; Greenberg et al., 2010). In the mentalization concept, perceiving, classifying and communicating one's own affects is seen as an achievement, as is perceiving the emotions of the partner (Cordes and Schultz-Venrath, 2015). This enables them to adopt the perspective of the other person and to see the effect of their own behavior from the partner's point of view. The interviewees

described this change of perspective as a decisive step in the process of couple counseling.

The respondents described that in the course of counseling they realized that the dysfunctional interaction patterns at the couple level had led them to emotional alienation and that they had lost emotional access to each other in permanently overstressing situations: "The wall, it went up." The threat to attachment in the couple relationship is highly linked to stress (Hazan and Shaver, 1987). This is consistent with the model of stress-dependent switching of mentalization (Luyten et al., 2011). Stress, heightened arousal and the accompanying activation of the attachment system result in a switch from explicit controlled to implicit automatic mentalizing (Plitt, 2017, p.44). Depending on individual attachment experiences and psychological structural characteristics, this switch occurs at different times. In cases of high emotional stress, as described by the respondents, partners may not have had access to their mentalizing abilities. The model of coregulation in close relationships assumes that the partners in couple relationships form a dynamic emotional system (Butler and Randall, 2013). During the couple counseling sessions, the respondents were able to lower their arousal and were (again) able to mentalize each other and reflect on their couple dynamics.

The respondents described changes outside the counseling situation, i.e., in the couples' everyday life. They had regained emotional and sexual/physical closeness to their partner, which also increased their subjective wellbeing: "Well, where - in the beginning, where we talked about it a lot, I thought that was great for both of us! He also became more and more open, and that was very, very nice. It made me feel better and better, and I also noticed how my body reacted differently. And the aches and pains that you have now became less and less."

Primary processes of change within the counseling sessions, which enable couples to experience intimacy in the short term, are distinguished from secondary processes of change outside the therapeutic situation (Schär, 2010). The experience of intimacy with the partner within the couple therapy session, supported by therapeutic interventions, promotes the transfer into the couple's everyday life. The respondents reported that shortly after the couples counseling sessions they implemented changes in their joint interaction as a couple in everyday life. In the model of SAVI (Strength and Vulnerability Integration), age-related socio-emotional strengths are postulated, which are countered by age-related vulnerabilities that manifest themselves in situations in which persistent emotional arousal occurs, which can only be reduced with a time delay in older age (Charles, 2010; Charles and Luong, 2013). A new balance as a couple was found, which one of the interviewed women expressed as follows: "And, but it's like this - 50 years, soon 50 years we have been together, it's like here, a chain link, sometimes it's messed up, the link, and then it's smooth again, or you pull it smooth. And it's the same in marriage. Sometimes there are times that are so tangled up that you think you will not get them straight again, and then they become smooth again." The connection between physical and psychological wellbeing and satisfaction in the couple relationship has been proven many times and is probably influenced by such psychobiological stress reduction processes (Frisch et al., 2017).

Some respondents tried to stabilize the couple relationship by practicing active avoidance of confrontational encounters with the partner on long-known conflict issues. "How do I say this? How did I do that? When I use that now, the word, submissive I gave myself. … So that she got the upper hand again - that is, now we have 4 days again, when she has been here, she was unresponsive for 3 days again." A conscious decision of being considerate or "willing to sacrifice" served some partners to take the negative tension out of the current couple interaction. "Yeah, and now we have sort of settled there in the middle. Um, I try not to provoke her, and she does not always take everything so badly. That's an advantage."

In long-term couple relationships in older ages, maintaining the level of functioning in the couple relationship is experienced as a gain, as it promotes subjective wellbeing (Ebner et al., 2006). According to Gross' process theory (John and Gross, 2004), older people more often choose the affect regulation strategy of reappraisal, in which they reinterpret the connoted or stressful situations. In this way, they avoid negative emotions and cope with the situations by using fewer resources. The use of passive emotion regulation strategies is part of the expanded socio-emotional competencies in older ages (Blanchard-Fields, 2007). Constructive and relationship-promoting conflict avoidance strategies are thus more frequently found in couple conflicts among the older people than in younger people (Holley et al., 2013). In older people, avoidance goals that are directed against a loss or a negative change of the currently stable status can thus be evaluated as constructive (Urry and Gross, 2010). Strategies of repression or suppression in emotionally significant conflicts in couple relationships require considerable cognitive resources (Edelstein and Gillath, 2008; Peters, 2015a). It must therefore be asked under which conditions the described avoidance strategies are to be regarded as a mature form of affect regulation, and when they reach their limits. This can occur when the physiological arousal reaches such a high level that a situation of excessive demands arises due to the age-related prolonged arousal (McEwen, 2000; Labouvie-Vief and Medler, 2002; Charles, 2010).

For the interviewees, making a new decision for their partner meant a far-reaching change, which was also described as a turning point: "I still said, here you are again at last. Yes, and such a small occasion, big effect, can make you realize, like brooding and pondering 2 days before, can make you realize how valuable the person actually still is." The long history as a couple was brought into view as a resource. Affect optimization theories (Carstensen et al., 2003; Charles, 2010) postulate that so-called good aging is characterized by self-effectively shaped positive present. Current approaches to affect reactivity (Ong and Bergeman, 2004; Almeida, 2005) emphasize that in stressful situations the extent of negative affect tis not that significant, but rather the possibility of experiencing positive emotions. The fact that they remembered good times in the couple relationship despite the current stresses and difficulties made it easier for the older adults to regulate their emotions (Riehl-Emde, 2016a,b).

There were clear indications from some respondents that they had not perceived any change in their couple issues. Four respondents from two of the couples reported that they had changed the way they dealt with an unbridgeable area of conflict. An increase in intimacy inside couples is supported by therapeutic interventions that promote the following factors in the partners: Empathy, insight into motives and feelings, insight and behavior change, and mobilization of support (Woolley et al., 2000).

In summary, it became clear that in the course of couples counseling relevant intra- and inter-individual changes occurred in the clients and in their couple relationship. Addressing the problems in the partnership brought about a greater awareness of the dysfunctional interaction circles and unresolved issues in the couple relationship. Through self-critical reflection of their own parts in these interaction patterns and emotional self- opening toward their partner, the respondents broke through their previous way of shaping the relationship. This enabled the couples to get emotionally and physically closer again. According to Riehl-Emde (2005), sexuality in old age contributes to people feeling secure in the couple relationship and close to their partner, which in turn supports the ability to regulate self-esteem. Tenderness is now considered an underestimated factor in the state of health in the third and fourth ages (Riehl-Emde, 2016a). For some of the respondents, "active avoidance of conflict" served to regulate negative emotions in the couple relationship.

Development in the couple system after end of counseling

The respondents retrospectively described that they experienced an emotional rapprochement with their partner during the course of the couple counseling process and implemented positive changes in couple communication as well as changes in their interactional patterns as a couple. This led to improved subjective wellbeing. However, the changes tended to be short-lived. Toward the end or after the end of the couple counseling process, the subjectively perceived stress and dissatisfaction regarding the couple relationship increased again for the majority of the respondents. This development can be clearly seen in the assessments of the quality of the couple relationship, which the respondents made during the interviews in a coordinated system (Figure 1). After an increase in the first phase of couple counseling, couple satisfaction dropped again more or less. It is very clear from the interviewees' statements that they often experienced the changes achieved during the counseling as not stable: "First momentum, then the old rut." The interviewees did not succeed in transferring the changes to everyday life in the long run. This was especially the case when negative stress factors reappeared: "Let us not talk much to each other because we both cannot anymore. And we actually wanted to get rid of that, … And that's not where we are at the moment. And that's why it's still incredibly difficult for us, for me, at the moment."

In the synopsis of all 10 assessments, it becomes clear that after an initial increase, satisfaction with the couple relationship drops again (Figure 1).

The interviewees said that they had ended the couple counseling too early or would seek counseling again in the event of further critical situations: "We also said afterwards 'We should not have given up so soon! We should have come here longer, talked longer and more, maybe it would have been even better. Maybe we broke off too soon." We said, 'OK, we'll manage. We're on the right track, we'll get there'. But it was still a long way from being really solidified." With increasing attachment stress, which those we interviewed experienced as stressful, a loss of emotional contact at the couple level and a decrease in the flexibility of the partners in reflecting can be assumed. Situations with high emotional arousal–such as stressful conflicts in the couple relationship–are associated with increasing physiological activity in older people (Kunzmann and Grühn, 2005; Uchino et al., 2005). Older people, unlike middle-aged adults, are thought to show less physiological reactivity when their arousal is low. If the emotional arousal caused by socio-emotional stress exceeds a threshold, older people show a stronger physiological reaction than younger people and as a result cannot use their crystalline intelligence skills to solve problems (*cf.* Peters, 2015b).

Within the framework of an integrative couple therapy model (Schär, 2010), a distinction is made between primary and secondary processes of change. In the short term, at the beginning of couple therapy, it is promoted that the couple experiences intimacy with each other (again) in different areas of their relationship. On this basis, interventions can be used at a later stage in couple therapy to promote the couple's experience of intimacy in the long run and subsequently couple satisfaction and couple stability.

In summary, it can be said that the majority of the interviewees found emotional and physical closeness in their couple relationship again during the couple counseling, perceived positive aspects in their partner and in the relationship and ended the couple counseling at this point. However, these aspects of change did not prove to be stable when intense stress occurred again. Conflicts on the couple level then increased again and both partners showed aggressive behavior as a result of their renewed overload. As one interviewee said: "Because simply both partners are physically in such a bad state and then only, not with each other, but only against each other. Everyone is exhausted, annoyed, but wants to finish their work." Due to the increased stress level and the activation of the attachment system, the explicit mentalization ability of the partners could have been limited. Cognitive capacity is lower due to switching to the implicit mentalization mode at high stress, which makes memory performance, information processing and problem solving more difficult. Higher emotional arousal due to chronic stress is coupled with a lower memory of learned communication skills in couples (Baucom et al., 2012).

The interviewees stated that they should have continued or resumed couple counseling for a longer period of time. Problems

in the couple relationship were named in the couple counseling, but the couples did not (yet) find viable solutions.

Use of health system facilities to regulate couples' conflicts

In addition to the three central themes "stress factors, problem areas and coping processes," which can already be found in the guideline for the interviews, it came up again and again in the interviews surprisingly that the interviewees made use of facilities of the health system, parallel to the counseling process or before and/or after it when the tensions in their couple relationship and consequently the subjective stress increased strongly. They made contacts with a general practitioner or a specialist, with psychotherapists in private practice, with a specialist psychiatric clinic or with a general hospital.

Massive acute and chronic health impairments–due to both physical and mental illnesses–were among the central stress factors that the interviewees mentioned as characteristics of their life situation. It was therefore to be expected that they would also seek help from the health system during the couple counseling process and/or afterwards. In some cases, however, the interviewees explicitly stated that their partner's stay in an inpatient facility or medical treatment after the end of couple counseling served to regulate the emotions in the couple relationship. With regard to her husband's inpatient stay in a psychiatric hospital, one woman said: "It is not a matter of deporting him and taking him away. But simply so that I can get some air. No, I do not want to leave or anything. I just want, we talked on the phone every evening, but I just want to have the feeling that he's okay for now. They'll build him up again, and then I do not need to do that. So according to the motto, I can look after myself a bit and do not have to - that's actually how it is, I've already told him so often, I also said that here at the time, I just do not want to have the responsibility."

In some cases, stress in the couple relationship had contributed to symptoms on the physical level that resulted in getting a medical treatment. One of the interviewees reflected: "Yes, and whether she told him that, I do not know, in any case there was the examination (at the family doctor's, author's note) and was able to put him in hospital, and that was more or less, I would almost like to say, that was the salvation of our marriage."

After hearing such statements in the interviews, questions arise about the networking of psychological counseling center and the health system. Effectiveness studies on family and couple therapy treatments indicate that medical treatments are less used in parallel. In particular, this is to be observed in so-called "high-utilizers" (Crane, 2007). For the majority of the interviewees, the initial indication to turn to a counseling center for couples counseling came from a medical or psychotherapeutic practice. The criteria of such referrals to couple counseling were not known in the context of this study. Neither was it known whether and how the services and interventions in health care facilities and in couple counseling were coordinated with each other. The question arises whether couples seeking counseling would make less use of the health system if the problems at the couple level were eased through couple counseling. Research on the relationship between frequent use of health care facilities and psychotherapy or family and couple therapy shows an "offset effect." Among those who used marriage or family therapy, the use of the health care system decreased by over 20% (Law and Crane, 2000).

The interviewees described that they used facilities of the health system to regulate their emotions when interpersonal situations in their couple relationship escalated. Based on these statements, it can be asked whether and how the networking of counseling center with the health system takes place. What criteria are used to refer couples to counseling center and then from these centers to health care facilities? Can the services and interventions in the counseling and health sectors be coordinated more effectively to meet the needs of those seeking advice? In order to maintain their subjective wellbeing, it may be advisable for older people to make use of facilities in the counseling and health sectors in parallel. The interventions of different help and therapy services should be coordinated as much as possible in order to achieve synergy effects. This would require cross-case and case-related contacts between the facilities.

Limitations of the study

Overall, the generalizability of the results of the study is severely limited due to the data basis. It was not possible to select the participants in the qualitative interviews according to certain criteria. It is questionable whether clients who were more satisfied with the couple counseling process and with the counsellor agreed to participate in the interviews. Couples who had separated or dropped out of counseling, for example, were not available for interviews.

The validity of the data is also limited by the characteristics of the sample. They were heterosexual couples aged 55 and over who had been married for many years in their first marriage. According to the counselors, the couple counseling ended normally and the couples were invited by their respective counsellor to participate in the questionnaire survey and in an interview. It is possible that any negative critical aspects of couple counseling were not mentioned in the interviews. The fact that the partners knew that the other person would also be interviewed on the same topic could also have led to the respondents' selective statements.

Conclusion and outlook

Long-standing couples seek couple counseling when they experience excessive stress due to the accumulation of chronic and acute stresses and limitations associated with the subjective feeling of being overwhelmed and helpless. When they register for couples counseling, they experience very high emotional arousal

due to being inundated with problems and finding no coping options of their own.

Due to the increased stress level, the partners lose access to their socio-emotional expertise that were acquired in the course of their lives and their problem-solving abilities in the couple relationship.

As a result of the overload, there is emotional alienation at the couple level, which activates the couples' attachment system. As a result, the partners get into further emotional turmoil.

The partners' ability to mentalize temporarily breaks down under their high stress load, which leads to a disruption of the couple's affective communication and sometimes to aggressive behavior of the partners. Individual vulnerabilities and attachment styles influence the switching point from explicit to implicit mentalizing in the couple system.

The counseling process enables the partners to emotionally re-approach each other on the couple level, which in turn leads to the emotional calming of the individuals. The couples resume physical touch, which calms the bonding system of the partners and reduces negative emotional arousal.

This calming down enables the older couples to access their acquired socio-emotional expertise again. By reducing arousal, the partners are (again) able to open up emotionally to each other, to take the other's perspective and to grasp their own part in the problems at the couple level (i.e., to use mature mentalizing). This enables reflective problem solving at the couple level, and the partners see in a differentiated was problem areas as well as resources in the couple relationship.

In the case of long-known or existing interactional problems in the couple relationship, older people use situational and constructive avoidance and distancing strategies that help them to avoid emotional stress in the couple relationship and to stabilize their emotional well- being.

If significant stress occurs again, the likelihood increases that older adults are not able to avoid high levels of distress or to use cognitive-behavioral strategies to mitigate aversive emotional experiences. As a result, their mature mentalizing capacity breaks down again. In these situations, they can only access their age-related emotional advantages in order to regulate their emotions to a limited extent.

Some older people in long-term couple relationships use health care facilities in stressful situations to get support in emotion regulation and to bring about relief in their couple system.

Even though the questionnaire study preceding the present study presented here is not central to this paper, two of the results are noteworthy: We found a decrease in subjective complaints and overall burden on the couple relationship, but at the same time an increase in dissatisfaction with affective communication/emotional intimacy, problem solving and aggression in the couple relationship. This last result can be explained by partial results of the study.

These assumptions form the basis for further research questions in the counseling of long-term couples. In this context, knowledge about the changes in emotional regulation strategies with increasing age remains of particular importance.

Practical implications for consulting with long-term couples

From our point of view, the results lead to assumptions about the design of the counseling process with long-term couples, which we have written down here as summarizing thoughts:

- Consider acute and chronic psychosocial stressors and resources as contextual factors and extent of fragilization.
- Consider results from affective neuroscience (arousal and coregulation processes in couple relationships).
- Focus on the age-dependent priority of emotional security and connectedness in the couple relationship as a basis for the constructive handling of conflicts and wellbeing.
- Mature strategies of emotion regulation, e.g., active avoidance of destructive conflicts in the case of "unsolvable problems" and promote interpersonal competences (de-escalation, self- opening, change of perspective, own assumption of responsibility).
- Targeted cooperation of couples counseling/therapy with institutions of the health system.
- Offer catassignmental consultation appointment for stabilization, encourage re-reporting in case of renewed stress.

Data availability statement

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

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

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

Conflict of interest

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

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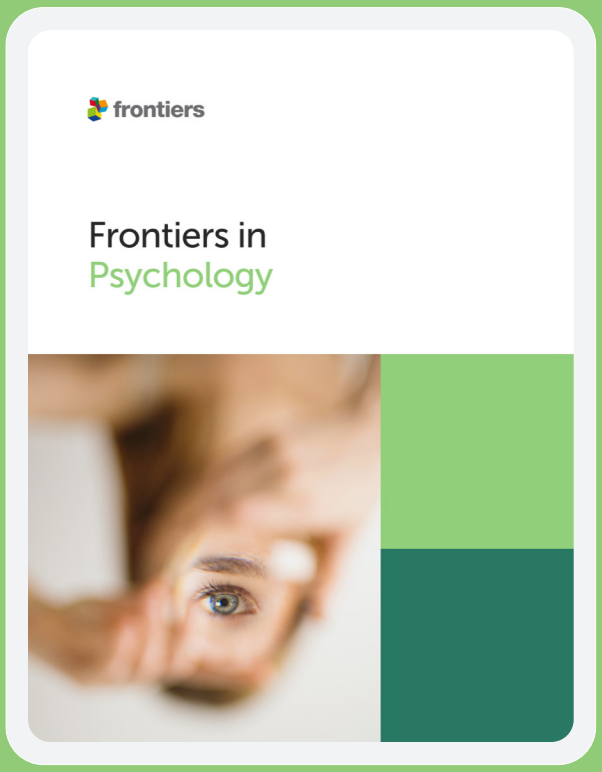

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