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Social determinants and psychosocial factors that impact on health status

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Social determinants and psychosocial factors that impact on health status

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Editorial: Social determinants and psychosocial factors that impact on health status

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Editorial on the Research Topic
Social determinants and psychosocial factors that impact on health status

Historically, several conceptual frameworks have been proposed to explain the determinants affecting the health-disease continuum. All of them considered individual variables, lifestyle, and health systems, but also contextual variables. Currently, there is consensus on the importance of the impact of social conditions, such as working conditions, socio-environmental setting, income level, access to education, or political-economic variables that play a crucial role in determining the health status of the population. To address these concerns, the World Health Organization (WHO) defines the social determinants of health as the "structural factors and living conditions that are responsible for much of the health inequities (…). The term ≪social determinants≫ summarizes the set of social, political, economic, environmental, and cultural factors that have a strong influence on health status" (WHO, 2008).

All countries have social inequalities in health, and they occur gradually along the social scale. The impact of these disparities is significant, and their trend is increasing. However, it seems that the greater the social disadvantage in any of the social determinants, the worse the health outcomes, and the worse when several axes of inequality concur (Ruiz et al., 2022). However, there is enough evidence to demonstrate how the implementation of appropriate health and social policies can reduce these health disparities (Benach, 1997), establishing strategies that consider these social inequalities in a multidisciplinary manner and focusing actions on primary interventions and health promotion (De La Guardia and Ruvalcaba, 2020).

This set of social factors and exposure to them condition the health status of the individual and his or her social participation in the community. From variables linked to the labor context, such as unemployment, which is associated with greater cardiovascular risk factors, especially in young people (Vancea and Utzet, 2017), or mental illness (Frasquilho et al., 2015). The physical environment in which we live also influences our state of health and enhances (or diminishes) the healthy lifestyle habits that individuals develop (Twohig-Bennett and Jones, 2018). Also, the public policies implemented have led to a decrease in citizen participation, as well as to the exclusion of many people, depriving them of the right to health (Falkenbach and Greer, 2018). Other variables linked to the generation of social inequalities in health deserve special attention, such as gender or ethnicity. When we refer to gender, we are not referring to physical differences related to sex, but to the social inequalities in health that gender entails, such as inequalities to enjoy good health. These inequalities seem to persist even in crises, such as the COVID-19 pandemic (Zwar et al., 2023). This Research Topic aims to shed light on how psychosocial and contextual factors determine people's wellbeing and quality of life.

From a cultural perspective, Li et al. found gender differences in binge eating behavior. Their results indicated that, in Chinese culture, body dissatisfaction and self-acceptance, independently or through a serial form, mediate gender differences in binge eating behavior. Shin and Park also addressed gender, in this case, linked to the existence and quality of social networks, examining their associations with various impacts on physical and mental health and analyzing the results according to gender. The findings suggest that women benefit more from support networks and are also more vulnerable to network deficits.

The family and residential context was also a focus of interest. A narrative review (Faraji et al.) updates the available evidence on how different family-related factors are related to the fear of cancer recurrence among survivors. This research made it possible to categorize them into four factors: partner-related, parenting-related, family-related, and social interactions. Their categorization makes it possible to construct a more comprehensive model that helps healthcare personnel improve the design of family interventions. The family and communication with their cancer patient relatives was the subject of interest for Naghavi et al.. They analyzed the general and individual attitudes of caregivers and non-caregivers regarding communication with cancer patients. Their results noted the contrast between positive attitudes toward direct communication and the actual practices observed. They suggest the creation of protocols for conveying bad news in a culturally competent manner and facilitating the patient's need to express their emotions and needs. Melero et al. were concerned with the psychological wellbeing of adults raised in foster families. They found that there is no direct relationship between aging and a decrease in psychological wellbeing. Increasing age is only related to lower psychological wellbeing in the case of a lack of mastery of certain developmental tasks of adulthood.

Several studies addressed psychosocial variables closely linked to contextual elements of the health systems. Bayraktar and Ozkan studied posttraumatic growth, coping, and illness perceptions in cancer patients. They highlight the need to strengthen positive coping methods and implement interventions targeting the cognitive aspects of their illness perceptions. Their results indicate that the relevant variables affecting posttraumatic growth in cancer patients in different cultures do not change. Jeon and Noh analyze psychosocial factors associated with health behaviors in older pregnant women to identify which behaviors promote and harm health in the Korean context. Among the psychosocial factors that explained prenatal health-promoting behaviors were maternal-fetal attachment and the social atmosphere of pregnancy stress. In contrast, artificial conception, multipara, and maternal role stress influenced prenatal health-damaging behaviors.

The instruments used in the health system have been another focus of interest. Norouzkhani et al. were concerned about the information and support provided to patients with inflammatory bowel disease. Through a Delphi consensus study, they generated a questionnaire of 100 items grouped into three categories: support needs, sources of information, and specific information needs. Buki et al. warn of the difficulties in assessing psychosocial factors associated with colorectal cancer. As a solution, they develop and validate the psychometric properties of the Colorectal Cancer Literacy Scale-Uruguay Version, that assess culturally based factors that influence colorectal cancer screening behaviors.

Abudoush et al. analyze the lived experiences of chronic pain in Arabic-speaking populations and its relationship with psychosocial processes such as care, coping, or social support. It addresses realities in sociocultural settings other than the Western setting and provides conclusions that justify the development of culturally sensitive interventions. Zhou et al. also considered ethnic differences, analyzing the role of perceived discrimination as a mediator between cultural identity and mental health symptoms in adults. They highlight the need to consider racial, ethnic, and socioeconomic inequalities, as well as cultural identity and bias, in mental health research and interventions.

Concern for the more structural social determinants, specifically those affecting the health and wellbeing of the elderly, was addressed by Zhang et al.. They refer to the following primary structural indicators: socioeconomic development factors, political factors, environmental factors, and cultural factors. Their findings show that individual social factors alone are insufficient to achieve high levels of health in older adults.

This Research Topic covers a wide range of social determinants and psychosocial factors that affect health and wellbeing, including socioeconomic context, culture, family, and gender, among others. The scientific contributions of the subject suggest that approaches to health interventions should consider these social variables that have an impact on health. The findings provide important information for families, patients, healthcare professionals, and policymakers.

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Psychological wellbeing in adult adoptees: current age and developmental tasks

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Introduction: Studies about adult adoptees are normally focused on the differences in adjustment difficulties between them and non-adoptees. However, there has been less research about adoptees' positive and developmental adjustment in adulthood. The aim of this study is to test a model of the mediating role of adoptees' achievement of adulthood tasks in the relationship between current age and psychological wellbeing.

Materials and methods: The sample consisted of 117 adults who were adopted as children by Spanish families. Their current mean age is 28.3 years. Participants underwent an interview and completed Ryff's Psychological WellBeing Scales.

Results: Findings show that current age is directly and negatively related to psychological wellbeing [$c' = -0.039$, 95% CI (-0.078, -0.001)], and the relationship between these variables is mediated by adoptees' achievement of adulthood tasks [indirect effect = 0.035, 95% CI (.014, 0.059)].

Discussion: The findings support traditional theories about transitioning to adulthood, and adds relevant information about this transition in adoptees. Moreover, this work indicates a new way of assessing adoption success, based on long-term measures and normative variables. Services providers should account for the importance of supporting young people on their life transitions and promoting their wellbeing, especially among those who started from disadvantaged contexts.

KEYWORDS

adult development, wellbeing, adoption, developmental tasks, mediation

1. Introduction

Adoption is a measure to provide a permanent and nurturing family to children whose family of origin is not able to offer them a secure context (Brodzinsky and Smith, 2019). Previous studies show the potential benefits of adoption in comparison to other child-protection measures such as foster care (Teyhan et al., 2018; DeLuca et al., 2019; Cáceres et al., 2021). Most of the studies about adoption have been carried out with children and adolescents, and mostly using parent-reported data. However, during the last decades there has been a growing interest in the study of long-term outcomes in adulthood. In this paper, we address the transition to adulthood in a group of Spanish adoptees in relation to their psychological wellbeing. As the life course perspective emphasizes, no stage of life can be understood in isolation from others, but that development is lifelong (Johnson et al., 2011).

The timing of transitions and their implications have long been a central concern for life-course analysts. Every life transition implies the need for adjustment to changes and the new roles related to them. Among life transitions, the transition to adulthood is particularly relevant for its challenges and singularity (Schulenberg and Schoon, 2012), especially for adoptees because they have some additional tasks to accomplish (Brodzinsky et al., 2014): new exploration of the meaning and implications of adoption, search for origins, or facing parenthood lacking information about the own genetic history. During emerging adulthood, adoptees continue to perform important psychological work related to the gathering of adoption-related information (Wrobel and Grotevant, 2019). As these authors highlight, in contrast to adolescence, in this life stage they can manage information about their adoption, or negotiate relationships within the adoptive kinship network, independently of their parents. Therefore, this transition to adulthood can have an additional personal impact for the adopted individuals because early adversity is associated to changes in their brain structure (Mackes et al., 2020), and it also might lead to a higher sensitivity to stress later on, when adoptees have to face adult life (McCrory et al., 2017).

Considering the changes and new responsibilities in people's lives, young adulthood may be a period of instability. A successful adulthood may be reached in several ways in terms of tasks, difficulties, and influences. Previous works state that there are certain life goals to achieve that are important to adult success (Layard et al., 2014; Mayseless and Keren, 2014). However, it is important to consider the large amount of variables such as historical changes that took place in the last decades, such as the decrease of the importance of marriage, the feminism role in our society, or changes in the labor market due to technology development (Estes and Sirgy, 2019).

In relation to the new roles, authors like Havighurst (1972) have defined the transition to adulthood in terms of tasks that people should accomplish in that life stage. These tasks (or "markers") can include: finishing education, getting a job, assuming civic responsibilities, or other goals associated with relationships and family, like finding a stable social group, choosing a romantic partner, becoming a parent, being responsible for a home, etc. (Havighurst, 1972; Salmela-Aro et al., 2012; Schulenberg and Schoon, 2012). Common points among before mentioned authors are: getting a job, having a partner, becoming a parent, being responsible for a (own) home, and having a stable social group. However, the construct of adulthood tasks suffered an attempt of deconstruction during the last decade so that, currently, the achievement of some of these tasks is not considered necessary to succeed in the transition to adulthood (Schulenberg and Schoon, 2012).

The above-mentioned attempt of deconstruction should be considered from the viewpoint of social and historical changes, such as the reconceptualization of marriage or the labor market (Schulenberg and Schoon, 2012; Estes and Sirgy, 2019), and the current new demands and instability in young adulthood (Bonnie et al., 2015). However, the process of going through and achieving the previously mentioned goals has been linked to higher wellbeing (Ryff, 2014). Overall, the performance of these tasks should be taken into account with regard to adjustment and wellbeing.

According to Ryff (2014), people enjoy psychological wellbeing when they achieve balanced development and satisfaction in the following six life domains: purpose in life, autonomy, personal growth, environmental mastery, positive relations with others, and self-acceptance. However, multiple variables influence the development of wellbeing, and different authors have created models to illustrate this influence (Campion and Nurse, 2007; Thompson and Marks, 2008; Layard et al., 2014).

Campion and Nurse (2007) developed a dynamic model of wellbeing, which reflects the influences of personal, social and environmental risk factors (e.g., poor health, addictions or unemployment) for wellbeing, and the need to increase protective factors (i.e., relationships, physical activity, and confidence). Thompson and Marks (2008) developed another model that reflects dynamic and bidirectional influences between wellbeing, external conditions and personal resources, which both play an important role in wellbeing. Layard et al. (2014), using measures of life satisfaction as an indicator of wellbeing, developed a model including variables from the preceding stages, that is, childhood and adolescence. According to these authors, a useful model must combine variables from adult outcomes (economic, social, and personal) and influences of past characteristics. They estimated such influences both through past and present variables. However, childhood characteristics seem to have limited predictive power for adult life satisfaction/wellbeing. Supporting this model, it has been demonstrated that behavioral and emotional difficulties during adolescence have a direct negative effect on wellbeing in adult adoptees (Sánchez-Sandoval et al., 2020). These authors also found that child behavioral and emotional difficulties are directly related to the same types of difficulties in adolescence, but the relationship between childhood difficulties and adult wellbeing is only indirect through the presence of those difficulties in adolescence.

Previous studies about adopted children and adolescents revealed that they scored slightly lower than non-adoptees in positive variables of wellbeing (Moreno et al., 2016; Paniagua et al., 2020). Other works also showed that adoptees scored higher in self-esteem and life satisfaction than adolescents living under other protection measures such as residential care or foster care (Sánchez-Sandoval, 2015; Moreno et al., 2016).

Concerning adoptees' wellbeing, numerous pre-adoptive factors have been related to children's lower wellbeing, such as institutionalization prior to adoption, abuse, or neglect; but the most studied one is age at adoption (Vandivere and McKlindon, 2010). As well as these pre-adoptive aspects, post-adoption issues may affect children's wellbeing. Findings suggest that adoption enhances children's development and wellbeing because their adoptive home environments are more stable than those of children who remain in foster care (Zill and Bramlett, 2014).

Despite the importance of analyzing adjustment related to positive variables and wellbeing during adulthood, less research on adoption has been carried out with adult adoptees. According to the results of the systematic review performed by Melero and Sánchez-Sandoval (2017), most of the research on adult adoptees is based on a perspective of difficulties, and there are only a few works that analyze positive variables. It is important to clarify that most of the previous studies, not only in adulthood but also during the whole lifespan, find more difficulties among the group of adoptees if they are compared to non-adoptees (Askeland et al., 2017; Melero and Sánchez-Sandoval, 2017; Corral et al., 2021). Oke et al. (2015) included both positive and symptomatological variables, concluding that some adult adoptees had poor wellbeing.

An important variable to take into account as an influence for psychological wellbeing is age. Previous findings are inconclusive when considering a positive or negative relationship between these two variables. On the one hand, research has shown that psychological wellbeing tends to be higher in young and midlife adults than in older ones (Ryff and Keyes, 1995; Keresteš et al., 2012). Young adults tend to see themselves as improving over time, while older adults perceive their decline (Ryff, 2014). On the other hand, other studies found a positive relationship between age and psychological wellbeing (Archer et al., 2015). Lastly, another work revealed no correlation between age and psychological wellbeing in a specific sample of adult adoptees (Wall, 2011). However, it is important to consider that cultural context may imply differences in age-related outcomes (Karasawa et al., 2011).

The third decade of life seems to be the most decisive concerning wellbeing and life transitions (Salmela-Aro et al., 2012), although the achievement of the tasks implied in transition to adulthood varies depending on people and their resources (Schulenberg and Schoon, 2012). In line with this, Salmela-Aro et al. (2012) identified different role patterns in young adulthood that are related to wellbeing: on-time and postponed. Individual differences in the achievement of tasks are greater around the mid-20s and after the mid-30s (Schulenberg and Schoon, 2012). These authors indicated that people who had achieved multiple tasks by the age of 25 had greater wellbeing. Hence, a failure to achieve tasks by a certain age may lead to lower rates of wellbeing (Salmela-Aro et al., 2012).

According to Ryff (2014) summary of researches, several variables influence psychological wellbeing outcomes during adulthood. Some of them are related to the markers or tasks of transition to adulthood. Marriage has a positive influence on some dimensions of wellbeing (Nikolaev, 2018), and marital satisfaction is a positive predictor of some of the dimensions of psychological wellbeing. Thomas et al. (2017) state that there are different possible results when researching the effect of marriage over wellbeing considering gender. Additionally, a study with adult adoptees indicate no significant relationship between marital status and psychological wellbeing (Wall, 2011).

Concerning issues of economy and employment, employed people report higher wellbeing than unemployed people (Nikolaev, 2018; D'Agostino et al., 2019). However, the relationship between employment and wellbeing seems to be more important in mid adulthood than in early or later adulthood (Lansford, 2018). A higher level of income may lead to greater wellbeing. As the basic needs are met, and people have access to resources like better education, health, or other services, their perceptions of wellbeing increase. However, this is not a universal effect, as it is less significant at very high levels of income. Many other factors may also influence the relationship between income and wellbeing, such as job satisfaction (Viñas-Bardolet et al., 2020). A positive relationship between income and psychological wellbeing was also found in adult adoptive populations (Wall, 2011), and also unemployment have been related to higher vulnerability in this population (Golm et al., 2020).

Prior studies indicate that the association between parenting and wellbeing seems to depend on the analysis performed and the comparison group (Lansford, 2018). Current positive parenting experiences are directly related to positive wellbeing (Shin An and Cooney, 2006). Regarding relations with parents, García-Mendoza et al. (2017) found no differences in wellbeing between young adults who lived with their parents and those who did not, but the study of D'Agostino et al. (2019) reported that living with parents decreased life satisfaction. In line with this, life satisfaction seems to decrease after age 35 for those still living with their parents (Nikolaev, 2015). Family dynamics as a whole are a significant predictor of overall psychological wellbeing in adult adoptees (Wall, 2011).

Regarding education, results about wellbeing are inconclusive. Some earlier research showed a positive relationship between education and wellbeing (Keresteš et al., 2012; Nikolaev, 2018). However, other works indicated a neutral or negative relationship between education and wellbeing. A higher education may improve the availability of job options, the management of resources, health, social networks, attractiveness in relationships, and parenting quality. However, a higher education may also imply negative consequences, like more responsibility at work, longer working hours, more stress, and higher expectations that may lead to less satisfaction (Nikolaev, 2018). A positive relationship between educational level and wellbeing has also been found in adult adoptees (Wall, 2011).

Other variables also appear to be related to wellbeing in adulthood. Gender differences seem to be more important in other life stages, like adolescence or late adulthood. However, some authors found that women scored higher than men in wellbeing (Ryff, 2014), or some dimensions such as positive relations and personal growth (Karasawa et al., 2011; Matud et al., 2019). In contrast, other studies reported that men scored higher than women in almost all the subscales of psychological wellbeing (Shin An and Cooney, 2006), or in some of them, such as autonomy and self-acceptance (Karasawa et al., 2011). However, prior research found no gender differences in wellbeing when gender interacts with age, with both men and women showing similar scores as they grow older (Karasawa et al., 2011). Social support is also related to wellbeing, as a significant and positive predictor of all the dimensions of psychological wellbeing. Its influence is similar in males and females (Keresteš et al., 2012).

Most of the presented research provides information about the relationship of some variables with wellbeing outcomes during adulthood. Some of them are markers or tasks of transition to adulthood. However, there are little works with a wide and comprehensive approach, incorporating age and most of these tasks at the same time. The current study analyzes the relationship between age and the achievement of the main tasks related to transition to adulthood and psychological wellbeing during early adulthood, in a group of adult adoptees.

The main aim of this study is to test a theoretical structural model, proposing a direct effect of current age and a mediating effect of the accomplishment of adulthood tasks on the psychological wellbeing of adult adoptees (see Figure 1). This model draws on the classical theories of development (e.g., Havighurst, 1972) and other studies (Salmela-Aro et al., 2012; Schulenberg and Schoon, 2012) although they did not refer specifically to adopted samples. According to the model, current age has a direct effect on psychological wellbeing. Additionally, the achievement of adulthood tasks would play a mediating role in the

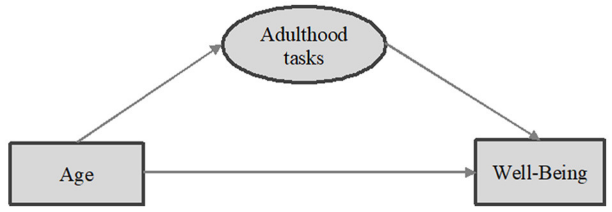

FIGURE 1
Hypothesized model.

association between current age and psychological wellbeing. In relation to these overall aims, we tested the following hypotheses: (1) There is a connection between current age and the level of psychological wellbeing. (2) That relationship would be influenced by the accomplishment of certain adulthood tasks, like getting a job or becoming a parent.

2. Methods

2.1. Participants

One hundred seventeen adult Spanish adoptees (around 50% males) took part in this study. All participants had been adopted domestically from care, they were not international adoptions. The sample is part of a longitudinal study with adoptive families. There were three assessments: Wave 1 (W1) in 1995 ($n = 394$), Wave 2 (W2) in 2001 ($n = 273$), and Wave 3 in 2016–2018 ($n = 117$). The current study belongs to the third wave. At W1, there was an attempt of contacting the whole amount of families that adopted a child in the geographical area between 1987 and 1993, years between the legal regulations of adoption and the beginning of the project. The other two waves had the same sampling strategy.

Participants' age at W3 ranged from 23 to 44 years ($M = 28.36$, $SD = 4.56$). Their mean age at adoption was 1.92 years ($SD = 3.14$), and most of them were adopted before 1 year of age (56%). As shown in Table 1, 62% of the sample had completed some kind of high school education, and 35% of them were still studying. Additionally, 54% of the participants were working, 47% already had their own homes, 31% had children, and 67% had a stable romantic relationship [considered when one of the following criteria are met: being involved in their relationships for more than 12 months (93%) and/or were married or cohabitating (62%)].

TABLE 1 Sample characteristics.

Characteristics ($n = 117$)		n	%
Individual			
Gender	Male	59	50
	Female	58	50
Age (in years)	23–29	87	74
	≥30	30	26
Disability		12	10
Educational level	Primary school	13	11
	High school	73	62
	College	31	26
Currently studying		41	35
Tasks and adjustment			
Romantic relationship		79	67
Children		36	31
Job		63	54
Own home		55	47
Stable support		103	88

There were no missing data in this sample.

2.2. Instruments

2.2.1. Adoption and life trajectories interview

We designed a semi-structured interview to collect participants' data on diverse life domains: academic achievement, career path, health (physical and mental), family situation, adoption trajectory, stressful life situations, social support, and personal resources. This interview included closed questions about the accomplishment of the adulthood tasks, like having a partner (e.g., *Are you involved in a stable romantic relationship?*) to which participants had to answer "Yes" or "No." The score of "adulthood tasks" ranges from 0 to 5 and is made up of the sum of the affirmative answers in task accomplishment: having a partner, having children, living independently from the parents' home, having a good source of support and having a job. This kind of score has been used previously referring to developmental tasks in adulthood (Schulenberg et al., 2004; Piotrowski et al., 2020). These authors proposed an additive model consisting of the mean score of success in the developmental tasks. Success in as many as tasks as possible is considered the sole predictor of wellbeing. Summing the scores of yes/no questions has also been used with other psychological constructs, like cumulative risk (Bry et al., 1982) or adverse childhood experiences (McCrory et al., 2015; Deschênes et al., 2018).

2.2.2. Psychological WellBeing Scales (Ryff and Keyes, 1995)

We used the Spanish short version (Díaz et al., 2006). It has 29 items rated from 1 (*Completely disagree*) to 6 (*Completely agree*). This scale includes a global mean score and the mean scores for the six subscales of the components of wellbeing: Purpose in life, Autonomy, Personal growth, Environmental mastery, Positive relations with others, and Self-acceptance. In this study, we only used the global mean score because of our focus on general wellbeing. The scale had excellent reliability ($\alpha = 0.91$).

2.3. Procedure

First, we contacted families from the previous waves. We then scheduled appointments for the interview and the completion of the protocols. Interviews took place in the participants' homes or other places they considered comfortable, and lasted between one and two hours. Before the interview, all participants read and signed an informed consent. In addition, the Bioethics Committee of the University of Cádiz approved the project.

Due to the longitudinal design of this project, it is important to examine attrition across waves. In this case, we assessed the attrition between the first two waves and the third one finding that it was not systematic regarding some variables collected in earlier assessments (W1 and W2). First, we focused on the sociodemographic characteristics of the sample: gender proportions, age at adoption, simple or multiple adoption (adopted alone vs. adopted with siblings), ethnicity, disability, initial harshness (adverse childhood experiences prior adoption), educational level of the family, institutionalization, birth parents' substance use, maltreatment before adoption, family structure, family profession, mental disease or deficiency in biological parents, relation with the adoptee prior to adoption, and satisfaction with adoption at W1. None of them was significant.

We also compared participants and non-participants at Wave 3 according to measures of psychological adjustment from either Wave 1 or Wave 2. First, we used the Rutter Revised Parent Scale (W1 and W2), which assesses child emotional and behavioral problems. Most of the comparisons did not show significant differences between participants and non-participants at Wave 3, except for hyperactivity from Wave 1 [$t_{(271)} = 2.528$, $p < 0.05$; higher mean score for participants].

In addition, we compared participants using measures of self-esteem and life satisfaction from Wave 2. No significant differences were found. More information about these measures can be consulted in (Sánchez-Sandoval and Palacios, 2012; Sánchez-Sandoval, 2015).

2.4. Data analysis

Data analysis was carried out using the Statistical Program for the Social Sciences (SPSS). First, descriptive and correlation analyses were performed. Then, a model of the direct and indirect effects of current age as a continuum on psychological wellbeing was tested (see Figure 1). We examined whether the accomplishment of adulthood tasks (M) mediated the relationship between current age (X) and wellbeing (Y).

Before the mediation analysis, the data were checked for distribution normality with the skewness and kurtosis values. The skewness and kurtosis scores were −0.76 and 0.26 for wellbeing, −0.06 and −0.83 for adulthood tasks, and 1.35 and 1.68 for current age, respectively. These values are adequate for performing the analysis (skewness < 2, kurtosis < 7). The mediation effect of current age was tested with PROCESS for SPSS developed by Hayes (2017). A bootstrapping procedure was used to test the significance of the indirect effect. We also used a 95% confidence interval (CI) to test the mediator effect. If the interval does not include zero, the mediation effect is significant. Finally, the Sobel test was also calculated.

TABLE 2 Differences in wellbeing concerning the achievement of every developmental task.

Developmental task	Achieved	Non achieved	*t*	*d*
Job	4.85	4.42	-2.82^{**}	0.522
Stable relationship	4.78	4.40	-2.28^{*}	0.450
Parenthood	4.48	4.73	1.27	0.290
Living independently	4.61	4.70	0.56	0.104
Stable social network	4.82	3.40	-6.84^{***}	1.948

$^{*}p < 0.05$.
$^{**}p < 0.01$.
$^{***}p < 0.001$.

3. Results

3.1. Preliminary descriptive analyses

First, we compared wellbeing mean score with the theoretical mean of the scale (values range from 1 to 6, so 3.5 is the value). Findings show that adoptees on the sample score significantly higher than the theoretical mean, so their wellbeing is higher than the mean [$t_{(116)} = 14.561$, $p < 0.01$]. After that, we compared the means of every variable included in the model by gender. There were no significant differences between males and females in the number of accomplished adulthood tasks [$t_{(115)} = -1.564$, $p > 0.05$]; current age [$t_{(115)} = 0.235$, $p > 0.05$]; or psychological wellbeing [$t_{(115)} = -1.763$, $p > 0.05$]. Then, comparisons were made between people who achieved every developmental task and those who did not. Findings show that people who have a job, a stable relationship and a stable social network have higher levels of psychological wellbeing than those who do not, with moderate to high effect sizes (see Table 2).

Dividing the sample into two groups, and comparing them both in the studied variables revealed no significant differences in psychological wellbeing between participants under or over 30 ($t = 1.222$, $p > 0.05$, $d = 0.259$). However, the variables related to developmental tasks (see Table 3) have significantly higher values among older participants (total tasks; $t = -5.001$, $p > 0.05$, $d = 1.059$). In addition, the mean ages of participants who achieved and not achieved developmental tasks were checked, finding significant differences between them. See Table 4 for more detailed results.

Table 5 displays the means, standard deviations, and correlations between the variables in the study's estimated model. We found positive significant correlations between psychological wellbeing and the accomplishment of adulthood tasks. The achievement of adulthood tasks also correlated positively with current age. No significant correlation was observed between current age and psychological wellbeing ($r = -0.021$, $p > 0.05$).

3.2. Model testing

Results of a simple mediation analysis indicated that current age is indirectly related to psychological wellbeing through its

TABLE 3 Results in an age-divided sample.

	Age		Chi-square	Phi
	<30	≥30		
Job				
Yes	42	21	4.23*	0.19*
No	45	9		
Stable relationship				
Yes	53	26	6.74*	0.24**
No	34	4		
Parenthood				
Yes	15	21	29.14**	0.49**
No	72	9		
Living independently				
Yes	40	22	6.70*	0.23*
No	47	8		
Stable social network				
Yes	77	26	0.07	0.02
No	10	4		

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

TABLE 4 Mean ages of achievers and non-achievers of developmental tasks.

	Yes	No	*t*	*d*
Job	29.49	27.04	3.07**	0.55
Stable relationship	29.15	26.71	3.27**	0.55
Parenthood	32.25	26.63	5.77**	1.49
Living independently	29.89	26.64	4.18**	0.75
Stable social network	28.37	28.39	0.06	0.01

**$p < 0.01$.

TABLE 5 Correlations and mean scores.

	Wellbeing	Adulthood tasks	Current age
Wellbeing			
Adulthood tasks	0.239**		
Current age	−0.021	0.536**	
Mean	4.67	2.91	28.34
SD	0.84	1.30	4.79

**$p < 0.01$.

relationship with the achievement of adulthood tasks. Figure 2 and Table 6 show the results of the mediation analysis, including information about the coefficients (Coeff.). Considering the Sobel test ($Z = 3.016$, $p = 0.002$), the model showed a significant mediator effect. Current age had a direct positive effect on the participant's achievement of adulthood tasks (*a*) [Coeff. = 0.153; 95% CI (0.108, 0.197), $p < 0.001$]. In addition, the effect of age on the prediction of wellbeing was significant [c'; Coeff. = -0.039; 95% CI (-0.078, -0.001), $p < 0.05$]. The achievement of adulthood tasks significantly predicted psychological wellbeing [*b*; Coeff. = 0.231; 95% CI (0.093, 0.369), $p < 0.01$]. The mediation analysis revealed that the total and direct effects of current age on the level of psychological wellbeing were, respectively, -0.004, and -0.039. A 95% bias-corrected confidence interval based on 10000 bootstrap samples indicated that the indirect effect of current age on wellbeing through the accomplishment of adulthood tasks ($ab = 0.035$) was amply above zero (0.014, 0.059). Moreover, Table 6 shows some effect size measures for the model (standardized indirect effects and coefficients, R^2, K^2, proportion of indirect effect on the direct effect).

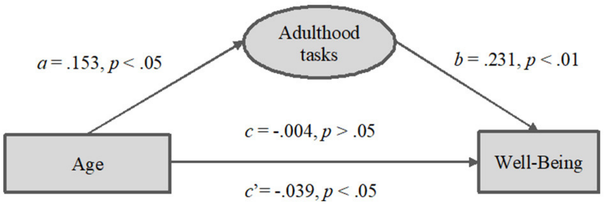

FIGURE 2
Simple mediation using the mediating effect of adulthood tasks on the relationship between age and wellbeing.

As shown in Figure 2 and Table 6, the presented indexes (*ab* and c') have opposite signs, making this mediation inconsistent (Warner, 2013). According to this author, this fact does not imply an absence of mediation, but a suppressor effect of the indirect effect on the direct effect. In this particular case, one might refer to competitive mediation, as stated by Zhao et al. (2010), because the direct effect points in the opposite direction than the indirect effect. The main consequence of this kind of mediation is that the total effect is close to zero and, consequently, non-significant.

Current age negatively predicted psychological wellbeing, but when including the achievement of adulthood tasks in the model, this total effect may change due to the positive indirect effect of the achievement of adulthood tasks. In other words, in our data, there is no direct relationship between getting older and a decrease on psychological wellbeing. The increase of age is only related to a lower psychological wellbeing in case of lack of mastery on certain adulthood developmental tasks.

4. Discussion

The purpose of this study was to test a model of the relationship between current age and psychological wellbeing, and the possible mediator effect of the achievement of adulthood tasks in this relationship. Results show a significant direct connection between current age and the level of psychological wellbeing. In addition, the indirect effect of the achieved tasks was significant in the association between these two variables, showing that task achievement plays an important mediator role. We also examined gender differences in the target variables. Findings showed no significant differences between males and females of this sample in wellbeing, current age, or the number of accomplished adulthood tasks.

TABLE 6 Mediational model coefficients.

Predictors	Consequent					
	Adulthood tasks			Wellbeing		
	Coefficient	*SE*	*p*-value	Coefficient	*SE*	*p*-value
Age	$a = 0.153$	0.022	<0.001	$c' = -0.039$	0.019	<0.05
Adulthood tasks	–	–	–	$b = 0.231$	0.069	<0.01
Constant	-1.411	0.646	<0.05	5.096	0.493	<0.001
	$R^2 = 0.286$			$R^2 = 0.088$		
	$F_{(1,\ 115)} = 46.268, p < 0.001$			$F_{(2,\ 114)} = 5.544, p < 0.01$		
Effect size measures	Partially standardized indirect effects of age			0.041		
	Completely standardized indirect effects of age			0.188		
	Standardized coefficients			$a = 0.535, b = 0.351, c' = -0.209, c = -0.021$		
	Ratio of the indirect effect of the direct effect			0.896		
	K^2 (ab over maximum ab)			0.593		

ab = indirect effect.

Previous studies showed higher levels of wellbeing in young and midlife adults in comparison to older ages (Ryff and Keyes, 1995; Keresteš et al., 2012). Considering, sample's age it is difficult to see those data reflected. However, as shown previously they have good levels of wellbeing compared to the theoretical mean, so that does not contradict prior findings. Nevertheless, the age between 20 and 30 years is critical for the attainment of adulthood tasks, which are also related to wellbeing (Salmela-Aro et al., 2012). It is important to take individual differences into account in this path (Schulenberg and Schoon, 2012). Considering that the age of the sample of this study ranged from 23 to 44 years, with a mean around 28, it could be concluded that most of the participants are undergoing this critical period. This might be one of the reasons why age played an important role in this study. That age period (from 20 to 30) is also characterized by the presence of more distress and instability because of the need to adjust to new roles (Bonnie et al., 2015), and the implications from early life experiences for adoptees (McCrory et al., 2017; Mackes et al., 2020).

Prior studies also found a relationship between the achievement of adulthood tasks and psychological wellbeing (Shin An and Cooney, 2006; Ryff, 2014; Nikolaev, 2015, 2018; Lansford, 2018), and some highlight the importance of age in that association (Salmela-Aro et al., 2012; Schulenberg and Schoon, 2012). These latter studies revealed that young adulthood is a critical moment for the development or achievement of certain tasks, which will also influence psychological wellbeing.

On another hand, there has been a recent attempt to deconstruct the concept of adulthood tasks and their achievement. According to Schulenberg and Schoon (2012), the attainment of certain goals is considered unnecessary for a successful transition to adulthood. In this sense, pathways for the mentioned transition can be quite heterogeneous, and there is a large range of variability in the configuration of the tasks. There could be several explanations for this. One of them is the presence of historical, social, and cultural influences. From the historical point of view, many things have changed in the last decades, like the importance of marriage, women's role in society, or employment skills (Schulenberg and Schoon, 2012; Estes and Sirgy, 2019). Another important factor is the 21st century sociocultural perspective of young adulthood, which considers this life stage a critical period in development, more demanding in terms of information and economical resources, less predictable, a possible magnifier of inequality, unhealthy, and in need of support (Bonnie et al., 2015).

Finally, Salmela-Aro et al. (2012) revealed different profiles regarding adulthood tasks: slow starters, highly educated with family, highly educated without family, and traditional work and family. These authors conclude that people with greater wellbeing are those who completed high education and who have their own families. On the contrary, those who still have to achieve tasks related to career or family (slow starters, or highly educated without family) have lower levels of wellbeing. These results, together with those the present study, support the idea of classical theories about adulthood task accomplishment and its relationship to psychological wellbeing, despite the attempts of deconstruction.

This research was conducted with a group of adult adoptees. Adoptees' adjustment in adulthood has been traditionally measured through the presence of problems, but few works have considered a perspective of wellbeing (Melero and Sánchez-Sandoval, 2017). In addition, wellbeing in adoptees is normally predicted by taking into account child and adolescent difficulties, so, in this study, we wanted to use variables that are typically assessed in adulthood as another way of considering a successful adoption. In this particular case, we tried to assess not only the success of the adoption process, but also the long-term success of the adoption *per se*, referring to the achievement of a successful development during the lifespan. As adoption is a measure to protect children and provide them a secure context to improve their outcomes, one might think that a successful development is also an attainment on the adoption process.

In line with the aforementioned ideas, it is noteworthy that the adoptees in this research generally show fairly high scores in wellbeing. It means that respondents in this study on average agreed to all positive items, which also implies that their score is significantly higher than the theoretical mean. A possible explanation of this result concerns the change of their childhood social status when they were adopted. In these adoptees' particular case, they experienced a change in terms of opportunities when suitable families adopted them. Consequently, the assimilation of values and norms in these people might proceed from their adoptive families. It is also likely that social support and positive family dynamics in the adoptive families had a positive influence on adoptees' wellbeing. This work provides evidence that support ideas of the life-course academics; to explain these people's wellbeing in adulthood is necessary to look back and consider important life events from their childhood, such as adoption and prior experiences. At the same time, this study also confirms the permeability of human development considering the influence of positive experiences through the lifespan, like the accomplishment of some of the adulthood tasks.

4.1. Limitations

The present study has some limitations that should be reflected. It would be more appropriate to test the model presented in this work in a control group of non-adopted people with similar characteristics. This comparison would provide a more complete view of the situation. In addition, the omission of adoption-specific tasks in the model is a possible limitation to consider. Another drawback to take into account is the sample size. The longitudinal design of the study presented herein makes it difficult to achieve a larger sample. However, the current sample in W3 is representative of the sample of W1, considering the results of the attrition analyses. In addition, it is important to consider that previous research with adoptees also used relatively small samples (Oke et al., 2015; Balenzano et al., 2018).

4.2. Implications for future research

The study provides a new research approach to adoption from a different perspective: the long-term success of adoption as assessed by variables used in general population during adulthood. This will allow us to focus on the development process rather than on the difficulties *per se*. This new approach could also help to depathologize the concept of adoption and the development of psychological wellbeing in the people involved. This work supports the idea that there is a growing need to study adult adoptees from a positive perspective. For this purpose, both longitudinal and cross-sectional studies are necessary to consider not only their past but also their current characteristics. For future works, it will be relevant to include also the analysis of adoption-specific tasks to see their influence on the process of transitioning to adulthood.

It is also important to transfer research results to practice, so it is necessary to have the appropriate services not only to help adult adoptees, but also to understand the possible particularities of this group. According to Bonnie et al. (2015), interventions encounter three main problems: they are not coordinated, they do not have the adequate focus, and most of them are not based on evidence. These authors also stated that the future wellbeing of our society is related to the investments made in current young adults, especially the ones that belong to high-risk groups. They highlight that providing these youngsters with more opportunities concerning education, economy, social life, and health will improve their possibilities for successful adult development. So, a possible way to improve adoption success might be the design of interventions to provide support for adoptees' life transitions and to promote the development of their wellbeing, and probably, their health in general.

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 study, involving human participants, was reviewed and approved by Bioethics Committee of the University of Cádiz. 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.

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Conflict of interest

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

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Psychosocial factors associated with health behaviors in pregnant women of advanced maternal age in Korea

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Objectives: To determine the association between psychosocial factors and health-promoting and health-impairing behaviors in pregnant women of advanced maternal age (AMA) in Korea.

Design: A cross-sectional survey study.

Setting: Online survey.

Samples: A total of 217 pregnant women aged 35 and older agreed to participate in the study, with 207 participants completing the self-report questionnaires.

Methods: We collected self-reported data on demographic, obstetric, and psychosocial factors and prenatal health behaviors using standardized measures. We conducted a descriptive analysis of the collected data and a linear regression to identify significant associations with health-promoting and health-impairing behaviors.

Results: We found that maternal–fetal attachment ($\beta = 0.43$, $p < 0.001$) and “social atmosphere” of pregnancy stress ($\beta = 0.13$, $p = 0.047$) were positively associated with prenatal health-promoting behaviors. We found that artificial conception ($\beta =-0.16$, $p = 0.011$) was negatively associated with prenatal health-impairing behaviors and that multiparity ($\beta = 0.23$, $p = 0.001$) and “maternal role” of pregnancy stress ($\beta = 0.27$, $p = 0.003$) positively associated with prenatal health-impairing behaviors.

Conclusion: Health-impairing behaviors of pregnant AMA women need assessment and the importance of health-promoting behaviors for maternal and infant health need reinforcing. We recommend pregnancy stress assessments at prenatal checkups and stress relief interventions that consider cultural differences and contexts rather than standardized interventions.

KEYWORDS

advanced maternal age, health-impairing behavior, health-promoting behavior, pregnant women, psychosocial factors

1. Introduction

Women are delaying childbirth in advanced countries (1). In Korea, the average age of women giving birth was 32.6 years, the highest among Organization for Economic Cooperation and Development (OECD) countries in 2017 (2). Korean women aged 35 and older accounted for approximately 33.8% of all births in 2020 (3).

Poor pregnancy and childbirth outcomes, including gestational diabetes mellitus (GDM), gestational hypertensive disorders (GHDs), placenta previa, congenital malformations, miscarriage, stillbirth, premature birth, low birth weight, and postpartum hemorrhage, are common among pregnant women of advanced maternal age (AMA) (4–6). The rate of premature births and the incidence of low birth weights are on the rise in Korea (3). The increased proportion of pregnant women of AMA, and the resulting detrimental pregnancy and childbirth outcomes not only have a negative impact on maternal and child health but also contribute to personal and national economic losses because of increased healthcare costs; thus, management and support for pregnant women of AMA are required (7). Lin et al. (8) reported that pregnant women of AMA could avoid negative childbirth outcomes through management, such as proper diet and physical activity, and many studies have shown that prenatal health behaviors lead to healthy birth outcomes (9–11).

Therefore, it is necessary to explore which characteristics relate to the health behavior of pregnant women of AMA. However, most studies have focused on pregnant women of all ages, and studies on pregnant AMA women are limited. Pregnant AMA women perceived pregnancy as more threatening than young women did (12), and they tended to engage in healthier behaviors (13). Hence, applying the findings of studies on pregnant women of all ages to pregnant women of AMA can make understanding the factors influencing prenatal health behaviors difficult. Furthermore, compared with other countries, pregnant women in Korea are under a lot of social pressure, which is natural given their role as mothers to behave for the health of their fetus (14).

Previous studies have explored which factors relate to prenatal health behaviors. A meta-analysis study on pregnant women's health behavior reported age, employment, income, education, parity, maternal–fetal attachment, stress, depression, and social support as predictive factors (15). Based on this, we divided prenatal health behavior-related factors into demographic, obstetric, and psychosocial factors. As a demographic factor, the higher the level of education and income, the healthier the behaviors tended to be (16, 17). Obstetric characteristics, such as current conception type, gestational age, parity, and experience of abortion, also relate to prenatal health behavior: Pregnant women in the third trimester than those in the second trimester, and younger pregnant women than older pregnant women engaged in less healthy behaviors (13, 18). Meanwhile, some studies have considered psychosocial factors as they could otherwise enhance these components through interventions when compared with demographic and obstetric characteristics. According to previous research, psychosocial factors influence prenatal health behaviors: Pregnant women's elevated self-esteem levels, fetal attachment, and social support lead to more healthy behaviors, whereas high levels of depression and stress lower healthy behaviors (19–21).

Prenatal health behaviors are classified as either health-promoting (e.g., exercise, adequate sleep, and nutrition) or health-impairing behaviors (e.g., inappropriate physical activity, smoking, drinking alcohol, and caffeine intake). Health-promoting behaviors necessitate consistent efforts, whereas health-impairing behaviors are reactive to situations and mood; thus, factors influencing health-promoting and health-impairing behaviors may differ (22).

Accordingly, some previous research has identified psychosocial factors influencing both prenatal health-promoting behaviors (23, 24) and prenatal health-impairing behaviors (25). One study even simultaneously reported factors influencing prenatal health-promoting and health-impairing behaviors (26). These previous studies, however, have limitations. For example, they limited the measures of prenatal health-impairing behaviors to smoking and drinking while they limited prenatal health-promoting behaviors to physical activity and exercise. Therefore, the influencing factors should be identified by categorizing health behaviors, including nutrition and eating habits, physical activity, and exposure to hazardous substances, into prenatal health-promoting and health-impairing behaviors. Figure 1 shows the theoretical framework of this study.

This study aimed to determine the association between psychosocial factors and health-promoting and health-impairing behaviors in pregnant women of AMA in Korea. The findings of this study may aid in the development of interventions for prenatal health behavior reinforcement based on the psychosocial factors of pregnant women of AMA in Korea, where AMA rates are high.

2. Materials and methods

2.1. Design

This was a cross-sectional survey study design.

2.2. Sample

Participants in this study were women in low-risk pregnancies aged 35 years or older. The inclusion criteria applied to women who could comprehend and answer the questionnaires in Korean, whereas the exclusion criteria applied to women with multiple pregnancies (e.g., twin and triplet pregnancy) and pregnancy complications [e.g., gestational diabetes mellitus (GDM), gestational hypertensive disorders (GHDs), and placenta previa]. The criteria for calculating the sample size were a level of significance of 0.05, a power of 0.90, and an effect size of 0.15. The sample size was calculated as 202 people using the G*Power program 3.1.9.7 (27).

2.3. Data collection

Pregnant women of AMA enrolled in response to recruitment notices in online communities (Naver Cafe and Kakao Open Chatting, with the former being the most famous among community-type social network services, and the latter among open chatting platforms in Korea) of pregnant women and at local obstetrics clinics, implying convenience sampling. We gathered data online because the Internet and mobile penetration rates in Korea are very high, so anyone, regardless of education or income level, can easily access the online survey. Pregnant women keen on this study accessed the online survey platform, SurveyMonkey via QR code or Uniform Resource Locator (URL). They reviewed the information (the objective of the study and process of participation, disadvantages/risks and rewards for participation, a statement that the collected data will not be used for any intent other than the purpose of this study, and a statement that participants can quit at any time if they wish to discontinue participation), and

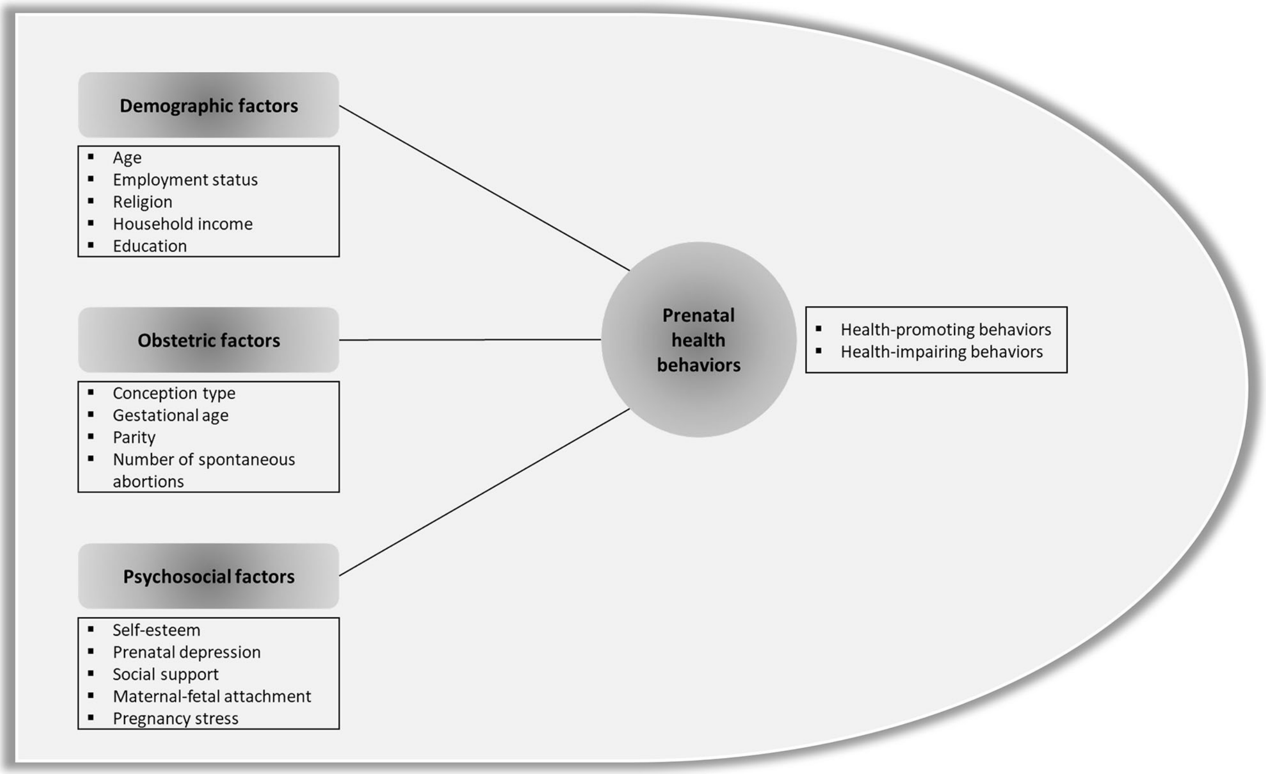

FIGURE 1
Theoretical framework.

then, they agreed to participate in this study. We screened and recruited participants who met the study's selection criteria by inquiring about their age, pregnancy complications, and multiple pregnancies. Additionally, we verified whether the respondent's mobile number to receive the mobile coupon as a reward was duplicated; whether the response time to complete the survey was too short; and whether the estimated day of confinement (EDC) matched gestational weeks. A total of 217 pregnant women volunteered to partake in the study between September and November 2020, but only 207 participants completed the self-report questionnaires via the online survey platform. Our online poll did not include any missing information.

2.4. Measures

2.4.1. Prenatal health behaviors

We assessed prenatal health-promoting behaviors and prenatal health-impairing behaviors using the Prenatal Health Behavior Scale (PHBS), including items on sleep, physical activity, nutrition, smoking, and alcohol consumption (28). Studies have validated this scale, originally designed for women in their mid- and late pregnancy, by applying it to women in the initial stages of pregnancy (29). The PHBS assesses health-promoting and health-impairing behavior on a five-point Likert-type scale (from 1 to 5) with 10 items each. The higher score for health-promoting behavior and the lower score for health-impairing behavior denote a higher degree of health behavior. Cronbach's alphas for the original PHBS were 0.75 and 0.59, respectively, for health-promoting and health-impairing behaviors (28). In an earlier study (30) that assessed 20 PHBS items in pregnant women at all pregnancy stages as in this research study, Cronbach's alphas were 0.72 and 0.55 for health-promoting and health-impairing behaviors, respectively. In this study, Cronbach's alphas were 0.76 for health-promoting and 0.70 for health-impairing behaviors.

2.4.2. Demographic and obstetric characteristics

According to research, general, and socioeconomic statuses (e.g., age, education, and income) relate to health behaviors (16, 17). Therefore, we gathered information about participants' age, employment status, religion, household income, and education. We also included the current conception type, gestational age, parity, and the number of spontaneous abortions, all of which link to health behaviors (13, 18, 30). Table 2 contains information on demographic and obstetric characteristics.

2.4.3. Psychosocial factors

We assessed self-esteem using the Rosenberg Self-esteem Scale (SES) (31). SES consists of 10 items, and a four-point Likert-type scale (from 1 to 4) measures the scores: the higher the score, the higher the self-esteem. Cronbach's alpha for internal consistency reliability of the original version of the SES was 0.85 (31), and it was 0.90, and 0.86 in the Korean version (32) and this study, respectively.

We evaluated prenatal depression using the Edinburgh Postpartum Depression Scale (EPDS) (33). EPDS includes common depressive symptoms related to pregnancies, and it is a viable tool during pregnancy (34); although no scale can examine depression during pregnancy (35), EPDS has been used to measure pregnancy-related depression in numerous kinds of research, including in Korea (36). EPDS comprises 10 items that a four-point Likert-type scale (from 1 to 4) evaluates, where a higher score indicates more severe depression. Cronbach's alpha for EPDS was 0.92 (33), and Cronbach's alphas for the Korean version (37) and this study were 0.85 and 0.82, respectively.

We assessed social support using the Multidimensional Scale of Perceived Social Support (MSPSS) (38) and the Spouse Supportive Behavior Scale (SSBS) (39). These scales were developed a long time ago, but numerous studies have used them as measures of social support until recently. MSPSS includes 12 items, including support from family, friends, and remarkable others. This study restricted family support to family members excluding spouses. As the spouse is intimate with a pregnant woman, we sought to distinguish them from other family members and accurately assess the spouse's support using SSBS. We used 10 items of SSBS, exempting the items of the spouse's supportive behaviors for physical convenience (e.g., "My husband comes home at the right time" and "My husband buys me comfortable clothes and shoes"), to identify the influence of psychosocial factors. We measured these two social support scales on a five-point Likert-type scale (from 1 to 5), with a higher score indicating more social support. Cronbach's alphas for original-version MSPSS (38) and the Korean version (40) were 0.88, and 0.90, respectively, and SSBS was 0.89 (39). This study determined them as 0.92 and 0.91.

We assessed maternal–fetal attachment using the Maternal–Fetal Attachment Scale (MFAS) (41). Although this scale is many years old, recent research still extensively uses the scale. MFAS comprises 24 items. We assessed MFAS on a five-point Likert-type scale (from 1 to 5), with a higher score indicating greater fetal attachment. Cronbach's alphas were 0.85, 0.92, and 0.89 for the original, the Korean version (42), and this study, respectively.

We assessed pregnancy stress using the Korean Pregnancy Stress Scale (PSS) (14). PSS includes 36 items split into seven dimensions: "physical and psychological changes (e.g., 'I have difficulty breathing')," "health of the mother and baby (e.g., 'I am worried about having an abnormal fetus')," "maternal role (e.g., 'Becoming a mother is a burden')," "family support (e.g., 'I am disappointed that my husband is indifferent to me')," "healthcare services (e.g., 'I have difficulty determining prenatal tests')," "social atmosphere (e.g., 'If my baby has some problems, our society seems to believe that the mother is the main cause')," and "coping in daily life (e.g., 'I eat a balanced diet')". We used 31 items and six dimensions of them in this study: "physical and psychological changes (eight items)," "health of the mother and baby (six items)," "maternal role (six items)," "family support (four items)," "healthcare services (three items)," "social atmosphere (four items)". The five excluded items were questionnaires that overlapped with health behavior scales or related to postpartum and childcare; three items of "coping in daily life"; "financial burden about postpartum care"; and "social atmosphere about childcare facility". PSS was calculated using a five-point Likert-type scale (from 1 to 5), with a higher score indicating greater stress. Cronbach's alphas for the original and this study were 0.85 (14) and 0.90, respectively.

2.5. Ethical considerations

Before participant enrollment and data collection, the institutional review board of the author's institution approved this research work (Korea University; No. KUIRB-2020-0244-03). The institutional review board waived the requirement of written informed consent for participation. All participants provided online informed consent, and we obtained the data only from those who voluntarily participated.

2.6. Data analysis

We evaluated data using the STATA 16.1 program and measured descriptive statistics for the demographic, obstetric, psychosocial variables, and prenatal health behaviors of samples. The *t*-test and analysis of variance confirmed the differences between pregnant AMA women's prenatal health-promoting and health-impairing behaviors on the basis of demographic, obstetric, and psychological characteristics. We used the Bonferroni method for the *post-hoc* test (43). Pearson's correlation analysis established the relationship between variables. Furthermore, we investigated the association between the factors and prenatal health behaviors using linear regression. We assessed multicollinearity by a variance inflation factor (VIF).

3. Results

3.1. Demographic, obstetric, and psychosocial characteristics

Table 1 summarizes the demographic, obstetric, and psychosocial characteristics. Most of them have bachelor's degrees. In terms of obstetric variables, more than three-quarters of the subjects had natural conception, and nearly half of them were in their third trimester. More than half of the women were nulliparous, and 62.32% did not have an abortion spontaneously. Among the psychosocial variables, the mean of self-esteem was 3.00 (*SD* 0.40) while the mean of prenatal depression was 1.76 (*SD* 0.42). Maternal–fetal attachment averaged 4.09 (*SD* 0.47). In terms of pregnancy stress, "social atmosphere" was the most significant (mean 3.84), while "family support" was the lowest (mean 1.91). Prenatal health-promoting behaviors averaged 3.50 (global score: 62.5), while health-impairing behaviors averaged 2.18 (global score: 29.5).

TABLE 1 Demographic, obstetric, and psychosocial characteristics of participants ($N = 207$).

Variables		*n*	%	M *(SD)*	Range
Age (years)	35–39	189	91.30	36.72 (1.94)	35–44
	Above 40	18	8.70		
Employment status	In office	80	38.65		
	Leave	37	17.87		
	Resignation	44	21.26		
	Never employed	46	22.22		
Religion	Buddhism	93	44.93		
	Christianity	20	9.66		
	Catholics	69	33.33		
	Nothingarian	25	12.08		
Monthly household income ($*)	Below 2,000	9	4.35		
	2,000∼4,000	70	33.82		
	4,000∼6,000	62	29.95		
	6,000∼8,000	35	16.91		
	Above 8,000	31	14.97		
Education	High school	8	3.87		
	College (Associate degree)	27	13.04		
	University (Bachelor's degree)	123	59.42		
	Graduate (Master's and Doctoral degree)	49	23.67		
Conception type	Natural	160	77.29		
	Artificial	47	22.71		
Gestational age (days)	1st trimester (-97)	36	17.40	173.85 (70.22)	32–275
	2nd trimester (98–195)	76	36.71		
	3rd trimester (196-)	95	45.89		
Parity	Nulliparous (0)	142	68.60	0.39 (0.63)	0–3
	Multiparous (≥1)	65	31.40		
Spontaneous abortions	0	129	62.32	0.55 (0.85)	0–5
	1–2	70	33.82		
	≥3	8	3.86		
Self-esteem				3.00 (0.40)	1.6–4
Prenatal depression				1.76 (0.42)	1–2.8
Social support	Support of spouse			4.10 (0.62)	1.3–5
	Support of family			4.22 (0.74)	1–5
	Support of friends			3.74 (0.82)	1–5
	Support of significant others			3.36 (1.14)	1–5
Maternal-fetal attachment				4.09 (0.47)	2.7–5
Pregnancy stress				3.02 (0.57)	1.7–4.5
	PSS 1			3.56 (0.70)	1.5–5
	PSS 2			3.13 (1.07)	1–5
	PSS 3			2.68 (0.94)	1–5
	PSS 4			1.91 (0.77)	1–4.8
	PSS 5			2.37 (0.94)	1–5
	PSS 6			3.84 (0.69)	2–5
Prenatal health-promoting behavior				3.50 (0.58)	1.3–4.8
Prenatal health-impairing behavior				2.18 (0.48)	1–4.4

*1$ = 1,000 Won (Korean), PSS 1, physical and psychological changes; PSS 2, health of the mother and baby; PSS 3, maternal role; PSS 4, family support; PSS 5, healthcare services; PSS 6, social atmosphere.

3.2. Prenatal health behavior according to demographic, obstetric, and psychosocial characteristics

Table 2 shows the prenatal health behavior according to demographic, obstetric, and psychosocial characteristics. In demographic and obstetric variables, education ($F = 4.57$, $p = 0.004$), parity ($t = 6.92$, $p = 0.009$), and the number of spontaneous abortions ($t = 3.40$, $p = 0.035$) were significantly different in prenatal health-promoting behaviors. Meanwhile, conception type ($t = 12.96$, $p < 0.001$) and parity ($t = 13.61$, $p < 0.001$) differed significantly in prenatal health-impairing behaviors. A *post-hoc* analysis was performed using the Bonferroni method. Statistically different demographic and obstetric variables were used to adjust the regression model.

In psychosocial variables, prenatal health-promoting behaviors significantly positively linked to self-esteem ($r = 0.28$, $p = 0.001$), prenatal depression ($r = 0.20$, $p = 0.003$), support of spouse ($r = 0.18$, $p = 0.009$), support of family ($r = 0.14$, $p = 0.047$), support of friends ($r = 0.17$, $p = 0.016$), support of significant others ($r = 0.16$, $p = 0.022$), and maternal–fetal attachment ($r = 0.44$). Furthermore, prenatal depression ($r =-0.20$, $p = 0.003$) significantly negatively linked to prenatal health-promoting behaviors. Among pregnancy stressors, "maternal role" ($r = -0.17$, $p = 0.048$) and "family support" ($r = -0.15$, $p = 0.028$) significantly negatively linked to prenatal health-promoting behaviors. Furthermore, prenatal health-promoting behaviors positively linked to the social environment ($r = 0.16$, $p = 0.025$).

Prenatal health-impairing behaviors significantly positively associated with prenatal depression ($r = 0.27$, $p < 0.001$). However, there was a positive relationship between prenatal health-impairing behaviors and self-esteem ($r = -0.21$, $p = 0.002$), spouse support

TABLE 2 Prenatal health behavior according to demographic, obstetric, and psychosocial variables ($N = 207$).

Variables		Prenatal health-promoting behavior				Prenatal health-impairing behavior			
		M ± SD	t/F	r	p	M ± SD	t/F	r	p
Age				0.00	0.956			−0.13	0.062
Employment status	In-office	3.4 ± 0.6	0.22		0.886	2.2 ± 0.5	0.22		0.886
	Leave	3.5 ± 0.6				2.2 ± 0.6			
	Resignation	3.5 ± 0.6				2.2 ± 0.5			
	Never employed	3.6 ± 0.5				2.1 ± 0.4			
Religion	Buddhism	3.4 ± 0.6	1.55		0.203	2.2 ± 0.5	1.55		0.203
	Christianity	3.4 ± 0.6				2.3 ± 0.6			
	Catholics	3.6 ± 0.5				2.1 ± 0.5			
	Nothingarian	3.6 ± 0.5				2.2 ± 0.4			
Monthly household income ($*)	Below 2,000	3.8 ± 0.6	1.17		0.326	1.9 ± 0.5	1.17		0.326
	2,000~4,000	3.5 ± 0.7				2.2 ± 0.5			
	4,000~6,000	3.4 ± 0.6				2.2 ± 0.4			
	6,000~8,000	3.5 ± 0.5				2.1 ± 0.4			
	Above 8,000	3.6 ± 0.4				2.2 ± 0.4			
Education†	High school^{a}	3.2 ± 0.5	4.57 b < d c < d		0.004**	2.0 ± 0.3	1.52		0.211
	College^{b}	3.3 ± 0.6				2.2 ± 0.5			
	University^{c}	3.5 ± 0.6				2.2 ± 0.5			
	Graduate^{d}	3.7 ± 0.5				2.1 ± 0.5			
Current conception type	Natural	3.5 ± 0.6	0.35		0.552	2.2 ± 0.5	12.96		<0.001**
	Artificial	3.5 ± 0.7				2.0 ± 0.5			
Gestational age	1st trimester	3.5 ± 0.7	2.43		0.091	2.1 ± 0.5	1.31		0.271
	2nd trimester	3.6 ± 0.5				2.2 ± 0.5			
	3rd trimester	3.4 ± 0.6				2.2 ± 0.5			
Parity	Nulliparous	3.6 ± 0.6	6.92		0.009**	2.1 ± 0.4	13.61		<0.001**
	Multiparous	3.3 ± 0.6				2.4 ± 0.5			
Number of spontaneous abortion†	0^{a}	3.6 ± 0.6	3.40 b < a		0.035*	2.1 ± 0.4	1.32		0.269
	1–2^{b}	3.4 ± 0.5				2.3 ± 0.5			
	3+^{c}	3.5 ± 0.6				2.2 ± 0.5			
Self-esteem				0.28	<0.001**			−0.21	0.002**
Prenatal depression				−0.20	0.003**			0.27	<0.001**
Social support	Support of spouse			0.18	0.009**			−0.24	<0.001**
	Support of family			0.14	0.047*			−0.04	0.550
	Support of friends			0.17	0.016*			−0.04	0.580
	Support of significant others			0.16	0.022*			0.00	0.996
	Maternal-fetal attachment			0.44	<0.001**			−0.20	0.004**
Pregnancy stress	PSS 1			−0.13	0.157			0.26	<0.001**
	PSS 2			−0.10	0.157			0.24	<0.001**
	PSS 3			−0.17	0.048*			0.36	<0.001**

(Continued)

TABLE 2 (Continued)

Variables		Prenatal health-promoting behavior				Prenatal health-impairing behavior			
		M ± SD	t/F	r	*p*	M ± SD	t/F	r	*p*
	PSS 4			−0.15	0.028*			0.34	<0.001**
	PSS 5			−0.07	0.291			0.20	0.003**
	PSS 6			0.16	0.025*			0.06	0.407

1$ = 1,000 Won (Korean), PSS 1, physical and psychological changes; PSS 2, health of the mother and baby; PSS 3, maternal role; PSS 4, family support; PSS 5, healthcare services; PSS 6, social atmosphere; $^*p < 0.05$, $^{**}p < 0.01$. †The a, b, c, and d are indicated for the *post-hoc* test results. The following right cell included the *post-hoc* test results.

TABLE 3 Linear regression analysis summary for psychosocial factors associated with prenatal health-promoting behavior ($N = 207$).

Variables		β Estimate	SE	*p*
Self-esteem		0.17	0.13	0.057
Prenatal depression		−0.06	0.12	0.521
Social support	Support of spouse	−0.04	0.10	0.723
	Support of family	−0.04	0.06	0.616
	Support of friends	−0.06	0.06	0.483
Support of significant others		0.00	0.04	0.965
Maternal-fetal attachment		0.43	0.09	<0.001**
Pregnancy stress	PSS 3	0.08	0.05	0.375
	PSS 4	0.04	0.08	0.719
	PSS 6	0.13	0.06	0.047*

Adjusted for education, parity, and spontaneous abortions. PSS 3, maternal role; PSS 4, family support; PSS 6, social atmosphere. $R^2 = 0.30$, adj $R^2 = 0.24$; $^*p < 0.05$, $^{**}p < 0.01$.

TABLE 4 Linear regression analysis summary for psychosocial factors associated with prenatal health-impairing behavior ($N = 207$).

Variables		β Estimate	SE	*p*
Self-esteem		0.02	0.10	0.809
Prenatal depression		0.01	0.11	0.937
Social support	Support of spouse	0.04	0.08	0.712
Maternal-fetal attachment		0.02	0.08	0.757
Pregnancy stress	PSS 1	0.01	0.05	0.936
	PSS 2	0.12	0.03	0.117
	PSS 3	0.27	0.05	0.003**
	PSS 4	0.15	0.07	0.159
	PSS 5	0.00	0.04	0.952

Adjusted for current conception type and parity. PSS 1, physical and psychological changes; PSS 2, health of the mother and baby; PSS 3, maternal role; PSS 4, family support; PSS 5, healthcare services. $R^2 = 0.26$, adj $R^2 = 0.22$; $^{**}p < 0.01$.

($r = -0.24$, $p < 0.001$), and maternal–fetal attachment ($r = -0.20$, $p = 0.004$). Furthermore, in pregnancy stress, "physical and psychological change" ($r = 0.26$, $p < 0.001$), "health of the mother and baby" ($r = 0.24$, $p < 0.001$), "maternal role" ($r = 0.36$, $p < 0.001$), "family support" ($r = 0.34$, $p < 0.001$), and "healthcare services" ($r = 0.20$, $p = 0.003$) significantly positively associated with prenatal health-impairing behaviors.

3.3. Factors associated with prenatal health behaviors

Table 3 shows the factors significantly associated with prenatal health-promoting behaviors. We adjusted demographic and obstetric variables, including education, parity, and spontaneous abortions. Psychosocial factors explained prenatal health-promoting behaviors, adjusted $R^2 = 0.24$, F (degree of freedom) $= 5.09$, $p < 0.001$. Maternal–fetal attachment ($\beta = 0.43$, $p < 0.001$) and "social atmosphere" of pregnancy stress ($\beta = 0.13$, $p = 0.047$) significantly associated with prenatal health-promoting behaviors. The variance inflation factors (VIFs) ranged from 1.17 to 7.18.

Table 4 shows the factors associated with prenatal health-impairing behaviors. We adjusted obstetric variables, including current conception type and parity. Psychosocial factors explained prenatal health-impairing behaviors, adjusted $R^2 = 0.22$, F (degree of freedom) $= 6.28$, $p < 0.001$. Artificial conception ($\beta = -0.16$, $p = 0.011$), multipara ($\beta = 0.23$, $p = 0.001$), and "maternal role" of pregnancy stress ($\beta = 0.27$, $p = 0.003$) significantly associated with prenatal health-impairing behaviors. The VIF was 1.08–3.09.

4. Discussion

Given that Korea has the highest mean age of women at childbirth among the OECD countries, this study was conducted on Korean pregnant women of AMA. This study is also one of the first to examine the influence of demographic, obstetric, and psychosocial factors on health behaviors in pregnant women of AMA by distinguishing health-promoting behaviors and health-impairing behaviors. As a result, the significant variables that were associated with health-promoting behaviors were maternal–fetal attachment and "social atmosphere" of pregnancy stress, whereas conception type, parity, and "maternal role" of pregnancy stress were significantly associated with health-impairing behaviors.

The global score means of prenatal health-promoting and health-impairing behaviors in this study were 62.5 and 29.5, respectively, and in the study using the same tool, they were 62.3 and 25.5, respectively (30). This study demonstrated slightly higher health-promoting behaviors than Pope et al. (30) did, thought to be because older pregnant women engaged in healthier behaviors than younger women did. The mean age of the sample of this study and that of the previous one was 36.72 years and

32.38 years, respectively. Meanwhile, we found health-impairing behaviors to be more prevalent but found behaviors that seriously harm maternal and fetal health, such as drinking and smoking, to be less prevalent. It may influence the cultural diversity of the health behaviors of pregnant women. In addition, cultural differences may affect the internal consistency of health behaviors. Yet, Cronbach's alpha is higher in this study than it is in others. In an earlier study with the same measurement but different item numbers (29), Cronbach's alphas for health-promoting and health-impairing behaviors were 0.93 and 0.93, respectively.

There were no demographic factors that significantly influenced prenatal health-promoting and health-impairing behaviors. However, education levels demonstrated a significant difference in prenatal health-promoting behaviors. In this study, a majority of the sample had high education levels (college, 13.0%; university, 59.4%; and graduate, 23.7%). Researchers assume Korean young adults have the highest level of education among OECD countries (44), and highly educated women frequently postpone marriage and pregnancy in favor of their careers. Generally, we believe that the more educated the people, the healthier their behaviors. Furthermore, pregnant women with a high level of education may engage in more healthy behaviors because they have a higher socioeconomic status and are more knowledgeable about prenatal health than those with a lower level of education would be.

This study found no significant obstetric factors influencing prenatal health-promoting behaviors, but current conception type and parity had a significant impact on prenatal health-impairing behaviors. First, women who had artificial conception are less likely to engage in health-impairing behaviors than women who had natural conception. Women who became pregnant using assisted reproductive technology experienced fear and anxiety about possible fetal loss (45). Thus, it is a belief that pregnant women with artificial conception avoid health-impairing behaviors for the safety of their fetus and the maintenance of pregnancy. Furthermore, pregnant AMA women may engage in more protective behaviors to maintain pregnancy than younger women might, given that reproductive functions and fertility decline with age. According to the findings, pregnant women with artificial conception require encouragement and support to avoid engaging in risky behaviors, as well as relief from anxiety about miscarriage and fetal health. Second, multiparous pregnant women engaged in more unhealthy behaviors than nulliparous women did. Nulliparous pregnant women are generally more anxious than multiparous pregnant women (46). Furthermore, primigravidas at AMA are more likely to engage in health-promoting behaviors than younger primigravidas (47). Thus, multiparous women may be less conscious of the risk of health-impairing behaviors during pregnancy because they have already undergone pregnancy and childbirth, and possibly, they gave birth at a younger age. Pregnant women with childbirth experience need emphasizing that they should avoid compromising their health even if they have previously experienced pregnancy and childbirth because the risk of pregnancy complications increases with maternal age.

Pregnant women with high fetal attachment exhibited more health-promoting behaviors than those with low fetal attachment according to this study's analysis of psychosocial factors. Likewise, a meta-analysis reported that maternal–fetal attachment is a strong predictor of prenatal health behavior (15). However, earlier research (48, 49) revealed that prenatal attachment influences health-impairing behaviors, such as smoking, in contrast to the findings of this study, which did not demonstrate a significant effect of fetal attachment on health-impairing behaviors. However, it was only "giving of self," a subscale of fetal attachment, and not the total fetal attachment score. It might be because pregnant women who have a high fetal attachment rate tend to engage in more vigorous prenatal health-promoting behaviors than prenatal health-impairing ones. Fetal attachment has a positive effect on health behaviors and ultimately, fetal health (50); thus, nurses can provide much-needed interventions to enhance maternal–fetal attachment by recognizing the fetus as an entity and strengthening the relationships and interactions with the fetus in pregnant women of AMA.

Stress during pregnancy was another important component as it had an impact on both prenatal health-promoting behaviors and health-impairing behaviors. "Social atmosphere," the social context of motherhood and childcare, induced more stress, which was related to a greater practice of health-promoting behaviors. On the other hand, the maternal role involved more stress, associated with a higher practice of health-impairing behaviors. These contradictory findings, which depend on the factors causing pregnancy stress, are brought on by the pervasive social belief that women in Korean society are in charge of raising children (51). Women are under social pressure that, as mothers, they must devote their time and effort to childcare; they are also afraid of social judgments comparing themselves with other mothers (52). In particular, Koreans are extremely sensitive to the opinions of people around them and their social views of them (53). As a result, peer pressure may motivate expectant mothers to maintain their healthy behaviors. In contrast, this societal pressure can lead to undue stress by parental duties and make expectant mothers feel powerless and burdened, which can result in behaviors that harm their health. Therefore, pregnant women of AMA need interventions for lowering pregnancy stress related to the mother's role.

4.1. Implications

On the basis of these results, we propose three implication points for practice and policy. First, it is necessary to assess the status of stress during pregnancy. In pregnant women of AMA, pregnancy stress affects both health-promoting and health-impairing behaviors. In Korea, public health centers screen for prenatal depression and link it to intervention programs because of the emphasis on the significance of mental health; however, they do not assess for prenatal stress. Thus, it is important to assess pregnancy stress, one aspect of mental health, and to employ stress reduction strategies as appropriate. Second, we should consider cultural differences when developing prenatal health promotion programs. Contrary to earlier research that claimed that more stress led to poorer health behavior, pregnant women of AMA engaged in more health-promoting activities because of higher pregnancy stress related to the social atmosphere.

The outcome could be a reflection of Korean culture and social norms, which strongly encourage pregnant women to adhere to prenatal health behavior recommendations. Thus, it is important to take cultural variations into account rather than universally applying the findings to all nations. Third, in the contents of the health behavior promoting program for pregnant women of AMA, it is suggested to consider not only emphasizing the necessity and method of prenatal health behaviors but also enhancing fetal attachment by providing an opportunity to interact with the fetus. Fourth, childbirth experiences, among adjusted obstetric variables, warrant consideration in developing health promotion programs for pregnant women. In this study, multiparous women tend to do prenatal health-impairing behaviors more than nulliparous women do. As a result, multiparous pregnant women require monitoring for unhealthy habits, and the program should highlight the significance of health-promoting activities.

4.2. Limitations

This study has some limitations. First, this study has a cross-sectional study design; thus, identifying the causal relationships between variables through data analysis was difficult. Additionally, it was unable to obtain data on pre-pregnancy health practices. Second, this study needs consideration when generalizing and applying the data to a country. Researchers must consider each country's cultural traits while implementing our study's findings. Third, we used an online survey to alleviate the drawbacks of convenience sampling; nonetheless, as Internet surveys are unable to contain representative samples, a type 1 error may have occurred. Future research will need to conduct a nationwide survey with systematic sampling in order to obtain an accurate population representation. Finally, we were unable to account for all confounding variables, such as pre-pregnancy health behaviors, including, smoking, alcohol consumption, exercise, and diet.

5. Conclusion

This study extracted the factors affecting the health behaviors of pregnant women of AMA. Maternal–fetal attachment, and stress induced by social atmospheres, such as expectations for motherhood and childcare, influenced prenatal health-promoting behaviors. Whereas the current conception type, parity, and maternal role stress influenced prenatal health-impairing behaviors. We discussed the implications in light of these findings and considered childbirth experience and cultural variations while creating health promotion initiatives for expectant mothers. Additionally, it is important to monitor pregnancy stress levels. These recommendations can help create plans for healthy behavior in pregnant women of AMA.

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 Korea University Institutional Review Board. The Ethics Committee waived the requirement of written informed consent for participation.

Author contributions

SJ conceptualized and designed the study, collected data, contributed to analyses, and wrote the manuscript. WN conceptualized the study, analyzed the data, critically discussed the results, and wrote the manuscript. All authors contributed to the manuscript revision and reading and approved the submitted version.

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Conflict of interest

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

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Development and psychometric validation of the Colorectal Cancer Literacy Scale—Uruguay Version

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Colorectal cancer is a leading cause of cancer death in Uruguay, yet less than half of the eligible population is up to date with screenings. Research is hampered because no measures exist to assess psychosocial factors that influence screening decisions in this population. To address this gap, we report on the development and psychometric validation of the Colorectal Cancer Literacy Scale—Uruguay Version, a scale based on the health literacy model. We developed an item pool based on the extant literature, obtained feedback from experts, and conducted focus groups with community participants and health care providers. After revision, we conducted a psychometric validation with a national community sample of 405 participants. Through an exploratory factor analysis, we identified four factors that were collapsed into two for theoretical and pragmatic reasons, representing (a) disposition toward cancer prevention and (b) attitudes, beliefs, and emotions about cancer. A third factor, knowledge about colorectal cancer, was examined separately given its distinct focus. Subsequently, we conducted a confirmatory factor analysis with the remaining sample participants using Rasch measurement theory for validation purposes and to further assess the scales' psychometric properties. The resulting 44-item scale presented a good model fit with adequate EAP reliabilities and good initial discriminant validity. Further criterion-related validity analyses should be performed when additional measures are available. The Colorectal Cancer Literacy Scale—Uruguay Version is a theoretically based measure that can bring to light barriers and facilitative factors in an underscreened population at risk. Implications for theory, research, and practice are discussed.

KEYWORDS

health literacy, psycho-oncology, Latin America, cancer control, scale development

Introduction

Colorectal cancer (CRC) is a leading cause of cancer burden among men and women, with approximately 2 million people diagnosed per year worldwide (1). This is a critical public health issue, given that CRC can be prevented through routine screening (2). Importantly, as individuals adopt lifestyle behaviors that enhance cancer risk (e.g., low-fiber diet, sedentarism), incidence and mortality rates are increasing in populations under the age of 50 (3, 4).

Uruguay, with a growing economy and with one of the most stable democracies in the Americas (5), shares globalization trends related to diet and lifestyle, yielding negative public health outcomes. Specifically, among cancers, CRC is a significant concern in Uruguay—its incidence and mortality rates are consistently ranked among the highest in the Americas (6). In Uruguay, across all cancers, CRC incidence and mortality rates rank second-highest for women (25.53 and 11.89 per 100,000, respectively) and third-highest for men (37.12 and 18.48 per 100,000, respectively (7). In addition, mirroring global trends, rates are on the rise for individuals under 50 years of age (8). These statistics are particularly concerning because through routine fecal occult blood tests (FOBT), it is possible to detect precancerous lesions and malignant tumors at early stages, when survival rates are highest (9). However, due in part to low screening rates (which, in turn, lead to late detection), morbidity and mortality remains high in the population.

Only 42% of Uruguayans between the ages of 50 and 64 have obtained the FOBT, despite the fact that the Ministry of Public Health recommends biennial FOBT screening for individuals 50–74 years of age (10). The fact that over half of eligible patients is not screening is a public health issue in need of attention. Moreover, given that the Uruguayan health care system has a public safety net (11, 12), the FOBT can be obtained, generally, for low cost. Thus, it is critically important to understand possible additional deterrents to screening. Psychosocial factors are likely to play a prominent role in individuals' decisions not to engage in preventive behaviors, yet there are no measures available to assess these risk factors. To fill this research gap, the goals of the current study were to (a) develop a scale that would measure psychosocial influences on CRC screening behaviors in Uruguay, and (b) conduct a national study to assess the scale's psychometric properties. With information about psychosocial determinants of CRC screening, interventions may be designed to effectively promote early detection, optimize public health resources, and lower the large financial burden of comorbid conditions and premature deaths due to CRC.

Conceptual framework

Research suggests that psychosocial factors affecting CRC screening may be nonmodifiable, such as SES and formal educational attainment (13), or modifiable, which are of special interest to health service providers. Modifiable factors include dietary and lifestyle patterns (14) as well as knowledge, beliefs, attitudes, and emotions about cancer and screening (15). The latter are amenable to intervention and are the focus of the current study.

A fitting conceptual framework to examine modifiable factors that influence screening uptake is health literacy. Defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (16), individual health literacy is theorized to promote taking an active role in one's health. In fact, there is documented evidence of an association between health literacy and CRC screening [e.g., (17–19)]. In an investigation conducted as part of the English Longitudinal Study of Aging, individuals with higher levels of health literacy had 20% greater odds of participating in a national CRC screening program than those with lower health literacy levels (20). Similarly, other national and international studies have reported links between inadequate health literacy and greater barriers to, and lower rates of, CRC screening [e.g., (18, 21–23)]. Several mechanisms may underlie health literacy's influence on health outcomes. For example, individuals with low health literacy have reported (a) greater barriers related to seeking and reading health-related information, and (b) lower CRC screening self-efficacy (24). Given these empirical associations, we set out to extend knowledge about psychosocial factors that influence CRC uptake in Uruguay based on a health literacy framework.

Health literacy is a complex construct that encompasses several components, namely print and oral literacy, numeracy, and cultural and conceptual knowledge. The latter represents the filter through which individuals obtain, process, and understand health information and options for diagnosis and treatment (25). Factors that compose cultural and conceptual knowledge include knowledge, beliefs, attitudes, and emotions (26). Data on these factors are needed as a foundation for the design of effective interventions and to influence policy [e.g., (27, 28)]. Based on the health literacy model, cultural and conceptual factors are posited to "reside" in the individual, yet they develop and interact within various larger contexts including culture and society, the health care system, and the educational system—which, in turn, are considered points of intervention (25, 27).

A growing evidence base suggests that aspects of cultural and conceptual knowledge, specifically, are related to cancer screening behaviors (23, 26, 29, 30). Despite evidence of this link, as well as Uruguayans' higher risk for CRC, we could not identify any studies on CRC health literacy conducted in Uruguay. A handful of studies published on CRC have focused on the influence of diet or genetic profiles on incidence rates [e.g., (31, 32)]. The limited literature base focused on psychosocial factors precludes empirical advances in this critical area.

Therefore, given the importance of assessing cultural and conceptual knowledge and its influence on CRC screening in Uruguay, a psychometrically valid scale is needed. In this effort, we developed the Colorectal Cancer Literacy Scale–Uruguay Version (CCLS–U), a new tool to assess cultural and conceptual knowledge related to CRC screening behaviors in Uruguay. In this article, we report on the process of scale development and present psychometric data from a national validation study. We begin with a review of the extant literature on factors that influence CRC screening in United States and international samples.

Psychosocial factors that influence CRC screening

Studies focused on Latinx, non-Latinx Whites and other Black, Indigenous, and People of Color in the United States have identified numerous factors that negatively influence screening rates: (a) low health literacy [e.g., (33)]; (b) limited knowledge about CRC and the purpose of cancer screening tests [e.g., (33, 34)]; (c) beliefs about the health care system, including lack of confidence in the system and mistrust of individual providers [e.g., (33)]; (d) negative attitudes, such as pessimistic attitudes about CRC survival (34, 35); (e) negative beliefs about CRC screening [e.g., (15, 33-35)]; (f) lack of recommendation from the primary care physician (34, 35); and (g) system-level barriers such as cost, medical insurance, and transportation (15, 34). In international studies, low knowledge emerged as a key barrier to screening in Singapore (36, 37), and positive attitudes about the FOBT was identified as a facilitative factor in Spain (38).

Within Latin America, in Argentina, an adjoining country that shares sociocultural characteristics with Uruguay, 87% of patients with health insurance indicated that they would not obtain a CRC screening unless their doctor recommended it (39). Consistent with previous studies, participants with more favorable attitudes toward doctors reported higher screening rates. Also in Argentina, findings from a national sample showed a widespread lack of knowledge about CRC, its symptoms, methods of early detection, and treatment (40). Next, we describe the process of developing the CCLS-U.

Materials and methods

Item development: measuring cultural and conceptual knowledge related to CRC

For the present study, we conducted a literature review to inform the content of items related to knowledge, beliefs, attitudes, and emotions related to CRC. The CCLS–U was modeled after an existing scale designed to measure cultural and conceptual knowledge with respect to breast and cervical cancer in Uruguayan women (41). An initial draft was developed in English, subsequently translated to Spanish using the back-translation method. To create an initial pool of items, we sought to tap each critical aspect relevant to CRC, avoiding item constriction (42). Thus, we first identified potential factors influencing CRC screening behavior for the general population, followed by influences among Latinos in particular. We then adapted or developed items to further explore these potential determinants of screening behavior among the Uruguayan population. We also drew from the extensive knowledge of researchers and staff at the Comisión Honoraria de Lucha Contra el Cáncer, a public health organization that had conducted a national CRC health promotion campaign. Consistent with previous scale development studies in the area of cancer [e.g., (43)] and experts' recommendations for scale development (44), we followed a mixed-methods approach and subsequently conducted focus groups to ensure drafted items covered a broad and representative item pool that would tap the full range of the latent construct. Figure 1 provides an overview of the scale development process.

Item validation and cognitive debriefing: focus groups

Once the draft of the CCLS–U was developed, we conducted separate focus groups with a community sample of men ($n = 10$) and women ($n = 9$), and a mixed-gender sample of health care providers ($n = 7$), all of whom provided feedback on the scale. An exclusion criterion was having a personal history of CRC, as cancer survivors are likely to have different perceptions and needs than those without a diagnosis. The group interviews, which were held in Montevideo, Uruguay, in a private conference room with refreshments, were conducted in Spanish and lasted 90–120 min. We did not provide compensation for participation in the study. Informed consent was not required for this phase of the study, as participants were only asked to provide feedback on scale items.

Community sample

Participants were identified through community gatekeepers known to the staff of the Comisión Honoraria de Lucha Contra el Cáncer. Our goal was to recruit participants who represented a range of ages and formal education levels. On average, participants were 60 years old (*SD* = 7.85; *range*: 45–77 years) and had 15 years of formal education (*SD* = 2.80; *range*: 10–21).

Initially, we asked participants to read the scale draft and make written comments or highlight areas that were confusing or irrelevant to their experience. We then used an interview guide to facilitate a discussion about all items, inviting the participants to suggest revisions or additions based on their previous observations. Based on results from these focus groups, minor edits were made to the survey. For the demographic questions, we (a) added choices to certain items to reflect the national context with respect to health insurance and income options (e.g., we added two options related to health insurance providers), and (b) ensured that information sources mentioned by the participants were reflected among possible responses. In addition, we made one edit to an item measuring cultural and conceptual knowledge to separate one double-barreled question into two items.

Health professionals sample

We also obtained feedback from seven health care providers including three oncologists, two gastroenterologists, one endoscopy assistant, and an oncology nurse with expertise in CRC. We followed a similar procedure for this group, first inviting them to comment on the clarity and relevance of the items. We then asked them to propose additions related to any aspects of knowledge, beliefs, attitudes, and emotions based on observations from their medical practice. We combined their feedback with that obtained from nine public health professionals with expertise in the development of national cancer prevention campaigns in Uruguay, and made the following additional refinements to the demographic questions and scale items: (a) we rephrased three words to conform to linguistic usage in Uruguay (e.g., we changed "*colonoscopía*" to "*fibrocolonoscopía*"), (b) we revised response options for several items to conform to the sociocultural context in Uruguay (e.g., we added "Eating grilled red meat with charred fat" as a risk factor for CRC), (c) we added three items to reflect behaviors and beliefs related to cancer and CRC screening (e.g., "How important is it to get a colonoscopy if the doctor recommended it?"), (d) we changed some words to make the meaning more precise (e.g., we changed the word "mass" to "polyp"), and (e) we disaggregated a double-barreled question into two items. The final version of the CCLS–U comprised 69 items. We subsequently conducted a large-scale, national validation of the measure with a community sample.

Participants

A total of 405 participants were recruited in community settings in five regions of the country (*departamentos*) akin to five US states: Colonia, Durazno, Lavalleja, Montevideo, and Rivera. We selected these *departamentos* due to their prominence in Uruguay, the fact that they represent various geographic regions of the country (i.e., Central, East, North, and South), as well as urban and rural settings. Inclusion criteria were: (a) born in Uruguay or having immigrated to Uruguay before the age of 11, (b) 50–74 years of age, and (c) no previous CRC diagnosis. The rationale for the inclusion criteria is as follows: we wanted to recruit participants who relied on the

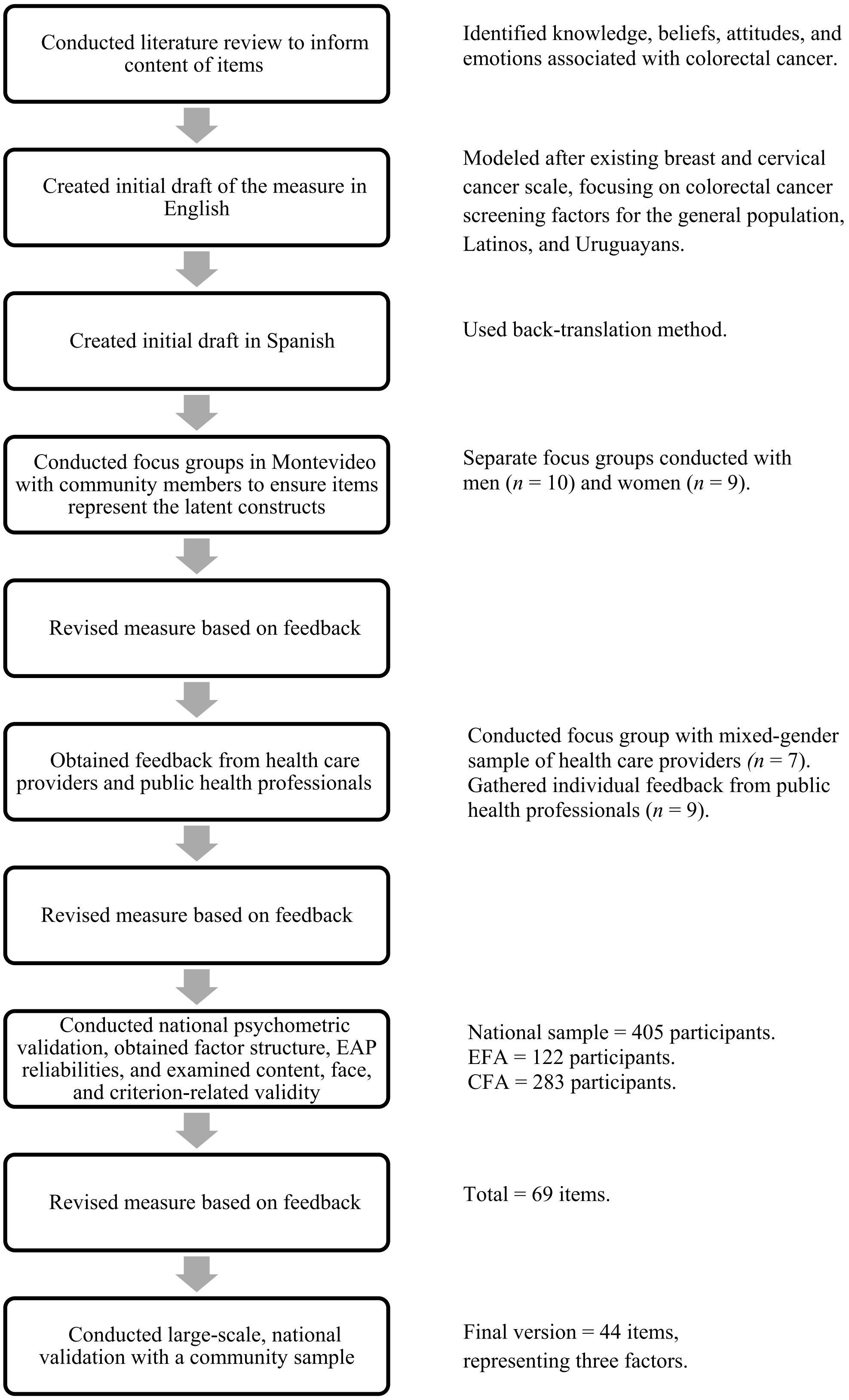

FIGURE 1
Overview of the scale development process.

Uruguayan health care system and had a long history of exposure to cultural health beliefs in Uruguay. The age range mirrored the ages at which participants needed to screen per national guidelines, and individuals who had been diagnosed with cancer were not included due to their unique communication and knowledge needs.

Of the 405 participants, 80 were recruited in Colonia (41 women, 39 men), 81 in Durazno (42 women, 39 men), 80 in Lavalleja (40 women, 40 men), 80 in Montevideo (40 women, 40 men), and 84 in Rivera (43 women, 41 men). Participants were, on average, 60 years old (*SD* = 7; range: 50–74 years). Men and women exhibited diverse demographic characteristics. A little more than a third (37%) were no longer in the workforce. Formal education levels ranged from 0 to 29 years (*M* = 11.16; *SD* = 4.46; *Mdn* = 11.00). Annual household incomes ranged from 72,000 to 11,640,000 pesos (approximately $2,087–$337,391 USD; *Mdn* = $480,000 pesos). After taking out four outliers on the upper end of the distribution, participants' incomes ranged from 72,000 to 1,800,000 pesos (approximately $2,087–$52,174 USD; *M* = 559,904.04 pesos; *SD* = 346,354.56 pesos). Most participants were married (53%), cohabiting (11%), or divorced (17%). About two-thirds of participants were members of a *mutualista* (a nonprofit health insurance network with a broad range of benefits, similar to an HMO in the United States) and a third were members of *ASSE* (a network of medical services provided by the government's public health system). Approximately two-thirds of participants (68%) had ever obtained an FOBT. Because the survey was administered verbally, there was only one missing data point for one participant.

Measures

Background questionnaire

A background questionnaire included 10 demographic questions to gather information such as age, gender, level of formal education, marital status, type of health insurance, household income, and occupational status. In addition, it included 13 questions related, specifically, to CRC. For example, items asked whether the participant's insurance covers the FOBT, whether they have a family history of CRC, whether they have ever attended a workshop on the importance of cancer screening, and their awareness about the colonoscopy exam.

CCLM–U

The measure, which has 69 items, measures knowledge (33 items; e.g., "A symptom of colorectal cancer is blood in the stool"), and attitudes, beliefs, and emotions (36 items; e.g., "I dislike talking about cancer," "There are things I can do to avoid getting colorectal cancer," "If I found out I had colorectal cancer, I would feel sad"). Knowledge items had three possible answers: "Yes," "No," or "I do not know"; beliefs were measured on a scale from (1) *strongly disagree* to (5) *strongly agree*, and most attitudes and emotions were measured on a scale from (1) *very little* to (5) *very much*. Items 23 and 28, which measure beliefs, were reverse coded such that higher scores indicate beliefs facilitative of screening. Similarly, all knowledge items were coded such that a higher score indicates an accurate answer.

Procedure

Community gatekeepers associated with the Comisión Honoraria de Lucha Contra el Cáncer recruited participants in community settings at each *departamento*. They set out to recruit 40 women and 40 men in each location. Gatekeepers used their knowledge of the community and local organizations to (a) identify prospective participants, (b) attend community events and make announcements about the study, and (c) identify additional prospective participants through snowball sampling. After ascertaining inclusion and exclusion criteria, and after obtaining informed consent, the gatekeepers verbally administered the scale, entering responses electronically on a tablet. To ensure anonymity, we did not collect participants' names, addresses, or other identifiable information. The tablet was password-protected, and used to gather data which subsequently was encrypted and available only to study staff. On average, it took 20 min to complete the measure.

Results

We conducted an exploratory factor analysis (EFA) followed by a confirmatory factor analysis (CFA). We first split the dataset using a random sampling procedure in SPSS to create a training dataset and a test dataset. The training dataset, which included approximately a third of responses ($n = 122$) was used to conduct an EFA and determine the dimensional structure of the scale. Based on recommendations from experts, this sample size is adequate for the purposes of the analysis (45, 46). We conducted the EFA separately for (a) attitudes, beliefs, and emotions items, and (b) knowledge items. This was necessary because the attitudes, beliefs, and emotions were measured using a Likert scale resulting in polytomous ratings, and knowledge items provided dichotomous responses. In addition, the latter items were conceptually different from the rest, as they were designed to measure knowledge about the nature of CRC, its risk factors, early detection, and prognosis. The test dataset consisted of approximately two-thirds of responses ($n = 283$) and was used to conduct a CFA based on a multidimensional Rasch model for validation purposes and to further evaluate the CCLS–U's psychometric properties. This sample size is also consistent with prior recommendations in the literature [see (47–49)].

Exploratory factor analysis

Prior to conducting the EFA, we tested relevant statistical assumptions. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.70, which is acceptable for conducting factor analysis (50, 51). Moreover, when converted to a Chi-square statistic, Bartlett's test of sphericity yielded a $p < 0.0001$, indicating unequal variances. These statistics provided support for the suitability of the data for the EFA. We subsequently conducted the EFA on 36 items related to attitudes, beliefs, and emotions. Based on an oblique rotation, a scree plot included 24 factors with eigenvalues >1, ranging from 8.28 to 1.03, although there was an elbow after the fourth factor. From the eighth factor forward, the increase in eigenvalues was very small. We also conducted a parallel analysis using the *psych* package in R. Results suggested six factors or four components to be extracted. Because we only had 36 items in total, we investigated the structures with three, four, and five factors.

After reviewing these factor structures, the four-factor solution emerged as the most interpretable. Through an iterative process of deleting items that did not meet retention criteria and rerunning the EFA, eight items with factor loadings below 0.35 were removed, yielding a 28-item solution. Factor I included five items focused on attitudes, beliefs, and emotions about medical science; Factor II was comprised of 10 items that tapped into attitudes, beliefs, emotions, and dispositions toward prevention; Factor III included four items related to attitudes and beliefs about cancer; and Factor IV contained nine items related to emotions about cancer. Given that two factors had low item counts, and consistent with the conceptualization of the study, we combined Factors I and II to represent attitudes, beliefs, emotions, and dispositions related to medical science and prevention (heretofore called Factor I; 15 items), and combined Factors III and IV to reflect attitudes, beliefs, and emotions associated with cancer (heretofore called Factor II; 13 items). We subsequently conducted another EFA on the new set of items and explored a two-factor structure solution. Two items had factor loading below 0.35; these two items were subsequently removed. Also, in the new structure, three items that originally had higher loadings on the second factor showed higher loadings on the first factor. Thus, the final two-factor structure included 17 items measuring Factor I and 9 items on Factor II. To these two factors we added a third factor measuring knowledge through a separate EFA. This last factor, which originally included 33 items, had 13 items removed; the remaining 20 items comprised Factor III. Eight items were removed due to low factor loadings and another five items due to unprecise wording that may result in a true or false correct response (e.g., "A risk factor for CRC is… Having a personal medical history of other types of cancer"—where the answer is dependent on the type of cancer). Each of the three factors is described next.

Factor I: disposition toward CRC prevention and diagnosis

Upon finalizing the EFA, Factor I consisted of 17 items. However, in the process of conducting the CFA, we obtained item–total correlations and EAP reliabilities for review. We found two items with very low item–total correlations ($r = .062$ and $r = .135$); these items did not fit the structure well. Subsequently, we removed these two items and saw an increase in all EAP reliabilities, evidence of an increased model data fit. The final Factor I subscale, which comprises 15 items, assesses the respondents' disposition toward CRC prevention including relevant attitudes, beliefs, emotions, and behavioral intentions. Sample items include "If I noticed a colorectal cancer symptom, I would go to the doctor to get it checked" (an anticipatory behavior toward prevention), "How important is it to get a fecal blood test?" (a belief about screening), and "If I found out I had colorectal cancer, I would feel anxious" (an anticipatory emotion related to diagnosis). We conceptualize these items as measuring the most proximal influences on screening behaviors, and therefore the most likely to affect CRC outcomes.

Factor II: attitudes, beliefs, and emotions about cancer and CRC

This subscale includes nine items centered on attitudes, beliefs, and distressing emotions associated with cancer more generally and CRC in particular. Focusing on symptoms, diagnosis, and treatment, the items assess perceptions that might negatively influence individuals' decisions to obtain CRC screenings. Sample items include "I dislike talking about cancer" (an attitude about cancer), "How painful do you think colonoscopies are?" (a belief about CRC screening), and "I would feel sad if I had to tell a family member that I have cancer" (an emotion related to cancer). We conceptualize this factor as measuring constructs that influence screening, although their effects are not as direct as perceptions related to prevention.

Factor III: knowledge

This subscale includes 20 items that measure knowledge about CRC risk factors, symptoms, screening processes, and the nature of the condition. Risk factors assessed include some that are true (e.g., "Eating grilled red meat with charred fat") and some that are false (e.g., "Having anal sex"). Other knowledge items include "It is possible to have colorectal cancer without symptoms" (measuring knowledge about symptoms; true), "A person needs to have a fecal blood test only when something is unusual in her/his feces" (measuring screening knowledge; false), and "It is possible to develop polyps in the intestine" (measuring the nature of CRC; true). Knowledge items are posited to form the basis for associated beliefs that may influence CRC screening.

Factor loadings for Factors I and II are shown in Table 1; factor loadings for Factor III are shown in Table 2. After establishing the

TABLE 1 EFA results for Factors I and II.

Item content by factor	Factor loadings	
	I	II
Factor I: Disposition toward CRC prevention and diagnosis		
Doctor effectiveness	**0.52**	0.09
Medicine effectiveness	**0.50**	0.01
Worried about caring for family if diagnosed	**−0.39**	0.41
Worried about caring for self if diagnosed	**−0.35**	0.22
Can avoid CRC	**0.62**	−0.20
Anxious about diagnosis	**−0.40**	0.38
Attentive health care provider	**−0.54**	−0.05
Would get symptom checked	**0.52**	0.08
Embarrassed digital rectal exam	**0.42**	0.33
Interested in CRC information	**0.52**	−0.09
FOBT is important	**0.74**	−0.01
Colonoscopy is important	**0.85**	0.00
Cancer is a divine punishment	**0.52**	0.17
Cancer treatment is worse than the disease.	**0.35**	0.28
Sad if diagnosed	**−0.48**	0.46
Factor II: attitudes, beliefs, and emotions about cancer and CRC		
Dislikes talking about cancer	0.38	**0.48**
Pain with colonoscopy	0.01	**0.36**
Worry about removing intestines	−0.07	**0.50**
Burden to loved ones	0.10	**0.51**
Afraid of cancer treatment	−0.01	**0.70**
Uncomfortable looking at stool	0.46	**0.58**
Uncomfortable tracking bowel movements	0.35	**0.62**
Sad telling others about diagnosis	−0.25	**0.70**
Uncomfortable placing stool sample in refrigerator	0.17	**0.45**

$N = 405$. CRC, colorectal cancer. Item wording has been abbreviated. The full scale is available by request from the LB. Bold values represent loadings for the corresponding factor.

TABLE 2 EFA results for Factor III.

Item content	Factor loading
Knowledge about CRC risk factors	
Age over 50	**0.56**
CRC family history	**0.56**
Personal medical history	**0.44**
Thinking about CRC	**−0.43**
Drinking alcohol	**0.44**
Lack of hygiene	**−0.50**
Lack of exercise	**0.68**
Obesity or overweight	**0.83**
Fatty foods	**0.47**
Red meat with charred fat	**0.48**
Anal sex	**−0.71**
Sex with someone diagnosed	**−0.67**
Other CRC knowledge	
Asymptomatic	**0.49**
Symptom: change in bowel habits	**0.41**
Can develop polyps in intestine	**0.53**
Symptom: bloody stool	**0.53**
FOBT only when something unusual	**0.49**
FOBT can find problems	**0.62**
Colonoscopy done to find tumor	**0.77**
Colonoscopy can find a polyp	**0.77**

N = 405. CRC, colorectal cancer. Item wording has been abbreviated. The full scale is available by request from the LB. Bold values represent loadings for the corresponding factor.

factors, we conducted a CFA using Rasch measurement theory for validation purposes and to further assess the CCLS–U's psychometric properties.

Confirmatory factor analysis

The use of Rasch measurement theory in scale development has grown significantly in recent years. It is currently widely applied in the United States and internationally across various fields, including the medical and social sciences [e.g., (52–54)]. Rasch measurement theory, in contrast to classical test theory, releases the assumptions that non-Rasch techniques hold [e.g., assuming equal item difficulty across all items, equal jumps across various points in a rating scale, and equal ability to answer all items by the test taker (55)]. Because we expected correlated latent constructs, we used a multidimensional Rasch model to increase estimation precision. In addition, we examined a multidimensional partial credit Rasch model to make estimations across items scored using different scale structures. The model-data fit for each individual item was assessed using item weighted fit (MSE).

To evaluate fit indices, we followed the criterion proposed by Engelhard & Wind (56), $0.50 < \text{fit} < 1.50$. Results revealed that none of the items violated this standard (range: 0.75–1.33). Also, the ideal value, 1.0, fell inside the 95% confidence intervals of the weighted fit statistic for all items. Thus, results showed a good fit of items to the model.

Reliability was computed using maximum likelihood estimation with expected *a posteriori* [EAP (57, 58)]. This reliability quantifies the amount of uncertainty in the measurement process and is interpreted similarly to traditional reliability indices (e.g., Cronbach's alpha). In contrast to traditional indices, EAP reliability is based on the variance of latent measures. For the 44-item multidimensional scale, we obtained EAP values as follows: Factor I = .71; Factor II = .70; Factor III = .70. Overall, reliabilities were .70 or above, presenting an acceptable fit and indicating good quality of the measuring instrument.

Psychometric properties

Content and face validity

To develop the items, we first engaged in a deductive process, defining the universe of items broadly. We purposefully surveyed various areas associated with health literacy with respect to CRC including (a) beliefs, attitudes, and emotions related to cancer more generally; (b) beliefs, attitudes, and emotions related to CRC signs and symptoms, screening exams, treatment, and prognosis; (c) experiences and expectations related to physician–patient interactions, and (d) knowledge of CRC signs and symptoms, screening exams, treatment, and prognosis. For all areas, we developed items in a systematic manner, consistent with recommendations from Cronbach and Meehl (59). We then asked public health experts to review the items, obtaining support for face validity. Subsequently, we conducted focus groups with community members and health care professionals to further validate these domains and ensure broad coverage of the topic, consistent with expert recommendations to enhance content and cognitive validity [e.g., (44)].

Criterion-related validity

As part of the psychometric analyses, we report on criterion-related validity, which is comprised of predictive, concurrent, convergent, and discriminant validity. *Predictive validity* indicates the strength of the relationship between the current scores and criterion scores obtained at some point in the future; these scores are typically assessed using a gold standard measure of a theoretically related construct (60). *Concurrent validity* refers to the degree of association between results using the newly constructed measure and the results of an established measure administered within a similar time frame. In turn, *convergent validity* provides information about the relationship between test scores and other measures of the same construct or a related construct (60). We were unable to examine these types of validity in this study because there are no measures available to assess CRC-related health literacy, or health literacy more broadly, in Uruguay. Given the lack of a "gold standard," we had no way of comparing scores on the current measure to those of more established measures of the construct.

To assess *discriminant validity*, which refers to a lack of association across different constructs, we examined interscale correlations. Given our theoretical conceptualization, we expected a strong positive correlation between Factor I (i.e., Disposition Toward CRC Prevention and Diagnosis) and Factor II (i.e., Attitudes, Beliefs, and Emotions about Cancer). A high correlation would reflect that individuals' greater disposition toward cancer prevention would be associated with holding favorable attitudes, beliefs, and emotions about cancer and CRC. In addition, we anticipated there would be a strong positive correlation between Factor I (i.e., Disposition Toward CRC Prevention and Diagnosis), and Factor III (i.e., Knowledge). A high correlation would suggest that individuals' favorable disposition toward cancer prevention would be related to having knowledge about risk factors, symptoms, screening processes, and the nature of the condition. As expected, interscale correlations were higher between Factors I and II, $r = 0.72$, $p < 0.001$, and Factors I and III, $r = 0.57$, $p < 0.001$, than between Factors II and III, $r = 0.29$, $p < 0.001$. The correlations were consistent with the expected strength and direction, providing support of discriminant validity in this sample.

Discussion

Initial evaluation of the CCLS-U supports its psychometric validity and reliability when used with a diverse Uruguayan national sample. To our knowledge, this mixed-methods study represents the first attempt to develop an empirically based measure to assess cultural and conceptual components of CRC health literacy in a Latin American country. Importantly, a psychometrically sound instrument grounded in the health literacy model allows for further advances in theory, research, and practice aimed at reducing CRC morbidity and mortality. In the next paragraphs we discuss strengths of the study, place results within the larger context of the literature, note limitations, and provide specific implications for future work in this area.

A particular strength of the study was its heterogeneous sample with good representation of individuals who would be expected to score high and score low, given their diverse demographic characteristics (23, 61, 62). In addition, the variation across geographic regions (e.g., urban areas, rural border towns) ensured representation of a range of cultural contexts within a relatively small country. We intentionally included an equivalent number of participants who identify as women and as men, given that CRC affects everyone, regardless of sex or gender identity.

The rigorous and systematic process followed to develop the measure is another strength of the study. Based on steps designed to enhance psychometric validity [e.g., (62)], we first conducted a thorough review of the literature, generated a comprehensive list of items, and refined them via focus groups and consultation with experts in the field. As intended, by following these recommended processes, the final measure showed good indices related to EAP reliability, content and face validity, and discriminant validity.

Specifically, Factor I captures dispositions toward cancer prevention and diagnosis including beliefs, attitudes, and emotions related to cancer screening and diagnosis. Factor II represents beliefs, attitudes, and emotions related to cancer in general and CRC in particular. In turn, Factor III includes knowledge items related to cancer risk factors, symptoms and signs, and prognosis. These factors are consistent with some found in prior scale development studies in cancer prevention. A psychometric validation of a measure assessing cultural constructs related to breast and cervical cancer screening in Latina populations yielded one factor related to disposition toward cancer prevention (i.e., negative beliefs about health professionals, sociocultural deterrents to screening), and a second factor related to attitudes and beliefs about cancer [i.e., catastrophic disease expectations (63)]. In a psychometric evaluation of a scale measuring aversion to CRC screening, one subscale encompassed related emotions (64). Our findings are also consistent with extant conceptualizations of disease-specific health literacy [e.g., (65)] and cultural and conceptual knowledge [e.g., (26, 63)].

Limitations of the study

Due to the lack of related measures designed for the Uruguayan population, we could not assess predictive, concurrent, and convergent validity. As measures become available, it would be important to conduct a further assessment of criterion-related validity. An additional limitation is that as a volunteer sample, participants who had the time and interest to complete the measures could be overrepresented. However, this was mitigated by the fact that about two-thirds of participants were still active in the workforce. Also, participants represented a wide range of demographic factors as well as variation in screening status. Beyond these limitations, this is the first study to examine CRC health literacy in Uruguayan populations, with implications for theory, research, and practice. We discuss these next.

Implications for theory and research

The CCLS-U is the first instrument designed to assess an integral component of health literacy that heretofore could not be measured—cultural and conceptual knowledge related to CRC. Thus, when administered along with measures of print literacy, oral literacy, and numeracy, a comprehensive assessment of health literacy will be achieved. Theoretical conceptualizations subsequently may be advanced to understand the relation between health literacy, screening adherence, and health promotion more generally. For example, if systematic differences are uncovered in CRC screening uptake, psychosocial factors associated with this inequity may be examined using the measure. In addition, the measure can facilitate the examination of extant conceptual models that contemplate the influence of cultural and conceptual knowledge on CRC behavioral outcomes. Using informed decision-making theory as a framework, researchers may assess personal and cultural factors that influence decision-making with respect to cancer screening. For instance, researchers could assess participants' culturally based perceptions of CRC screening as well as their knowledge of CRC screening risks and benefits. This would facilitate an evaluation of the role of culturally based factors in patients' process of weighing the risks and benefits of screening. Thus, with these data, researchers may identify additional information and/or supports needed by the patient to facilitate decision-making with respect to screening (66).

The measure may be used, as well, to identify psychosocial factors that discriminate among individuals who are up-to-date and overdue for screening such as knowledge, beliefs, attitudes, and emotions that need to be addressed through intervention. Because sex and gender interactions influence decisions related to health and well-being (67), examining differences across these factors would be important. The measure may also be used to subsequently evaluate intervention outcomes and identify the most promising approaches to increasing screening rates, assisting in the process of optimizing health promotion resources. To understand factors that contribute to health literacy changes across time, the CCLS-U may be used in longitudinal studies. Information gathered through these studies can help further refine theoretical frameworks and interventions. In addition, the long-term efficacy of interventions and/or national campaigns may be evaluated over time using the measure.

Future directions for research may also include adapting the CCLS-U for use with new populations. This process would require an extensive review of the literature on knowledge, beliefs, attitudes, and emotions related to CRC for the population of focus. Adaptations may include revising the phrasing of questions as well as adding or eliminating certain items given the cultural and psychosocial characteristics of the sample. We recommend conducting focus groups to assess the cultural relevance and clarity of revised items prior to finalizing it. As part of the focus groups, participants may be asked to say out loud what they understand by certain items. This cognitive debriefing exercise would allow researchers to evaluate whether their intent in designing the item corresponds to the way participants understand it.

In cases where the new measure is in a different language, focus group participants should be asked about the appropriateness of translated concepts, especially words and ideas that are challenging to convey in the target language. In all cases, researchers would be well-advised to be mindful of local dialects or cultural nuances by geographic locale. In the event that revisions are extensive, we recommend conducting psychometric testing to examine the reliability and validity of the revised measure with the new population.

Similarly, another future research direction would include adapting the CCLS-U for use with other cancers for which early detection is also key to survival. This process would require an extensive review of the literature on health literacy, knowledge, beliefs, attitudes, and emotions related to the specific cancer examined and its screening methods. Again, adaptations may include revising the content of questions as well as adding or eliminating certain items given the nature of the cancer, the population of interest, and the type of screening procedure (e.g., a focus on women and Pap smear testing to examine cervical cancer health literacy). Similarly, if extensive revisions are made, it would be important to examine the psychometric properties of the revised measure.

In future studies, researchers may also explore shortening the current measure to create a checklist that a patient could easily complete while waiting to be seen by a health care professional. Key items may act as a screener and offer clinicians information they can use to tailor psychoeducational messages (e.g., focus on clearing up incorrect information) during the medical appointment.

Implications for practice

The CCLS-U can help identify populations at risk due to low screening rates. This information can be used to advocate for the allocation of scant resources to medically underserved populations (e.g., individuals with low health literacy), thereby optimizing impact. Specifically, the measure may be used to examine possible associations among sociodemographic factors (e.g., region of the country, family history of CRC, formal education, sex, gender), cultural and conceptual knowledge, and screening behaviors. For example, an analysis of score differences across *departamentos* may yield information about underserved areas where screening rates are low and public health programs are needed. Similarly, the measure may be used to understand the unique educational needs of traditionally underrepresented groups, such as Uruguayans of African descent and individuals with disabilities. In this way, the measure can serve used as a tool to uncover, understand, and address linkages between social determinants of health and cancer screening outcomes.

In addition, the CCLS-U may help identify facilitative factors and barriers to CRC screening experienced by a specific group (e.g., women, men). With these data, practitioners may tailor health promotion messages and referrals that, importantly, may lead to higher CRC screening rates. This is consistent with recommendations to promote cultural sensitivity through attention to deep structure by crafting messages that address the intended audience's psychosocial, cultural, and environmental perceptions related to health and illness (68, 69). Tailored messages would be disseminated through psychoeducational interventions such as educational materials, workshops, and screening reminders. These interventions may be directed at communities, individuals at risk or overdue for screening, and/or their families. In addition, health care professionals may benefit from training opportunities to learn about knowledge, beliefs, attitudes, and emotions that would be timely to address with a specific population.

Specifically, we found that Factor I relates to individuals' attitudes, beliefs, emotions, and dispositions toward prevention and diagnosis; these constructs are amenable to change through psychoeducational programming, which makes it critical to measure them for future intervention. Items comprising Factor II relate to attitudes, beliefs, and emotions about cancer, which may be used to tailor culturally relevant interventions. Factor III consists of items measuring CRC knowledge such as knowledge about the nature of CRC, its risk factors, early detection, and prognosis. Having the ability to measure knowledge enables researchers and practitioners to examine increases in knowledge following targeted intervention.

We also recommend questioning the status quo, which is the common practice of giving psychoeducational workshops on early screening without incorporating tailored approaches to modify each of the constructs—knowledge, beliefs, attitudes, and emotions. For example, patients who are afraid of cancer treatment (an emotion) might benefit from an intervention that requires them to examine the underlying cultural messages giving rise to this emotion. In turn, patients who lack information might benefit from exposure to information that enhances their knowledge about CRC, such as dietary risk factors and needed dietary changes.

Conclusion

In this study, we described the development and psychometric validation of the CCLS-U, a newly developed scale to assess culturally based factors that influence CRC screening behaviors. Initial data suggest the viability of the scale, which can be used to advance theory, research, and practice in this area. As additional measures of health literacy and related factors become available for the Uruguayan population, the scale may be further developed by examining its convergent validity and assessing discriminant validity in alternative ways. Moreover, as the scale is implemented, its predictive validity may be examined. We present detailed strategies to adapt the CCLS-U for use with other populations. In addition, we make recommendations for revisions to develop a measure focused on other cancers in which early detection is also key to survival.

We are hopeful that this scale will become an important tool in promoting health, diminishing the cancer burden, and avoiding premature death in populations at high risk for CRC.

Data availability statement

The dataset generated and analyzed during the current study is not publicly available due to the fact that participants did not give written consent for their data to be shared publicly.

Ethics statement

This study was approved by the University of Miami Human Subjects Research Office and the Instituto Nacional del Cáncer in Uruguay. The study was conducted in accordance with local legislation and institutional requirements. The study involved minimal risk. The institutional review board/ethics committee waived the requirement of written informed consent for participation from the participants; verbal consent was obtained instead.

Author contributions

LB and MR made substantial contributions to the conception, design, interpretation of data, and manuscript writing. JW made substantial contributions to the analysis and interpretation of data. SS, DL, BS, and MB made substantial contributions to the conception, design, and acquisition of data. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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

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Unchanging dynamics in posttraumatic growth in cancer patients: ways of coping and illness perception

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Introduction: This study aims to address the positive changes due to traumatic experiences, such as being diagnosed with cancer and experiencing this disease for a certain period. Within this purpose, socio-demographic and disease-related variables, coping ways and illness perceptions that affect posttraumatic growth in cancer patients were examined. Secondly, the findings of this study, which is one of the first studies on posttraumatic growth in cancer patients in Turkey, were compared with the findings of current studies on the subject.

Method: Datums were collected by an interview form and three scales (Posttraumatic Growth Scale, Ways of Coping Inventory and Illness Perception Scale-R) to 78 cancer outpatients in Istanbul University Oncology Institute in 2007.

Results: Results showed that cancer patients have higher posttraumatic growth levels than the mean. According to analysis, posttraumatic growth total score between confrontive coping ($t = -2.344$, $p < 0.05$), self-controlling ($t = -3.704$, $p < 0.001$), accepting responsibility ($t = -3.032$, $p < 0.01$), escape-avoidance ($t = -2.285$, $p < 0.05$), planful problem solving ($t = -2.502$, $p < 0.05$), positive reappraisal ($t = -5.241$, $p < 0.001$), and seeking social support ($t = -3.527$, $p < 0.01$) has relationship. Also, there is a relation between posttraumatic growth subscales and the Revised form of Illness Perception Questionnaire; Change in relationships with others subscale ($t = 2.887$, $p < 0.01$) and Change in self-perception subscale ($t = 2.660$, $p < 0.01$) between timeline (acute/chronic), Change in self-perception subscale between timeline (cyclical) ($t = -2.788$, $p < 0.01$) and uncontrollable body factors ($t = -1.916$, $p < 0.05$) Change in philosophy of life subscale between external attributions ($t = -2.057$, $p < 0.05$) and Change in relationships with others subscale ($t = -2.920$, $p < 0.01$) between chance factors. It was found that positive reappraisal ($F = 78.290$, $p < 0.001$), self-controlling ($F = 39.814$, $p < 0.001$), and distancing ($F = 46.311$, $p < 0.001$) were significant predictors of posttraumatic growth total score. Results showed that ways of coping and illness perceptions were essential variables in posttraumatic growth.

Discussion: Studies on posttraumatic growth in Turkey and the world have significantly increased in recent years. This study aimed to examine the findings obtained from cancer patients in 2007 in discussion with the findings in the current literature. In this context, it is seen that the relevant variables affecting posttraumatic growth in cancer patients in different cultures do not change.

KEYWORDS

cancer, psychological trauma, posttraumatic growth, ways of coping, illness perception

1. Introduction

Traumatic events can generally be classified as incidents caused by human actions and events concerning other factors. Events caused by human actions include sexual assault, physical violence, and similar occurrences, while events not caused by human actions are classified as natural disasters, diseases, and accidents. It is known in the relevant literature that events caused by human actions have a higher likelihood of causing various psychiatric problems, particularly post-traumatic stress disorder (PTSD). Among traumatic experiences that humans do not intentionally cause, cancer is important in psychological trauma studies (Türksoy, 2003; Dobrikova et al., 2021; Baník et al., 2022).

Cancer is one of humanities leading problems, especially in contemporary medicine, and evokes adverse reactions and thoughts, such as fear, hopelessness, helplessness, guilt, abandonment, and death. Cancer is a disease that should be evaluated holistically with medical, psychological, social, economic, and spiritual components (Özkan, 1993). Exposure to cancer is considered to be a traumatic experience due to its unusual, chronic, and unexpected nature (Tedeschi and Calhoun, 1995). Examination of the literature reveals that an increasing amount of information claims that positive changes can arise out of the negative consequences of different types of traumas, especially in cancer patients; the growth phenomenon perceived after traumatic experiences involving high levels of stress is called posttraumatic growth (PTG) (Tedeschi et al., 2018; Faustova, 2020; Baník et al., 2022; Li, 2022). This study aimed to address the positive changes that occur as a result of being diagnosed with cancer and experiencing the disease for a certain period.

Posttraumatic growth is a term used to describe the positive changes experienced by individuals due to a struggle with life crises involving high levels of stress (Tedeschi and Calhoun, 2004; Tedeschi et al., 2018). Posttraumatic growth includes changes in three main areas: self-perceptions, relationships with others, and philosophy of life. According to the functional-descriptive model proposed by Calhoun and Tedeschi (1998), many variables, such as ways of coping, social support, ruminative thoughts, and personality traits, are important in the emergence of PTG (Calhoun et al., 2010; Calhoun and Tedeschi, 2013; Tedeschi et al., 2018). It can be seen from the literature that PTG, and its relationship with various variables, has been investigated in different types of traumas. For example, in firefighters (Armstrong et al., 2014; Sattler et al., 2014; Kehl et al., 2015), Hurricane Katrina survivors (Kilmer and Gil-Rivas, 2010; Chan and Rhodes, 2013), spinal cord injury patients (Chun and Lee, 2010; January et al., 2015), earthquake survivors (Karanci and Acartürk, 2005; Eren-Koçak and Kılıç, 2014; Taku et al., 2015), and accident survivors (Rabe et al., 2006; Zoellner et al., 2008).

Most of the research on PTG in health psychology has been conducted with cancer patients (Cordova et al., 2001; Lechner et al., 2003; Sears et al., 2003; Ho et al., 2004; Widows et al., 2005; Thornton and Perez, 2006; Liu et al., 2020; Aydoğdu and Dirik, 2021) and it has been shown that positive health behaviors in many patients are due to significant cognitive restructuring (Tedeschi et al., 2018). In this context, it is considered important to examine two concepts: ways of coping and illness perceptions. However, in the relevant literature, no studies have examined ways of coping and illness perceptions together in the context of PTG in cancer patients; this study addresses this gap, therefore.

In general, in the current literature, studies of PTG in cancer patients have shown that ways of coping, religion, and traumatic stress are predictors of PTG in women diagnosed with ovarian cancer (Oh et al., 2021), cancer patients with high religious and spiritual beliefs show higher levels of PTG (Schwarz and Vavrová, 2021). Moreover, while social support is positively correlated with PTG in cancer patients who are receiving treatment or in remission, it is not correlated with PTG in those who are in the terminal stage of cancer and there is a positive correlation between self-efficacy and PTG in treatment (remission) and terminal stage cancer patients (Dobrikova et al., 2021). In a study examining locus of control, ways of coping, emotion regulation strategies, and social support in patients diagnosed with lung cancer, social support had a direct positive effect on PTG; ways of coping and cognitive reappraisal emotion regulation strategies were the main mediating variables and explained approximately 73.1% of the indirect effect between PTG and social support (Zhang et al., 2021).

Baghjari et al. (2017) reported that among problem-focused coping strategies, cognitive appraisal and seeking social support explained 53% of changes in PTG in women and men with advanced cancer and may be helpful in clinical interventions, such as problem-focused coping skills training and facilitative measures to provide social support. In their qualitative study, Lelorain et al. (2012) revealed that the PTG is a theme specific to women with high levels of coping, social support, and active cognitive processing skills.

In their meta-analysis, Wan et al. (2022a) examined the relationship between PTG and resilience in breast cancer patients (17 studies, including 4,156 breast cancer patients) and found a high positive correlation between PTG and resilience, while Adamkovic et al. (2022) examined the relationship between life satisfaction, PTG, ways of coping and resilience in cancer patients and found that increasing life satisfaction was strongly associated with resilience, moderately associated with ways of coping, and weakly associated with PTG. In a study conducted by Schmidt et al. (2012) involving 54 cancer patients, it was discovered that having a secure attachment style was closely linked to positive reframing, active coping, and religion. Furthermore, all three variables demonstrated associations with PTG. Regression analysis revealed that positive reframing and religion served as coping mechanisms that could mediate the relationship between having a secure attachment style and experiencing PTG.

In summary, ways of coping, social support, resilience, and life satisfaction are among the variables that have been studied in conjunction with PTG in various types and stages of cancer patients. In these studies, ways of coping and similar concepts such as emotion regulation are frequently addressed when exploring PTG in cancer patients. However, illness perceptions have been less studied. Studies of illness perceptions frequently with ways of coping in cancer patients include:

Postolica et al. (2017) examined ways of coping, illness perceptions, and family adaptation to the disease in cancer patients with and without a family history of cancer, Kocyigit et al. (2021) examined illness perceptions, ways of coping, and magical thinking in breast cancer patients, Hopman and Rijken (2015) examined illness perceptions, the characteristics of illness, and ways of coping in cancer patients. In a similar way Kugbey et al. (2020) in women diagnosed with breast cancer in Ghana, Zhang et al. (2018) in patients diagnosed with lung cancer and Dempster et al. (2012) examined coping and illness perception in oesophageal cancer patients, while Krok et al.

(2019) examined the mediating effect of meaning in life and ways of coping in the relationship between illness perceptions and affective symptoms in gastrointestinal cancer patients. However, it is seen that the concept of illness perception in cancer is also included in intervention methods. Stephenson et al. (2021) examined the role of coping and illness perceptions in supportive care in patients with various cancer diagnoses such as breast, colorectal, lung, prostate, and melanoma; Fischer et al. (2013) examined illness perceptions and coping in a psycho-educational group intervention for women with breast cancer. Pourfallahi et al. (2020) examined the effect of informational-emotional support programs on illness perception and emotional coping in patients diagnosed with breast, colorectal, gastrointestinal, lung and leukemia and undergoing chemotherapy.

Although studies that have addressed PTG and illness perceptions together are limited, some relevant findings have been reported. For example, Leal et al. (2016) examined PTG, core beliefs, and illness perceptions in women diagnosed with breast cancer using a structural equation model, while Banik (2012) examined PTG, psychological distress, and illness perceptions in people diagnosed with cancer. Rahimzadegan et al. (2022) examined the relationships between PTG, illness perceptions, and emotion regulation in cancer patients; they showed that negative illness perceptions were significantly and negatively related to PTG, while optimistic illness perceptions and emotion regulation skills were both significantly and positively related to PTG.

Lau et al. (2018) examined the relationship between illness perceptions and PTG in newly diagnosed HIV-positive men. Linear regression analyses conducted on the emotional representation subscale ($\beta = -0.49$) and five cognitive representation subscales (timeline, consequence, identity, attribution to God's punishment/will, and attribution to chance/luck) revealed they were negatively correlated with PTG ($\beta = -0.13$ to -0.37), whereas four other cognitive representation subscales (coherence, treatment control, personal control, and attribution to carelessness) were positively correlated with PTG ($\beta = 0.15$ to 0.51). The associations between the five cognitive representation subscales and PTG were all mediated by emotional representation. The results suggest that interventions that promote PTG, especially ones that address illness perceptions and emotional representation, are necessary for this group of patients.

Rogan et al. (2013) conducted a study to examine how illness perceptions, distress, disability, ways of coping, and posttraumatic growth (PTG) were related in individuals with acquired brain injury (ABI). The findings revealed that individuals who reported higher levels of PTG were more likely to utilize adaptive coping strategies ($r = 0.597$), experience lower levels of distress ($r = -0.241$), and hold stronger beliefs about their ability to control the consequences of their brain injury through treatment ($r = 0.263$). Adaptive coping strategies were the most significant predictor of PTG ($sr2 = 0.287$), explaining a large portion of the observed variance. Illness perceptions were not found to be significantly related to growth experiences. Our study is similar to Rogan et al.'s study in terms of evaluating PTG, illness perceptions, and ways of coping, but it uses a different patient group (cancer patients), and it is expected that different results will be found due to the different dynamics of the physical illnesses.

As a result of the increasing number of studies addressing PTG in cancer patient samples, and the increase in knowledge on the subject, systematic reviews and meta-analyses in this field have increased in recent years (e.g., Long et al., 2021; Ahmadi et al., 2022; Almeida et al., 2022; Knauer et al., 2022; Wan et al., 2022b; Wang et al., 2023). These studies, together with those of Lau et al. (2018) and Rogan et al. (2013), discussed above, indicate that cognitive and emotional factors are essential in facilitating PTG in cancer patients.

This study aimed to examine the phenomenon of PTG in cancer patients, and how it is related to ways of coping and illness perceptions, which are both thought to affect PTG. According to the number of studies and meta-analyses on PTG in cancer patients, it is seen that it is important to fill the gap in literature by examining ways of coping and individuals' illness perceptions of their traumatic experiences, which are believed to be influential in positive growth following traumatic experiences, is particularly important for developing intervention approaches.

2. Materials and methods

2.1. Participants, procedure and aims of the study

This study was conducted with 78 cancer patients who applied to Istanbul University Oncology Institute as outpatients in 2007. The selection criteria for the sample group were that the participant should be literate, open to cooperation, willing to be interviewed, be aged from 18 to 65, have mental competence, did not have a psychotic disorder, and that at least 6 months and not more than 5 years had passed since the cancer diagnosis. This research aligns with the ethical principles outlined in the Declaration of Helsinki. It adheres to the ethical standards of the Istanbul University Faculty of Medicine, as confirmed by the institution's ethics board approval number 2006/2123. The participants were recruited through convenience sampling, informed about the nature and purpose of the study, and signed the Voluntary Consent Form before participation.

In general, firstly, the level of PTG in cancer patients was determined and the effect of these variables on PTG was then examined. The frequencies and percentages for the relevant variables were examined in a Turkish sample of cancer patients who also self-reported the perceived causes of their disease via their responses on the Illness Perception Questionnaire. The research questions to be answered are as follows:

1. Do total and subscale PTG scores differ relative to the sociodemographic characteristics of cancer patients?
2. What is the frequency of occurrence of the total and subscale PTG scores of cancer patients?
3. Do the total and subscale PTG scores differ relative to the disease related variables?
4. Is there a correlation between PTG scores, ways of coping scores and illness perception scores in cancer patients?
5. Is there a relationship between the ways of coping scores, total and subscale illness perception scores, and the High/Low total and subscale PTG scores of cancer patients?
6. Do the combined ways of coping and illness perception subscale scores predict the total and subscale PTG scores of cancer patients?
7. What are the subjective evaluations of the causes of cancer among cancer patients in Turkey?

2.2. Measures

A semi-structured interview form was used to collect socio-demographic and disease-related data. Three individual questionnaires were used to collect the data on PTG, ways of coping, and illness perceptions, which acted as the dependent and independent variables. These are discussed in turn below.

2.2.1. Semi-structured interview form

This was self-authored and collected socio-demographic data (age, gender, marital status, etc.) and disease-related data (diagnosis, stage, treatment, etc.).

2.2.2. Posttraumatic growth scale

The Posttraumatic Growth Scale (PTGS) was developed by Tedeschi and Calhoun (1996) to measure positive change due to traumatic events. Although there were 34 items in the first version of the scale, as a result of their analyses, the authors later transformed it into 21 items and five subscales: new possibilities, relating to others, personal strength, spiritual-existential change, and appreciation of life. The items are measured on a 6-point Likert-type scale (0 = *I have not experienced this change due to my life crisis* to 5 = *I have experienced this change a lot due to my life crisis*). An acceptable level of construct validity was found in university students, with an internal consistency coefficient of 0.90, and a test–retest reliability after two months of 0.71 (Cohen et al., 1998; Park and Lechner, 2006). Dirik (2006) made Turkish adaptation of the PTGS with rheumatoid arthritis patients and obtained three factors explaining 59% of the variance. These were named "Change in Relationships with Others," "Change in Philosophy of Life," and "Change in Self-Perception." The overall reliability coefficient of the scale was 0.94. The scale used a 6-point Likert scale, as per the original scale. The Turkish adaptation by Dirik (2006) was used in the current study. The Cronbach's alpha values of the PTGS obtained from the sample group in this study is 0.94 for total score, "Change in Relationships with Others 0.90, "Change in Philosophy of Life 0.81, and, 0.89 for the"Change in Self-Perception."

2.2.3. Ways of coping inventory

The Ways of Coping Inventory (WCI) was developed by Folkman and Lazarus (1985) to measure way of coping and consists of 66 items and eight subscales referring to a range of coping methods: confrontive coping (It refers to aggressive efforts to change the situation and involves hostility and willingness to take risks), distancing (It represents cognitive efforts to diminish the importance of the event and prevent personal impact), self-controlling (It includes individuals' efforts to regulate their emotions and actions and bring them in order), seeking social support (It describes the efforts to seek informational, material, and emotional support), accepting responsibility (It refers to recognizing one's role in resolving the problem and taking action to put things in order), escape-avoidance (It involves behavioral efforts to distance oneself from the problem and engage in wishful thinking), planful problem-solving (It describes problem-focused efforts used to change the situation, including an analytical approach to problem-solving), and positive reappraisal (It refers to efforts to find positive meaning in the situation based on personal development and may also involve a religious dimension). The WCI uses a 4-point Likert-type scale (0 not using-3 extensively using), which indicates how often each method is used (as cited in Kaçmaz, 2003). High Cronbach's alphas have been reported for the Turkish adaptation of the WCI, which was used in this study (Kutlu, 1999: $\alpha = 0.83$; Özkan and Kutlu, 2004, in their study with the relatives of patients with hematologic cancer: $\alpha = 0.92$). The Cronbach's alpha value of the WCI total score obtained from the sample group in this study is 0.93. The reliability coefficients of the subscales are as follows, in respectively: confrontive coping 0.54, distancing 0.66, self-controlling 0.56, seeking social support 0.79, accepting responsibility 0.58, escape-avoidance. 51, planful problem-solving 0.69, and positive reappraisal 0.76.

2.2.4. Illness perception questionnaire-revised

The Illness Perception Questionnaire (IPQ) was developed by Weinman et al. (1996) and revised by Moss-Morris et al. (2002). The revised questionnaire consists of three dimensions: symptoms (identity), perceptions, and reasons. The *symptoms/identity* dimension is scored as "Yes = 1" and "No = 0" and consists of two subscales called identity A and identity B, each with 14 symptoms (e.g., pain, nausea, difficulty breathing, weight loss, fatigue, wheezing, headache, dizziness, difficulty sleeping, loss of strength, etc.). For each of these symptoms, the individual is first asked whether they have experienced it since the onset of the disease and then whether they associate this symptom with their illness. This dimension is designed in a format where the person responds yes/no to both questions. The sum of affirmative answers to the second question forms the evaluation result of the disease type dimension. The *perceptions* dimension is scored on a 5-point Likert-type scale and has 38 questions and seven subscales: timeline (acute/chronic), timeline (cyclical), consequences, personal control, treatment control, illness coherence, and emotional representations. Timeline subscales investigate the individual's perceptions regarding the duration of their illness and classify it as acute, chronic, or cyclical. The consequences subscale explores the individual's beliefs about the possible effects of their illness on severity, and physical, social, and psychological functionality. Personal control examines the individual's internal perception of control over their illness's duration, course, and treatment. Treatment control investigates the individual's beliefs about the effectiveness of the applied treatment. Understanding of the disease assesses the individual's understanding or grasp of their illness. Emotional representations explore the individual's feelings related to their illness. The *reasons* dimension is also scored on a 5-point Likert-type scale and consists of 18 questions and five subscales: personal attributions (stress or anxiety, my attitude, personality traits, emotional state, family problems, decreased body resistance, my own behavior), external attributions (poor medical care in my past, environmental pollution, accident or injury, overwork), lifestyle attributions (smoking, alcohol, diet, eating habits), uncontrollable bodily attributions (a germ or virus, hereditary-irritable, aging), and chance attributions (luck or bad luck). In addition, there is a dimension requiring qualitative assessment whereby the individual is asked to write down the three most important reasons for his/her illness (Armay, 2006; Kocaman et al., 2007).

Armay (2006) examined the validity and reliability of the IPQ-R using cancer patients, finding Cronbach's alphas for the various subscales from 0.604 to 0.859. With internal medicine clinic patients, Kocaman et al. (2007) found alpha coefficients for the three dimensions of 0.89, 0.69–0.77, and 0.25–0.72, respectively. The Cronbach's alpha values obtained from the sample group in this study is 0.87 for identity dimension, 0.71 for perceptions dimension and 0.68 for reasons dimension. Subscale's alpha coefficients are as follows; identity A 0.73, identity B 0.79; timeline (acute/chronic) 0.89, timeline (cyclical) 0.59, consequences 0.69, personal control 0.56, treatment control 0.76, illness coherence 0.69, and emotional representations 0.86; personal attributions 0.68, external attributions 0.17, lifestyle attributions.49, uncontrollable bodily attributions 0.014, and chance attributions (single item).

2.3. Statistical analysis

The data collected for this study were analyzed using the Statistical Program in Social Sciences (SPSS). Descriptive statistics were used to examine the characteristics of the data, and Pearson correlation analysis was conducted to explore the relationships between variables. For comparisons between the two groups, the independent samples *t*-test was used to test the significance of the difference between the two means. On the other hand, the ANOVA test was used when comparing multiple groups. The Tukey post-hoc test was then applied to identify significant differences between specific groups based on the results of the ANOVA test. The reliability of the scales was assessed using Cronbach's alpha coefficient. Stepwise regression analysis was employed to identify the predictive factors of the dependent variables.

3. Results

As seen in Table 1, a total of 78 cancer patients participated in the study; 53 were female (67.9%) and 25 were male (32.1%). The ages ranged from 19 to 65 years. The total and subscale PTG scores did not differ for sociodemographic variables. The socio-demographic and disease variables are presented in Table 1.

As seen in Table 2, based on the mean total PTGS scores, the sample group scored above average (M = 69.71, SD = 27.91). The sample group also scored above average on the "Change in Relationships with Others" (*M* = 22.79, SD = 11.00), "Change in Philosophy of Life" (*M* = 13.69, SD = 7.59), and "Change in Self-Perception" (*M* = 33.23, SD = 12.34) subscales.

Table 3 According to the analysis conducted on the Posttraumatic Growth Scale (PTGS) total score and subscales, significant differences were found based on disease-related variables.

In terms of the PTGS total score [F (2,75) = 3.688] and the "Change in Self-Perception" subscale score [F (2,75) = 3.159, $p < 0.05$], there were significant differences among the sample group based on their perception of the adequacy of knowledge on disease and treatment. *Post hoc* (Tukey) tests were conducted to determine which levels differed significantly. The results indicated that individuals who reported having "insufficient (partially)" knowledge about their disease and treatment had significantly higher PTGS total scores compared to those who reported "none" knowledge, at a significance level of 0.05. Specifically, individuals who reported being "insufficient (partially)" knowledgeable about their disease and treatment (Mean = 77.40) had higher PTGS total scores than those who reported having "none" knowledge (Mean = 45.83). Similarly, in terms of the "Change in Self-Perception" subscale, individuals who reported being "insufficient (partially)" knowledgeable (Mean = 36.36) scored higher than those who reported having "none" knowledge (Mean = 23.33).

TABLE 1 The socio-demographic and disease variables.

Socio-demographic and disease information	Variable	N	%
Sex	Female	53	67.9
	Male	25	32.1
Age	19–35	7	9.0
	36–50	26	33.3
	51–65	45	57.7
Education status	Literate	2	2.6
	Primary school	26	33.3
	Middle school	8	10.3
	High school	23	29.5
	University and above	19	24.4
Marital status	Married	53	67.9
	Single	14	17.9
	Widow	9	11.5
	Divorced	2	2.6
Employment status	Working	8	10.3
	Not working	63	80.8
	Not working due to illness	7	9.0
How to perceive the economic status	Low	9	11.5
	Middle	52	66.7
	High	18	21.8
Being treatment or control patient status	Treatment patient	15	19.2
	Control patient	63	80.8
Type of cancer	Stomach	4	5.1
	Breast	39	50.0
	Esophagus	1	1.3
	Over	2	2.6
	Lung	11	14.1
	Rectum	6	7.7
	Soft tissue sarcoma	1	1.3
	Pancreas	2	2.6
	Neuroendocrine sarcoma	1	1.3
	Larynx	1	1.3
	Malingnant melanoma	2	2.6
	Thymoma	1	1.3
	Gall bladder	1	1.3
	Osteosarcoma	1	1.3
	Testis	1	1.3
	Anal canal	1	1.3
	Nasopharynx	1	1.3
	Kidney	1	1.3
	Klatskin (Cholangio carcinoma)	1	1.3

(Continued)

TABLE 1 (Continued)

Socio-demographic and disease information	Variable	N	%
Time since diagnosis (months)	6–12	18	23.1
	12–24	29	37.2
	24–48	24	30.8
	48–60	7	9.0
Stage	Stage 1	13	16.7
	Stage 2	33	42.3
	Stage 3	18	23.1
	Stage 4	7	9.0
Presence of similar disease in the family	Yes	31	39.7
	No	47	60.3
Treatments received or currently receiving	Surgery	2	2.6
	Chemotherapy and radiotherapy	9	11.5
	Chemotherapy and surgery	5	6.4
	Radiotherapy and surgery	16	20.5
	Chemotherapy, radiotherapy, and surgery	44	56.4
	Vaccination,chemotherapy, radiotherapy, and surgery	1	1.3
	Vaccination and surgery	1	1.3
Adequacy of knowledge on disease and treatment	Adequate (full)	42	53.8
	Insufficient (partially)	30	38.5
	None at all	6	7.7
How to perceive the seriousness of the disease	Not serious	4	5.1
	A little serious	12	15.4
	Serious	24	30.8
	Quite serious	15	19.2
	Very serious	23	29.5

TABLE 2 The mean scores of total and subscale posttraumatic growth scale.

	N	Mean	SD	Min-Max
Posttraumatic growth scale total score (PTGS)	78	69.71	27.91	0–105
Change in relationships with others subscale	78	22.79	11.00	0–35
Change in philosophy of life subscale	78	13.69	7.59	0–25
Change in self-perception subscale	78	33.23	12.34	0–45

A significant relationship was found between the "Changes in Philosophy of Life" subscale and the variable of time since diagnosis [*F* (3,74) = 3.261, $p < 0.05$]. *Post hoc* (Tukey) tests were conducted to determine which levels differed significantly. The results indicated that the group with a period of 48–60 months since diagnosis had significantly higher scores on the "Changes in Philosophy of Life" subscale of the PTGS compared to the groups with a period of 6–12 months and 12–24 months, at a significance level of 0.05. Specifically, the group with a period of 48–60 months since diagnosis (Mean = 21.57) had higher scores on the "Changes in Life Philosophy" subscale compared to the groups with a period of 24–48 months (Mean = 12.75) and 6–12 months (Mean = 11.83).

TABLE 3 Comparison of disease related variables with PTGS total and subscale scores.

	Posttraumatic growth scale total score				
Adequacy of knowledge on disease and treatment	Source of variation	Sum of squares	SD	Mean square	*F*
	Between groups	5,374,119	2	2,687,059	3,688*
	Within groups	54,645,676	75	728,609	
	Total	60,019,795	77		
	Change in self-perception subscale				
	Source of variation	Sum of squares	SD	Mean square	*F*
	Between groups	911,427	2	455,714	3,159*
	Within groups	10,820,419	75	144,272	
	Total	11,731,846	77		
Time since diagnosis (months)	Change in philosophy of life subscale				
	Source of variation	Sum of squares	SD	Mean square	*F*
	Between groups	518,108	3	172,703	3,261*
	Within groups	3,918,507	74	52,953	
	Total	4,436,615	77		

*$p < 0.05$.

As seen in Table 4, Total PTGS score had moderately positive significant correlation between confrontive coping ($r = 0.465$; $p < 0.01$) self-controlling ($r = 0.527$; $p < 0.01$), seeking social support ($r = 0.371$; $p < 0.01$), accepting responsibility ($r = 0.533$; $p < 0.01$), escape-avoidance ($r = 0.354$; $p < 0.01$), planful problem-solving ($r = 0.384$; $p < 0.01$) subscales, WCI total score ($r = 0.580$; $p < 0.01$), and highly positive correlation with positive reappraisal subscale ($r = 0.734$; $p < 0.01$). Distancing subscale had no significant correlation with PTGS total score.

"Change in Relationships with Others" subscale had moderately positive significant correlation between confrontive coping ($r = 0.401$; $p < 0.01$) self-controlling ($r = 0.491$; $p < 0.01$), seeking social support ($r = 0.392$; $p < 0.01$), accepting responsibility ($r = 0.513$; $p < 0.01$), escape-avoidance ($r = 0.322$; $p < 0.01$), planful problem-solving ($r = 0.361$; $p < 0.01$) positive reappraisal subscale ($r = 0.593$; $p < 0.01$) subscales and WCI total score ($r = 0.529$; $p < 0.01$). Distancing subscale had no significant correlation with "Change in Relationships with Others."

TABLE 4 Correlation between PTGS total, subscales scores and WCI, IPQ-R total and subscale scores.

Correlations	Posttraumatic growth scale total score	Change in relationships with others subscale	Change in philosophy of life subscale	Change in self-perception subscale
Posttraumatic growth scale total score	1	0.907**	0.846**	0.933**
Change in relationships with others subscale	0.907**	1	0.657**	0.755**
Change in philosophy of life subscale	0.846**	0.657**	1	0.712**
Change in self-perception subscale	0.933**	0.755**	0.712**	1
Confrontive coping	0.465**	0.401**	0.336**	0.487**
Distancing	0.176	0.164	0.146	0.162
Self-controlling	0.527**	0.491**	0.366**	0.529**
Seeking social support	0.371**	0.392**	0.065	0.451**
Accepting responsibility	0.533**	0.513**	0.309**	0.559**
Escape-avoidance	0.354**	0.322**	0.309**	0.320**
Planful problem-solving	0.384**	0.361**	0.299**	0.363**
Positive reappraisal	0.734**	0.593**	0.624**	0.746**
Ways of coping total Score	0.580**	0.529**	0.409**	0.585**
Identity A	−0.003	0.073	−0.011	−0.065
Identity B	−0.070	−0.004	−0.064	−0.116
Timeline (acute-chronic)	−0.262*	−0.252*	−0.217	−0.235*
Timeline (cyclical)	0.153	0.071	0.226*	0.144
Consequences	−0.017	0.020	−0.122	0.018
Personal control	0.098	0.126	0.078	0.062
Treatment control	0.045	0.065	−0.002	0.046
Illness coherence	−0.016	0.059	0.085	−0.140
Emotional represantations	0.075	0.074	0.053	0.072
Perception dimension total score	−0.033	0.019	−0.063	−0.053
Reasons dimension total score	0.108	0.066	0.182	0.074
Personal attributions	0.069	0.009	0.197	0.027
External attributions	0.124	0.132	0.196	0.042
Lifestyle attributions	−0.075	−0.056	−0.067	−0.078
Uncontrollable bodily attribution	0.118	0.020	0.100	0.188
Chance attributions	0.182	0.247*	0.050	0.159

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

"Change in Philosophy of Life" subscale had moderately positive significant correlation between confrontive coping ($r = 0.336$; $p < 0.01$) self-controlling ($r = 0.366$; $p < 0.01$), accepting responsibility ($r = 0.309$; $p < 0.01$), escape-avoidance ($r = 0.309$; $p < 0.01$), positive reappraisal subscale ($r = 0.624$; $p < 0.01$) subscales, WCI total score ($r = 0.409$; $p < 0.01$) and marginal moderately positive correlation with planful problem-solving ($r = 0.299$; $p < 0.01$). Distancing and seeking social support subscales had no significant correlation with "Change in Philosophy of Life."

"Change in Self-Perception" subscale had moderately positive significant correlation between confrontive coping ($r = 0.487$; $p < 0.01$) self-controlling ($r = 0.529$; $p < 0.01$), seeking social support ($r = 0.451$; $p < 0.01$), accepting responsibility ($r = 0.559$; $p < 0.01$), escape-avoidance ($r = 0.320$; $p < 0.01$), planful problem-solving ($r = 0.363$; $p < 0.01$) subscales, WCI total score ($r = 0.585$; $p < 0.01$), and highly positive correlation with positive reappraisal subscale ($r = 0.746$; $p < 0.01$). Distancing subscale had no significant correlation with "Change in Self-Perception."

According to the Illness Perception Scale-R, Timeline (acute/chronic) subscale had weak and negative significant correlation between PTGS total score ($r = -262$; $p < 0.05$), "Change in Relationships with Others" ($r = -252$; $p < 0.05$), and "Change in Self-Perception" ($r = -235$; $p < 0.05$) subscales. Timeline (cyclical) had weak and positive correlation with "Change in Philosophy of Life" subscale ($r = 226$; $p < 0.05$). From reasons dimension, change attribution subscale had weak and positive correlation between "Change in Relationships with Others" subscale ($r = 247$; $p < 0.05$).

As seen in Table 5, there was a significant relationship between the total and subscale PTGS scores (When the sample group is divided into low and high scores according to the median value) and the total and subscale WCI scores. Accordingly:

Patients who obtained higher total PTGS scores had higher scores for confrontive coping [$t(76) = -2.344$, $p < 0.05$], self-controlling [$t(76) = -3.704$, $p < 0.001$], accepting responsibility [$t(76) = -3.032$, $p < 0.01$], escape-avoidance [$t(75) = -2.285$, $p < 0.05$], planful problem-solving [$t(76) = -2.502$, $p < 0.05$], positive reappraisal [$t(76) = -5.241$, $p < 0.001$] subscales, and the total WCI score [$t(75) = -3.52$, $p < 0.01$].

Patients who obtained higher scores on the "Change in Relationships with Others" subscale had higher scores in confrontive coping [$t(76) = -2.023$, $p < 0.05$], self-controlling [$t(76) = -4.103$, $p < 0.001$], accepting responsibility [$t(76) = -3.292$, $p < 0.01$], escape-avoidance [$t(75) = -2.393$, $p < 0.05$], planful problem-solving [$t(76) = -2.077$, $p < 0.05$] positive reappraisal [$t(75) = -4.369$, $p < 0.001$] subscales, and the total WCI score [$t(75) = -3.446$, $p < 0.01$].

Patients who obtained higher scores on the "Change in Philosophy of Life" subscale had higher scores in confrontive coping [$t(76) = -1.976$, $p < 0.05$], self-controlling [$t(76) = -2.699$, $p < 0.01$], accepting responsibility [$t(76) = -1.969$, $p < 0.05$], escape-avoidance [$t(75) = -2.379$, $p < 0.05$], positive reappraisal [$t(76) = -5.124$, $p < 0.001$] subscales, and the total WCI score [$t(75) = -2.643$, $p < 0.05$].

Patients who obtained higher scores on the "Change in Self-Perception" subscale had higher scores in confrontive coping [$t(76) = -3.876$, $p < 0.001$], self-controlling [$t(76) = -4.683$, $p < 0.001$], seeking social support [$t(76) = -2.903$ $p < 0.01$], accepting responsibility [$t(76) = -4.162$, $p < 0.001$], escape-avoidance [$t(75) = -2.886$, $p < 0.01$], planful problem-solving [$t(76) = -2.973$,

TABLE 5 Comparison of posttraumatic growth scale total and subscale scores (Low-High) between ways of coping scale total and subscale scores.

Ways of coping		Change in relationships with others subscale			Change in philosophy of life subscale			Change in self-perception subscale			Posttraumatic growth scale total score		
		N	Mean ± SD	t	N	Mean ± SD	t	N	Mean ± SD	t	N	Mean ± SD	t
Confrontive coping	Low	38	7.89 ± 3.96	−2.023*	37	7.89 ± 3.90	−1.976*	37	7.18 ± 3.40	−3.876***	39	7.79 ± 3.78	−2.344*
	High	40	9.52 ± 3.12		41	9.48 ± 3.21		41	10.12 ± 3.27		39	9.66 ± 3.24	
Distancing	Low	38	11.39 ± 4.20	−1.371	37	11.83 ± 4.05	−0.393	37	11.59 ± 4.19	−0.907	39	11.61 ± 4.21	−0.909
	High	40	12.62 ± 3.71		41	12.19 ± 3.96		41	12.41 ± 3.78		39	12.43 ± 3.74	
Self-controlling	Low	38	9.50 ± 4.23	−4.103***	37	10.02 ± 4.53	−2.699**	37	9.24 ± 4.32	−4.683***	39	9.69 ± 4.40	−3.704***
	High	40	13.07 ± 3.43		41	12.51 ± 3.58		41	13.21 ± 3.12		39	12.97 ± 3.34	
Seeking social support	Low	38	11.28 ± 4.96	−1.651	37	12.13 ± 4.84	−0.034	37	10.64 ± 4.51	−2.903**	39	11.53 ± 4.99	−1.196
	High	40	12.97 ± 4.01		41	12.17 ± 4.34		41	13.51 ± 4.20		39	12.76 ± 4.04	
Accepting responsibility	Low	38	6.13 ± 3.07	−3.292**	37	6.51 ± 3.35	−1.969*	37	5.86 ± 2.77	−4.162***	39	6.23 ± 3.19	−3.032**
	High	40	8.20 ± 2.45		41	7.80 ± 2.40		41	8.39 ± 2.58		39	8.15 ± 2.34	
Escape-avoidance	Low	37	9.16 ± 3.86	−2.393*	36	9.13 ± 4.53	−2.379*	36	8.91 ± 3.93	−2.886**	39	9.23 ± 4.40	−2.285*
	High	40	11.32 ± 4.04		41	11.29 ± 3.39		41	11.48 ± 3.87		39	11.30 ± 3.51	
Planful problem-solving	Low	38	10.21 ± 4.34	−2.077*	37	10.45 ± 4.35	−1.498	37	9.78 ± 4.18	−2.973**	39	10.05 ± 4.17	−2.502*
	High	40	12.15 ± 3.89		41	11.87 ± 4.00		41	12.48 ± 3.84		39	12.35 ± 3.96	
Positive reappraisal	Low	38	10.63 ± 5.18	−4.369***	37	10.27 ± 4.96	−5.124***	37	10.16 ± 4.85	−5.415***	39	10.35 ± 4.80	−5.241***
	High	40	15.02 ± 3.59		41	15.24 ± 3.55		41	15.34 ± 3.55		39	15.4103 ± 3.6253	
Total	Low	37	103.24 ± 31.77	−3.446**	36	105.52 ± 33.66	−2.643*	36	99.50 ± 30.19	−4.637***	39	103.31 ± 31.74	−3.527**
	High	40	126.45 ± 27.28		41	123.87 ± 27.20		41	129.17 ± 25.95		39	126.97 ± 26.98	

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

$p < 0.01$], positive reappraisal [t (76) = −5.415, $p < 0.001$] subscales, and the total WCI score [t (75) = −4.637, $p < 0.001$].

As seen in Table 6, there was a significant relationship between the PTGS subscale scores (When the sample group is divided into low and high scores according to the median value) and the IPQ-R subscale scores. Accordingly:

Patients who obtained lower scores on the "Change in Relationships with Others" subscale had higher timeline (acute/chronic) scores [t (76) = 2.887, $p < 0.01$], and those who obtained higher scores on the "Change in Relationships with Others" subscale had higher change attribution scores [t (76) = −2.920, $p < 0.01$].

Patients who obtained higher scores on the "Change in Philosophy of Life" subscale had higher in external attribution scores [t (76) = −2.057, $p < 0.05$].

Patients who obtained lower scores on the "Change in Self-Perception" subscale had higher timeline (acute/chronic) [t (76) = 2.660, $p < 0.01$], timeline (cyclical) [t (76) = −2.788, $p < 0.01$], and uncontrollable bodily attributions [t (76) = −1.916, $p < 0.05$] scores.

In the stepwise regression analysis reported in Table 7, the order in which the subscales were included in the analysis was: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem-solving, positive reappraisal, identity A, identity B, timeline (acute/chronic), timeline (cyclical), consequences, personal control, treatment control, illness coherence and emotional representations, personal attributions, external attributions, lifestyle attributions, uncontrollable bodily attributions, and chance attributions.

As seen in Table 7, when three WCI subscales, namely positive reappraisal, distancing, and self-controlling, were included in the analysis, the total variance explained by these variables was 62%, and this was significant [F (3,73) = 39.814, $p < 0.001$]. Other variables that were not predictive of the total scores of the dependent variable were excluded fro*M* the regression analysis. When the contribution of these three variables in explaining the variance of the dependent variable was analyzed, positive reappraisal explained 51% of the variance [F (1,75) = 78.290, $p < 0.001$]; when distancing was included in the analysis, the variance explained increased to 55% [F (2,74) = 46.311, $p < 0.001$] and distancing negatively predicted PTG. When self-controlling was included in the analysis, the variance increased to 62% [F (3,73) = 39.814, $p < 0.001$].

When four of the WCI subscales, namely positive reappraisal, accepting responsibility, distancing, and self-controlling, were included in the analysis, the total variance explained by these variables was 46% and this was significant [F (4,72) = 15.531, $p < 0.001$]. Other variables that were not predictive of the "Change in Relationships with Others" subscale were excluded fro*M* the regression analysis. Among the four coping ways, positive reappraisal was found to explain the highest amount of variance, accounting for 33% of the total variance [F (1,75) = 37.607, $p < 0.001$]. When accepting responsibility was added into the analysis, the amount of variance explained increased to 37% [F (2,74) = 21.85, $p < 0.001$], while distancing was found to negatively affect "Change in Relationships with Others" and increased the amount of variance explained to 41% [F (3,73) = 17.369, $p < 0.001$]. Finally, when self-controlling was included in the analysis, the total amount of variance explained reached 46% [F (4,72) = 15.531, $p < 0.001$].

When three subscales of the WCI, namely positive reappraisal, seeking social support, and escape-avoidance, and the illness coherence subscale of the IPQ-R, were included in the analysis, the total variance explained by these variables was 50%, and this was significant [F (4,72) = 18.058, $p < 0.001$]. Other variables that were not predictive of the "Change in Philosophy of Life" subscale were excluded fro*M* the regression analysis. When the contribution of these four variables in explaining the variance of the "Change in Philosophy of Life" subscale was examined, it was seen that positive reappraisal explained 36% of the variance [F (1,75) = 42.897, $p < 0.001$], and when seeking social support was included in the analysis, the variance explained increased to 41% [F (2,74) = 26.557, $p < 0.001$], and seeking social support predicted "Change in Philosophy of Life" negatively. When escape-avoidance was included in the analysis, the variance explained increased to 46% [F (3,73) = 20.881, $p < 0.001$], and when illness consistency was included, the variance explained increased to 50% [F (4,72) = 18.058, $p < 0.001$].

When four subscales of the WCI, namely positive reappraisal, distancing, self-controlling, and accepting responsibility, were included in the analysis, the total variance explained by these variables was 68% and this was significant [F (4,72) = 38.329, $p < 0.001$]. Other variables that were not predictive of the "Change in Self-Perception" subscale were excluded fro*M* the regression analysis. When the contribution of these four variables in explaining the variance in "Change in Self-Perception" was examined, positive reappraisal explained 52% of the variance [F (1,75) = 83.174, $p < 0.001$], and when distancing was included in the analysis, the variance explained increased to 58% [F (2,74) = 52.244, $p < 0.001$] and distancing predicted the change in self-perception negatively. When self-controlling was included in the analysis, the variance explained increased to 65% [F (3,73) = 46.367, $p < 0.001$], and when accepting responsibility was included, the variance increased to 68% [F (4,72) = 38.29, $p < 0.01$].

The essential first-order causes of the participants' diseases can be seen in Table 8 and were found to be: 11 patients (14.1%) smoking-alcohol-nutritional problems, 12 patients (15.4%) environmental factors (Pollution, Chernobly, Virus,…), 4 patients (5.1%), hereditary, 36 patients (46.2%) stress-overwork, 5 patients (6.4%) emotional problems, 3 patients (3.8%) fate, 2 patients (2.6%) family problems, 1 patient (1.3%) aging, 2 patients (2.6%) sadness due to the Marmara earthquake, 1 patient (1.3%) playing with the skin (self-doctoring), 1 patient (1.3%) not being able to breastfeed.

The second most important causes of disease were found to be: 15 patients (19.2%) smoking- alcohol-nutritional problems, 9 patients (11.6%) environmental factors (Pollution, Chernobly, Virus,…), 8 patients (10.3%), hereditary, 14 patients (18%) stress-overwork, 6 patients (7.7%) emotional problems, 7 patients (9.0%) fate, 4 patients (5.1%) family problems, 1 patient (1.3%) aging, 1 patient (1.3%) sadness due to the Marmara earthquake, 4 patients (5.1%) life style/philosophy (e.g., Not being able to live in the moment), 4 patients (5.1%) medical negligence, 5 patients (6.4%) decreased body resistance.

The third most important causes of disease were seen to be: 7 patients (9.0%) smoking-alcohol- nutritional problems, 17 patients (21.8%) environmental factors (Pollution, Chernobly, Virus, Food from the Black Sea region), 7 patients (9.0%), hereditary, 13 patients (16.7%) stress-overwork, 6 patients (7.7%) emotional problems, 1 patient (1.3%) fate, 6 patients (7.7%) family problems, 2 patient (2.6%) aging, 1 patient (1.3%) early menarche, 9 patients (11.6%) life style/philosophy/personal traits, 2 patients (2.6%) medical negligence, 7 patients (9.0%) decreased body resistance.

TABLE 6 Comparison of posttraumatic growth scale subscale scores (Low-High) between illness perception questionnaire subscale scores.

Illness perception Questionnaire-Revised		Change in relationships with others subscale			Change in philosophy of life subscale			Change in self-perception subscale		
		N	Mean ± SD	*t*	*N*	Mean ± SD	*t*	*N*	Mean ± SD	*t*
Identity A	Low	38	6.42 ± 3.23	−0.954	37	6.56 ± 3.17	−0.536	37	6.51 ± 3.22	−0.681
	High	40	7.10 ± 3.05		41	6.95 ± 3.13		41	7.00 ± 3.08	
Identity B	Low	38	5.71 ± 3.40	0.211	37	5.56 ± 3.34	−0.151	37	5.62 ± 3.20	−0.016
	High	40	5.55 ± 3.32		41	5.68 ± 3.37		41	5.63 ± 3.49	
Timeline (acute-chronic)	Low	38	18.36 ± 6.24	2.887**	37	17.48 ± 7.10	1.559	37	18.27 ± 6.19	2.660**
	High	40	14.32 ± 6.12		41	15.21 ± 5.72		41	14.51 ± 6.26	
Consequences	Low	38	19.65 ± 5.74	0.700	37	19.29 ± 6.08	0.139	37	18.32 ± 5.64	−1.339
	High	40	18.77 ± 5.38		41	19.12 ± 5.09		41	20.00 ± 5.40	
Personal control	Low	38	21.68 ± 3.92	−1.596	37	22.27 ± 3.89	−0.273	37	21.78 ± 4.28	−1.332
	High	40	23.07 ± 3.77		41	22.51 ± 3.92		41	22.95 ± 3.44	
Treatment control	Low	38	22.10 ± 2.53	−0.451	37	22.70 ± 2.31	1.310	37	22.16 ± 2.72	−0.274
	High	40	22.40 ± 3.18		41	21.85 ± 3.26		41	22.34 ± 3.02	
Illness coherence	Low	38	18.55 ± 3.90	−1.036	37	18.81 ± 4.36	−0.497	37	18.91 ± 4.19	−0.285
	High	40	19.55 ± 4.55		41	19.29 ± 4.19		41	19.19 ± 4.35	
Timeline (cyclical)	Low	38	11.05 ± 3.80	−1.034	37	11.45 ± 3.80	−0.140	37	10.27 ± 3.85	−2.788**
	High	40	11.97 ± 4.06		41	11.58 ± 4.10		41	12.65 ± 3.70	
Emotional represantations	Low	38	17.73 ± 6.89	−0.106	37	17.16 ± 7.58	−0.815	37	16.62 ± 7.32	−1.499
	High	40	17.90 ± 6.71		41	18.41 ± 5.96		41	18.90 ± 6.10	
Perception dimension total score	Low	38	129.15 ± 15.24	0.352	37	129.18 ± 16.26	0.361	37	126.35 ± 15.52	−1.291
	High	40	128.00 ± 13.80		41	128.00 ± 12.76		41	130.56 ± 13.26	
Personal attributions	Low	38	19.28 ± 5.45	−0.246	37	18.48 ± 5.43	−1.375	37	18.94 ± 5.63	−0.721
	High	40	19.62 ± 6.51		41	20.34 ± 6.37		41	19.92 ± 6.31	
External attributions	Low	38	8.57 ± 2.75	−1.007	37	8.24 ± 2.73	−2.057*	37	8.59 ± 2.32	−0.932
	High	40	9.20 ± 2.69		41	9.48 ± 2.60		41	9.17 ± 3.04	
Lifestyle attributions	Low	38	6.23 ± 2.67	0.091	37	6.67 ± 3.06	1.339	37	6.13 ± 3.08	−0.197
	High	40	6.17 ± 3.24		41	5.78 ± 2.84		41	6.26 ± 2.88	
Uncontrollable bodily attribution	Low	38	6.89 ± 2.49	0.348	37	6.48 ± 2.61	−1.054	37	6.24 ± 2.12	−1.916*
	High	40	6.70 ± 2.45		41	7.07 ± 2.30		41	7.29 ± 2.64	
Chance attributions	Low	38	2.05 ± 1.46	−2.920**	37	2.32 ± 1.51	−1.201	37	2.48 ± 1.59	−0.289
	High	40	3.00 ± 1.39		41	2.73 ± 1.48		41	2.58 ± 1.43	
Reasons dimension total score	Low	38	43.05 ± 9.54	−0.721	37	42.21 ± 9.83	−1.412	37	42.40 ± 9.16	−1.249
	High	40	44.70 ± 10.57		41	45.41 ± 10.12		41	45.24 ± 10.72	

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

4. Discussion

In this study, which examined PTG in cancer patients within the scope of ways of coping and illness perceptions, no significant differences were found for PTG scores in terms of the basic socio-demographic variables (age, gender). This supports related literature that found no significant difference in terms of variables such as gender and age in relation to satisfaction with life, PTG, coping strategies, and resilience in cancer survivors (Adamkovic et al., 2022), and no significant differences between the PTG of female and male patients in the Predicting PTG Based on Coping Strategies in Women and Men Involved with Advanced Cancer study (Baghjari et al., 2017). However, our findings contrast research (Dobrikova et al., 2021) showing that female patients undergoing cancer treatment and in the last stage of the disease have significantly higher PTG (new possibilities, spiritual change subscales) than male patients in the same circumstances. Studies with cancer patients, who are a vulnerable and sensitive group, may yield statistically insignificant results when sample sizes are insufficient for subgroups based on variables such as age, gender, and cancer type. This situation often

TABLE 7 Predictors of posttraumatic growth scale total and subscale scores.

Posttraumatic growth scale total score										
							Change statistics			
Step	**Variable**	***B***	**Beta**	***R* Square**	**Adjusted *R* Square**	***F***	***R* Square Change**	***F* Change**	**SD**	**Sig *F* Change**
1	Positive reappraisal	4.080	0.715	0.511	0.504	78.290***	0.511	78.290	1,75	0.001
2	Distancing	−1.661	−0.236	0.556	0.544	46.311***	0.045	7.523	2,74	0.008
3	Self-controlling	2.188	0.339	0.621	0.605	39.814***	0.065	12.467	3,73	0.001

Change in relationships with others subscale										
							Change statistics			
Step	**Variable**	***B***	**Beta**	***R* Square**	**Adjusted *R* Square**	***F***	***R* Square Change**	***F* Change**	**SD**	**Sig *F* Change**
1	Positive reappraisal	1.323	0.578	0.334	0.325	37.607***	0.334	37.607	1,75	0.001
2	Accepting responsibility	0.904	0.238	0.371	0.354	21.855***	0.037	4.399	2,74	0.039
3	Distancing	−0.705	−0.250	0.417	0.393	17.369***	0.045	5.652	3,73	0.020
4	Self-controlling	0.771	0.298	0.463	0.433	15.531***	0.047	6.260	4,72	0.015

Change in philosophy of life subscale										
							Change statistics			
Step	**Variable**	***B***	**Beta**	***R* Square**	**Adjusted *R* Square**	***F***	***R* Square Change**	***F* Change**	**SD**	**Sig *F* Change**
1	Positive reappraisal	0.945	0.603	0.364	0.355	42.897***	0.364	42.897	1,75	0.001
2	Seeking social support	−0.422	−0.258	0.418	0.402	26.557***	0.054	6.863	2,74	0.011
3	Escape-avoidance	0.417	0.228	0.462	0.440	20.881***	0.044	5.966	3,73	0.017
4	Illness coherence	0.354	0.202	0.501	0.473	18.058***	0.039	5.621	4,72	0.020

Change in self-perception subscale										
							Change statistics			
Step	**Variable**	***B***	**Beta**	***R* Square**	**Adjusted *R* Square**	***F***	***R* Square Change**	***F* Change**	**SD**	**Sig *F* Change**
1	Positive reappraisal	1.812	0.725	0.526	0.520	83.174***	0.526	83.174	1,75	0.001
2	Distancing	−0.835	−0.271	0.585	0.574	52.244***	0.060	10.632	2,74	0.002
3	Self-controlling	0.999	0.354	0.656	0.642	46.367***	0.070	14.936	3,73	0.001
4	Accepting responsibility	0.877	0.212	0.680	0.663	38.329***	0.025	5.549	4,72	0.021

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

arises due to the challenging data collection process with sensitive this vulnerable group.

It was observed that the sample had above-average total scores for the PTGS (M: 69.72, Min.-Max.: 0–105) as well as for the three PTGS subscales: "Change in Relationships with Others," (M: 22.79, Min.-Max.: 0–35) "Change in Life Philosophy," (M: 13.69, Min.-Max.: 0–25) and "Change in Self-Perception." (M: 33.23, Min.-Max.: 0–45) The total and subscale PTGS scores were higher like in similar studies. For example, average PTG scores have been reported as 64.1 for breast cancer patients (Cordova et al., 2001), 54.2 for mixed-type cancer patients (Lechner et al., 2003), 46.6 for prostate cancer patients (Thornton and Perez, 2006), 47.8 for recurrent breast cancer patients

TABLE 8 The results regarding the reasons of cancer.

Reasons (1)	N	%	Reasons (2)	N	%	Reasons (3)	N	%
Smoking- alcohol- nutritional problems	11	14.1	Smoking alcohol- nutritional problems	15	19.2	Smoking alcohol- nutritional problems	7	9.0
Enviromental factors (Pollution, Chernobly, Virus,…)	12	15.4	Enviromental Factors (Pollution, Chernobly, Virus,…)	9	11.6	Enviromental Factors (Pollution, Chernobly, Virus, Food from the Black Sea region)	17	21.8
Hereditary	4	5.1	Hereditary	8	10.3	Hereditary	7	9.0
Stress-overwork	36	46.2	Stress-overwork	14	18	Stress-overwork	13	16.7
Emotional problems	5	6.4	Emotional problems	6	7.7	Emotional problems	6	7.7
Fate	3	3.8	Fate	7	9.0	Fate	1	1.3
Family problems	2	2.6	Family problems	4	5.1	Family problems	6	7.7
Attributed to aging	1	1.3	Attributed to aging	1	1.3	Attributed to aging	2	2.6
Sadness due to the Marmara eartquake	2	2.6	Sadness due to the Marmara eartquake	1	1.3	Early menarche	1	1.3
Playing with the skin (self-doctoring)	1	1.3	Life style/Philosophy (e.g. Not being able to live in the moment)	4	5.1	Life style/philosophy, personal traits	9	11.5
Not being able to breastfeed	1	1.3	Medical negligence	4	5.1	Medical negligence	2	2.6
–	–	–	Decreased body resistance	5	6.4	Decreased body resistance	7	9.0

(Ho et al., 2004), 64.67 for cancer patients after bone marrow transplantation (Widows et al., 2005), 68.09 for survivors of ovarian cancer (Oh et al., 2021), 65.68 for women diagnosed with breast cancer (Aydoğdu and Dirik, 2021), and 48.33 (Liu et al., 2020), and 69.01 (Li, 2022) for breast cancer patients.

Most previous studies used the five subscales of the PTGS. However, this study utilized the three-subscale version, which may be why the sample group experienced a higher level of PTG like in other studies. This finding is consistent with the existing literature. It is important to note that the PTG scores in this study are highly dependent on the study population and methodology, and should not be used to generalize across different groups. Additionally, individual scores may vary widely depending on various factors, such as stage and type of cancer, treatment experiences, and personal characteristics.

In the analysis examining whether disease-related variables differed based on the total and subscale scores of PTGS, significant results were obtained only for the variables "Time since diagnosis (months)" and "Adequacy of knowledge on disease and treatment." The level of posttraumatic growth in cancer patients has been found to have a significant relationship only with the "Changes in Philosophy of Life" subscale of the Posttraumatic Growth Scale. According to this relationship, patients who have passed 48–60 months since diagnosis have higher scores on the Changes in Philosophy Life subscale than those who have passed 6–12 and 24–48 months. In a study conducted by Sears et al. (2003) on early-stage breast cancer patients, the time elapsed since diagnosis was found to be associated with posttraumatic growth. It was revealed that a more extended time elapsed from diagnosis was a predictive factor for higher overall scores in posttraumatic growth. In a study on posttraumatic growth and the time elapsed since diagnosis, it is suggested that it may be stronger following diagnosis or the completion of treatment compared with after 1 or 2 years. This is attributed to individuals becoming accustomed to the disease over time and becoming automatic (Stanton et al., 2006). In their longitudinal study on breast cancer patients, Manne et al. (2004) discuss a consistent and significant increase in posttraumatic growth scores after approximately 18 months. Cordova et al. (2001) found that the time elapsed since breast cancer diagnosis was positively associated with posttraumatic growth in participants who had been diagnosed with cancer for 5 years or less and had completed their treatments at least 2 months ago. Weiss (2004) examined posttraumatic growth in spouses of breast cancer patients and included individuals diagnosed 1–5.5 years ago, with a time elapsed since diagnosis ranging from 15 to 66 months. The time elapsed since diagnosis was weakly correlated with spouses' posttraumatic growth scores, and a shorter time since diagnosis was positively correlated with posttraumatic growth scores. Lechner et al. (2003) did not find a significant difference in the benefit of time elapsed since diagnosis in cancer patients. Widows et al. (2005) also found no significant difference in the time elapsed since bone marrow transplantation. The studies mentioned above do not provide a direct comparison opportunity for the "Changes in Philosophy of Life" subscale of the posttraumatic growth scale because they were either included in the five subscales of their analyses or based on total scores. However, as seen, there are studies conducted with patients who have passed 5 years (Ho et al., 2004), generally considering approximately 12–18 months as a high probability for posttraumatic growth to occur. In this study, however, it is observed that the group with a time elapsed of 48–60 months receives higher scores in the Changes in Philosophy of Life subscale. This may be attributed to philosophical change requiring a long process of adaptation and integration.

Analyzed based on the variable of the adequacy of knowledge about the disease and treatment, a significant relationship was found between the "Total Score of Posttraumatic Growth Scale" and the "Change in Self-perception" subscale. It was observed that those who indicated "insufficient (partially)" knowledge about their disease and treatment received higher scores compared to those who indicated "none" in terms of the "Total Score of Posttraumatic Growth." Similarly, a significant relationship was found between those who indicated "insufficient (partially)" and "none" in the "Change in Self-perception" subscale, where those who indicated "insufficient (partially)" received higher scores compared to those who indicated "none." These results indicate that even partially knowing their illness enables patients to achieve higher posttraumatic growth scores than not knowing at all. As stated by Armay (2006), individuals' levels of knowledge about their diseases can be determining factors in their reactions. Adequacy of knowledge can facilitate coping, eliminate catastrophic perceptions, and positively affect reactions related to the illness.

On the other hand, knowledge inadequacy can lead to increased anxiety, difficulties in treatment adherence, and delayed recovery. In light of this information, the finding is consistent with the knowledge that being partially knowledgeable about the disease can eliminate catastrophic perceptions and lead to positive reactions, compared to not knowing. Also, according to Boyacıoğlu et al. (2022), higher knowledge about disease positively affects PTG.

Regarding the correlation analysis, total PTGS and subscale scores had a moderately positive significant correlation between WCI total and subscale scores except "distancing." Moreover, the "seeking social support" subscale had no significant correlation with "Change in Philosophy of Life. According to the Posttraumatic Growth (PTG) model proposed by Tedeschi and Calhoun, coping stands out as a fundamental element. It has been argued that coping and posttraumatic growth are synonymous in the history of the concept (Calhoun and Tedeschi, 1998). This study also reveals a high positive correlation between positive coping ways and PTG. Baghjari et al. (2017) found no correlation between emotion-focused coping and PTG, while Baník et al. (2022) stated that existential factors (such as religious beliefs) associated with PTG have a linear, while posttraumatic stress symptoms have a curvilinear correlation. Schmidt et al. (2012) demonstrated in their study involving 54 cancer patients that active coping, positive reframing, and religion are associated with PTG. Similarly, Jaafar et al. (2021) established that approach coping strategies are related to PTG.

According to the Illness Perception Questionnaire-R, Timeline (acute/chronic) subscale had a weak and negative significant correlation between PTGS total score "Change in Relationships with Others," and "Change in Self-Perception" subscales. Timeline (cyclical) had a weak and positive correlation with the "Change in Philosophy of Life" subscale. Fro*M* the reasons dimension, the change attribution subscale had a weak and positive correlation with the "Change in Relationships with Others" subscale. It is known that individuals' sense of having control over traumatic events and attributions to the occurrence of traumatic events are important in terms of growth and psychopathology (Şalcıoğlu, 2003; Cao et al., 2018). In our study, there is a weak and negative correlation between variables, and it is believed that the sense of being able to achieve well-being after the illness is associated with posttraumatic growth. There is limited literature on illness perception and posttraumatic growth. However, Rahimzadegan et al. (2022) reported that negative illness perception is negatively correlated with posttraumatic growth, while positive illness perception is positively correlated in cancer patients. Rogan et al. (2013) stated that a firm belief in the controllability of symptoms associated with brain damage and adaptive coping strategies are related to posttraumatic growth.

The study also examined whether there was a significant difference between ways of coping and illness perceptions based on grouping the total and subscale PTG scores into "Low" and "High" categories. It was observed that all except the distancing subscale of the WCI, differed relative to the total or at least one of the PTGS subscales in favor of those with high scores (Please refer to Table 3 for the mean values in favor). Rogan et al. (2013) found that adaptive coping strategies were associated with higher levels of PTG in individuals diagnosed with acquired brain injury. Baghjari et al. (2017) reported that cognitive appraisal and seeking social support among problem-focused coping strategies explained PTG in advanced cancer patients, suggesting that clinical interventions such as problem-focused coping skills training and facilitating social support could be beneficial. Lelorain et al. (2012) conducted a qualitative study and revealed that PTG was a specific theme for women who possessed high levels of coping skills. Previous studies generally demonstrate that the use of functional coping strategies increases PTG, and even escape-avoidance coping strategies can become functional and effective in PTG. Fro*M* this perspective, our findings regarding coping strategies are consistent with the literature and indicate that coping strategies are an important variable in PTG.

Regarding the IPQ-R (illness perceptions), no significant difference was found relative to the total PTGS scores. For the PTGS subscales, those who scored higher on the "Change in Philosophy of Life" subscale had higher external attribution scores than those who scored lower. When the "Change in Self-Perception" subscale was analyzed, timeline (acute-chronic) scores differed in favor of those with low scores; likewise, the timeline (cyclical) and uncontrollable bodily attribution subscales also differed in favor of those with high scores. There was differentiation based on the timeline (acute-chronic) factor in favor of those who scored low on the "Change in Relationships with Others" subscale. In terms of the causes of illness, attributing the illness to chance factors created a difference in "Change in Relationships with Others." It was observed that individuals who scored high on this subscale tended to attribute their illness more to chance factors compared to those who score low (Please refer to Table 4 for the mean values in favor).

In recent years, only a few studies have considered both PTG and illness perceptions together. For example, in Rogan et al.'s (2013) study of individuals who had acquired brain injury, there was no significant correlation between illness perceptions and PTG; the only result was that higher levels of PTG were associated with increased utilization of stronger beliefs about treatment-induced controllability ($r = 0.263$). Furthermore, Lau et al. (2018) examined the relationship between illness perceptions and PTG in newly diagnosed HIV-positive men. Linear regression analyses indicated that the emotional representation subscale and five cognitive representation subscales (timeline, consequences, identity, God's punishment/will, and luck/chance attribution) were negatively associated with PTG. However, another four cognitive representations (coherence, treatment control, personal control, and attribution to carelessness) were positively associated with PTG. The emotional representation entirely mediated the relationships between the five cognitive representation subscales and PTG. Rahimzadegan et al.'s (2022) study of PTG and illness perceptions in cancer patients, showed that negative illness perceptions had a significant and negative relationship with PTG, while optimistic illness perceptions had a significant and positive relationship with PTG ($p < 0.05$). Taken together, these results indicate the need for interventions that promote PTG in cancer patients, particularly interventions that target illness perceptions, especially emotional representation.

According to the results of the stepwise regression analysis conducted to determine what variables predicted the total PTG score, three WCI subscales––positive reappraisal, distancing, and self-controlling––were found to have predictive effects. It was observed that distancing negatively predicted PTG, while "Change in Relationships with Others" was predicted by a combination of positive reappraisal, accepting responsibility, distancing, and self-controlling, but negatively predicted by distancing. The combined variables of positive reappraisal, seeking social support, escape-avoidance, and illness coherence predicted "Change in Philosophy of Life," while seeking social support negatively predicted "Changes in Philosophy of Life." "Change in Self-Perception" was predicted by positive reappraisal, distancing, self-controlling, and accepting responsibility, but negatively predicted by distancing.

Oh et al. (2021) found that religion, ways of coping and posttraumatic stress symptoms explained 52.2% of PTG in ovarian cancer survivors. Baghjari et al. (2017) found that problem-oriented coping strategies, cognitive assessment, and seeking social support explained 53% of PTG changes ($p < 0.001$) in advanced cancer patients; however, emotion-oriented strategies, including emotional inhibition and somatic inhibition, had no significant relation with PTG, while the regression model revealed that using problem-oriented strategies can predict the rate of PTG. Schmidt et al. (2012), in a cancer patient regression analysis, suggested that using positive reframing and religion as coping strategies may mediate the relationship between secure attachment and PTG. Widows et al. (2005), in a study exploring PTG after bone marrow transplantation, found that greater use of positive reappraisal, problem-solving, and seeking alternative rewards coping methods before transplantation was associated with higher PTG. Ho et al. (2004) found that positive coping was the most crucial predictor of PTG compared to negative coping in a study of cancer survivors in China. Sears et al. (2003), in their study of patients with early-stage breast cancer, found that positive coping benefited PTG and coping styles are interconnected but separate processes; they also found that seeking more social support was associated with PTG. Thornton and Perez (2006) investigated PTG in prostate cancer survivors and their spouses, in terms of coping 1 year after surgery; having a positive approach and using emotional support were found to be associated with PTG for both the patients and their spouses. In different studies dealing with different variables, the predictors of PTG emerge as variables with similar dynamics. As seen in the studies above, variables such as seeking social support, religious coping, confronting the problem are important in the predictors of PTG.

The results of both the independent group t-test analysis and the regression analysis of the ways of coping and illness perceptions data showed especially that ways of coping are essential for cancer patients to experience positive change. This study and previous studies reveal that coping mechanisms such as confrontation, positive reappraisal, and seeking social support are particularly important. In terms of illness perceptions, there have been a limited number of studies in the field, but when this and other studies (e.g., Rogan et al., 2013; Lau et al., 2018; Rahimzadegan et al., 2022) are examined, it can be seen that attributions regarding the timeline of the disease, reasons, and idea on the disease prognosis are important in PTG. Considering that these variables are related to the cognitive evaluation processes of individuals and cognitive ways of coping, especially positive reappraisal and problem-solving, this is an important finding. It is thought that strengthening positive ways of coping in approaching cancer patients may also positively affect the disease perception process. Finally, the fact that similar findings were obtained in this study of data collected in 2007 and previous studies published before 2022 strengthens the consistency of this information and the necessity of focusing on ways of coping in interventions.

When patients in the sample group were asked about the three most important causes of their cancer, the first reason given was stress/overwork at 46.2%, the second was Smoking Alcohol-Nutritional problems at 19.2%, and the third was environmental factors (Pollution, Chernobly, Virus, Food from the Black Sea region at 21.8%). Smoking, overwork, nutritional problems, fate, bad luck, personality traits, etc. were also seen to be causal issues. Some of the unique answers given were: Chernobyl-radiation (in terms of patients living in the Black Sea region), earthquake-related sadness, playing with the skin (self-doctoring), not being able to breastfeed, keeping problems inside, medical negligence, not being able to live in the moment/self, foods from the Black Sea region, and early menarche.

References to geographical and environmental events such as earthquakes and the Chernobyl disaster were relatively high. In addition, culture-specific attributions, such as not being able to breastfeed children and having early menarche, stood out among women. The not being able to live in the moment/not being able to live oneself reason for getting cancer was an interesting finding. As Yalom (2002) states, "Most cancer patients know that they are living more fully now, they are no longer postponing their lives to a future period. The individual realizes that they can only live in the present moment." (pp. 263). This finding can be interpreted as a punishment/reward for not being able to "exist" before having cancer.

5. Limitations

Although the present study contributes to the existing literature on PTG in cancer patients, particularly for the Turkish population, it has several limitations. Firstly, the study employed a cross-sectional design, which limited the ability to establish causal relationships between variables. A longitudinal design would be more appropriate for exploring the precise relationships between variables. Secondly, one of the main limitations of the study was the small sample size. However, considering the challenging nature of collecting data from special groups like cancer patients (e.g., obtaining participant consent, scheduling interviews during suitable physical health conditions, etc.), even data from a single individual can be considered valuable. However, this study compared 2007 data with the findings of current publications on the topic and observed similarities in results across different sample sizes. This provides support for the study despite its limited scope. Eventually, the limitation is that some subscales in the reasons dimension of the Illness Perception Questionnaire has low reliability coefficients. However, the scale has been adapted in Turkey and is used as a reliable measure. The low reliability coefficients of the subscales may be due to the small number of items, typically 2–3, in those subscales.

6. Conclusion

Receiving a cancer diagnosis and living with this disease is an inevitable and traumatic reality. This traumatic event affects the patient and many individuals who witness the process, including their loved ones. This impact can be damaging, such as the development of psychiatric disorders. However, it can also manifest positively under the concept of "posttraumatic growth," which has gained increasing importance in the literature and continues to do so. Examining ways of coping and individuals' perceptions of their traumatic experiences, which are believed to be influential in positive growth following traumatic experiences, is particularly important for developing intervention approaches. The critical point in these intervention approaches is to focus on the perception of the illness and ways of coping to keep hope alive in patients. In addition, since each type of cancer has its dynamics (for example, breast cancer is related to the image of femininity) and process (stage and course of the disease), these features should be considered in individual intervention approaches and group work.

This study investigated PTG, ways of coping, and illness perceptions in cancer patients, highlighting the need to strengthen positive coping methods and implement interventions that target the cognitive aspects of their illness perceptions. This study was one of the first to explore PTG in cancer patients in Turkey. Considering the culture-specific differences in illness experiences, the emergence of similar findings to studies of the same topic in different cultures and at different times underscores the significance of the findings. This sheds light on the importance of ways of coping and PTG for our understanding of other traumatic experiences, particularly those related to other chronic illnesses.

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 humans were approved by the Istanbul University Medical Faculty. The studies were conducted in accordance with the local legislation and institutional requirements. The 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.

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Conflict of interest

Publisher's note

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Expert opinions on informational and supportive needs and sources of obtaining information in patients with inflammatory bowel disease: a Delphi consensus study

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Background: The present study introduces informational and supportive needs and sources of obtaining information in patients with inflammatory bowel disease (IBD) through a three-round Expert Delphi Consensus Opinions method.

Methods: According to our previous scoping review, important items in the area of informational and supportive needs and sources of obtaining information were elucidated. After omitting duplicates, 56 items in informational needs, 36 items in supportive needs, and 36 items in sources of obtaining information were retrieved. Both open- and close-ended questions were designed for each category in the form of three questionnaires. The questionnaires were sent to selected experts from different specialties. Experts responded to the questions in the first round. Based on the feedback, questions were modified and sent back to the experts in the second round. This procedure was repeated up to the third round.

Results: In the first round, five items from informational needs, one item from supportive needs, and seven items from sources of obtaining information were identified as unimportant and omitted. Moreover, two extra items were proposed by the experts, which were added to the informational needs category. In the second round, seven, three, and seven items from informational needs, supportive needs, and sources of obtaining information were omitted due to the items being unimportant. In the third round, all the included items gained scores equal to or greater than the average and were identified as important. Kendall coordination coefficient W was calculated to be 0.344 for information needs, 0.330 for supportive needs, and 0.325 for sources of obtaining information, indicating a fair level of agreement between experts.

Conclusions: Out of 128 items in the first round, the omission of 30 items and the addition of two items generated a 100-item questionnaire for three sections of informational needs, supportive needs, and sources of obtaining information with a high level of convergence between experts' viewpoints.

KEYWORDS

inflammatory bowel diseases, needs assessment, informational need, information seeking behavior, consumer health information, supportive needs, psychosocial need, Delphi technique

1. Introduction

The increasing prevalence of inflammatory bowel disease (IBD) in developed and developing countries imposes a significant burden on healthcare systems (Calvet et al., 2014), which has led to an emerging global health concern (Molodecky et al., 2012). IBD mainly appears in two forms: ulcerative colitis (UC) and Crohn's disease (CD). Chronic immune-mediated inflammatory gastrointestinal impairments are the underlying causes of multiple acute life-threatening complications, such as toxic megacolon, sepsis due to penetrating disorder, and thromboembolism (Carter et al., 2004). Although the exact etiology of IBD remains elusive, a complex interaction of genetic (Orholm et al., 1991) and environmental (Danese et al., 2004) factors is found to be responsible for the abnormal activation of the mucosal immune system (Baumgart and Carding, 2007). Both disorders are characterized by periods of remission and active intestinal inflammation, such as diarrhea and abdominal pain, that may even result in hospitalization (Langholz et al., 1994; Munkholm et al., 1995). Additionally, UC and CD increase the risk of colorectal cancer by up to 18% (Eaden et al., 2001). Associated primary sclerosing cholangitis may lead to cholangiocarcinoma. Accordingly, IBD patients are prone to high mortality, either directly or indirectly (Selinger et al., 2013). Because of the chronic nature of these disorders, their unpredictable disease course, their onset at young ages, and the high cost of medical and surgical treatments, they cause social isolation and mood disorders such as depression and anxiety (Sajadinejad et al., 2012; Moradkhani et al., 2013; Williet et al., 2014).

IBD is historically managed in a reactive and crisis-driven mode rather than proactive (Crohn's and Colitis Australia, 2013). Several models of care have been developed for IBD and can be used to overcome certain barriers to quality care. The WHO proposes an integrated approach to improve care quality and avoid disease complications (Jackson and De Cruz, 2019). It is patient-centered and involves patients in service developments; it includes an action plan for follow-up, contains education, incorporates a detailed evaluation of biopsychosocial functioning, and has a dedicated nurse for care coordination (Mikocka-Walus et al., 2012). This approach reduces the frequency of clinic visits, hospitalizations, and polypharmacy, which decreases healthcare costs (Mikocka-Walus et al., 2013).

However, such an integrated model of care is not accessible to all IBD patients, and only large tertiary centers can provide such multidisciplinary care. Another model of care for IBD patients is participatory care, in which patients play a role in the management of the disease. A collaboration is formed between the patient and the physician, while the patient is responsible for driving the healthcare system. Various electronic health tools (Eysenbach and CONSORT-EHEALTH Group, 2011), including web-based platforms, smartphone applications, telemedicine, and decision-support instruments, facilitate the implementation of this model of care. The participatory model promotes patient engagement, augments monitoring of the disease condition, and makes easy earlier intervention (Jackson et al., 2016). Value-based healthcare has recently emerged as a model of care that aims to improve quality in healthcare. It evaluates health outcomes and associated costs at the disease level (van Deen et al., 2015). This model is ultimately designed to overcome hurdles related to care costs (van Deen et al., 2017).

In recent years, the focus of disease management has been on patients rather than their disease. Patients with enhanced knowledge show a higher quality of life and are eager to obtain more information about their disease (Bernstein et al., 2011). Hence, elevating the perception of patients about IBD and its treatment options through care optimization by improving the information provided and augmenting education increased the quality of life and reduced depression and anxiety (Elkjaer et al., 2008). However, educating patients alone is not enough, and self-care strategies also improve disease symptoms, psychological wellbeing, and the use of healthcare resources (Barlow et al., 2010). A study showed that patients who had been trained in self-management care demonstrated higher confidence, had more ability to deal with their condition, experienced fewer hospitalizations, and maintained their quality of life at an appropriate level (Kennedy et al., 2004).

Evidence-based medicine (EBM) uses the best-known findings from current clinical care research diligently and wisely to integrate clinical expertise and manage individual patients (Hohmann et al., 2018). Although EBM is an outstanding approach, it has not yet been sufficiently developed for certain topics with a lack of evidence or uncertainty (Powell, 2003; Keeney et al., 2006). In such circumstances, a consensus opinion of experts is a suitable alternative. One of the available methods in this regard is the Delphi method. In this study, a panel of experts was established without any face-to-face data exchange. Data were collected by distributing sequential questionnaires in at least two rounds. Experts were informed about the feedback from each round in an anonymous way, and finally, an opinion systematically emerged (Hohmann et al., 2018). The advantages of the Delphi method are anonymity, controlled feedback, and statistical group responses (Dalkey and Helmer, 1963; Dalkey, 1969).

Data regarding indices of supportive needs, information needs, and sources of obtaining information for IBD patients are scarce. It is important to elucidate such indices from the perspective of experts, who are routinely involved in the management of these patients. Moreover, the level of knowledge of IBD patients in developing countries such as Iran is significantly lower compared with their peers in developed regions. This then leads to undesirable consequences such as late diagnosis (Rezailashkajani et al., 2006). Owing to the importance of self-empowerment in patients with IBD and identifying informational and supportive needs and sources of obtaining information, the present study was designed to fill this gap via a Delphi consensus study.

2. Methods

2.1. Study design and registration protocol

A Delphi consensus study was designed to identify informational and supportive needs and sources of information for patients with IBD. This research was approved by the Institutional Ethics Committee of Mashhad University of Medical Sciences (IR.MUMS.REC.1400.230).

2.2. Motivations for the choice of the Delphi methodology

Based on a scoping review, the current Delphi study is the second phase of investigations in the era of self-care aspects in patients with IBD (Norouzkhani et al., 2023). In the scoping review, important parameters such as informative, psychological, and supportive elements for IBD patients were extracted from the literature and reported. Owing to the various opinions on disease diagnosis and management, formal group consensus methods can deliver objective and subjective judgments. In addition, formal group consensus methods include a wide range of knowledge and experience, interaction between members, and stimulating constructive debate. Therefore, the scientific research committee team identified parameters that need to be evaluated, scrutinized, ranked, and weighted specifically by experts. In this way, upcoming investigations, such as those of interventional procedures, are feasible based on expert-filtered data. To summarize, because the findings of the scoping review are the prerequisite for conducting the next phase, Delphi consensus is the option of choice to integrate diverse viewpoints from experts in the field. The main steps of the Delphi approach are illustrated in Figure 1.

2.3. Research questions

The current study aims to seek answers to the following questions:

What is the experts' opinion on the informational needs of patients with IBD?
What is the experts' opinion on the supportive needs of patients with IBD?
What is the experts' opinion on sources for obtaining information on patients with IBD?

2.4. Identification and selection of experts

A steering committee consisting of experts in the field of IBD was identified and selected. They were responsible for performing, leading, and supervising all the research steps. These experts were in well known national specialists in the field of IBD. This team also defined certain criteria, primarily based on the regulations of the European Food Safety Authority (Authority, 2014), for selecting experts who were responsible for responding to the questionnaires. These inclusion criteria were years/type of experience, vocational qualifications, related references, publications, awards, conference presentations, academic qualifications, and teaching experiences. Other criteria, such as expressing judgments and experiences of risk assessment, were also considered. A steering committee first assessed the feasibility of the types of specialty for responding to the questionnaires and then attempted to identify them. Main national experts in the field of IBD were mapped according to the existing databases/literature/knowledge or those with the most relevant publications in this area through Internet searches. Even those with opposing views were invited. At this point, their CVs were requested if they were not found in the public database. Those experts who did not respond to the questionnaires after 14 days were excluded from the study. All the invited experts were asked to sign a form informing them about the study's subject and objectives, its duration, and approximate round numbers to show their agreement to participate.

In the current study, two sampling methods were used to establish the panel of experts. Initially, purposive sampling was utilized to select the first line of experts based on defined criteria. Then, snowball sampling was used to accelerate the process of finding experts and increase the number of panel members. First-line experts were asked to introduce other experts in accordance with the defined criteria. This method of selecting panel members was used because the researchers' committee had no precise information about their expertise, which significantly affected the study's outcome. Furthermore, because experts in a specific field usually knew each other well in the context of a scientific community, more experts were found in a shorter period of time. Indeed, experts communicate with each other more easily based on previous familiarity, and hence, they accept participation and membership in the panel more readily compared with invitations from the researchers' committee. The average age of the experts was 44.89 ± 6.44 years, and 56.14% of them ($n = 32$) were men. All of them were academics in universities and research institutes and were gastroenterologists ($n = 24$, 42.11%), psychologists/psychiatrists ($n = 16$, 28.07%), or nurses ($n = 17$, 29.82%). The total years of experience of the experts in the field of IBD were 15.49 ± 5.58 years. Table 1 depicts the number of panel members, their field of specialty, and the duration of their work experiences.

2.5. Design of the preliminary questionnaire and implementation of the pilot study

Our scoping review (Norouzkhani et al., 2023) identified important items in the informational needs, supportive needs, and sources of obtaining information. After omitting duplicates, 56 items in information needs, 36 items in supportive needs, and 36 items in sources of obtaining information were identified. Based on the retrieved items, specific questions were designed for each section, ultimately leading to a questionnaire with both open- and close-ended questions. The questionnaire was sent to four experts to find any possible pitfalls and misunderstandings within the questions. These experts were selected from three different provinces (Tehran, Khorasan Razavi, and Mazandaran). They discussed all the questions in the preliminary questionnaire and decided to replace some of them with more understandable questions with more suitable keywords if necessary. The experts proved the validity of the questionnaire and its content validity upon reaching a common understanding of the questions in line with the subject of the study. To check the reliability, Cronbach's alpha was calculated. Moreover, a test-retest examination was conducted for the questionnaires of the first and second rounds. As indicated in Tables 2–4, a 5-point Likert scale was defined, including one score for very low, two scores for low, three scores

FIGURE 1
Main steps of Delphi consensus implemented in the present study.

TABLE 1 Characteristics of panel members.

Specialty	*N*	Duration of work experiences (years)		
		<10	10–15	>15
Gastroenterology and hepatology (academic staff)	24	3	6	15
Psychiatry or clinical psychology (academic staff)	16	3	8	5
Nurse	17	2	5	10
Total	57	8	19	30

for moderate, four scores for high, and five scores for very high importance. In each section, the mean score was calculated for every question based on the received scores from all the experts, and this mean was considered for assigning the item to the low (<3) or high importance (≥ 3) category. If the question gained a high score, which means high importance, it was included in the next round of the questionnaire. Otherwise, it was omitted.

Experts who participated had no direct interaction with each other, and data were exchanged via an Internet-based platform without physical contact. Generally, in this method, experts were asked to send their responses and any possible comments on consecutive questionnaires according to the cumulative feedback from the previous round. The feedback helped the experts to reevaluate, modify, or expand the comments (Windle, 2004). The promising advantage of such an approach is that it ensures anonymity for the participants. Such anonymity ensures that no specific expert would have a dominant effect on others' opinions (Dalkey, 1969; Landeta, 2006), allowing all individuals to have the same opportunity to express their own opinions. This way, it facilitates the free expression of ideas and helps acquire sufficient insight and knowledge in the field (Walker and Selfe, 1996; Turoff and Linstone, 2002; Ali, 2005).

A web-based platform was used for sending the first round of questionnaires. An analysis of the responses collected from the first round formed the basis for the preparation of the second round questionnaire. Based on the results from the first round, five questions out of 56 in the information needs section, one out of 36 in the supportive needs section, and seven out of 36 in the information sources section had scores lower than the mean. Hence, these questions were regarded as having low importance and omitted from the questionnaire. Moreover, experts agreed to add one item (fasting) to the information needs section and another one (acquiring psychological skills) to the supportive needs section. They believed that these two are effective in recognizing information and supportive needs in IBD patients. The second round of questionnaires and the results of the first round were sent to the experts via the web-based platform. The experts were informed in detail about the changes. Experts' comments were collected in the second round and combined to provide scoring for each question. Based on the findings extracted from the

TABLE 2 **First round questions of Information needs of patients with inflammatory bowel disease.**

In your opinion, how important are these information in educating and meeting the information needs of patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
1	"General information about inflammatory bowel diseases"					
2	"Etiology"					
3	"Information on epidemiological results and pathogenesis"					
4	"Disease course and progress"					
5	"Clinical symptoms/appearance"					
6	"Defecation information"					
7	"Information on the anatomy/physiology of the digestive system"					
8	"Information on diagnostic methods including (types of diagnostic methods, risk of diagnostic methods and information on the interpretation of diagnostic tests)"					
9	"Prognostic information/long-term outcomes"					
10	"Information on risk factors/disease flare-up"					
11	"Prevention from recurrence and disease control"					
12	"Required actions during recurrence"					
13	"Extra-intestinal appearance/disease complications"					
14	"Cancer information"					
15	"Infection risk information"					
16	"Information related to co-morbidities and its management"					
17	"Information related to the mortality of inflammatory bowel disease"					
18	"Treatment and its side effects"					
19	"Medications and their side effects"					
20	"New research information and progress in inflammatory bowel diseases"					
21	"Participating information in research studies"					
22	"Adherence to medications"					
23	"Surgery information"					
24	"Information on non-pharmacological treatments"					
25	"Information on alternative and complementary medicine"					
26	"Information about COVID.19"					

(Continued)

TABLE 2 (Continued)

In your opinion, how important are these information in educating and meeting the information needs of patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
27	"Vaccination information"					
28	"Lifestyle and daily life information"					
29	"Information risky behaviors such as smoking" in educating and meeting the information needs of patients					
30	"Nutrition information"					
31	"Nutritional deficiency information"					
32	"Nutritional supplement information"					
33	"Enteral nutrition information"					
34	"Exercise or physical activity information"					
35	"Rehabilitation information"					
36	"Travel information"					
37	"Pain management and related symptoms"					
38	"Disease management and self-care information including (adjustment of medication according to conditions, individual patient follow-up plan, empowerment for self-management in relapse, home remedies, ...)"					
39	"Coping and living inflammatory bowel disease"					
40	"Information about social communication aspects"					
41	"Stories and experiences about dealing with the disease of other patients"					
42	"Disease control and struggling against stress and psychological issues"					
43	"Information on quality of life"					
44	"Information on religious and spiritual issues to deal with the disease"					
45	"Information related to gynecological issues"					
46	"Information about sexual relationship"					
47	"Information related to heredity/genetic information/microbiome"					
48	"Informing to the family or any other influential people"					
49	"Information related to the family (matters affecting the patient's family, effective training for the patient's family)"					

(Continued)

TABLE 2 (Continued)

In your opinion, how important are these information in educating and meeting the information needs of patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
50	"Information about work-related issues"					
51	"Interventions for sanitary and preventive care"					
52	"Social-health resource information"					
53	"Information about Hospitals/physicians"					
54	"Information related to when to see a doctor in case of symptoms emergence"					
55	"Information on legal and political aspects"					
56	"Information about insurance coverage/financial support/treatment and drug costs"					

second round, a third round of questionnaires was designed. Seven questions out of 52 in the information needs section, three out of 36 in the supportive needs section, and seven out of 29 in the information sources section were found to have scored lower (<3) than the mean. These questions were regarded as having low importance and omitted from the questionnaire. At this step, no further items were proposed for adding to the questionnaire. After sending the new questionnaire to the experts and collecting their comments, they were subjected to analysis.

2.6. Ceasing the rounds

After the third round, analysis of the responses showed that the scores for all the questions were higher than the mean. The experts proposed no new statements at this stage. Furthermore, the results of all three rounds of this Delphi approach showed that experts' consensus had been reached for the following reasons: (1) No statement was omitted or added in the third round, (2) given that the number of respondents was more than 10 individuals and the Kendall coefficients were 0.330, 0.344, and 0.325 in three sections at the third round, a completely meaningful condition was deduced, and (3) there was a slight difference between the second and third rounds without significant growth in the Kendall coefficient.

2.7. Calculation of the weight and scales of the items

After finalizing the identification of important items in three sections, the weight and scale of each item were determined based on the scores assigned by the experts at the end of round three.

3. Results

In the present study, various important items were identified in the areas of informational needs, supportive needs, and sources of obtaining information using the Delphi consensus for patients with IBD and were presented from the viewpoints of experts using the consensus. Based on previous findings (Norouzkhani et al., 2023), a preliminary questionnaire was designed (Tables 2–4). In a scoping review, we previously identified informational needs, information resource, and supportive needs, as well as psychological needs, of IBD patients based on the Daudt methodological framework (Norouzkhani et al., 2023). After defining the research questions according to the four sections mentioned, all types of studies that were conducted in patients with IBD and $\geq$18 years of age were considered without any restrictions in the language or settings. A single consensus strategy based on the inclusion and exclusion criteria was defined, and electronic databases were extensively searched from January 2000 to April 2022. After omitting duplicates and screening the titles, the abstracts of the remaining papers were separately scrutinized by two independent experts. To ensure the similarity of the decisions made by these two experts on the inclusion and exclusion of the papers, 10% of them were checked by a third expert. At the next stage, full texts were assessed, and any disagreements were resolved by a third party. According to the guidelines for conducting the scoping reviews (Peters et al., 2015), there was no need to appraise the methodological quality or risk of bias in the included papers.

The resulting questionnaires were delivered to 79 other experts in the first round, and only 57 of them answered. There was a non-normal distribution among the collected parameters. As shown in Table 5, the Cronbach alpha was calculated at 0.760, which shows the reliability of the questionnaire. A total of 13 questions out of 128 were omitted from the questionnaire due to their low importance based on the scores. In terms of informational needs,

TABLE 3 **First round questions of supportive needs of patients with inflammatory bowel disease.**

In your opinion, how important are these items in supporting patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
1	"Supporting psychological/emotional needs"					
2	"Screening and psychological assessment"					
3	"Psychological support (counseling, psychotherapeutic intervention and follow-up)"					
4	"Coping skills with the disease"					
5	"Psychological self-care"					
6	"Management of physical needs"					
7	"Addressing the concerns of life and death and spiritual issues"					
8	"Educating the patient the ability to obtain information, including recommending educational resources"					
9	"Educating patient"					
10	"Providing appropriate information (clear, structured and factual information and providing information at the right time)"					
11	"Educating/informing family, friends and colleagues"					
12	"Attention to the patient's family or caregivers"					
13	"Social health support systems and support groups"					
14	"Participation of the family/partner of the patient/caregiver"					
15	"Acquiring social skills"					
16	"Advocacy to marital intimacy"					
17	"Advocacy of the needs and problems related to gestation and fertility"					
18	"Access to health care"					
19	"Facilities (availability of care facilities, availability of toilets in clinics, no need to share a room with others, quality of health in hospitals, quick visit in case of recurrence and fast diagnosis and regular follow-up)"					
20	"Legal support"					
21	"Financial support"					
22	"Occupational support"					
23	"Supporting activities of daily living"					
24	"Disease management or self-care"					
25	"Support from nutritionists"					
26	"Support from psychologists/psychiatric specialists"					
27	"Multidisciplinary care services/holistic approach"					

(Continued)

TABLE 3 (Continued)

In your opinion, how important are these items in supporting patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
28	"Shared/patient-centered decision-making approaches"					
29	"Technological support"					
30	"Information sharing and good coordination between gastroenterologists, other professionals and patients"					
31	"Support and appropriate interaction between doctor and patient"					
32	"Easy access and contact with health workers and specialists"					
33	"Urgent advice (by phone, or clinic appointments)"					
34	"Monitoring and follow-up of the patient's condition"					
35	"Advocacy and support for experiencing cognitive needs such as memory loss"					
36	"Future support needs such as attention and support for transition needs"					

items that were omitted were "participating information in research studies," "rehabilitation information," "information about social communication aspects," "social-health resource information," and "information on legal and political aspects." Only the item "advocacy and support for experiencing cognitive needs such as memory loss" was omitted from the supportive needs section.

Regarding the information sources section, "physiotherapist," "health network," "email," "friends/acquaintances/family," "travel counseling centers," "legal representation of patients in obtaining information," and "medical encyclopedia" were removed. Meanwhile, two further items (fasting and acquiring psychological skills) were added to the questionnaire. After analyzing the responses from the first round, the Kendall rank correlation coefficient was used to determine the degree of convergence. The Kendall coefficient of 0.354 for information needs, 0.252 for supportive needs, and 0.353 for sources of obtaining information showed ∼35%, 25%, and 35% convergence between the experts' viewpoints, respectively.

The number of questions was decreased to 117 by making the required changes. Analyzing the results of the second round of the questionnaire revealed that 17 questions indicated low importance based on their scores. The lack of any further items to be added to the questionnaire indicated that the current version had covered all aspects of the study objectives. In the second round, the Kendall coefficient was 0.343 for information needs, 0.310 for supportive needs, and 0.363 for sources of obtaining information, showing ∼34%, 31%, and 36% convergence between the experts' viewpoints, respectively. Although the Kendall coefficient was meaningful at this stage, this does not provide sufficient evidence to cease the Delphi approach in the second round because there were still some questions of low importance in the second questionnaire, and therefore, the experts had not reached a consensus.

Omitting 17 indices of low importance produced a questionnaire with 100 questions. All the questions in the third round had a score equal to or greater than the mean. It was deduced that all the remaining items were of high importance. The Kendall coefficient was calculated to be 0.344 for information needs, 0.330 for supportive needs, and 0.325 for sources of obtaining information, meaning that there was ∼34%, 33%, and 32% convergence between the experts' viewpoints, respectively. Similarly, in the second round, no other items were proposed by the experts, indicating that the current ones had encompassed all aspects of the study. The criteria for ceasing the rounds were provided, as there were no omissions or additions for any other items, and the difference in the Kendall coefficients between the second and the third rounds was not significant. Finalized items are provided in Tables 6–8 based on their weight and scaling.

4. Discussion

The main aim of the present study was to provide a comprehensive set of important items in the management of IBD in three sections: information needs, supportive needs, and sources of obtaining information for patients with IBD based on the experts in the field. These three sections constitute critical indices that patients with IBD need to control and manage the disease. Moreover, this study not only precisely discriminated important items from other ones but also allowed the classification of the important items via a rating system. In other words, this makes the differentiation of the

TABLE 4 First round questions of information sources and methods needs of patients with inflammatory bowel disease.

In your opinion, how important and useful are these sources of obtaining information useful for patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
1	“Health professionals team”					
2	“Gastroenterologist”					
3	“Family physician/general practitioner”					
4	“Nurse”					
5	“Nutritionists”					
6	“Physiotherapist”					
7	“Psychiatrists/psychologists”					
8	“Pharmacist”					
9	“Surgeon”					
10	“Traditional medicine or complementary medicine physicians”					
11	“Inflammatory bowel diseases hospitals/clinics”					
12	“Health network”					
13	“Brochure or pamphlet”					
14	“Magazines and newspapers or the press”					
15	“Materials prepared by the physician”					
16	“Tv/radio”					
17	“Educational video clip”					
18	“Surfing the Internet”					
19	“Websites”					
20	“Social networks”					
21	“Applications of mobile phones”					
22	“Internet-based sources”					
23	“Telephone-based information services”					
24	“Email”					
25	“Friends/acquaintances/family”					
26	“Personal/other patients’ experiences”					
27	“Insurance”					
28	“Support and advisory services/associations for patients with inflammatory bowel disease”					
29	“Travel counseling centers”					
30	“Legal representation of patients” in obtaining information					
31	“Pharmaceutical companies or research institutes”					

(Continued)

TABLE 4 (Continued)

In your opinion, how important and useful are these sources of obtaining information useful for patients with inflammatory bowel disease?						
		Importance range				
		Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
32	"Scientific and medical papers and journals"					
33	"Summaries of conference articles"					
34	"Medical books"					
35	"Medical encyclopedia"					
36	"Summary of scientific researches"					

TABLE 5 Cronbach's alpha value.

	Questionnaire elements	Number of items	Cronbach's alpha
1st round	Information needs	56	0.704
	Supportive needs	36	0.710
	Information sources	36	0.705
	Total	128	0.760

most and least remarkable items among important items feasible. In our study, a 128-item questionnaire in the first round was optimized into a questionnaire with 100 items after three rounds of the Delphi consensus. The findings of this study were derived from the combined viewpoints of major stakeholders in the field of IBD, including gastroenterologists, psychiatrists/psychologists, and nurses, through a Delphi consensus approach. A convergence of 32–34% among experts' viewpoints was reached at the end of the process, indicating an efficient consensus process.

Identifying the needs of IBD patients in precise categories is beneficial for patients, physicians, and other healthcare professionals. Such information enables patients to manage the disease, alleviate relevant anxiety and worries, and improve their compliance. Otherwise, screening for some negative consequences of IBD, such as colorectal cancer, is underestimated by patients. Moreover, patients feel they have control over medical decisions, which causes a positive relationship with their physicians and healthcare professionals, which in turn makes patients feel less alienated. Moreover, this awareness reduces the upcoming complications that affect the three parties in terms of overcoming the barriers in formal and informal support, increasing the support intake from different resources, and directing the delivery of information to the patients in a more conducive and systematic manner.

Owing to internal (lack of control over bowel movements) and external stressors (access to restrooms), patients with IBD require specific supportive needs, which multi-professional teams should develop. One study identified instrumental support (disease-related information) and emotional support (discussing disease management). To support IBD patients, various strategies (behavioral, social, and emotional) were adopted to cope with disease conditions (Larsson et al., 2017). In our study, experts believe that "disease compatibility skills" would be of the highest priority regarding supportive needs.

There is a paucity of information regarding IBD among patients. Intriguingly, it was reported that patients with different profiles of demographic characteristics and clinical parameters have unique and clinically relevant information needs (Daher et al., 2019). Insufficient efforts in delivering specific domains of information to IBD patients may impede the identification of symptoms required for disease diagnosis. Indeed, information is a valuable element, and it can be regarded as a potentially important component that improves IBD outcomes (Pittet et al., 2016). However, most IBD patients believe that they did not receive important information about the disease in the first 2 months after diagnosis (Bernstein et al., 2011). Notably, disease duration affects the patients' knowledge. Those who are recently diagnosed may need different types of information compared with those with chronic illnesses (Bernstein et al., 2011).

IBD patients need information to manage the disease in their daily routine. This was referred to as "knowledge needs" in one study (Lesnovska et al., 2014) and was classified into three groups: those related to the disease course, those related to managing everyday life, and those difficult to understand and assimilate. This type of need has great variation, especially at the time of diagnosis and during relapse. "Medications and their side effects" and "pain management and related symptoms" were identified as the most important items in the information needs section of the present study. In one study on IBD patients from Greece, the main complaint was the lack of information about treatment. The study revealed that certain hurdles in some aspects of their lives, such as health-related social life, emotional status, and work productivity, were significantly affected (Viazis et al., 2013). Treatment (medical and surgical), clinical appearance, cancer, and mortality risks are the types of additional information needed by the patients (Catalán-Serra et al., 2015).

With respect to the sources of obtaining information, "gastroenterologists" were known as the major sources in our study. Another study reported that gastroenterologists, besides the Internet, were the most frequent sources of information 2 months after diagnosis. However, it was shown that only 45% of patients were very satisfied with the information they received at the time of diagnosis (Bernstein et al., 2011). In third place, general

TABLE 6 Approved items in information needs section after three rounds of Delphi consensus presenting in the order of weight and scaling.

Priority	Index
1	• Medications and their side effects • Pain management and related symptoms
2	• Clinical symptoms/appearance • Prevention from recurrence and disease control • Required actions during recurrence • Treatment and its side effects • Adherence to medications • Disease management and self care[a]
3	• General information about inflammatory bowel diseases • Defecation • Risk factors/disease flare-up
4	• Disease course and progress • Prognosis/long-term outcomes • Risky behaviors like smoking • Nutrition
5	• Information related to when to see a doctor in case of symptoms emergence
6	• Vaccination • Nutritional deficiency • Coping and living inflammatory bowel disease
7	• Extra-intestinal appearance/disease complications • Risk of infections • Co-morbidities and its management • Disease control and struggling against stress and psychological issues • Gynecological issues
8	• Non-pharmacological treatments • Exercise/physical activity • Stories and experiences about dealing with the disease of other patients • Quality of life • Informing to the family or any other influential people
9	• Religious fasting
10	• Cancer • COVID19 • Nutritional supplements
11	• Family[b]
12	• New research information and progress in inflammatory bowel diseases
13	• Interventions for sanitary and preventive care
14	• Etiology • Alternative and complementary medicine • Travel
15	• Hospitals/physicians
16	• Diagnostic methods[c] • Mortality • Surgery • Sexual relationship

[a] Including medication dose proportionate to conditions, self-follow up program, empowerment in order to augment self-care in the case of disease recurrence, in-home therapy, and etc.

[b] Including important issues that affect the patients' family and useful educations for patients' family.

[c] Including different diagnostic methods and information to interpret the tests results.

TABLE 7 Approved items in supportive needs section after three rounds of Delphi consensus presenting in the order of weight and scaling.

Priority	Index
1	Coping skills with the disease
2	Supporting psychological/emotional needs Screening and psychological assessment Psychological support[a] Psychological self-care Providing appropriate information[b] Support and appropriate interaction between doctor and patient
3	Educating the patients Educating/informing the family, friends, and colleagues Participation of the family/partner of the patient/caregiver Advocacy of the needs and problems related to gestation and fertility Occupational support Disease management or self-care Multidisciplinary care services/holistic approach Urgent advice (by phone, or clinic appointments)[c] Monitoring and follow-up of the patient's condition Psychological support[d]
4	Management of physical needs Attention to the patient's family or caregivers Advocacy to marital intimacy Shared/patient-centered decision-making approaches Information sharing and good coordination between gastroenterologists, other professionals and patients Easy access and contact with health workers and specialists
5	Educating the patient the ability to obtain information, including recommending educational resources Social health support systems and support groups Access to health care Facilities[e] Financial support
6	Acquiring social skills Supporting activities of daily living Support from psychologists/psychiatric specialists Technological support
7	Support from nutritionists

[a] Including consultation, psychotherapy interventions, and follow up.

[b] Including clear, structured, and real information in appropriate time.

[c] These are delivered through phone calls or medical appointments.

[d] These include counteracting against stress, solving-problem skills, and capability to address conflicts between individuals.

[e] This means availability of care facilities, availability of toilets in clinics, no need to share the rooms with others, sanitation level in hospitals, and instant visits, fast diagnosis, and routine follow up in case of recurrence.

practitioners were known as sources for obtaining information another study. Once more, only about half of the patients claimed that the gastroenterologists covered their information needs. Furthermore, it should be noted that the Internet was useful for young patients and those with a high level of literacy (Catalán-Serra et al., 2015).

Both the mental and physical health of IBD patients are impaired, according to the findings from one study, which showed that general health perceptions were below the critical value in 40% of patients. This demonstrates the importance and divergence of needs among IBD patients (Casellas et al., 2020). In a survey to identify the needs of young adults with IBD, psychological needs

TABLE 8 Approved items in information sources and methods section after three rounds of Delphi consensus presenting in the order of weight and scaling.

Priority	Index
1	Gastroenterologist
2	Materials prepared by the physician
3	Health professionals team Applications of mobile phones
4	Psychiatrist/psychologist Surgeon Brochure/pamphlet Educational video clip Telephone-based information services
5	Nurse Nutritionist Personal/other patients experiences Support and advisory services/associations for patients with inflammatory bowel disease[a]
6	Family physician/general practitioner Inflammatory bowel disease hospitals/clinics Tv/radio Internet-based sources Scientific and medical papers and journals Summaries of conference articles
7	Websites Social networks Summary of scientific researches

[a] Association of inflammatory bowel disease patients.

and daily living needs were presented as the most and least common ones (Cho et al., 2018). Because the burden of psychological distress was found to be concerning in such patients, point-of-care screening and interventions should be considered initially in the context of biopsychological care (Moon et al., 2020).

Clinical conditions of IBD patients, such as laboratory findings, activity parameters, and endoscopic examinations, traditionally form the basis of daily practice and care plans, such as the type of medications, frequency of visits, and referral to another specialist (Sainsbury and Heatley, 2005; Sajadinejad et al., 2012; Moradkhani et al., 2013; Williet et al., 2014). Although quality of life is improved by such an objective evaluation of the disease, some subjective aspects based on patients' characteristics such as personality, expectations, family framework, and social issues are also determined (Casellas et al., 2020). Nowadays, holistic and personalized medicine have become novel features in therapeutic approaches that alter the model of care for chronic diseases like IBD (Kennedy and Rogers, 2002; Baars et al., 2010). In line with this, the empowerment of the patients, their involvement in disease management, and incorporating their opinions into clinical decisions seem vital (O'Connor et al., 2013; Rettke et al., 2013). Implementing these approaches improves quality of life and creates satisfaction in patients regarding the kind of care and treatment they receive (Barlow et al., 2010; O'Connor et al., 2014). In a scoping review, the nature and extent of the research evidence were published for IBD patients across three life cycles. Scrutinizing the main needs of children, adolescents, and adults showed the value of the involvement of the patient and healthcare providers through supporting and promoting engagement. Moreover, such interventions were advised to be organized from a multidisciplinary perspective (Volpato et al., 2021).

Empowerment of IBD patients significantly contributes to rehabilitation programs and helps them handle the long-term consequences of the disease and manage their health status more efficiently by obtaining better outcomes (Small et al., 2013). Empowerment, as a complicated experience of personal modifications in life values and priorities, is classified at individual, organizational, and community levels (Aujoulat et al., 2007). In one study, the key aspects of empowerment in IBD patients were reported to be social interaction skills and disease-specific health literacy (Zare et al., 2020). Interactions with others in the form of communicating with optimistic people, establishing family and friendly entertainment plans, and having relations with peers improve the mental status of patients and are considered an efficient approach for controlling psychological situations that trigger IBD flare-ups. The ability to ask for support is another aspect of such interactions, which can be substantiated by asking physicians to speak to the relatives of the patients for support, meet coworkers/bosses about the disease, and demand reliable information in web-based tools from valid sources (Zare et al., 2020).

The Internet is not only a learning source for IBD patients but also a substrate for communication. Patients who use the Internet are young, more educated, and sicker (Angelucci et al., 2009). While the Internet delivers a considerable amount of information to IBD patients (Cima et al., 2007), it affects the relationship between patients and the physicians. It should be noted that information derived from the Internet is usually unregulated and unfiltered, and this may lead to confusion and mislead people into making poor choices. Some Internet-based applications, or social media applications, allow for exchanging ideas and facilitate interpersonal interaction (Kaplan and Haenlein, 2010), eventually resulting in patient empowerment (Flisher, 2010). In addition, some applications are designed for use on smartphones and mobile tablets and help patients with symptom tracking and self-management. Some other applications are equipped to print or email reports to the physicians. However, some limitations, such as a lack of clarity in the qualifications of the providers, production of design and develop disease management products without consultation with IBD care providers, and the absence of validated measures of disease severity, restrain their use (Fortinsky et al., 2012).

To meet a wide range of needs that are considered important by patients, providing reliable applications would be an outstanding help. Although patients can access huge amounts of data through the Internet, social media, and support groups, they prefer to receive information about their disease mainly from physicians. However, transferring all the required information from physicians to patients through traditional verbal communication appears to be impractical. To overcome this barrier, written information, such as brochures or websites with user-friendly interfaces, is an appropriate alternative that supplements physician–patient consultations and provides a higher level of detailed information (Bernstein et al., 2011).

Reaching a high level of agreement is one of the strengths of the present study. This shows the validity of the consensus process that was obtained from the opinions of health experts from different fields. The inclusion of patients' preferences in a multidisciplinary way is necessary for clinical care.

4.1. Limitations

The findings of this study may not be generalizable to all IBD patients due to differences in the characteristics of IBD patients (prevalence and severity of the disease). All the invited experts were from the same country, and their opinions may differ from those of their peers in other regions. Furthermore, it is logistically impossible to gather all the experts in the field from different specialties. Distribution of experts with sufficient skill and expertise in managing IBD patients are not homogenous between regions and countries. Patients are not homogenous between regions and countries. Health infrastructures and facilities, such as centers specifically organized to support IBD patients in terms of medications and other needs, are not equally available between high- and middle-income countries. The comprehensive nature of care in chronic diseases such as IBD requires different healthcare providers, such as nutritionists, gynecologists, radiologists, general practitioners, stoma therapists, rheumatologists, physician assistants, pharmacists, and immunologists, to be involved in delivering diverse information to patients. For instance, mucosal immunologists, who are among the most important experts with critical roles in the differential diagnosis of various forms of IBD (CD and UC), were not present in our study. All these factors, in our opinion, may limit the generalizability of the findings of the current study.

5. Conclusion

The present study identified 100 items across three categories: supportive needs, sources of obtaining information, and the specific informational needs of IBD patients, as identified by experts using a Delphi-based methodology. Properly educating IBD patients based on verified needs can result in decreased stress levels, improved treatment adherence, and enhanced disease control and management. Although we believe that these questionnaires are useful for national patients in delivering certain information and meeting some needs, future studies should be conducted with the inclusion of a broader range of experts from both basic and clinical specialties and with the participation of different centers from different regions and countries to identify specific and more generalizable needs for IBD patients.

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 Mashhad University of Medical Sciences (IR.MUMS.REC. 1400.230). The patients/participants provided their written informed consent to participate in this study.

Author contributions

NN and HT conceived the original idea. NN carried out the experiment and wrote the manuscript with support from HT and MF. AB, MF, and JS carried out the experiment and aided in interpreting the results. SE and AB helped supervise the project. HT supervised the project. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

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

Publisher's note

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Exploring chronic pain related attentional experiences, distress and coping strategies among Arabic-speaking individuals in Jordan and the United Kingdom

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Introduction: The lived experiences of chronic pain (CP) among Arabic-speaking populations remain underexplored. A better understanding of these experiences and their associations with attention difficulties, coping mechanisms, and treatment options could lead to improved support for this group.

Methods: This qualitative study utilised a descriptive design and involved one-to-one interviews with 51 participants with CP who had just completed two attention tasks. Interviews were conducted using a semi-structured topic guide, transcribed verbatim and translated from Arabic to English before agreeing on the coding framework. Themes and subthemes were extracted using a framework analysis approach.

Results: The study identified six main themes: Factors contributing towards developing or exacerbating CP, the impact of CP on psychosocial functions, including attention, the perceived role of social support, coping strategies for managing CP, perceptions about available treatments and recommendations for interventions.

Discussion: CP significantly impacts individuals' physical and psychosocial functions, and it is reciprocally associated with attentional difficulties. Despite using various approaches to manage their CP, none of the participants used psychological interventions or counselling. Understanding the diverse impacts of CP and the coping strategies employed to develop culturally sensitive interventions, review current related policies, and improve healthcare services is crucial to managing CP among this population.

KEYWORDS

chronic pain, attention experiences, qualitative, framework analysis, Arabic, distress, coping strategies

1. Background

Chronic pain (CP) affects more than 30% of people globally and hence is a major personal and economic burden (Cohen et al., 2021). Two CP conditions, namely neck pain and back pain, are among the top leading causes of years lost to disability (Vos et al., 2017). Studies among Arabic populations concur that the prevalence of CP is high (20–46.4%, Elzahaf et al., 2016; Almalki et al., 2019). CP can have a multifaceted impact on the health and well-being of individuals (Tanaka et al., 2022). Attention is one of the important factors that have been linked to CP (Diotaiuti et al., 2021). However, the focus of the previous literature has been the quantitative scaling of CP-related symptoms and examining its subtypes (MacNeela et al., 2015). Attention is typically explored using experimental tasks (Crombez et al., 2013). A recent systematic review and meta-analysis found that people with CP exhibit significant attentional bias toward sensory pain-related information, however, these experimental tasks have not been used previously among the Arabic population (Abudoush et al., 2023). Moreover, there is no qualitative research internationally to understand the subjective attentional experiences of individuals with CP, coping mechanisms, and potential treatment pathways. A qualitative exploration can balance out the limitations of the quantitative methods and provide a deep insight into the perspectives of the individuals on challenges accompanying CP and their views about possible interventions (Kelle, 2006; Ritchie et al., 2013).

Because of its chronic nature, coping with CP is a key component in understanding how positive or negative strategies are used on a daily basis (Dysvik et al., 2005). Autonomy-driven approaches encourage individuals with CP to be more independent and resilient, which helps active engagement in therapy and life (Gittell, 2016; Gorman-Badar, 2020). Furthermore, exploring the experiences of Arabic individuals with CP specifically can help to examine the sociocultural factors (e.g., social values, religious beliefs, and language) that might be specific to this population. The sociocultural perspective is important due to its multidimensional impact on shaping how individuals respond to, and cope with, their CP. Thus, considering a culturally sensitive approach, such a perspective can help understand how CP-related difficulties might be used in developing an attention-related intervention through patient-driven options. This study aimed to explore the attentional experiences, coping mechanisms and suggestions for treating CP among Arabic-speaking individuals in Jordan and the United Kingdom (UK).

2. Methodology

2.1. Design

A qualitative study nested within an experimental study. All the participants in the CP group (experimental group) of the study were invited to participate in the qualitative part of a larger empirical study (the original sample included 58 CP participants and 58 healthy controls).

2.2. Setting

This was a hybrid study (i.e., conducted remotely and in-person) with participants recruited from pain clinics, physiotherapy clinics, community centres, and hospitals from two study sites (i.e., Jordan and The United Kingdom). For complete information about the design, see the original experiment by Abudoush et al. (2021).

2.3. Eligibility criteria

2.3.1. Inclusion criteria

Arabic-speaking individuals with CP (i.e., pain for 3 months or more) who were aged 18 years or above, have a normal or corrected to normal vision, have a native speaking, reading, and writing of the Arabic language, resident of either Jordan or the United Kingdom at the time of the experiment, can complete experimental tasks with 70% or more of accuracy assessments, have access to a laptop or desktop with an internet connection for at least 90 min for one time, willing to participate in the study, and can provide informed consent.

2.3.2. Exclusion criteria

Individuals were excluded if they were having any severe or uncontrolled mental or medical disorders that would affect their participation and/or having a current acute or subacute pain.

2.3.3. Description of the experiment

The experimental study was pre-registered on the open science framework (OSF; Abudoush et al., 2021). It involved exposure to pain-related words such as sensory-related (e.g., stabbing, pinching), and affect-related (e.g., punishing, frightful) words. Two groups (i.e., CP and matched healthy control) were tested for their selective attention performance using two experimental tasks (i.e., spatial cueing task, and Emotional Stroop task). Also, a number of questionnaires were used to assess participants` resilience, perceived stress, anxiety, and depression levels. The qualitative study aimed to explore the participants` subjective attention-related experiences that cannot be measured using quantitative methods.

2.4. Recruitment

The study was approved by the University of Manchester Research ethics committee number 3 (UREC 3) (2022-11074-21987) in the UK, and the Jordanian Ministry of Health (MoH) (Moh/REC/2021/233) in Jordan. A total of 116 participants ($N=58$ in the CP group and $N=58$ in the healthy control group) matched for age, gender and country of residence were recruited through online advertisements and posters at pain clinics, physiotherapy clinics, community centres, and hospitals. Interested potential participants directly contacted the researcher to participate and were screened against study eligibility criteria, followed by sending and explaining the participant information sheet (PIS). Participants received reimbursement for their time.

For the qualitative nested study, participants from the CP group who gave additional consent for the interview were included. All 58 individuals with CP who participated in the main experiment were invited for a one-to-one interview. Seven of them did not consent to participate. A total of 51 participants formed the final sample and completed the interview. Although there are no specific limits for the sample size in the qualitative interview, it is worth mentioning that our sample is considered within a reasonable sample size range (Dworkin, 2012). A reasonable sample size would ensure that all possible themes and subthemes are covered in the study and that there is no new data generated when conducting additional interviews. Dworkin (2012) suggests a sample size that ranges between 5 and 50 participants.

2.5. Data collection

A semi-structured interview was conducted directly after the experimental study. A semi-structured topic guide was developed to facilitate the interview. The topic guide aimed to explore four main areas to identify and elicit details on the following;

1) How their daily attentional experiences are affected by CP,
2) Attention experiences related to exposure to pain-related cues within the experimental tasks,
3) Participants' perspectives on coping with CP, and
4) Participants' views about possible interventions that could be of benefit.

The topic guide was developed by two authors (AA and TK) and reviewed by the other co-authors. AA is an expert in the CP-attention field, and TK is an expert in the qualitative research field (Appendix 1). To ensure the suitability of the questions included, the topic guide was reviewed and modified according to feedback from an individual with CP who was included in the study according to the patient and public involvement and engagement (PPIE) principles. It included a combination of open and closed questions to help participants express their emotions and thoughts related to the CP. The topic guide was also updated during the period of the data collection phase according to feedback from participants. The first section included questions about the daily attentional experiences affected by the CP, which is fundamental to understanding the impact of the CP on their attention, especially those related to the tasks that require attention. The second section explored the included the attention experiences related to the exposure to pain-related cues, which is crucial to understanding the effect of participating in an experimental study that contains pain-related cues in the Arabic population. This is essential for future research in this population. The third section included the different perspectives related to coping with CP, which is vital to understanding the patterns of adjusting to attention-related difficulties and what coping strategies might help in overcoming such difficulties. The last section in the topic guide was about the possible interventions, which explored the participants' opinions about what could help them to overcome the challenges related to the CP and related attentional difficulties.

The interviews were conducted by the first author (AA), who is bilingual (i.e., Arabic and English), an experienced clinical psychologist who has worked with patients with CP for many years. All interviews were conducted using the Zoom application (Zoom Video Communications Inc, 2022), audio recorded and saved on a secure server until the transcription phase was done. All interviews were transcribed by two authors (AA and KA) and reviewed for accuracy. Initially, seven interview transcripts were translated into English and coded by (AA), and these coded transcripts were discussed with a senior qualitative researcher (TK). Both AA and TK agreed on an initial coding framework. For the remaining interviews, Arabic transcripts were coded using the coding framework by (AA), and only coded verbatims were translated from Arabic to English. To minimise the loss of meaning, the authors followed the recommendations of Van Nes et al. (2010). For example, the authors used fluid descriptions of meanings when necessary rather than relying only on the direct translation to allow for an accurate contextual meaning of the verbatims. The interview duration mean was 21 min, and interview time ranged between 11 and 47 min.

2.6. Analysis

An inductive framework thematic approach was used to analyse the results (Gale et al., 2013; Ritchie et al., 2013). The first author conducted the familiarisation stage (AA) and reiterated through transcripts to fully understand the data. Then, researchers independently coded seven interviews (AA and TK), discussed the codes resulting, and agreed on the framework themes and sub-themes. Next, the first author (AA) completed coding and categorising the other 44 interviews independently. Then, TK reviewed all interview codes and translated verbatims to ensure accurate coding, categorisation, and their dependability. A discussion between all authors was held to agree on the analytical decisions and then on the final codes matched to the verbatim list to ensure credibility and dependability.

To ensure the quality of the analysis and the reasonableness of the sample size, researchers considered the data saturation concept during the analysis process (Braun and Clarke, 2021). Further, because of the numerous subtypes of CP a large sample was essential to ensure that different aspects of CP-related experiences were covered. The resulting large data was managed by the researchers (AA and KA) under the supervision of a senior qualitative researcher (TK). Using framework analysis helped in organising such data in a structured way for easier interpretations. The suitability of analysis and confirmability was ensured through re-iteration of the transcripts, agreeing on the code book (i.e., framework identification), and regular review of the progress of data analysis. Further, despite the potential effect of the prior experience of the researcher on shaping the findings, researcher bias was avoided by ensuring that the different co-authors were involved in all steps and decisions related to data analysis.

3. Results

For demographic characteristics, all participants have Arabic ethnicity. We interviewed 51 participants, 33 of whom were based in Jordan and 18 in the UK. Thirty-one participants were male and 20 were female. The mean age of the participants was 42 years (SD = 14), and two-thirds were married. At least half of the participants had a University/college degree, and the vast majority (48 participants) had medium to high-income levels. The most common types of pain were low back pain (12 participants), headache (9 participants), and chronic primary musculoskeletal pain (9 participants). The average pain intensity (i.e., out of 10 points) between interviewed participants was moderate to severe (M = 5.67, SD = 2.07). The pain duration ranged between 4 months and 24 years (M = 7.21, SD = 6.53).

3.1. Framework analysis themes

A framework was created using Microsoft Office Excel sheets comprising 51 interviews and six main themes representing the study's objectives around lived experiences of CP, reciprocal impact between CP and attention on daily attentional experiences and exposure to pain cues, available treatments and perspectives about coping strategies with CP (Figure 1). An example of the process of going from meaning to formulating themes is illustrated in Table 1.

3.1.1. Factors contributing towards developing or exacerbating CP

This theme emerged from the first and second topic guide points. Different factors were identified as contributing to developing, exacerbating, or maintaining CP among Arabic-speaking individuals. These factors were explained through five subthemes.

3.1.1.1. The impact of psychological status on CP

Participants perceived that the severity levels of CP were related to their psychological conditions. A couple of participants from both study sites highlighted the connection between their mood and the pain they experienced, and one participant shared as

> "*I feel that if I'm emotionally tired and I have pain, the pain can also increase, but if I have pain and my mental health is good, the pain does not decrease, but I think of it less.*" (P44)

Many participants firmly stated that the pain intensity went in tandem with stress at home or work. Psychosocial pressure, such as stress at work, the tension of assignments, and family pressure, intensified the pain. One female participant reported;

> "*If I increased my concentration more than what was needed, the pain increased because I would have been in stress, but if my*

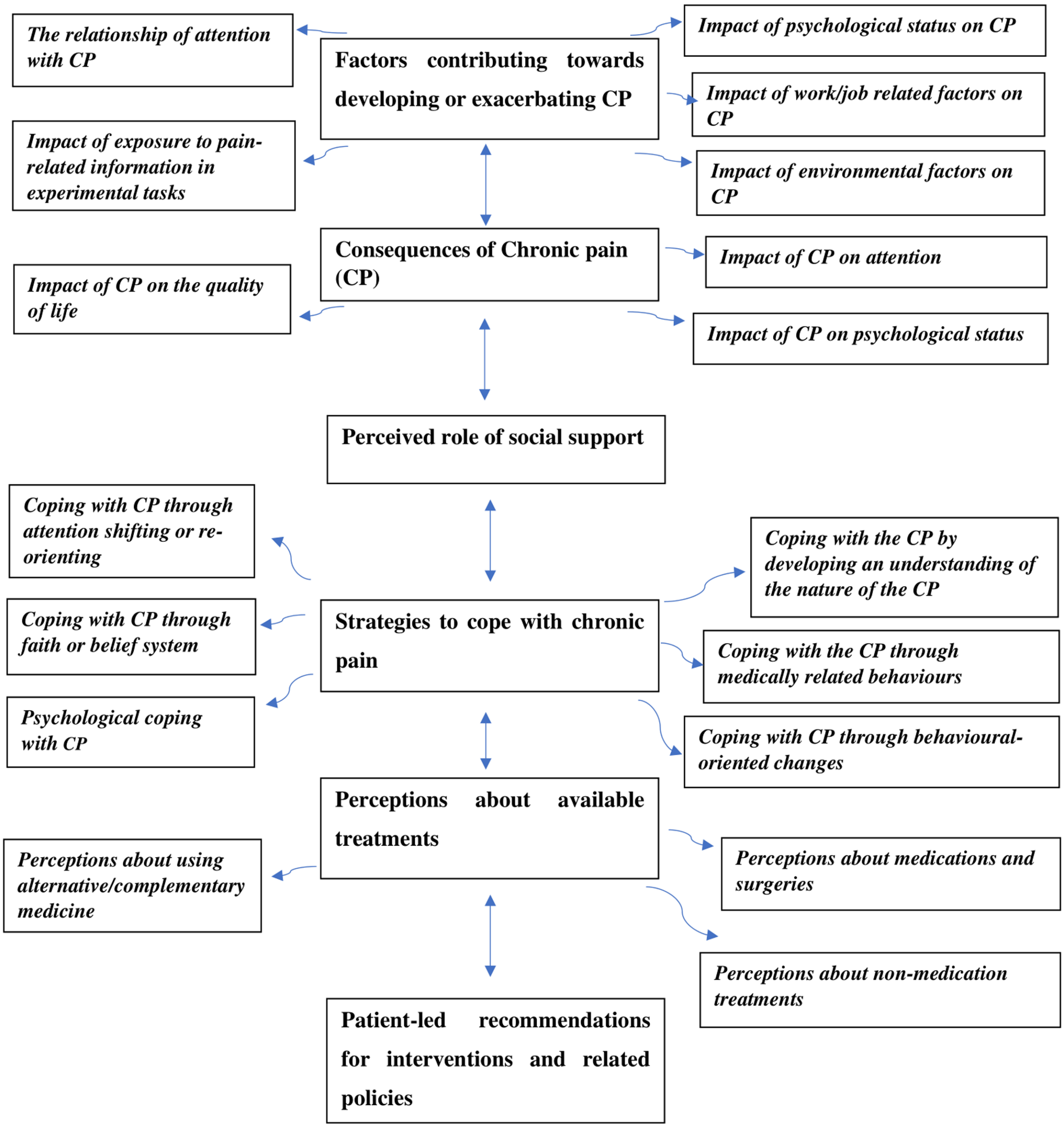

FIGURE 1
A diagram showing the themes and subthemes.

TABLE 1 An example of the process of going from meaning unit to code to category to sub-them to theme.

Meaning Unit	Code	Category	Sub-theme	Theme
"If pain is severe, I have to stop doing the task because it affects my concentration ability" (P2)	Impact on attention when the pain is severe	Factors contributing towards developing or exacerbating attention difficulties	Impact of CP on attention	Consequences of Chronic pain (CP)
"I am (Having) attention because I am too arranging things and know how to manage it. Attention and focus will improve, and attention and focus are (good) from a lot of what I am (doing). On the contrary, (because) I am paying attention and concentrating it made my illness improve." (P42)	Coping through arranging	Coping with CP through reorienting	Coping with CP through attention shifting or re-orienting	Strategies to cope with chronic pain

> *concentration was normal and moderate, which is a regular day, for example, that you work during the day in the normal hours, so that is fine."* (P49)

3.1.1.2. The impact of work/job related factors on CP

Work behaviours were one of the sources that exacerbated the CP. Nature of work, such as *sedentary* (P43), or having worked in a prolonged fixed position, e.g., *long screen time in one position* (P35), or *excessive standing* (P32), had an effect on the degree of pain suffered. Participants realized their pain increased with *specific postures at work, mainly when they had a deadline* (P49). One female student participant expressed how her routine at the study workstation was connected to the pain.

> *"I feel that the pain increases when I work a lot on a computer or when I am stressed, I mean, lots of things to do on that day. It is not a requirement that it be related to study, (but) it means that it is related to my normal life. You know, this is what happens when I feel that it is a period of tension, a period of pressure."* (P1)

3.1.1.3. The impact of environmental factors on CP

Participants identified that lifestyle factors such as diet, obesity, *"not exposing enough to sunlight"* (P3), *"cold weather"* (P13), and *"lifestyle stress"* (P12) had an effect on CP. Food quality or the type of food influenced the development of CP in a few participants. Some kinds of food, for instance, ready-made food, were perceived as inappropriate for their illness, and that *"food is not giving benefit"* (P3), which made their pain worsened. Therefore, they tried to follow a healthy diet. For one particular housewife, *"weight gain"* (P42) made her CP persistent.

3.1.1.4. The relationship of attention with CP

The relationship of attention with CP is consistent with the notion that focusing on pain intensifies it, whereas diverting attention towards something else decreases the pain (P12), and one participant described it as a "*paradoxical effect*" (P17):

> *"I continue feeling the pain when I focus on the pain, I mean if I did not distract myself (to something else)."* (P11)

Participants also mentioned other ways in which attention can contribute to exacerbating pain. They reported that tasks requiring greater attention could increase pain intensity. Pain became noticeable when they focused on specific functions, e.g., reading or working at home. This experience was also related to body posture while concentrating on computer-related tasks. Student participant experienced it and shared:

> *"When I am concentrating on something, or I have something, the pain increases, yeah, exactly it increases if I read or study or work at home, all of these increase the pain".* (P16)

3.1.1.5. The impact of exposure to pain-related information in experimental tasks

In the context of the experiment that preceded the qualitative interviews, participants were requested to respond as soon as possible to target information (i.e., degree of the colour of a green frame surrounding a black square in the Posner spatial cueing task, and the colour of the word in the emotional Stroop task). The target information appeared after or during presenting pain-related cue. In their reflections on this experiment, some participants highlighted that conducting attention experimental tasks needed concentration and extra effort to keep focusing on the task, which made them a *"little exhausted"* (P13). One participant explained the pain-related information:

> *"It is possible some words for me, they are, as I told you, big. For example, such as kicking out and stabbed."* (P42)

Nevertheless, other participants saw this attentional exposure as a source of *"excitement"* (P1) or as *"brainstorming"* (P9). One participant explained the experience of attention during the experimental task as follows:

> *"If I focus on the thing that they told you to, on the cross, you will find it easy, great, if I start to oversight and look at the words, I forgot once or twice, and so I realised that I got mixed up…if I focused on the information that I have, the cross sign, and focus on the colours and answer fast with focus, but if you scattered the words you can't."* (P32)

Positive feedback on the experiment was also reported by the participants. Participants highlighted that the activities included in the task were enjoyable. The *"rehearsal"* (P42) part helped them to be prepared for exposure to pain-related information and completing the experimental tasks. One male participant highlighted that the good thing about the attention tasks was that they *"made one reflect* *on themselves in relation to the topic of attention, sometimes we do tasks, or we carry out tasks without concentrating or with partial concentration."* (P50)

3.1.2. Consequences of chronic pain

This theme emerged from the first topic guide point. Three subthemes that explain the impact of CP were identified from the interviews as follows:

3.1.2.1. The impact of CP on attention

The impact of CP on attention was frequently mentioned in different forms, including *"If pain is severe, I have to stop doing the task because it affects my concentration ability"* (P2) and that *"focusing tires and exhausts me when I am in pain"* (P20), and *"it distracts my attention"* (P21). Interestingly, some participants linked the severity of pain (P49) with the attention they had throughout the time of the day, which one participant reported as follows:

> "*It depends; sometimes, when the pain is severe, my concentration becomes scattered depending on the degree of pain during the morning, noon and afternoon. In the afternoon, the pain is very intense."* (P23)

Moreover, the interruption caused by CP on attention can be seen in different dimensions of life. The pain made it difficult for the participants to focus on their surroundings or work. They were required to put more effort when they tried to remain focused on what they were doing, such as communicating with others (P50). One participant shared his experience:

> *"All of your focus is on your pain, so you are not conscious about what is happening around you, like, when you are in a certain gathering, you will not be aware of some things there, who is there, who is praying, who is working, what is required from you. All your concentration, body and senses are focused on the pain."* (P33)

3.1.2.2. Impact of CP on psychological status

Impact of CP on psychological status was evident among some participants, such as CP perceived as "*distressing*" (P26) and "*psychologically irritating that increases negativity*" (P31). Participants were usually angry and frustrated (P19) as they had to live with CP, under pressure (P18), or feeling trapped, and they perceived that they could not have a normal life (P20). One participant reported;

> *"Some days, you could find that I stopped bearing it (pain); I become nervous from it. I get angry that way, and why (I have pain)? I want to get rid of it, I want to get out of this thing. I want to live like any other normal person."* (P12)

Participants mentioned pain as being associated with suffering, and their experience of CP created pessimistic views. Most of them explicitly described how CP negatively affected their mental status, such as *desperation* (P25), *hopelessness, disability* (P45), *having a bad mood or being secluded* (P36):

> "*When I get a pain episode, I get isolated, and I feel the world is black. It causes me much sadness. Then depression creates (further) depression. Yeah, sometimes I cry, become nervous, and tense. I isolate myself to avoid getting anyone angry. It's the hardest thing, I get a psychological condition when I got a pain episode."* (P10)

A couple of participants expressed the fear and being *"careful and scared"* (P22) related to the CP. They were fearful or anxious about escalating CP (P8) or of developing imminent pain in other parts of the body. One participant also shared her worries about getting a proper diagnosis, so she tried to procrastinate seeking medical checks. Also, self-blaming and *"internal conflict"* (P50) arose after the pain had been exacerbated.

> "*I am living with the illness, but I still have that fear that it will increase, that it will spread to my hands. I remain scared because it is in the neck and shoulders to radiate down to my hands. The fear, the worry. I am scared that it will spread to my hands."* (P11)

3.1.2.3. The impact of CP on the quality of life

The Impact of CP on the quality of life was described as having a *"great negative effect"* (P22). Participants reflected on the chronicity of pain through the necessity for "*adapting to the situation*." Some participants were *forced to give up what they liked* (P39) and *to navigate life without having any (self) control* (P42). They became dependent and relied heavily on their families or friends, even for certain routine chores such as taking out clothes from the wardrobe or getting a sofa (P50). Participants compared their life before and after having the CP, and one of them reported:

> *"It influences everything, sleep, work, studies, everything, like, it's tiring. That's it your head hurts, you become unable to do anything like before."* (P36)

Pain also limited the participants' quality time, mainly with family; they became secluded and pushed away family members to avoid being seen in pain or tried to avoid recreation. Some participants also explained how CP negatively affected their social relationships and social engagement. Under the effect of pain, they could not interact with others, leading them to *"less participation in society"* or *"avoid people"* (P42) eventually.

Participants with CP also suffered sleep disturbance or lack of quality sleep (P12). They repeatedly woke up during the night due to pain, which was even harder for participants with certain types of CP, such as chronic back pain (P43) or in patients whose symptoms got worse at night time (P38), and sometimes, they required sleeping pills.

Participants also faced *"challenges"* (P2) in daily life due to CP, including *"work"* (P18), *"house chores"* (P18), *"praying"* (P19), "*studying*" (P21), *"cooking"* (41), *"driving"* (P45), and *travelling far distance"* (P50). Some participants described this impact as an *"actual disability"* (P9) that required staying home for a long time.

3.1.3. Perceived role of social support

This theme emerged from the third topic guide point related to coping with CP. Participants with CP acknowledged the positive role of having social support and being treated with empathy. Many participants regarded families, friends, colleagues, and neighbours as very helpful in terms of soothing the pain or even helping distract their attention from the pain. The psychological aspect of treatment was considered more important than painkillers or other medical-related interventions, and social support could represent *"collaboration, cooperation and sensitivity"* (P31). A few participants also shared their experience of receiving positive psychosocial support during severe pain episodes. The role of family support was explained by one participant:

> *"The most important thing is the family, like, this affects me very very much from a psychological point of view and gives me, like, a push to keep going, like, how should I say this, positivity in my mental health. I feel much better emotionally when you have people around you, your family."* (P40)

Participants perceived the *encouraging and caring words* (P14) as mental support which made them feel compassion and security. They particularly mentioned that *chatting* with someone, including colleagues or friends (P48), reduced their pain intensity and made them more comfortable. They greatly acknowledged the power of words from others such as *"do not give up, resist, try moving"* (P10). Some viewed social support as an essential key element in pain management, and other treatments came later (P33). A participant enthusiastically shared as;

> *"The relief is more psychological than if it is physical. The second thing is it possible, just because the people around me, I mean, social support in general, they talk to me, I mean, they ask me about my pain and if I am getting better, oh, it helps, I mean, I don't know how to say it to you, but I mean, I feel a connection, I mean the social (bonds)."* (P1)

One important distinction participants made is that social support is not the mere number of people around them but the *quality of support* they receive from them (P42). Support by people who also experienced pain was also reported as beneficial.

However, a few participants also mentioned that *too much involvement from family members made them feel uncomfortable* (P13).

3.1.4. Strategies to cope with chronic pain

This theme emerged from the third topic guide point. Participants shared their coping strategies related to managing their CP, which resulted in six main subthemes.

3.1.4.1. Coping with the CP by developing an understanding of the nature of the CP

Some participants developed a detailed "*understanding of the nature of CP*" (P6), the *"reasons"* (P51) behind its persistence and coping strategies to achieve maximum functionality and minimise the impact of pain.

One participant reported:

> *"(through) the person himself and his mentality and his understanding can know the nature of the pain, and the concept of creating pain inside the human and how to control this pain and cope with it, this has a huge role in human (life)…Let's say your closest friend, would you harm your closest friend? The same thing with pain."* (P5)

3.1.4.2. Coping with the CP through medically related behaviours

Aligning with the previous theme on the perceptions about the available treatment options, an overlap has been found with the coping strategies, where participants tried various different treatments to manage their CP with some participants trying several different approaches. These options included *"Physiotherapy" (P1, 11, 12, 14), "vitamins" (P4), "muscle relaxants and neck collar" (P11), "injections to reduce pain" (P9), "painkillers" (P15), "medical corset and creams" (P17), "painkillers and sleeping pills" (P21), "medications" (P30), "comfortable (medical) shoe" (P32), eyeglasses" (P34).* Participants also did some actions such as *"going to the hospital" (P9), "going to the doctor (P31), "following the instructions that could increase the back pain" (P33), "going to chiropractic to check the body alignment" (P48).* However, none of the participants tried psychological therapies to manage the CP.

3.1.4.3. Coping with CP through behavioural-oriented changes

Participants used a range of behavioural activities to cope with existing CP, including physical activities such as *"sports exercises"* (P47), *"swimming"* (P32), *"going to the gym"* (P48), *"immediately stopping what I am doing"* (P1), *"go to a warm swimming pool"* (P50) and *"walking when the sun is out"* (P4). Other participants tried to change the way of performing tasks to find a "*better and easier*" (P2) way, such as *"monitoring"* their pain location (P20). Coping through a *"changing lifestyle"* (P42) and daily routine were reported as strategies that help keep pain at minimal levels, as well as following a *"healthy diet" (P3) or "drinking herbs and ginger" (P5).*

Other participants related coping through organising their time, *"doing everything in chunks"* (P14), *"following a programme every week"* (P17) and having *"enough sleep"* (P24). Work-related behaviours included being cautious when doing work tasks so that it would not affect their injury negatively. Two participants reported that they tended to change their posture while working or reduce the working hours to avoid exacerbating the pain. One middle-aged female reported her coping behaviours as follows.

> *"Searching about any article or video and listening to my body… listens to something that relaxes them whether it is Qur'an or music calmness somewhat can relax, reduce the pain, yes, turning the lighting for example, like, if one takes a relaxation session."* (P7)

3.1.4.4. Coping with CP through attention shifting or re-orienting

Participants shifted their attention away from pain, such as changing the task they were doing or *"distracting"* (P10) themselves from pain by *"ignoring the pain"* (P27). To compensate, participants engage in other activities that *"preoccupy"* (P25) their attention and keep themselves *"busy as much as possible"* (P33), *"working on something useful, sat down and working or reading help forgetting or not forgetting but paying less attention to pain, overlook pain"* (P40).

Participants were trying in their daily life activities to focus on other more functional tasks, which, in turn, makes *"the sense of pain becomes lighter"* (P1). Some participants reported the reciprocal effect of taking care and attention to what a person should do and then ignoring the pain itself. One participant summarised this attention reprioritisation experience as follows:

> *"I am (Having) attention because I am too arranging things and know how to manage it. Attention and focus will improve, and attention and focus are (good) from a lot of what I am (doing). On the contrary, (because) I am paying attention and concentrating it made my illness improve."* (P42)

3.1.4.5. Coping with CP through faith or belief system

Some participants mentioned their faith or belief as a source of "hope" (P45), which kept them "*positive and hopeful, and being patient*" (P2) and that supplication and *"spirituality"* (*P13) helped* to relax them (P13). Others saw the CP as a *"test"* (P5) that they must live with it. Some faith-related behaviours included reading *"the Qur'an, or doing Tasbeeh (remembering god)" (P10), "supplicates a lot" (P26), or "pray to Allah that he calms me" (P20).*

3.1.4.6. Psychological coping with CP

Some participants focused on optimism and resilience-related mentality to adjust to the CP experience. Using these psychological resources to *"pay attention to the positive things"* (P42) and increase acceptance was an essential feature in some participants' perspectives as they reported *"attempting to accept the suffering"* (37) and "*adapting to pain*" (P40). However, other participants highlighted the need to normalise pain, such as *"act as if I do not have pain"* (P29), and *"not giving up"* (P20). Further, participants mentioned the importance of motivating and *"energising"* (P3) themselves by *"remaining encouraged"* (P8). This positive perspective and persistence, in turn, helped some participants to preserve their attention while doing different tasks. One male participant reported:

> *"I do not let anything prevent me from focusing on anything I do, whether it is simple or complex."* (P46)

Participants reported that *"psychological readiness"* (P51) is essential in dealing with CP and that it is a crucial factor, so *"the first thing is to do something that will lift your mood"* (P29) because "*good mental health and that's it*" (P21). One male explained that accepting that this is a chronic condition and dealing with it with a positive attitude is crucial:

> *"I cannot refuse, I cannot change what happened, but I can change what is about to come."* (P8)

3.1.5. Perceptions about available treatments

This theme emerged from the fourth topic guide point. Three subthemes were identified explaining perceptions related to available treatments.

3.1.5.1. Perceptions about medications and surgeries

Participants had varied experiences and opinions about medications, which is one of the first-line interventions for dealing with CP. Some participants perceived that oral medicines significantly reduced CP, and therefore, they felt comfortable (P24). Nonetheless, participants perceived that the effect of some medications notably decreased over time, and they were required to switch to another type (P41). One participant reported:

> *"I tried painkillers that are Paracetamol exclusively. it is the only one that works for me. After many years of using it, its effect has diminished a little."* (P46)

Most participants used different treatments to relieve the symptoms, including oral medicines, topical applications, injections, and surgery. For some participants, using one (e.g., pain killer alone) or a combination of medicines (e.g., muscle relaxants and injections) was effective and they had *a positive perspective on medications* (P6). However, some participants thought *medications produced only temporary pain relief* (P38). One young participant reported:

> *"CP medications merely cure the symptoms, not the underlying reason."* (P37)

Some participants reported being unable to adhere to medications due to fears of side effects in the long term. One participant reported:

> *"Surely it (overuse of CP medications) will multiply diseases. I mean, for me, the medicine, in particular the medicine, I mean, I do not take it as a patient I have at home, does not take it, but only with caution. There is a need for someone (to supervise), and there is a need for a specific time for it (the medication)."* (P12)

Many participants were pessimistic about available treatments. They "*took the pain medication because of its availability*" (P33), and "*to manage and prevent (pain episodes) temporarily*" (P19) "*rather than cure the pain*" (P27). One participant reported:

> *"There is nothing that I have come across that has helped me as I've felt."* (P18)

Few participants did not like the idea of *"going to the hospital or clinic"* (P8) regularly for pain management and possible side effects. One participant explained:

> *"If one continues to use these (medications), it can have an effect negatively on your organs in your body. So this is what, uh, in my opinion, has, to be honest, one should stay away from them as much as possible."* (P3)

In addition to their side effects (e.g., drowsiness, kidney problems, liver problems, stomach aches), some medicines for CP were also considered expensive, which usually frustrated them. One participant noted:

> *"Very tiring (the treatments). Uh really, really tiring and annoying and expensive. And I mean you get the frustration, I mean, I can't take (medication) every day. The problem of medications also is that it has side effects."* (P10)

3.1.5.2. Perceptions about non-medication treatments

Participants mentioned using non-medication treatments such as herbs and physiotherapy. Participants' experience with physiotherapy was positive. They used physiotherapy in conjunction with other types of treatment, mainly medications. Participants felt comfortable while doing the exercises, and they perceived it was helpful in subsidising pain and reducing discomfort. Some perceived that physio-related medical equipment such as "*back belt*" (P4), "*leg band*" (P17), "*bandage*" (P44) "*warm device*" (P50) was beneficial. One participant reported:

> "*I must strengthen my muscles, so the exercises are important, ice combined with the physiotherapy was better than taking medicines.*" (P47)

They also appreciated the specialist treatment of physiotherapists because they could do exercises with appropriate techniques, especially when they did their sessions with a physiotherapist. Some provided reasons for not following home physiotherapy as *"unable to manage their time at home"* (P43) or worried of worsening pain while doing exercises themselves. One participant revealed:

> "*Physiotherapy just requires a long time because when I come home I get the pain, now it moves my fingers fine and lowers them well, but when I come home and I get the pain. I stop, I say to myself that I don't want (to do exercises), because I don't want to be in more pain. So I let myself like this, just when I go to her (physiotherapist) she will work instead of me and I can tolerate that.*" (P41)

A few participants complained that the benefits of physiotherapy were temporary and that their pain returned after one to two sessions. Other participants differentiated between physiotherapy and exercises. For them, physiotherapy was not effective but the exercises, stretching and carrying heavy things and resistance training were extremely helpful in reducing the pain. Despite mentioning these treatments, none of the participants had undergone any type of psychotherapy or counselling for managing their CP.

3.1.5.3. Perceptions about using alternative/complementary medicine

A few participants had tried various alternative/complementary medicine to relieve CP, including *"Chinese needles"* (P1), "*Arabic medicine*" (P5), "*herbs,"* and *"cupping"* (P6). Their belief in religion, together with alternative/complementary medicine had a positive effect on the pain management although they did not last for long. However, one participant regretfully shared his negative experience with alternative/complementary medicine since he perceived that the treatment could have ended up with him being in paralysis.

> *"A month ago, I lost hope that I could go back to walking normally again or doing my daily routine. I tried a (traditional) prescription, and others suggested prescriptions for more than a month. I tried two or three (traditional mixes), and also I did not get any benefit. They took me to a person who treats using traditional Arabic medicine for that. I also didn't benefit. I benefitted one day, I mean, let's say when he cracked (my back), he almost paralysed me."* (P9)

3.1.6. Patient-led recommendations for interventions and related policies

This theme emerged from the fourth topic guide point. Participants provided recommendations related to their physical activity for managing the CP. These suggestions focused on outdoor activities such as doing *"sports"* (P12) or *"going on a trip"* (P42). Other participants gave suggestions related to the faith and belief system. Some participants suggested that having spiritual life or religion would enhance *"inner peace"* (P6). Treatment-related suggestions to manage CP varied among participants, but they agreed that awareness of the factors that maintain the CP symptoms and *"understanding the reasons"* (P6) behind CP would be important in being *"self-sufficient"* (P1). A common piece of advice from participants was to seek proper medical treatment and commit to it. However, one participant warned that individuals should avoid excessive use of *"heavy painkillers"* (P30) and seek other options.

Adaptation to CP was one of the leading suggestions for managing CP through psychological willpower. Some participants thought that being able to *"adapt"* (P41) and *"tolerate pain endurance"* (P30) are essential to have a well-balanced life and keeping motivated for future planning. Interestingly, some participants linked hope to *"making others who also have pain happy"* (P6). One male highlighted the role of psychological status as *"You can enhance your psychological potential so that you are satisfied with the situation that you are in so you can continue with life"* (P31).

Participants agreed that the quality of services they receive from the health systems has a major impact on their well-being. The importance of increasing awareness about CP interventions. For example, via media was mentioned by one participant through "*the role of TV and advertising" (P6).* Some participants highlighted the need to involve policy-makers, media, and other influencing parties *to "support the use of recognised methods for pain management"* (P5) and provide proper *"training for professionals"* (P37). One older male highlighted (with a frustrated tone) the lack of support he received to manage his CP and the necessity to improve the services given to this population as;

> "*There has to be special care. it is the right of the people by the government, that it takes care of their matters and provides them with services via their power, ability and their various ministries or specialities, ……….They should not leave people like on margin, and in their very limited financial situation, suffering until they lose their life, they have to, uh, care for us and maintain our dignity and provide us with everything that we need…… we need their ability to recruit all possible resources to cease suffering. ……you go to the hospitals and find them to be overcrowded, both in the outpatients and inpatients.*" (P31)

4. Discussion

This study explored the views of Arabic-speaking individuals on the impact of CP on their lives, attentional experiences, coping strategies, available treatments and CP daily management, as well as recommendations for future interventions to improve the management of CP. Factors contributing towards developing or exacerbating CP varied and included psychological (i.e., mood disturbance), contextual (i.e., job/work requiring attention) and social factors (i.e., social support). These findings align with previous studies which emphasised the link between CP and mental well-being (Turk and Okifuji, 2002). While some participants reported positive affect despite the CP, others had negative affect that impaired their functionality. Previous literature highlights that negative affect is the most assessed psychological factor associated with CP (Meints and Edwards, 2018), and that the pain tolerance of individuals with CP is low when their mood is low (Tang et al., 2008). Evidence also exists on the association between the availability of social support and improvement in CP symptoms (Turk et al., 2016). Most participants in this study preferred having supportive people around them, however, some participants preferred to be left alone. Having people in their close circle helped most participants manage their CP and maintain their optimism. It has been seen as a source of motivation to keep going in life.

Despite not being explored in the context of attention-related experiments before, the role of attention in exacerbating CP was clearly observed. Participants highlighted that focusing on pain (whereas distraction was a solution) as well as tasks requiring attention (such as performing experimental tasks during an experiment) were exacerbating factors. They also described difficulties in focusing their attention or concentrating when their pain was severe. A recent systematic review has highlighted that individuals experiencing CP find it difficult to complete tasks that require attention, such as driving (Vaezipour et al., 2022). However, the experience of being exposed to pain-related words during the attention experiment was acceptable for most of the participants, which reflects the safety of such exposure. This suggests that interventions such as attention bias modification (ABM) training, which is an attention training that enhances participants' focus on the positive cues and away from pain-related cues, are likely to be acceptable to this group (Carleton et al., 2020). ABM training can potentially help in managing CP by reprioritising attention away from cues in the surrounding environment that trigger or maintain pain (Carleton et al., 2020).

In terms of impact, CP, made some participants feel hopeless with self-defeated opinions and behaviours related to suffering for a long period. They felt "forced" to live with pain, but the suffering is "optional," as reported, so the psychological situation differs significantly. In addition to the psychological impact, CP-related attentional difficulties affected other practical aspects of the participants' lives, such as not being able to concentrate on their daily tasks and minimised their productivity, which aligns with previous literature (Graziosi et al., 2022). These, in turn, adversely affected the physical and psychological health of people with CP (Kawai et al., 2017). There is established evidence of the impact of CP on the overall quality of life of this population, including physical functioning, and interference with professional life (Hadi et al., 2019).

Participants mentioned several coping strategies and most were able to adjust their lifestyles and manage their CP. Also, they expressed their perceptions about their ability to cope with CP in the future. However, some participants were unable to manage their CP, either because of a lack of awareness or high severity of pain; they tended to focus on pain and could not reorient their attention to other functional tasks. Participants who had the ability to develop coping strategies appeared to be more resilient and had better mental health. A review by Burke and her colleagues found that individuals focused on physical-psychological factors of CP tended to experience greater fear of pain and depressive symptoms (Burke et al., 2015). However, no studies related to the Arabic population were included in this review. There is an overlap of findings with previous literature about some beliefs about the impact of and coping with CP. However, as discussed in a relatively recent systematic review, they did not investigate these beliefs in light of the future ability to cope (Morton et al., 2019).

Some participants overcame CP-related difficulties by being psychologically resilient, which often involved having a spiritual-faith belief system. This psychological status helped increase acceptance and coping and enhanced behavioural solution-focused approaches. Those participants were generally able to manage their pain and achieve tasks in their daily lives and work despite persistent pain. It is noteworthy that some participants had the ability to use psychological capacities to adapt and recover from the impact of persistent pain. Psychological resilience is considered one of the healthy ways to face difficult circumstances (Newton-John et al., 2014). None of the participants had used psychological interventions or counselling and this seems a missed opportunity. It is worth exploring the availability of culturally sensitive services and any cultural reasons why participants have not accessed these services. Findings revealed that participants relied on social support and spiritual-faith systems for coping with their CP, which can be attributed to the cultural-specific characteristics of the Arabic population. A systematic review by Zolezzi and colleagues showed that stigma towards mental illness treatments is prevalent among patients, care providers and the general public in the Arabic population (Zolezzi et al., 2018). In a Cochrane database review, there were 75 randomised control trials that included psychotherapies for the CP population, yet none involved the Arabic population (de c Williams et al., 2020).

The perception of the available treatments varied among the participants, some of whom had tried numerous different treatments and indicated that the treatments were temporary and did not cure the pain. Some participants did not seem to benefit from any of the available treatments. These findings are consistent with a previous systematic review that explored different treatments for CP and showed that a multidisciplinary treatment approach might have a higher chance of success compared to standard medical treatment (Scascighini et al., 2008). However, the pessimistic view of some of the participants prevented them from trying different alternatives. Further, it seems that some participants had misconceptions about the safety of medications, surgeries, and therapeutic exercises as part of physiotherapy (Taylor et al., 2007; Sanchez and Zurke, 2016), which raise concerns about the quality of services, or the quality of the information provided. The participants' high expectations led to their entrapment in the pursuit of a cure and perfect outcomes, despite the chronic nature of CP. The participants provided several suggestions for managing their condition on a daily basis, such as the crucial role of willpower. Ridson and colleagues explained how willpower is linked with improved coping mechanisms and increased tolerance towards CP (Risdon et al., 2003). Additionally, some participants mentioned the importance of establishing policies and improving health services for CP.

Despite its several strengths, this study also has important limitations. First, the sample size was shaped by the linked experimental study and did not depend only on the saturation level of the qualitative data study, resulting in repeated data. Second, despite offering breaks before the interviews, participants had to do the interview after the experiment, which they might have found tiring. Third, because this study is concerned with the Arabic population, the ability for transferability and generalisability is limited, and exploring CP-attention experiences in the experimental context for other cultures is encouraged. On the other hand, an advantage was that experiencing the task prompted participants to talk more about attention. Another advantage was the prompt questions in the interview that helped build up a rapport. Further, this study succeeded in unfolding the factors associated with CP maintenance, especially those related to the CP-attention relationship. To further advance the findings of this study, future research is recommended to explore in greater detail the policy changes and enhancements in healthcare services required to address the needs of individuals with CP and their attention difficulties.

5. Conclusion

This is the first qualitative study to explore the subjective attention experiences and related impacts of Arabs with CP in both experimental settings and daily attentional tasks. We found that individuals' everyday functions, including attention, are reciprocally affected by CP symptoms. Participants reported that different factors contribute toward developing or exacerbating CP and affect psychological functions. A positive perception of social support can be essential in managing and coping with CP-related symptoms. Appropriate coping strategies and social support can ameliorate the adverse effects of CP on people's lives, including attentional difficulties. Participants tried various treatment interventions; however, none used psychological approaches to manage their CP. Based on patient-led suggestions, there is a clear need for improved policies and healthcare services for individuals with CP. The study's findings provide valuable insights for researchers, practitioners, and policymakers seeking to enhance the well-being of people with CP.

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 humans were approved by the University of Manchester Research Ethics Committee number 3 (UREC 3). The affiliation of UREC 3 is the University of Manchester. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AA: Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing, Conceptualization. KA: Data curation, Investigation, Writing – review & editing. TK: Data curation, Formal analysis, Methodology, Supervision, Writing – review & editing. MP: Supervision, Writing – review & editing. EP: Supervision, Writing – review & editing. NM: Writing – review & editing. NH: Supervision, Writing – review & editing.

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

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Supplementary material

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Exploring configurations of social determinants for enhancing older adult health in China: an fuzzy-set qualitative comparative analysis based on 31 provinces in China

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With China's aging population on the rise, addressing population aging has become a national priority, particularly focusing on improving older adult health. This study employs the social determinants of health framework, considering China's unique macro-social, economic, policy, healthcare, and family cultural factors, to develop a framework for understanding the social determinants of health for older adult in China. Using the fsQCA method and a configurational perspective, the complex relationship between social determinants of health and older adult health status is examined. The findings indicate that individual social determinants alone are insufficient for achieving high levels of older adult health. Instead, three configurations of social determinants have been identified as conducive to high older adult health: Economic Development-Environment – Cultural Dominant Type, Socio-Economic Development – Older Adult Security – Environment – Cultural Dominant Type, and Economic Development Dominant Type. These configurations offer diverse pathways for enhancing older adult health. Conversely, the study identifies two configurations associated with low older adult health levels, exhibiting an asymmetric relationship with the configurations resulting in high older adult health levels. Moreover, economic development consistently emerges as a core condition across all three configurations associated with high older adult health levels, while two configurations associated with low older adult health lack this core condition. These findings underscore the universal contribution of enhancing economic development to improving older adult health.

KEYWORDS

social determinants of health, older adult health, configurational effects, fsQCA, health policy

1. Introduction

Population aging is an inevitable and objective trend in the development of any country or region (1). According to the 7th National Population Census data in China in 2020, the proportion of the population aged 60 and above was 18.70%, and the proportion of the population aged 65 and above was 13.50% (2). Relevant departments predict that the aging process will further accelerate in the near future. With the deepening of population aging in China, a key measure to address this issue is to focus on the health of the older adult (3). As society and the economy continue to develop, people's understanding of health has evolved from "the absence of disease or injury" to a broader perspective. The World Health Organization (WHO) defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (4)." In addition to this, research on factors influencing health has also advanced. Modern health concepts suggest that population health is influenced by various factors, including genetics, behaviors, and lifestyles, which have direct impacts on health (5). However, the WHO emphasizes that social determinants of health (SDH) play a fundamental role in determining people's health and disease, affecting various stages of life, particularly during old age. The characteristics of SDH vary across different countries and periods, making them important entry points for policy interventions (6, 7).

Currently, research on the social factors influencing older adult health often focuses on single perspectives. For example, macro factors such as socioeconomic conditions (8), healthcare policies and systems (9), social security policies (10), and environmental factors (11), as well as micro factors such as individual income (12) and family support (13), have been analyzed using traditional regression analysis to examine the average effects of these factors on older adult health. However, older adult health is a complex phenomenon resulting from the interactions of internal and external factors (14). The potential interactions among various influencing factors can lead to different effects on older adult health. Moreover, the macro and micro factors influencing older adult health differ across provinces in China, and the combination of different factors also produces varying effects on older adult health. Therefore, it is crucial to identify an effective path that can generate high levels of older adult health, which provides important policy implications.

Based on a configurational perspective, this study employs the fuzzy-set Qualitative Comparative Analysis (fsQCA) method to analyze necessary and sufficient complex causal relationships between the social determinants of health and older adult health levels. The study aims to answer the following questions: (1) What macro and micro indicators should be included in a Chinese-specific framework for the social determinants of health? What are the weights of each factor? (2) Are the social determinants of health in China necessary conditions for achieving high levels of older adult health? (3) Which configurations of the social determinants of health can sufficiently generate high levels of older adult health? Which factors are universally present in configurations associated with high levels of older adult health? This study may contribute in the following ways: (1) Based on the theoretical framework of social determinants of health, we construct a Chinese-specific framework for the social determinants of older adult population health, filling the conceptual gap in the SDH framework for the older adult population in China and providing a new perspective for studying the influencing factors of older adult population health. (2) By using the fsQCA method and adopting a configurational perspective, we integrate antecedent conditions composed of socioeconomic development, policies, environment, and culture, and explore the relationship between different configurations and older adult health levels, offering new insights for the empirical study of social determinants of health and older adult health levels. (3) By introducing a configurational perspective to explore the complex impact of the social determinants of health on older adult health levels, this study has important theoretical and practical significance for investigating key factors and multiple paths to improve the health levels of the older adult population.

2. Literature review

2.1. Social determinants of health

Social Determinants of Health (SDH) refer to the environmental conditions in which people are born, live, learn, work, play, and age. These conditions have broad impacts on our health, functioning, and quality of life (15), and they are determined by the distribution of money, power, and resources at global, national, and local levels. Healthy China 2030 categorizes social determinants of health into five major groups: economic stability, educational opportunities and quality, access to healthcare and its quality, social and community context, and neighborhood and built environment. Research defines them as the primary factors that induce disease occurrence, beyond the factors that directly cause diseases, making them the "causes of causes" of diseases (16).

2.2. Social determinants of health and older adult health

2.2.1. Socioeconomic development and older adult health

A series of research findings targeting the older adult population indicate that there is still a stable and continuous positive relationship between individuals' physical health and socioeconomic status. Older adult individuals from privileged social classes exhibit better health conditions (17, 18). The key factor leading to this relationship is the access to "elastic resources" (19), which are resources that can help people avoid health risks or minimize the consequences of risks. These resources mainly include income, knowledge, power, prestige, and various interpersonal relationships within the social network (20). Some studies suggest that the impact of socioeconomic development on health is limited. Economic development in a region often leads to comprehensive improvements in residents' living environment, social infrastructure, and the quality of public services, which have a universally positive spillover effect on health. However, as economic development reaches a certain level, this spillover effect gradually diminishes (referred to as the "ceiling effect"). Consequently, the relationship between economic development and residents' health becomes less significant (21). However, considering the current situation in China, the influence of socioeconomic development on older adult health remains significant. Socioeconomic development is primarily reflected in macroeconomic variables such as *per capita* GDP (22, 23), employment opportunities (24), urbanization, and the proportion of the population in poverty (25).

2.2.2. Policies and older adult health

Policies related to older adult health are closely intertwined with healthcare, medical services, and older adult care. They constitute an essential component of a country's governance system. Brave man et al. highlighted that the healthcare system is a crucial health determinant significantly influenced by policies (26). Physical and mental health often deteriorate with age, and the aging population requires more healthcare services, leading to an increased overall demand for medical care (27). The vulnerability of the older adult population makes them the primary beneficiaries of healthcare services. The improvement of service systems can effectively meet the nursing requirements of the older adult population and enhance their health outcomes (28). Personal pension payments serve as a vital lever of social pension security. They are a crucial source of support for older adult living and play a strong positive role in promoting older adult health and reducing health inequalities (29, 30). Additionally, the improvement of social pension resources, such as the development of nursing homes and other infrastructure, also contributes to the promotion of older adult health (31).

2.2.3. Environment and older adult health

Previous research has revealed a close relationship between natural and community environments and individuals' health and survival (32). Older adult are more sensitive to the social and natural environments around them, and environmental deterioration has a more pronounced impact on their health and survival compared to younger adults (33). Rapid population aging, coupled with the ecological degradation resulting from rapid economic growth, significantly affects the quality of life for older individuals and their families. The relationship between community environment and older adult health has been extensively studied (34–36). The community environment reflects the physical infrastructure of a community, including green spaces, accessible roads, fitness facilities, and other elements (37).

2.2.4. Culture and older adult health

With the socioeconomic development, the heterogeneity of China's older adult population continues to increase (3). The expansion of higher education opportunities implemented in China since 1990 has facilitated an improvement in the overall educational attainment of the population. As cohorts progress, the heterogeneity in educational attainment among the older adult population is expected to further increase. Studies have shown that the disparity in health outcomes is closely related to differences in educational attainment (38). Family support, as a core component of informal care, has drawn attention from scholars regarding its influence on the health of older adult. Some studies suggest that support from family members contributes to improved health outcomes for older individuals (39).

In summary, previous research provides a foundation for understanding the relationship between social determinants of health and older adult health. This study adopts a configurational perspective and employs the fsQCA method to explore the diverse pathways through which social determinants of health at the provincial level promote improvements in older adult health. The study aims to answer how the combination of social determinants of health can be optimized to effectively enhance older adult health and achieve healthy aging. The theoretical model of this study is illustrated in Figure 1.

3. Research methodology and data

3.1. QCA method

The QCA (Qualitative Comparative Analysis) method is a case-oriented approach used to address the interdependencies and complexity of configurational phenomena. It was proposed by Ragin (40). In this study, the fsQCA (fuzzy-set Qualitative Comparative Analysis) method is employed, which is based on set theory and Boolean algebra. It analyzes the combinations of necessary and sufficient conditions that lead to specific outcomes.

The fsQCA method is chosen to explore the complex causal mechanisms underlying the level of older adult health for several reasons. Firstly, previous research has shown that older adult health is a complex phenomenon influenced by the interaction of various internal and external factors. Therefore, to understand the pathways to improve older adult health, it is insufficient to rely solely on statistical analyses of independent or pairwise interactions among the explanatory variables. The fsQCA method, starting from a holistic perspective, addresses this limitation by analyzing the complex causal relationships among multiple factors. Secondly, the high level of older adult health outcomes suggests the existence of multiple equivalent causal chains for improving older adult health. The fsQCA method helps researchers identify configurations of explanatory factors that lead to equivalent outcomes, allowing for an understanding of differentiated patterns in improving older adult health under different conditions. It further facilitates the discussion of complementary and substitutive relationships among the social determinants of health. Thirdly, fsQCA is well-suited to address asymmetric problems, where the causes of high older adult health levels are not necessarily the opposite of the causes of low older adult health levels. Finally, the fsQCA method is applicable to analyzing medium-sized samples ranging from 10 to 15–50 cases. In this study, the sample consists of 31 provincial regions, which falls within the medium-sized sample range.

3.2. Data

3.2.1. Data sources

The study uses provincial regions in China as the basic spatial units (excluding Taiwan, Hong Kong, and Macau). The self-rated health data of the older adult population primarily come from the Seventh National Population Census. Data on the social determinants influencing older adult health levels are mainly sourced from the "China Statistical Yearbook," "China Health Statistics Yearbook," and the 2020 Seventh National Population Census.

3.2.2. Variable selection and calibration

3.2.2.1. Outcome variable

Self-rated health refers to the subjective self-assessment of an individual's health status. It is a comprehensive evaluation of an individual's health based on subjective feelings and objective symptoms. It can reflect aspects of health that objective health indicators may not capture. Self-rated health has been widely used in research to reveal the relationships between the physiological, psychological, social adaptation, and life satisfaction of older adults (41). It also has robust predictive power for cancer, cardiovascular diseases, mortality rates, and functional decline. Thus, self-rated health, as a multidimensional health indicator, not only reveals the current health status but also has predictive value for future health (42). Since 2005, self-rated health of the older adult population has become a key health indicator in the national population census. In

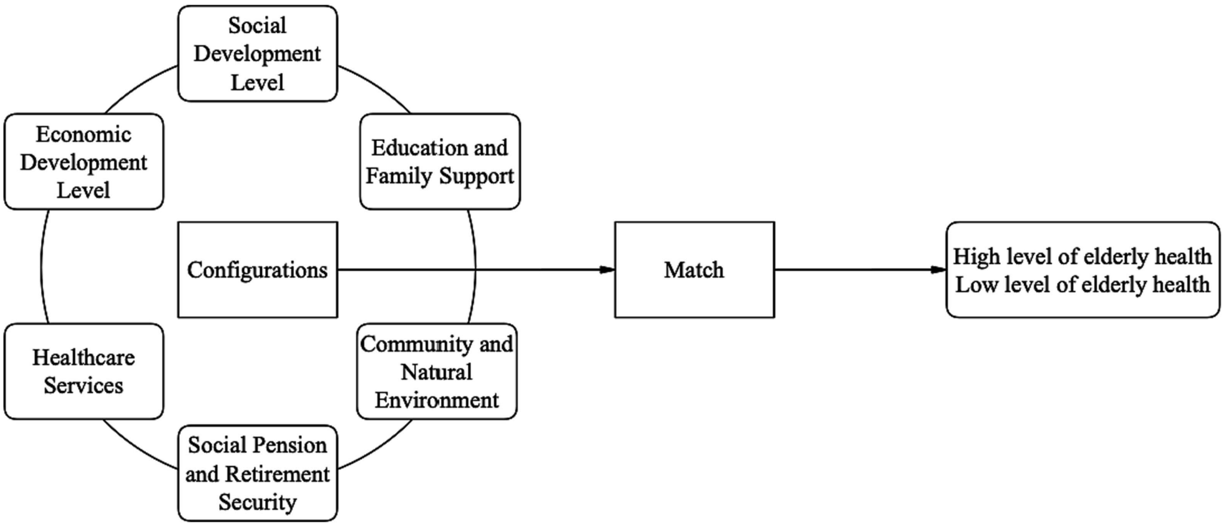

FIGURE 1
Theoretical framework of the influence of social determinants of health on older adult health.

the data from the Seventh National Population Census, a self-rated health status question was included for respondents aged 60 and above. The options for respondents to choose from include "healthy," "basically healthy," "unhealthy but can take care of oneself," and "unable to take care of oneself." In this study, "healthy" and "basically healthy" are defined as indicators of older adult self-rated health, and the proportion of older adult individuals with self-rated health is used as a measure of provincial older adult health levels.

3.2.2.2. Explanatory variables

Based on the theoretical model of social determinants of health for the older adult constructed in the previous text, the six social influencing factors of health are evaluated through a three-level indicator weighting process, with weights determined based on relevant literature and data characteristics as follows:

1. Social Development Level: This factor mainly encompasses the degree of attracting immigrants and the level of aging (43). Hence, the economic development level is calculated by weighing two relative indicators: net migration rate (50%) and older adult dependency ratio (50%).
2. Economic Development Level: Referring to the practice in most literature (44), the *per capita* disposable income is chosen to represent the economic development status.
3. Health and Medical Services: This factor primarily includes the accessibility of health and medical resources. It is calculated by weighing two indicators: hospital beds per 10,000 people (50%) and healthcare personnel per 10,000 people (50%).
4. Social Pension Security: This factor mainly reflects the level of pension benefits (45). It is represented by the *per capita* pension level.
5. Community and Natural Environment: This factor encompasses the conditions of the community and natural environment. It is calculated by weighing two indicators: *per capita* green space area (50%) and *per capita* healthcare facility ownership (50%).
6. Education and Family Support: This factor includes the regional education level and the level of family support for the older adult. It is calculated by weighing two indicators: percentage of people with high school education and above (50%) and family support rate (50%) (Table 1).

3.2.2.3. Calibration

Before conducting the necessity and sufficiency analysis, it is necessary to calibrate the causal factors and the outcome. In this study, the direct calibration method of fuzzy sets is used to calibrate each variable. This method involves specifying values on a certain distance scale, where the three endpoints of the scale form a fuzzy set standard: completely non-membership, crossover point, and complete membership (46). Referring to previous research and combining empirical knowledge (47), this study selects the median, 5th percentile, and 95th percentile of each variable as the crossover point, complete non-membership, and complete membership threshold, respectively. Additionally, to avoid the problem of configuration membership exactly equal to 0.50 for the cases of causal factors, a constant of 0.001 is subtracted from the 0.5 membership degree in this study (48). The calibration results of each variable, along with descriptive statistical analysis, are presented in Table 2.

4. Results

4.1. Necessary analysis of individual conditions

In this study, fsQCA 3.0 was used to perform a necessary test on each condition, and the test results are shown in Table 3. It can be inferred that there are no individual causal conditions with consistency scores higher than 0.9, indicating that there are no single factors that have significant explanatory power in determining high or low levels of older adult health.

TABLE 1 Indicator system of social determinants of older adult health in China.

Primary indicators	Secondary indicators	Tertiary indicators	Measurement methods
Socio-economic development factors	Social development level	Net population inflow rate	(Resident Population – Registered Population) divided by the registered population
		Older adult dependency ratio	Population aged 65 and above divided by the population aged 15–64
	Economic development level	*Per Capita* disposable income	Total disposable income of all residents divided by the resident population
Policy factors	Health and medical services	Number of medical and health institution beds per 10,000 people	Number of beds in medical and health institutions divided by the population, multiplied by 10,000
		Number of health technical personnel per 10,000 people	Number of health technical personnel divided by the population, multiplied by 10,000
	Social pension security	Average level of old-age pension	Average pension amount per person multiplied by the percentage of the population receiving pensions
Environmental factors	Community and natural environment	*Per Capita* green space area	Urban public green space area divided by the urban non-agricultural population
		Per Capita ownership of health facilities	(Number of community service institutions + pharmacies) divided by the resident population
Cultural Factors	Education and family support	Percentage of high school education and above	Number of individuals with high school education and above divided by the total population aged 15 and above
		Family support rate	Number of older adult people relying on family support divided by the population aged 60 and above

4.2. Sufficiency analysis of configuration of conditions

Based on the necessary condition analysis, the fuzzy set truth table analysis procedure was used to incorporate the different causal conditions. Since this study had a sample size of 31, which falls within the range of small to medium-sized samples, a frequency threshold of 1 was determined. Additionally, to ensure a balanced configuration of 0 s and 1 s in the truth table, the original consistency threshold was set to 0.80, based on existing research. Finally, to avoid potential issues with contradictory configurations, the PRI consistency threshold was set to 0.70.

The fsQCA 3.0 software was run, and it produced complex solutions (without using logical remainders), intermediate solutions (utilizing logical remainders consistent with theory and practice), and parsimonious solutions (using all possible logical remainders that help simplify the configuration). Following existing research (47), the intermediate solution was employed, supplemented by the parsimonious solution to distinguish core conditions from peripheral conditions. The presence of a causal condition in the configuration is represented by "•," while the absence is represented by "°." In the configuration, a larger circle denotes a core condition, a smaller circle denotes a peripheral condition, and an empty space indicates that the presence or absence of the causal condition is not crucial for the outcome. The analysis results are presented in Table 4.

Based on the analysis results, there are three configurations that generate high levels of older adult health: H1a, H1b, and H3. The consistency scores for these configurations are 0.9115, 0.9234, and 0.9201, respectively, all of which are greater than 0.9. This indicates that all the conditions are sufficient for generating high levels of older adult health. The overall consistency of the solutions is 0.9223, further confirming that the three configurations are sufficient conditions for high older adult health. The overall coverage of the solutions is 0.5287, indicating that the obtained configurations explain the main reasons for generating high levels of older adult health.

Similarly, there are three configurations that result in low levels of older adult health: L1 and L2. Their consistency scores are 0.9397 (≥0.90), and the coverage is 0.4765, demonstrating that these configurations are sufficient conditions for the outcome and explain approximately 48% of the reasons for low levels of older adult health. In the following analysis, we will examine each configuration in detail, separately for high and low levels of older adult health.

4.2.1. Sufficiency analysis of high older adult health level

Horizontal analysis of various configurations (H1a, H1b, H2) for high older adult health levels reveals three patterns (47): Economic Development – Environment – Cultural Dominant Type, Socio-Economic Development – Older Adult Security – Environment – Cultural Dominant Type, and Economic Development Dominant Type.

Economic Development – Environment – Cultural Dominant Type (H1a): This configuration indicates that high economic development level, favorable natural and social environments, and good education and family support are core conditions. Even with relatively lower health and medical services and social pension security, high older adult health levels can still be achieved. The explanatory sample coverage rate is 0.3365, and the unique coverage rate is 0.1335, both being the highest among the three configurations. Typical provinces falling into this category include Tianjin and Zhejiang, which are situated in the economically advanced eastern coastal regions. These provinces have a leading economic development level, relatively well-built community healthcare facilities, and a higher average level of education among the older adult. Additionally, a

TABLE 2 Calibration results and descriptive statistical analysis.

Conditions and outcome	Fuzzy set calibration			Descriptive analysis			
	Complete membership	Crossover point	Completely non-membership	Mean	Standard deviation	Minimum value	Maximum value
Social development level	0.30	0.08	0.04	0.11	0.09	0.01	0.45
Economic development level	60915.50	27881.00	21769.50	32086.35	12455.12	20335.00	72232.00
Health and medical services	80.20	71.85	58.03	71.15	7.17	55.40	92.00
Social pension security	42412.81	19032.96	11859.63	22099.97	10378.26	11187.00	53412.00
Community and natural environment	12.67	8.71	7.06	9.30	1.80	5.83	13.21
Education and family support	0.40	0.35	0.28	0.34	0.04	0.26	0.43
Proportion of self-assessed health among the older adult	0.91	0.86	0.81	0.86	0.04	0.77	0.91

TABLE 3 Necessary test of individual conditions using fsQCA.

Condition variables	Determinant variables	Result variable			
		High level of older adult health		Low level of older adult health	
		Consistency	Coverage	Consistency	Coverage
X1	High level of social development	0.67522	0.74946	0.53751	0.56302
~X1	Low level of social development	0.60631	0.58144	0.76081	0.68853
X2	High level of economic development	0.73848	0.86368	0.46030	0.50803
~X2	Low level of economic development	0.57935	0.53217	0.87649	0.75978
X3	High level of healthcare services	0.60750	0.61288	0.68500	0.65216
~X3	Low level of healthcare services	0.65521	0.68791	0.59338	0.58791
X4	High level of social pension security	0.53220	0.60460	0.60800	0.65183
~X4	Low level of social pension security	0.69352	0.65214	0.63119	0.56011
X5	High level of community and natural environment	0.70537	0.70759	0.63777	0.60375
~X5	Low level of community and natural environment	0.60499	0.63896	0.69112	0.68883
X6	High level of education and family support	0.67772	0.69650	0.57936	0.56189
~X6	Low level of education and family support	0.57370	0.59105	0.68706	0.66798

TABLE 4 Configuration for achieving high/low levels of older adult health.

Causal conditions	High level of older adult health			Low level of older adult health	
	H1a	H1b	H3	L1	L2
Level of social development	-	•	•	-	⊗
Level of economic development	●	●	●	ⓧ	ⓧ
Healthcare and medical services	⊗	-	ⓧ	-	-
Social pension and older adult care security	⊗	•	•	●	●
Community and natural environment	●	●	ⓧ	ⓧ	ⓧ
Education and family support	●	●	⊗	⊗	-
Consistency	0.9115	0.9234	0.9201	0.9375	0.9400
Original coverage	0.3361	0.2872	0.2526	0.3987	0.4266
Unique coverage	0.1335	0.0840	0.1078	0.0499	0.0778
Overall consistency	0.9223			0.9397	
Overall coverage	0.5284			0.4765	

● indicates the presence of a core condition; ⊗ indicates the absence of a core condition; • indicates the presence of a marginal condition; ⓧ indicates the absence of a marginal condition; – indicates that the condition can either be present or absent without affecting the accuracy of the pathway.

substantial proportion of the older adult population receives support from their families.

Socio-Economic Development – Older Adult Security – Environment – Cultural Dominant Type (H1b): This configuration indicates that high economic development level, favorable natural and social environments, and good education and family support are core conditions. The high levels of social development and social pension security complement each other, enabling the achievement of high older adult health levels even in the absence of excellent health and medical services. H1b configuration exhibits symbiotic characteristics, where society, economy, policy, and culture benefit from each other's existence, leading to a synergistic and mutually reinforcing relationship. Representative provinces falling into this category include Beijing, Shanghai, and Guangdong. Apart from their high socio-economic development levels, these provinces have more comprehensive social pension security policies and rich family caregiving cultures. Specifically, the social pension system includes substantial individual pension benefits, and family members provide considerable financial support. The increased income is then invested in the older adult's health, leading to improved satisfaction and overall health levels.

Economic Development Dominant Type (H2): This configuration highlights high economic development level as the core condition, with high socio-economic development, low health and medical services, high social pension security, low community and natural environment, and low education and family support as the marginal conditions. It indicates that in areas where sufficient medical resources, favorable environment, and cultural conditions are lacking, high older adult health levels can still be achieved as long as the socio-economic development level is high and individual pension benefits are substantial. Specifically, higher *per capita* disposable income positively influences disease incidence and mortality rates, mental health, and subjective self-rated health among the older adult. Additionally, individual pension benefits play a vital role in preventing older adult poverty, thereby enhancing personal well-being and life satisfaction.

4.2.2. Sufficiency analysis of low older adult health level

In order to examine causal asymmetry, this study analyzed the social determinants of health configurations that lead to low older adult health levels and identified three configurations associated with low older adult health. Firstly, configuration L1 reveals that in settings lacking high economic development, favorable community and natural environments, and education and family support, even with higher levels of social pension security, the older adult's health level remains low. Representative provinces falling into this category include Tibet, Inner Mongolia, Xinjiang, and other western regions. These provinces experience relatively underdeveloped social development, with a significant outflow of young labor force resulting in a large population of older adult left behind, and the overall education level is relatively low. Despite substantial financial subsidies from the central government for social pension insurance, such as full government subsidies for urban and rural residents' basic pension insurance in the western regions and increasing subsidies for the New Rural Cooperative Medical Care in the central and western regions, these measures cannot fundamentally improve the low health status of the older adult population. Secondly, configuration L2 indicates that in settings lacking high socio-economic development and favorable community and natural environments, regardless of the levels of health and medical services and education and family support, the older adult's health level remains low. This demonstrates the significant impact of economic development and community and natural environments on older adult health.

4.3. Robustness test

This study conducted a robustness test on the configurations of social determinants that lead to high older adult health levels. QCA is a set-theoretic method that considers slight changes in operations as robust when the subset relations among the results do not alter the substantive interpretation of the research findings. Drawing on previous studies (49), this study employed the technique of changing the critical values for outcome variables and necessary conditions. Specifically, the completely non-membership and completely membership critical values were changed to the 10th percentile and 90th percentile, respectively. The consistency threshold and case frequency remained unchanged. The resulting consistency and coverage showed minimal variations, but the configuration pathways remained largely consistent. The results are presented in Table 5. The aforementioned test demonstrates that the research findings in this study possess good robustness.

TABLE 5 **Robustness test.**

Causal conditions	High proportion of older adult self-rated health		
	H1	H2	H3
Level of social development	•	•	•
Level of economic development	●	●	●
Healthcare and medical services	⊗	-	ⓧ
Social pension and older adult care security	-	•	•
Community and natural environment	•	•	ⓧ
Education and family support	●	●	⊗
Consistency	0.9344	0.9472	0.9510
Original coverage	0.5856	0.2586	0.2066
Unique coverage	0.0607	0.0802	0.0907
Overall consistency	0.9477		
Overall coverage	0.5109		

● indicates the presence of a core condition; ⊗ indicates the absence of a core condition; • indicates the presence of a marginal condition; ⓧ indicates the absence of a marginal condition; – indicates that the condition can either be present or absent without affecting the accuracy of the pathway.

5. Discussion

5.1. Theoretical contributions

Firstly, this study builds upon the existing social determinants of health (SDH) theoretical framework and integrates China's unique national conditions to construct an analytical framework that synergistically drives the health of the older adult at four macro-level elements: socio-economic development, policies, environment, and culture. This framework incorporates multiple conditional factors and derives six social determinants of health, providing robust theoretical support for subsequent empirical analysis by localizing the SDH theory to the older adult population in China.

Secondly, based on a configurational perspective, this study empirically examines the necessity and sufficiency of six key factors—socio-economic development, health care services, older adult social security, community and natural environment, education, and family support—for older adult health. It departs from the traditional regression analysis that selects a single variable to examine older adult health and overlooks the interdependencies among the predictors. This study serves as a valuable complement to existing literature in terms of methods and perspectives.

5.2. Practical significance

Based on the research on the relationship between social determinants of health and the level of older adult health, this study reveals that a single social determinant is insufficient to promote high levels of older adult health. Different provinces may have different paths to enhancing older adult health due to varying levels of socio-economic development, healthcare and social security policies, etc. Therefore, it is essential to optimize the combination of social determinants of health to promote the improvement of older adult health levels. The practical implications of the study are as follows:

(1) Economic development is of paramount importance in improving older adult health. All three configurations associated with high levels of older adult health include high levels of economic development. Furthermore, the two configurations associated with low levels of older adult health have core deficiencies in economic development. This suggests that high levels of economic development have a universal impact on high levels of older adult health. *Per capita* disposable income, as an important indicator of economic development, plays a significant role in health. Therefore, increasing the income level of the older adult is of great importance to their health. Based on the current Chinese national conditions, measures such as raising the retirement age to increase the income of individuals over 60 with labor capabilities, increasing the basic pension level for urban and rural residents to improve the income standard of insured older adult individuals, and raising the minimum living allowance level to eliminate absolute poverty among the older adult can be implemented. However, while improving the overall income level of the older adult, it is necessary to comprehensively improve the income distribution system and guard against health inequalities resulting from income disparities.

(2) Both configurations H1a and H1b, representing high older adult health levels, exhibit high levels of community and natural environments and strong education and family support. This indicates that while emphasizing economic development, it is crucial to be cautious about the potential sacrifices in natural environments due to high population density and the potential overcrowding of older adult health facilities. Additionally, investing in education should not be overlooked. Ensuring equal access to education opportunities, increasing educational investment to promote higher education among the population, and improving educational quality are all measures that can enhance older adult health levels. These initiatives will contribute to the improvement of overall older adult health while promoting educational equity and well-being.

(3) Policy formulation needs to optimize the social determinants of health to synergistically enhance older adult health. There are diverse development paths for high levels of older adult health in different provinces. Considering the different development stages and resource endowments of different provinces, it is not

feasible to expect the same optimization measures to achieve improvements in older adult health levels across all provinces. Instead, a "leader-follower" approach should be adopted, with leaders continuously exploring effective paths to promote older adult health and followers catching up to stimulate further exploration by the leaders, ultimately finding effective configurational paths to enhance older adult health.

5.3. Limitations

This study has the following limitations: Firstly, although the theoretical framework is based on China's unique macro and micro-environmental conditions and builds upon the SDH theoretical framework, the complexity of factors influencing health makes it difficult to include all relevant factors. In the future, as society progresses and develops, the model can incorporate more macro and micro-level factors that influence older adult health. Secondly, constrained by data availability, this study only focuses on analyzing the static relationship between social determinants of health and older adult health levels. In the future, with the accumulation of data from sources like the national census and the improvement of indicators for social determinants of health, researchers can further analyze how changes in social determinants of health dynamically impact changes in older adult health levels, and use TQCA for time-series configurational analysis. Lastly, this study combines quantitative analysis with qualitative analysis on case studies, which helps reveal the mechanisms behind the quantitative findings. However, large-sample QCA studies lack the depth and richness of qualitative analysis that individual case studies provide. Future research can conduct in-depth case studies on different types of older adult populations (e.g., with and without spouses, with and without pensions) to reveal effective paths for enhancing the health levels of different older adult groups based on social determinants of health.

6. Conclusion

The optimization of social determinants of health to promote the improvement of older adult health levels is a focus of research on aging. Socio-economic development, policies, environment, and culture all play important roles in older adult health levels. This study, based on the theoretical framework of social determinants of health, focuses on China's 31 provincial regions and uses fsQCA to analyze the relationship between social determinants of health and older adult health levels from a configurational perspective.

Firstly, this study establishes a comprehensive evaluation index system for older adult health based on the theoretical framework of social determinants of health, taking into account China's national conditions in terms of socio-economic development, policies, environment, and culture. Secondly, using fsQCA, this study examines the necessity of each factor and finds that a single social determinant of health does not constitute a necessary condition for high levels of older adult health. However, high levels of economic development play a relatively universal role in achieving high levels of older adult health. Thirdly, using the configurational perspective and the QCA method, this study identifies three configurations of social determinants of health that lead to high levels of older adult health. These configurations reflect the multiple pathways to achieving high levels of older adult health in different provinces. Finally, this study finds that all three configurations associated with high levels of older adult health include high levels of economic development, while all three configurations associated with low levels of older adult health include low levels of economic development, indicating the significant role of income levels among the older adult in health.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: http://www.stats.gov.cn/sj/pcsj/rkpc/7rp/indexch.htm; https://data.stats.gov.cn/easyquery.htm?cn=C01.

Ethics statement

Ethical approval was not required for the studies involving humans because this study utilizes publicly available secondary data. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements because This study utilizes publicly available secondary data.

Author contributions

SZ: Conceptualization, Funding acquisition, Methodology, Writing – original draft, Writing – review & editing. XW: Methodology, Writing – original draft, Writing – review & editing. HW: Conceptualization, Project administration, Writing – original draft, Writing – review & editing.

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Conflict of interest

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

Publisher's note

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Communication with cancer patients: the perspective of caregivers versus non-caregivers in Iran

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Objective: This study investigated and compared the attitudes of healthy Iranian individuals ($n = 302$) in forms of two groups of caregivers and non-caregivers of cancer patients about the communication with cancer patients, and their personal wish to know the diagnosis if they ever had cancer. In addition, this study aimed to identify how many participants in the caregivers' group had spoken with their family member affected by cancer about their illness.

Methods: Caregivers (50.7%) and non-caregivers (49.3%) responded to two questionnaires regarding their general attitudes about communicating with cancer patients, and their willingness to know about their illness if they had cancer.

Results: The majority of participants (92.8%), especially in the caregiver group, agreed with the right of patients to know the diagnosis and prognosis, and also wished to know if they ever had cancer. However, around 64% of caregivers never talked about cancer with the affected patients.

Conclusion: Participants generally believed that patients have the right to know the diagnosis and prognosis, and they also wished to know if they ever had cancer. However, in reality many cancer patients are not included in communication sessions in Iran. Health professionals should focus on how to create a balance between medical bioethics with cultural influences on communication with patients.

KEYWORDS

communication, cancer patients, breaking bad news, culture, caregiver

1. Introduction

Communication with a patient about cancer is a challenging task for both healthcare providers and families. In some cases, it is the family that decides when, how, and how thoroughly to disclose the diagnosis and prognosis of cancer to the patient, and medical specialists may be requested to withhold bad news (Hume and Malpas, 2016). The principles of Beauchamp and Childress (2001) have far-reaching influence in medical ethics. In particular, the principle of "autonomy" has become the basis of legal regulations, and requests about "informed consent" (e.g., informing about potential side effects before starting medical interventions) and "shared decision making" with all its legal implications are rooted in this principle. While from an ethical perspective it can be discussed whether patients also have a right to "not knowing," legal regulations in many countries have a clear preference for the interpretation that only fully informed patients can make autonomous decisions about how to proceed.

Several protocols have been designed to guide healthcare professionals to respect biomedical ethics and to communicate with patients about their diagnosis and treatment. For example, the SPIKES protocol, which is taught in many universities around the world, recommends that professionals follow six steps before breaking bad news. The steps include setting up the interview, assessing the patient's perception, obtaining the patient's invitation to hear the bad news, giving knowledge and information, addressing the patient's emotions, strategies about the treatment, and summary (Baile et al., 2000). The SPIKES protocol is implemented moderately well (Seifart et al., 2014; von Blanckenburg et al., 2023; Wege et al., 2023). However, according to some studies, the protocol is may not culturally sensitive. In a survey of over 1,300 patients in Canada, Mirza et al. (2019) found that several patients' needs were not included in the SPIKES protocol. In Middle Eastern (Farhat et al., 2015) and Asian (Shin et al., 2016; Hahne et al., 2020) countries, there is considerable resistance against direct communication with patients.

Before discussing the process of breaking bad news in the Iranian healthcare system, a small background about Iran worth mentioning. With approximately 80 million population, Iran is located in the Middle East and North Africa (MENA) region. The Iranian healthcare system consists of two main sectors: public and private. The Ministry of Health and Medical Education (MOHME) is the central authority that makes most of the decisions about the health system's goals, policies and resources in Iran (Ministry of Health and Medical Education, 2023). Both public and private sector provide primary, secondary and tertiary healthcare. Even though the high-level Iranian documents (such as the third to sixth five-year development plans, Mega Health Policies) repeatedly stressed the importance of providing health insurance for all Iranians, lowering out of pocket health spending, and ensuring fair access to health care services, there are still challenges in health insurance coverage in Iran, and many patients have to pay the gap between public and private medical tariffs (Doshmangir et al., 2021). This can be specially challenging for high-cost treatments as occurs in cancer treatment.

Medical education is entirely supervised by MOHME in public and private universities. Breaking the bad news and specifically SPIKES protocol is part of the medical education in Iran, however, according to Labaf et al. (2014), there is no national data on the delivery of bad news by Iranian doctors and their mastery of the necessary communication skills and the adequacy of training provided in universities. Although over 80% of Iranian healthcare specialists and patients had positive attitudes toward telling the truth to a patient (Zamani et al., 2011; Nasrollahi et al., 2022), a study shows that only 35% of patients were completely informed about their disease, and only 7% of patients were aware of the prognosis (Larizadeh and Malekpour-Afshar, 2007), especially when the patient is young or old. Medical students in Iran learn how to break bad news, however in practice, it is often the families that handle the news and the information (Larizadeh and Malekpour-Afshar, 2007; Scheidt et al., 2017). In a recent representative study from Pakistan, the majority of patients expressed a preference for their family members to receive the bad news initially (Shah et al., 2023). When the family is involved in the diagnosis stage, such as receiving test results, meeting with various specialists to reach a diagnosis, the possibility that the patient is left out of the decision-making process is very high (Scheidt et al., 2017). In such a situation, it is very common that the family and surrounding people request the doctor not to tell the patient the definitive diagnosis.

While several studies on delivering bad news have been conducted worldwide, it is crucial to investigate people's attitudes toward disclosing such news to a patient. As mentioned earlier, the perspectives of healthcare staff on a patient's right to know may not align with the family's preferred approach to conveying bad news. The caregivers have an important role and often wish not to harm the patients (Scheidt et al., 2017). Nevertheless, it could be, that attitudes about the communication process may change due to the experiences in the care and the communication compared to persons without any contact to the illness of cancer. Thus, it is essential to ascertain the personal preferences of caregivers regarding their own potential diagnoses. Do they wish to be informed of the diagnosis, or would they prefer not to know? Does the experience of caring for someone with cancer change one's own attitudes? Are there any disparities between their attitudes and the reality? Considering the substantial number of Iranian migrants dispersed globally, along with the healthcare system in Iran, the findings of this study may hold global significance in ensuring culturally sensitive care. In this study, we aim to address the following questions:

1. What are the attitudes of healthy individuals (both caregivers and non-caregivers) toward communicating with cancer patients?
2. Who should inform about the illness if participants are diagnosed with cancer?
3. Is there a correlation between personal preferences for knowledge and general attitudes toward communicating with cancer patients? Are there any moderators to consider?
4. Among the caregivers, how many have had discussions about the disease with their family members affected by cancer?

Our hypothesis is, that there will be a significant difference in the attitudes toward communication with cancer patients between healthy individuals who are caregivers and those who are not due to the experience of caring for someone with cancer. We suppose, that there will be a correlation between participants' personal treatment preferences and their general attitude toward communicating with cancer patients. The proportion of caregivers who have discussed the disease with their affected family member will be less than 50%.

2. Methods

2.1. Sample

The questionnaire was filled out by two groups of participants: caregivers and non-caregivers of cancer patients. Non-caregivers were recruited online through different social media, and caregivers were recruited online, through different social media (such as what's up, Telegram and Instagram), and also from an NGO supporting people with cancer and their families. For online group, we formed an online questionnaire through google form and sent the link around. In the first page we wrote the statement of purpose and informed consent statement. Recruitment lasted for six months. Participants from the NGO were contacted by phone and if they agreed to participate, they were given an option between the online questionnaire or an interview via phone call. The majority of participants completed the online version. The data set was anonymous and is stored in a locked computer in the university. The study was approved by the University of Isfahan Ethics Committee (J/2509/99).

2.2. Instrument

Attitudes toward communication with cancer patients were assessed with an 18-item questionnaire that was piloted among 20 Iranians caregivers and non-caregivers. The questionnaire had two parts; the first part addressed attitudes of the participants about communicating with a cancer patient. In this part, six questions were selected and translated/ back translated from the German Marburg Breaking Bad News (MABBAN) scale (von Blanckenburg et al., 2020) which is a questionnaire that assesses patient preferences for breaking bad news communication based on the SPIKES protocol (Seifart et al., 2014). To ensure a broader approach (communication with the family/ spouse as well) and not just communication with the doctor, the beginning of the items was changed from "The doctor should… e.g. give the patient the opportunity to ask questions" to "It is better to… e.g. give the patient the opportunity to ask questions". Four items were developed by researchers and clinicians (e.g., "It is better that the patient knows that he/she has cancer", "I want to know that I have cancer") (see Table 1). All items were rated as agree or disagree. In the present study, the Cronbach's alpha coefficient was estimated as 0.72. Guttman split half coefficient estimated as 0.79. The second part of the questionnaire started with the sentence "If I had cancer, I would want to know that I have cancer", followed by the same items as the first part ("e.g. I want the following people to give me enough possibilities to ask questions") with the preferred source of information (doctor, parents, children, spouse). Moreover, we asked the caregivers "Does anybody talk with the patient about his/her cancer?" and "Who was the person to break the bad news?" Guttman split half coefficient estimated as 0.78 for the second part. Content validity ratio (CVR) was assessed as well. We sent the questionnaire to eight health psychologist and received their responds about the necessity of the items. The CVR was calculated as 0.94 that was acceptable.

2.3. Statistical analyses

SPSS23 statistical software was used to analyze the data. Descriptive analyses were conducted to describe the sample's demographic characteristics. Identifying the differences between two groups was tested using chi-squared tests. Logistic regressions with a moderated model (Model 1) were tested using the PROCESS macro to investigate the moderating effects of age, gender, education, and history in relation to the first and tenth questions of the questionnaire (Hayes, 2013).

3. Results

3.1. Demographic characteristics

Based on the Cochran's (1977) formula and initial pilot scores (SD = 0.3), the general sample size was estimated to be at least 139 people. The questionnaire was completed by 302 participants; of these, 153 (50.7%) were caring for a cancer patient in their family, and 149 (49.3%) had no history of cancer in the family. Of this group, 250 individuals were female (82.8%) and 52 were male (17.2%). The age ranged between 30 and 65 years (M = 43.9, SD = 6.2). The majority of participants had a Bachelor's degree (39/4%), followed by a Master's degree (25/8%), high school diploma (17/9%), PhD (12/3%), and high school or less (4/8%).

3.2. Attitudes toward breaking Bad news

The frequency and percentage of participants' answers to items 1 to 10 are presented in Table 1. In addition, the results of the chi-squared test are provided in Table 1 in order to determine significant differences in the frequency of answers by caregivers and non-caregivers. Most participants agreed with the general attitude that it is important to communicate with persons affected by cancer. The item "It is better to inform the patient about the disease during the first conversation" was agreed upon by less than half of the asked persons. Moreover, significantly fewer caregivers would inform the patient about alternative treatment methods. Interestingly, almost all caregivers (92.8%) would like to know if they were affected by cancer, but only two thirds of non-caregivers agreed with this statement (65%).

3.3. Who should inform about the disease

The results of the chi-squared test to examine the frequency of answers to questions 11 to 18 in the two groups are presented in Table 2. In response to all the questions of the questionnaire related to the person who informs the cancer patient of different aspects of the disease, between caregivers and non-caregivers, most people would prefer the doctor to inform them. In comparison between the two groups, only in response to question 14 (I want the following people to give me the opportunity to ask questions) was there a difference between groups ($p < 0.05$). More participants in the non-caregivers group were more likely than caregivers to have the opportunity to ask questions to their spouse.

3.4. Relation between general attitudes and the personal wish for knowledge

To investigate the association between attitudes regarding the knowledge of having cancer in general and if the person had cancer himself/herself, a Spearman-Brown correlation was applied, showing a small but significant correlation ($r = 0.270$, $p < 0.001$). The result indicates a positive and significant correlation between question 1 (It is better that the patient knows that he/she has cancer) and question 10 (I want to know that I have cancer) of the questionnaire. It seems that the more people agree that they should inform the cancer patient about their disease, the more inclined they are to want to be informed themselves if they were to have the disease.

To assess the moderating influence of gender, age, education, caregiver status, and the general attitude "It is better that the patient knows that he/she has cancer" on the statement "I want to know that I have cancer", logistic regressions were conducted using the PROCESS

TABLE 1 Comparison of the general attitudes toward cancer communication among caregivers and non-caregivers.

		Caregivers ($N = 153$)	Non-caregivers (N = 149)	Chi^2	
General attitudes about breaking bad news in cancer patients		Agree *n* (%)	Agree *n* (%)	Chi^2	*p*-value
1	It is better that the patient knows that he/she has cancer.	127 (83)	133 (89.3)	2.57	0.12
2	It is better to talk to cancer patients about their illness.	128 (83.7)	133 (89.3)	2.02	0.15
3	It is better to inform the patient about the disease during the first conversation.	73 (47.7)	62 (41.6)	1.14	0.29
4	It is better to explain the details of the disease comprehensibly and in detail.*	117 (76.5)	119 (79.9)	1.14	0.29
5	It is better to give the patient enough possibilities to ask questions.*	150 (98.0)	147 (98.7)	0.18	0.67
6	It is better to inform the patient about possible therapies.*	149 (97.4)	147 (98.7)	0.63	0.43
7	It is better to inform the patient about alternative treatment methods (traditional therapy, palliative therapy).*	131 (85.6)	142 (95.3)	8.15	0.004
8	It is better to inform the patient about effects of the tumor on life circumstances.*	116 (75.8)	115 (77.2)	0.08	0.78
9	It is better to characterize the expected course of disease in all clarity.*	111 (72.5)	112 (75.2)	0.27	0.61
10	I want to know if I have cancer.	142 (92.8)	98 (65.8)	33.83	<0.001

Adapted from the MABBAN scale.

procedure (Hayes, 2013). The results, detailed in Table 3, demonstrated a significant impact of education ($p < 0.05$) and personal history ($p < 0.001$) on the desire to be informed about cancer. However, no significant effects were observed for gender and age.

In scrutinizing the moderating roles of gender, age, education, family history of cancer, and the general attitude toward delivering challenging news, the reported confidence intervals (CIs) indicated that only the interaction between caregiving status and the general attitude was statistically significant in predicting an individual's preference for being informed about their cancer diagnosis (95% CI = [1.29–4.55]; the 95% CI did not encompass zero). Conversely, the interactions of gender, age, education, and the general attitude were not significant (the 95% CIs included zero). Thus, caregiving for a cancer patient plays a noteworthy moderating role in this relationship.

These results illustrate a distinction in the relationship between responding to the first item ("It is better that the patient knows that he/she has cancer") and the tenths item ("I want to know that I have cancer") in the two groups. Specifically, the association between the general attitude toward awareness of the illness and the personal wish to be informed was more robust in the caregiver group.

3.5. Talking about cancer with patients

From 153 caregivers, we received answers from 127 respondents about the following questions: "Does anybody talk with the patient about his/her cancer?" and "Who was the person to break the bad news?". Table 4 shows the results; 46 (36.2%) patients were spoken to directly about their illness, but nobody had ever talked with 81 (63.8%) patients about their cancer.

4. Discussion and conclusion

The study aimed to assess the attitudes of both caregivers of cancer patients and non-caregivers toward communicating with individuals diagnosed with cancer. It examined the alignment between general

TABLE 2 Who should inform about the illness (breaking bad news).

		Informant	Caregivers (*N* = 153)	Non-caregivers (*N* = 149)	Chi^2	*p*-value
			n (%)	*n* (%)		
11	If I had cancer I want the following people to talk to me about my illness.	Doctor	127 (83)	119 (79.9)	2.10	0.55
		Parents	5 (3.3)	4 (2.7)		
		Children	1 (0.7)	0 (0)		
		Spouse	20 (13.1)	26 (17.4)		
12	I want the following people to inform me about the disease during the first conversation.	Doctor	117 (76.5)	116 (77.9)	1.28	0.73
		Parents	7 (4.6)	5 (3.4)		
		Children	1 (0.7)	0 (0)		
		Spouse	28 (18.3)	28 (18.8)		
13	I want the following people to explain me the details of the disease comprehensibly and in detail.	Doctor	136 (89.9)	129 (86.6)	1.99	0.57
		Parents	1 (0.7)	2 (1.3)		
		Children	3 (2.0)	1 (0.7)		
		Spouse	13 (8.5)	17 (11.7)		
14	I want the following people to give me the opportunity to ask questions.	Doctor	148 (96.7)	135 (90.6)	10.02	0.02
		Parents	1 (0.7)	2 (1.3)		
		Children	2 (1.3)	0 (0)		
		Spouse	2 (1.3)	12(8.1)		
15	I want the following people to inform me about possible therapies.	Doctor	146 (95.4)	139 (93.3)	3.38	0.38
		Parents	2 (1.3)	1 (0.7)		
		Children	1 (0.7)	0 (0)		
		Spouse	4 (2.6)	6 (6.0)		
16	I want the following people to inform me about alternative treatment methods (traditional therapy, palliative therapy).	Doctor	143 (93.5)	137 (91.9)	1.68	0.64
		Parents	3 (2.0)	3 (2.0)		
		Children	1 (0.7)	0 (0)		
		Spouse	6 (3.9)	9(6.0)		
17	I want the following people to inform me about the effects of cancer on life circumstances.	Doctor	136 (88.9)	131 (87.9)	7.71	0.05
		Parents	6 (3.9)	2 (1.3)		
		Children	3 (2.0)	0 (0)		
		Spouse	8 (5.2)	16 (10.3)		
18	I want the following people to characterize the expected course of disease in all clarity.	Doctor	145 (94.8)	137 (91.9)	6.08	0.11
		Parents	1 (0.7)	2 (1.3)		
		Children	3 (2.0)	0 (0)		
		Spouse	4 (2.6)	10 (6.7)		

attitudes toward delivering difficult news in cancer communication and participants' personal preferences if they were themselves diagnosed with cancer. Moreover, the study investigated the extent to which caregivers engaged in conversations with patients, including who assumed the responsibility of conveying the diagnosis. In summary, the majority of participants affirmed the patient's right to be informed about the diagnosis and prognosis, expressing a personal desire for the same transparency if they were facing a cancer diagnosis. However, a significant portion of caregivers reported not having discussed the illness with the affected patient.

The first finding of this study revealed that nearly all participants, regardless of their caregiving status, advocated for direct communication with patients and expressed a desire to be informed if they were diagnosed with cancer. Many persons express a strong desire to possess knowledge about their diagnosis (Jung et al., 2019). This sentiment aligns with the principles of biomedical ethics as outlined by Beauchamp and Childress (2001), emphasizing the "right to know" in numerous studies. However, half of the participants did not support immediate disclosure during the initial conversation. This is while studies have shown that it is better to share information with

TABLE 3 Logistic regression of the possible moderators (age, gender, education and caregiver status) to the general attitude (It is better that the patient knows that he/she has cancer) on the individual wish to know about cancer (I want to know if I have cancer) ($n = 302$).

Moderator	Variables	model	p-value	B (SE)	p	CI 95%
Age	Age	21.16	0.00	−0.02 (0.02)	0.23	−0.07–0.01$^{(n.s)}$
	General attitude			1.59 (0.35)	0.00***	0.89–2.29
	Interaction			−0.07 (0.04)	0.14	−0.15–0.02$^{(n.s)}$
Sex	Sex	20.23	0.00	−0.15 (0.41)	0.71	−0.94–0.65$^{(n.s)}$
	General attitude			1.5 (0.36)	0.00***	0.81–2.22
	Interaction			0.99 (0.91)	0.27	−0.79–2.77$^{(n.s)}$
Education	Education	25.36	0.00	−0.31 (0.14)	0.03*	−0.59–0.03
	General attitude			1.64 (0.36)	0.00***	0.92–2.36
	Interaction			−0.49 (0.35)	0.16	−1.17–0.20$^{(n.s)}$
Caregiver	Caregiver	70.02	0.00	−2.31 (0.43)	0.00***	−3.15–1.47
	General attitude			2.62 (0.61)	0.00***	1.46–3.82
	Interaction			2.13 (0.67)	0.00***	1.29–4.55

SE (standard error), $*p < 0.05$, $**p < 0.01$, $***p < 0.001$, LLCI (lower level confidence interval), ULCI (upper level confidence interval). 95% CI that does not include zero.

TABLE 4 Caregivers' conversations with the patients (n = 127).

The patient was NOT spoken about to his/her cancer	81 (63.8%)
The patient was spoken to about his/her cancer	46 (36.2%)
The informant	
Physician	35 (76.1%)
Spouse	4 (8.7)
Siblings	4 (8.7%)
Parents	0 (0%)
Friend	3 (6.5%)

the patients as much as they understand and gradually over several sessions with empathy (Zendehdel, 2019).

One particularly intriguing finding is that 92% of caregivers expressed a preference for being informed if they were diagnosed with cancer, while only 65% of non-caregivers shared this sentiment. This observation mirrors the existing literature on information avoidance, wherein some individuals choose to remain uninformed, especially when they anticipate that the information may negatively impact their mental well-being. Case et al. (2005) posited that individuals may, at times, opt not to confront the reality of their situation, particularly in matters of health. They argued that information avoidance is frequently linked to feelings of anxiety, fear, self-efficacy, and locus of control. Consequently, while it is generally assumed that information can alleviate anxiety, this does not hold true for all individuals. Even in Western countries like the USA, a nationally representative sample demonstrated that 4 to 5 out of 10 patients actively avoided information. This behavior was attributed to factors such as gender (male), a family history of cancer, and feelings of information overload (Chae et al., 2020).

Furthermore, the findings show that healthcare professionals were the most preferred source for delivering the bad news among both groups. Only in item 14 did some people in the non-caregivers group state that they preferred their spouse to give them the opportunity to ask questions. Selecting the spouse as the source of questions and answers may show the need for people to communicate during a chronic illness; however, this answer was significantly higher among non-caregivers. People who had dealt with cancer in their family preferred professional sources for questions and answers. Nevertheless, an Iranian study found, that only 32 (13.6%) of the medical staff had received training in delivering bad news, and a significant majority, 195 (83%), expressed the need for a course to develop this skill (Biazar et al., 2019). This highlights a clear gap in training and underscores the importance of providing further education in this area especially because clinical communication encompasses far more than the mere transmission of information (Bousquet et al., 2015; Matthews et al., 2019; Tranberg and Brodin, 2023).

The study's most surprising discovery was the contrast between the positive attitudes toward direct communication and the actual practices observed. A majority of caregivers reported that no one had discussed the cancer diagnosis with the patients. As a result, they were uncertain whether the patient was aware of their condition or not. This pattern aligns with previous Iranian studies, which consistently found that the majority of patients remained unaware of their diagnosis (Zahedi and Larijani, 2009; Parsa et al., 2011; Lashkarizadeh et al., 2012; Joibari et al., 2013). Similar trends have been observed in Eastern countries. For instance, a study in Lebanon revealed that although most participants believed patients should be informed about their disease, but only 14% of physicians disclosed the truth (Farhat et al., 2015). In China, Hahne et al. (2020) also noted that doctors typically inform the family first, and if requested, withhold information from the patient. In two other Chinese studies, between 35 and 50% of doctors said that they withhold information about cancer from their patients (Fan et al., 2011; Wang et al., 2011).

The fact that over 63% of our participants chose not to share information with their patients raises several critical concerns. Firstly, despite Iranian medical students being educated in biomedical ethics and the SPIKES protocol, in practice, many appear to defer to the families' wishes to avoid direct communication with patients. Secondly, due to this lack of direct communication, there is no way to ascertain whether patients are aware of their cancer and what their specific needs might be. Consequently, patients may not be adequately included in the decision-making process regarding their treatment. Fourthly, it appears that families' expectations serve as a barrier to open and comprehensive communication between healthcare professionals and cancer patients. In Iran, the role of the family is paramount in handling bad news and providing care (Bazrafshan et al., 2022). In many cases, it is the family that determines how much patients are told, who delivers the information, and even when to transition from treatment to palliative care (Shah et al., 2023). Abazari et al. (2017) created a localized protocol to break bad news in Iran. They emphasized including the views of close family in informing the patient, prioritizing the "no harm" principle over "respect for autonomy", replacing the term cancer with less scary words, planning and preparing the family to tell the truth, and not mentioning a potential time of death. Part of this recommendation seems not to be in line with the western view on delivering bad news but may work better in Iran (Scheidt et al., 2017).

There are some limitations to this study. One of the limitations of the research was the lack of qualitative investigation of this issue. Therefore, the information about this issue was collected only quantitatively. The majority of respondent were female. Although it is not surprising as female consists of the majority of caregivers around the world (Sharma et al., 2016), the generalization of the study results to the male caregivers in Iran should be done with caution. The majority of caregivers in this study took care of an elderly patient and withholding the information from them was possible. Considering the level of access to information, similar study with young population with cancer would have different result in Iran. Moreover, non-caregivers were recruited via social media, whereas caregivers were recruited via social media and phone calls (NGO contact). Thus, a selection bias cannot be completely excluded. Nevertheless, the majority of the second group also answered the online version of the questionnaire, and there was no difference in education and almost no difference in age (caregivers: M = 45.1 years, SD = 6.3 versus non-caregivers: M = 42.8 years, SD = 6.1), which indicates the comparability of the two groups.

In conclusion, this study analyzed the general and individual attitudes of caregivers and non-caregivers regarding communication with cancer patients. It also looked at the congruency of the answers with a scenario of having cancer in the future and the wish to know about it. The study explored how many participants had actually talked with the cancer patients in their family. The majority of participants believed that patients have the right to know about the diagnosis and prognosis, and they wished to know it if they ever had cancer. However, the majority of caregivers stated that they have not talked with the cancer patient about their illness.

These findings may have some implications for families, patients, healthcare services, and policymakers. For families and the patients, it is important to know that the "right to know" should not be withheld based only on the expectation that the patient will lose hope and the spirit to fight cancer. Instead, giving the right to "not know" can be achieved by asking the patient how much they want to know. Healthcare professionals may face conflicts between the protocols of breaking bad news and the wish of the family to not directly talk with patients. Healthcare staff need to consider the cultural background of the patient and find a way to "not harm" the therapeutic relationship with the family while informing the patient of the disease. Policymakers should create a curriculum to deliver bad news in a culturally competent way and to facilitate a patient's need to express their emotions and needs.

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 humans were approved by the University of Isfahan Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AN and SS were involved in data collection. AN, SS, WR, and PB contributed in analyses and writing up the report. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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

Publisher's note

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Familial aspects of fear of cancer recurrence: current insights and knowledge gaps

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Fear of cancer recurrence is fear or worry about cancer recurrence or progress. Fear of recurrence can impact patients' quality of life and wellbeing. Cancer survivors' families support them practically and emotionally, making them a vital supplement for official healthcare. Given the well-established important role of the family in dealing with cancer, we compiled the studies that examined the relationship between family-related factors and fear of cancer recurrence (FCR) among cancer survivors (CSs). One of the foremost studies in this field is the FCR model presented by Mellon and colleagues, which included concurrent family stressors and family-caregiver FCR as factors linked to survivor FCR. Our goal was to prepare the ground for a family-based model of FCR that is more comprehensive than the one proposed by Mellon et al. sixteen years ago. The studies included those with samples of adult cancer survivors from different regions of the world. Most of the studies we reviewed are cross-sectional studies. We categorized family-related factors associated with survivor FCR into partner-related factors, including subgroups of disclosure to partner, cognitions of partner, and partner's sources of support; parenthood-related factors, including having children and parenting stress; family-related factors, including living situation, family history of cancer, family's perception of the illness, and family characteristics; and social interactions including social support, disclosure, social constraints, and attitudes of others. This review sheds light on how significant others of cancer survivors can affect and be affected by cancer-related concerns of survivors and emphasizes the necessity of further investigation of family-related factors associated with FCR.

KEYWORDS

fear of cancer recurrence, family caregiver, close relationships, communication, cancer survivors, cancer-related concerns

1 Introduction

Cancer has become one of the most prevalent conditions that impact people worldwide, but the number of survivors is increasing with improvements in treatments and care (Cancer Today, 2020). For instance, nearly 20 million new cancer cases were diagnosed worldwide in 2020 (Sung et al., 2021). However, for some types of cancer, a significant percentage of patients are expected to survive. For example, global 5-year survival rates for breast and prostate cancer, two of the most common cancers, exceed 90% (Nardin et al., 2020; Subudhi, 2023). While it is great news that many people are now surviving a once-deadly disease, research shows that Cancer survivors

(CS) experience a wide range of problems caused by cancer and its treatments, including physical, psychosocial, spiritual, and existential issues, some of which persist for years (Institute of Medicine and National Research Council, 2006). Future uncertainty and fear of cancer recurrence are among the most common difficulties that CSs and their caregivers experience (Institute of Medicine and National Research Council, 2006; Jefford et al., 2008).

Fear of cancer recurrence (FCR) is defined as fear or worry about cancer recurrence or progress (Lebel et al., 2016) and is experienced at moderate to high levels by 59% of CSs (Luigjes-Huizer et al., 2022). FCR can motivate survivors to promote healthy behaviors to adapt to their new situation (Park and Gaffey, 2007). On the other hand, lower quality of life, more psychological distress, increased use of healthcare, and increased healthcare costs are downsides to FCR (Thewes et al., 2012; Simard et al., 2013; Lebel et al., 2014, 2016; Jimenez et al., 2017; Champagne et al., 2018; Hall et al., 2018).

Family support is one of the sources that help the survivors deal with their challenges to such a degree that it has been known as a vital supplement for official healthcare (Nijboer et al., 1998; Haley, 2003; Koltai et al., 2018). The family becomes a part of the caregiving team for patients. They get involved in a wide range of issues, from symptom management to problems related to hospitalization and dealing with financial, autonomy, psychological, and social issues (Effendy et al., 2015). Families of CSs support them emotionally by reassuring and consoling, expressing love and affection, being present, distracting the patient from cancer, and practically by accompanying them to the hospital for examinations, treatments, support with household chores, etc. (Vrontaras, 2018). The impact of the family on patients' adaptation to their new situation and how they cope with the condition goes beyond simply being a support network. For example, spouse-caregivers with higher emotional distress early after diagnosis significantly decrease patient adaptation to cancer a year later (Park et al., 2010). Many studies tried to model the family's contribution to cancer survivorship, hoping that the model can help design interventions to improve patient's quality of life and adaptation.

Exploring familial aspects of fear of cancer recurrence needs to be a priority in psycho-oncology because this form of health anxiety is increasing due to the increasing number of survivors. Moreover, research has shown that multiple dimensions of both caregiver and patient well-being, including role adjustment, mental health, quality of life, and psychological distress are interrelated (Northouse et al., 2000; Chen et al., 2004; Bambauer et al., 2006; Kim and Given, 2008). Following the lead of these studies, fear of cancer recurrence should be seen as a factor influenced by caregivers, which usually means family members. As a result of our deepened understanding of how family members influence survivor FCR, we can educate families on how to alleviate FCR in survivors. Further, we would be able to design psychological interventions that could involve family members in the therapy for those with elevated FCR. It should arguably be so because family members are as involved as the survivors with the emotional impacts of cancer.

Mellon et al. (2007) suggested a family-based model of FCR, which was influenced by the resilience model (McCubbin and McCubbin (1996). This intricate family resilience model describes the link between stressors and increased demands for family adaptation. In short, according to this model, stressor events and the pile-up of demands affect family meaning and schema, situational appraisal, family resources, and social support, either through family type or directly, which in turn influence family problem-solving and coping skills. Finally, family problem-solving and coping skills are directly linked to family adaptation (McCubbin and McCubbin, 1996). Inspired by this model, Mellon et al. (2007) proposed their model of FCR in which several individual factors (including age, education, sex, and race), stressors (including concurrent family stressors and illness-related stressors), and family resources (including family hardiness and social support) affected fear of recurrence in survivors and family members through their illness representation. In this model, there is a bidirectional relationship between CS and family members' fears. Testing their model on a sample of CSs and their family members, they presented a revised model (Mellon et al., 2007): individual factors, stressors, and illness representation affect the CS and family members' FCR directly, and the relationship between the CS and family member's fear is bidirectional, as it was in the initial model. Mellon et al. (2007) have acknowledged that many other factors can be added to their model. Since Mellon et al. (2007) model was proposed, several studies have looked into family-related factors, such as the type of relationship and social context, associated with survivors' FCR that may suggest alterations to the original model.

This narrative review aims to examine the studies investigating the link between fear of recurrence in patients and family members and how their relationship and social context impacted patients' fear of recurrence. We have categorized family-related factors into partner-related, parenthood-related, family-related, and social interactions.

2 Study selection

The search was conducted on PubMed and Google Scholar. Relevant keywords in the search included fear of cancer recurrence, FCR, fear of cancer progression AND family, caregiver, spouse, partner, parent, mother, father, child. During reviewing papers, if a new keyword was discovered (e.g., disclosure), it was searched to include potentially relevant articles. References and citations have been explored for relevant publications. Among the articles, those that assessed FCR in adult survivors and contained variables or themes that involved the social circle of cancer survivors were selected for the review. The search was conducted in April 2023 and included peer-reviewed articles published in English between 2001 and 2023. A total number of 38 publications met these criteria and were included in this review. Table 1 presents an overview of these studies.

3 Synthesis of findings

3.1 Partner-related factors associated with fear of cancer recurrence

To begin with, having a partner or not is one of the factors that may impact the level of FCR in CSs. Partnered men diagnosed with prostate or testicular cancer have shown significantly less FCR than single ones (Bergman et al., 2009; Rincones et al., 2021). In contrast, married women had more cancer worries than non-married women in a sample of women with breast or ovarian cancer (Mellon et al., 2008). These studies may not be comparable due to differences in design, scales used, different definitions of relationship and the different nature of prostate, testicular, breast, and ovarian cancers. Also, the mentioned studies are exceptions in the relationship between FCR and marital status since most studies have found no significant

TABLE 1 Studies included in the current review examining family-related factors related to FCR and summary of their findings.

Publication	Study design	Measures/ questionnaires	Cancer type	Findings/associations
Acheampong et al. (2020)	Cross-sectional	FCR-4	Breast	Having children t(84.43) = 4.35, $p < 0.001$
Aghdam et al. (2014)	Descriptive-correlational	FoP-Q-SF	Leukemia Gastro-Intestinal Breast Lung	"Fear of children contracting cancer" as the highest-rated item in the FoP-Q-SF "Worry about family" as the second highest-rated item in the FoP-Q-SF
Arès et al. (2014)	Cross-sectional	CARS[1]	Breast	Having children ($F(1, 738) = 9.60$, $p = 0.002$, partial $\eta 2 = 0.013$). Parenting stress ($\beta = 0.18$, t (515) = 3.25, $p = 0.001$)
Bergman et al. (2009)	Prospective observational cohort	MAX-PC[2]	Prostate	Having a partner (PE = 5.79, $p = 0.03$)
Boehmer et al. (2016)	Cross-sectional	The self-report measure developed by Northouse (1981)	Breast	Caregiver FCR ($t = 3.15$, $p = 0.0017$) Survivor-caregiver co-residence ($t = 3.44$, $p = 0.0006$) Caregiver social support ($t = -2.57$, $p = 0.0102$) Caregiver seeking counseling ($t = 4.98$, $p = 0.0001$)
Chien et al. (2018)	Prospective repeated-measures & experimental with random assignment	MAX-PC	Prostate	Spouse's religious beliefs ($\beta = -0.211$, $p = 0.027$) Living with the extended family ($\beta = -0.232$, $p = 0.033$)
Cohee et al. (2017)	Cross-sectional	CARS	Breast	Cognitive processing as a mediator between social constraints ($a = 0.631$, $p = 0.001$) and FCR ($b = 0.292$, $p = 0.001$)
Custers et al. (2017)	Cross-sectional	CWS[3]	Breast	Having children (t(445) = −2.37, $p = 0.018$)
Dumalaon-Canaria et al. (2018)	Cross-sectional	CARS	Breast	Family history of cancer ($r = 0.143$, $p = 0.011$)
Dunn et al. (2015)	Longitudinal	Four items from the QOL-PV[4]	Breast	Living alone (SE = −0.654, $p = 0.270$) Distress of illness to family (SE = 0.154, $p = 0.052$)
Galica et al. (2020)	Qualitative	Semi-structured review	Ovarian	Family support as the best resource for dealing with FCR
Götze et al. (2019)	Cross-sectional cohort	FoP-Q-SF[5]	Breast Gynecological Kidney Hematological Colon Skin Head and Neck Prostate	"Worry about family" as one of the top fears underlying FCR
Halbach et al. (2016)	Prospective, multicentre cohort-study	FoP-Q-SF	Breast	Having children ($r = 3.26$, $p = 0.017$)
Hamama-Raz et al. (2022)	Qualitative	semi-structured in-depth interviews	Cervical	Three central themes of FCR: No longer resilient," "To be afraid in a dyad," "And what if the disease comes back and I die?"
Hanprasertpong et al. (2017)	Prospective cross-sectional	FoP-Q-SF	Cervical	"Worry about family" as one of the top fears underlying FCR
Hu et al. (2021)	Cross-sectional	FoP-Q-sf	Multiple Myeloma	Partner FCR ($r = 0.614$, $p < 0.01$) Family hardiness ($r = -0.267$, $p < 0.01$) Social support ($r = -0.287$, $p < 0.01$)

(Continued)

TABLE 1 (Continued)

Publication	Study design	Measures/ questionnaires	Cancer type	Findings/associations
Humphris et al. (2019)	Mixed-methods observational	FCR-7	Breast	Emotional talk with therapeutic radiographer ($\beta = -0.514$, $p = 0.011$)
Iglesias-Puzas et al. (2022)	Cross-sectional	FCR-7	Non-Metastatic Melanoma	Having a family history of cancer (1.9 times higher)
Johnson Vickberg (2001)	Qualitative	Semi-structured interview	Breast	Social support
Koch-Gallenkamp et al. (2016)	Cross-sectional	FoP-Q-SF	Breast Colorectal Prostate	Social support (odds ratio = 2.13, 95% confidence interval = 1.78–2.55)
Lai et al. (2019)	Qualitative	purposive sampling technique	Breast	FCR themes: "Trapped in insecurity," "Suffering in silence," and "Pretending as if nothing has happened."
Lebel et al. (2013)	Cross-sectional	CARS	Breast	Having children ($F = 6.64$, $p < 0.001$)
Liu et al. (2022)	Cross-sectional	FoP-Q-SF	Lung	Social support ($r = -0.255$, $p < 0.01$)
Mehnert et al. (2009)	Cross-sectional	FoP-Q-SF	Breast	Motherhood ($d = 0.14$, $p = 0.05$)
Mehnert et al. (2013)	Prospective multicentre cohort	FoP-Q-SF	Gynecological Head and Neck Skin Colon/ Rectum Lung Hematological Neoplasia	Social support ($r = -0.16$, $p < 0.001$) Detrimental interactions ($r = 0.37$, $p < 0.001$)
Melchior et al. (2013)	Cross-sectional	FoP-Q-SF	Breast	Having children ($b = 0.159$, $p = 0.089$)
Mellon et al. (2008)	Cross-sectional	CWS	Breast and/ or Ovarian	Having a partner ($b = 0.11$, $p = 0.03$) Family history of cancer ($b = 0.03$, $p = 0.9$)
Muldbuecker et al. (2021)	Cross-sectional	FoP-Q-SF	Prostate Laryngeal Breast	Partner FCR Prostate Cancer ($r = 0.51$, $p = 0.001$) and Breast Cancer ($r = 0.31$, $p = 0.001$)
Perndorfer et al. (2019)	Longitudinal	FCRI[6]	Breast	Protective buffering ($r = 0.24$, $p = 0.001$)
Perndorfer et al. (2022)	Longitudinal	FCRI	Breast	Partners' sleep quality ($b = -0.85$, $p = 0.001$) Partners' sleep onset latency ($b = 0.23$, $p = 0.022$)
Rincones et al. (2021)	Systematic review of literature	Various	Testicular	Having a partner (NA)
Sawma and Choueiri (2022)	Cross-sectional	FCRI–SF[7]	Breast	Balanced flexibility ($b = -0.67$, $p < 0.001$) Quality of communication ($b = -0.33$, $p = 0.004$) Chaotic family functioning ($b = -0.49$, $p = 0.001$)
Şengün İnan and Üstün (2019)	Qualitative	Semi-structured interviews	Breast	Motherhood Social support Stigma and the negative attitudes of others, especially spouses
Shen et al. (2022)	Cross-sectional	FCRI-SF	Acute Leukemia	Social constraints ($r = 0.362$, $p < 0.01$)
Shi et al. (2022)	Quasi-experimental	FoP-Q-SF	Cervical	The quality of communication within the family ($t = 6.169$, $p < 0.001$)
Shin et al. (2022)	Cross-sectional	FCRI	Stomach	Social support ($b = -0.190$, $p < 0.001$)

(Continued)

TABLE 1 (Continued)

Publication	Study design	Measures/ questionnaires	Cancer type	Findings/associations
Singh-Carlson et al. (2013)	Qualitative	Semi-structured interviews	Breast	Younger women experiencing FCR relating to uncertainty around their future, middle-aged women related to what would happen to their children and older women not being troubled by FCR
Soriano et al. (2018)	Longitudinal	FCRI	Breast	Spouse responsiveness (week2: coefficient estimate = 0.456, $p < 0.01$; week3: coefficient estimate = −0.421, $p < 0.01$)
Soriano et al. (2019)	Cross-sectional & longitudinal	FCRI	Breast	Spouse threat sensitivity (estimate coefficient = −0.109, $p < 0.001$)
Soriano et al. (2021)	Longitudinal	FCRI & CARS	Breast	Social constraints (estimate coefficient = 1.117, $p = 0.05$) Protective buffering (estimate coefficient = 1.102, $p < 0.001$)
Steele et al. (2007)	Cross-sectional	Specific questionnaire designed for this study	Colorectal	Having children younger than 21 (NA)
Thewes et al. (2016)	Qualitative	semi-structured interview	Breast	Social support Talking to unsupportive or negative people about FCR Disclosure to friends and family and support groups “Worry about family” as one of the top fears underlying FCR
Uner and Korukcu (2021)	Qualitative	semi-structured interview	Cervical	“Worry about family” as one of the top fears underlying FCR
van de Wal et al. (2017)	Cross-sectional	CWS	Prostate	Partner FCR ($r = 0.44$, $p < 0.001$)
Wijayanti et al. (2018)	Cross-sectional	FCRI	Gynecological	Family history of cancer ($t = 5.53$, $p = 0.001$) Social support (self-esteem support ($F = 32.33$, $p < 0.05$), appraisal support ($F = 34.14$, $p < 0.05$), and belonging support ($F = 28.28$, $p < 0.01$))
Wu et al. (2019)	Longitudinal	Single-item	Prostate	Spouse FCR (Baseline (ICC[8]=0.34, $p = 0.004$) and 6 months (ICC = 0.26, $p = 0.02$))
Xu et al. (2019)	Longitudinal	Single-item	Breast	Disclosure of positive information via patient’s perception of positive information ($B = 0.130$, $p < 0.01$; $B = -0.315$, $p < 0.001$)
Yeung and Lu (2022)	Cross-sectional	Single-item	Breast	Social constraints ($r = 0.31$, $p < 0.001$)
Zheng et al. (2022)	Cross-sectional	FoP-Q-SF	Lung	Social support ($r = -0.416$, $p < 0.000$)
Zhong et al. (2022)	Cross- sectional	FoP-Q-SF	Glioma	Perceived social support ($r = -0.504$, $p < 0.05$)

[1] Concerns About Recurrence Scale.
[2] Memorial Anxiety Scale for Prostate Cancer.
[3] Cancer Worry Scale.
[4] Quality of Life—Patient Version.
[5] Fear of Progression Questionnaire--short form.
[6] Fear of Cancer Recurrence Inventory.
[7] Fear of Cancer Recurrence Inventory—Short Form.
[8] Intraclass Correlations.

relationship between the two variables (Northouse, 1981; Leake et al., 2001; Llewellyn et al., 2008; Simard et al., 2010; Custers et al., 2017; Dumalaon-Canaria et al., 2018; Lebel et al., 2018; Starreveld et al., 2018; Thewes et al., 2018). However, a plausible explanation for the contrasting results could be that women are traditional caregivers in most cultures, and this makes them a relieving caregiver when their partner is ill. In these circumstances, they become care receivers, and the same fact makes them feel like a burden on their partners. A study finds gender role conditioning to be an underlying factor for women assuming the role of caregiver for themselves (Guberman et al., 1992). In addition to gender differences, it would be beneficial to analyse the data controlling for age since it is possible that age would be a moderator in the relationship between marital status and FCR.

In a qualitative study investigating the meaning of FCR for cervical cancer survivors, one of the main themes that emerged was "to be afraid in a dyad," which refers to FCR being the sort of challenge that is discussed with a partner and dealt with by getting help from partner's resources (Hamama-Raz et al., 2022). In this study, communication with partners seems to be the main distinction between women who feel alone in their survivorship experience and those who do not (Hamama-Raz et al., 2022). Several quantitative studies confirm the significant relationship between open communication with a partner and survivor FCR. Protective buffering, which is defined as "efforts to protect one's partner from upset and burden by concealing worries, hiding concerns, and yielding to the partner to avoid disagreements" (Manne et al., 2007), is a construct measured by the extent to which CSs or their partners engage in specific behaviors to deal with cancer-related issues. Likewise, the social constraints are constructs reflecting the perception that one cannot share cancer-related thoughts, concerns, or worries with one's spouse on account of his/her disinterest, unavailability, or disapproval (Lepore and Revenson, 2007). Higher protective buffering and social constraints of CSs have been shown to predict their increased FCR in longitudinal studies, although one's protective buffering or social constraints do not affect his/her partner's FCR (Perndorfer et al., 2019; Soriano et al., 2021). Cognitive processing is suggested to mediate the relationship between social constraints and FCR, according to Cohee et al. (2017).

Capitalisation, which describes the process of disclosing positive events to a close other (attempt), whose response is perceived as genuine and enthusiastic (perceived partner responsiveness, hereafter termed responsiveness) (Langston, 1994; Gable and Reis, 2010), is another way of looking into couple communication. A study by Soriano et al. (2018) has examined the relationship between capitalisation and FCR around the first mammogram post-diagnosis, from which inconsistent results have emerged: although they had hypothesized that both attempts and responsiveness would buffer FCR, attempts never significantly predicted lower FCR and responsiveness only predicted lower FCR after the mammogram. Disclosure of positive information by spouse is also another factor influencing FCR according to a longitudinal study: spouses' disclosure of information that was communicated in a positive manner (i.e., supportive, inclusive, and concerned manner) has shown to be linked to breast cancer survivors' decreased FCR via breast cancer survivors' perceptions of positive information (Xu et al., 2019). The results of the studies that emphasize the effect of within-couple communication on FCR can be justified by the social-cognitive processing model, which suggests that sharing concerns with a close other is an adaptive response to adversity since it facilitates cognitive processing (Lepore, 2001; Lepore and Revenson, 2007). So, any variable that refers to openness to communication may be related to FCR, while withholding worries hinders cognitive processing, thus impends adjustment and maintains FCR (Lepore, 2001; Lepore and Revenson, 2007). Within-couple communication relationship with survivor FCR has been supported by several studies, most of which are longitudinal ones, making the data more reliable and the suggested relationship more likely to be a cause-and-effect relationship. However, all quantitative studies that suggest this link have been conducted on women diagnosed with breast cancer, which hinders the generalizability of the results. Women diagnosed with breast cancer are more concerned with some cancer-related problems than women diagnosed with other cancer types, which probably makes the nature of their fears about recurrence different from other CSs. For example, women with breast cancer experience higher sexual dysfunction [including abnormalities in sexual desire, arousal, lubrication, satisfaction, orgasm, and dyspareunia (Boquiren et al., 2016)] in comparison with women with other cancer types (Jing et al., 2019), which probably causes more worries concerning sexuality. Worries about the sexual consequences of cancer and its treatment is a topic to discuss with a partner, so couples' communication may be quite beneficial for women with breast cancer but not as helpful for women with other cancer types. Future research is needed to investigate the content of discussions about FCR with partners (e.g., surrounding which items of CARS) and compare the effect of discussing each specific concern on FCR. Furthermore, no study has been conducted on men regarding the relationship between couples' communication and FCR.

Some cognitions of CSs' partners are also associated with survivor FCR. In a qualitative study on Turkish breast cancer survivors, an identified trigger of FCR was stigma and negative attitude of spouses (Şengün İnan and Üstün, 2019). Threat sensitivity, which reflects individual differences in the general tendency to attend to, behaviourally and emotionally respond to, and avoid threatening negative stimuli (Carver and White, 1994), is also characteristic in partners that can influence survivor FCR. When FCR peaks in the first mammogram post-diagnosis in breast cancer survivors and their spouses, spouse threat sensitivity, not CS's, predicts longer recovery from FCR peak in both CS and spouse (Soriano et al., 2019). However, spouse threat sensitivity could not predict reactivity or patient FCR on mammogram day (Soriano et al., 2019). Like attitudes toward cancer and threat sensitivity, having religious beliefs or not as the partner of a CS is linked to survivor FCR. In a sample of Taiwanese prostate cancer survivors and their partners, CSs whose partners had religious beliefs reported less FCR than those with partners without religious beliefs (Chien et al., 2018). Of course, we are unsure which element or function of religion causes this link. The most studied construct concerning survivor FCR in a relationship context is partner FCR. Several studies have shown a positive association between survivor FCR and partner FCR among different sexes, cancer types, countries, and FCR scales (Boehmer et al., 2016; van de Wal et al., 2017; Hu et al., 2021; Muldbuecker et al., 2021). Not much is known about the causality that may lay under this association. However, in the study by Boehmer et al. (2016), partners' FCR directly affected survivors' FCR, while survivors' FCR did not affect partners' FCR. Likewise, spouse FCR 6 months after treatment showed a significant association with patient FCR a year after treatment, but no trends toward patient FCR being correlated with later spouse FCR emerged, which indicates that it may be spouse FCR, that influences patient FCR, not vice versa (Wu et al., 2019). The effect of partner cognitions on survivor FCR seems only natural since FCR is coped with in a dyad (Hamama-Raz et al., 2022), and partners are frequently cited as the most important confidants (Figueiredo et al., 2004); when a CS counts on someone as her companion in adversity, the companion's thoughts on the matter gains importance and affects the way the CS thinks and feels about her experience.

Another category of partner-related factors associated with survivor FCR is the partner's source of support. CSs whose partners have higher social support seem to have lower FCR, while those who seek counseling have higher FCR (Boehmer et al., 2016). A possible explanation could be that seeing a partner receiving support from more conventional sources (e.g., family and friends) is a sign of them handling the situation well, whereas seeking help from a professional signifies a crisis or an overwhelming situation. According to this potential explanation, CSs are less fearful about cancer relapse or progression when their partner is handling the situation well.

Not many studies have worked on factors associated with FCR in the relationship context that are potential consequences of survivor FCR. But, survivor FCR is associated with a partner's reduced sleep quality and greater sleep onset latency in a sample of American couples coping with early-stage breast cancer (Perndorfer et al., 2022). Speculation about why this association exists can be that partners are emotionally and physiologically sensitive to CSs' worries to a high degree.

3.2 Parenthood-related factors associated with fear of cancer recurrence

Not much research has been done on how being a parent affects FCR. But several studies suggest that motherhood is a trigger of FCR, a factor affecting the nature of FCR, and associated with higher FCR (Mellon et al., 2008; Mehnert et al., 2009; Lebel et al., 2013; Melchior et al., 2013; Arès et al., 2014; Halbach et al., 2016; Custers et al., 2017; Şengün İnan and Üstün, 2019; Acheampong et al., 2020). Further, Steele et al. (2007) found that women younger than 21 with children experience higher levels of FCR. Similarly, Singh-Carlson et al. (2013) found that younger women commonly experienced FCR relating to uncertainty around their future, whereas, for middle-aged women, the FCR centred around what would happen to their children and older women were not troubled by FCR. A more specific construct concerning parenting and how it might interact with FCR is investigated by Arès et al. (2014), who found that parenting stress increases FCR. In the study by Arès et al. (2014), young breast cancer survivors who had children Arès et al. (2014) also reported that breast cancer interfered more with their intimate lives than childless CSs. These findings pieced together imply that the heightening effect of motherhood on FCR comes from women's responsibility for their children. Cancer recurrence means having to go through intense treatment, having less time to spend with their children; an increase in the possibility of their death, leaving their children motherless; and an increase in the responsibilities expected from their adolescent due to his/her mother being hospitalized or debilitated. Consequently, women worry about cancer recurrence more if they have children they should care for.

A study by Aghdam et al. (2014) on Iranian CSs (male and female) showed that fear of children contracting cancer is the highest-rated item in the Fear of Progression Questionnaire. To our knowledge, no study has specifically examined the relationship between fatherhood and FCR.

3.3 Family-related factors associated with fear of cancer recurrence

Some quantitative and qualitative studies on samples from various cultures, cancer types, and ages have identified "worry about family" as one of the top fears underlying FCR (Aghdam et al., 2014; Thewes et al., 2016; Hanprasertpong et al., 2017; Götze et al., 2019; Uner and Korukcu, 2021). Further, Uner and Korukcu (2021) have found the basis for fear of death to be fear of leaving their loved ones alone among young Turkish CSs suspected of new cancer. Considering this finding, it could be estimated that some CSs' worry for their families is manifested in items or themes other than "fear of family being affected by cancer," and family has even greater importance in their mind than the results that research shows.

The living situation of CSs seems to influence their FCR levels. Survivors who do not live alone experience higher FCR (Dunn et al., 2015) and survivor-caregiver co-residence seem to increase survivors' FCR (Boehmer et al., 2016). Although these results have come solely from female breast cancer survivors from the USA, a population probably not representative of all CSs, and they used unconventional measurements for FCR, they give us a cue for further investigation of how CSs perceive the influence cancer has on their relationships with people around them. Another study concerning the living situation of cancer survivors and FCR was carried out on an entirely different population. Chien et al. (2018) found Taiwanese prostate cancer survivors with their partners, children, and grandchildren to have lower FCR than those with only their partners. The contrasting results of these studies emphasize sex and cultural differences. For example, it may be the case that CSs in American culture, an individualistic society that emphasizes autonomy, feel like a burden on the people they live with, while CSs in Taiwanese culture, a collectivist society that counts taking care of elderly family members as a duty, feel quite comfortable with getting as much help as they need from their extended families. Alternatively, the reason for the difference between the studies of Boehmer et al. (2016) and Dunn et al. (2015) and the study of Chien et al. (2018) may be partially again due to women being traditional caregivers, who feel like they should not be care receivers.

Another family-related factor associated with FCR is a family history of cancer. Having a family history of cancer seems to increase FCR, as seen in American women with breast/ovarian cancer, Australian women with breast cancer, Spanish melanoma patients and Indonesian women with gynaecological cancer (Mellon et al., 2008; Dumalaon-Canaria et al., 2018; Wijayanti et al., 2018; Iglesias-Puzas et al., 2022). More research is needed to make clear how a family history of cancer may affect a CS's perception of cancer, recurrence, and caregiving. However, a plausible explanation is that maybe CSs with a family history of cancer are more cognizant of the difficulties accompanied by cancer, or they think that their family resources are drained after dealing with cancer once.

Similar to the study by Mellon et al. (2007), which relates the meaning of illness to family members to FCR, Dunn et al. (2015) showed that distress of illness in the family is associated with FCR. This data means there may be a cause-and-effect relationship or a bidirectional interaction between how family members perceive and feel about cancer and survivor FCR. This is very likely since there is evidence of CSs mentioning the attitude of people around them, especially their partners, as affecting their FCR (Thewes et al., 2016; Şengün İnan and Üstün, 2019).

Some family characteristics have been linked to FCR, expected concerning how families communicate and handle difficulties. Family hardiness, balanced flexibility and the quality of communication within the family are associated with decreased FCR (Hu et al., 2021; Sawma and Choueiri, 2022; Shi et al., 2022). On the other hand, chaotic family functioning increases FCR levels, while cohesion, disengagement, enmeshment, and family satisfaction does not seem to impact the severity of FCR (Sawma and Choueiri, 2022). These studies only include Chinese and Lebanese CSs, with the majority of them being women. So, with regard to differences in the role of the family in Eastern cultures and Western ones, it seems necessary to compare the relationship of these constructs with FCR in various cultures. But according to what we know until now, it could be said that FCR is more effectively curbed in families that are more flexible in their roles, more resilient to stress, better in problem-solving, cooperation, and open communication, and feel more in control of difficulties.

Family support is the best resource for dealing with FCR for some CSs (Galica et al., 2020). However, not all people feel comfortable to discuss their worries about cancer with their family members. In a Taiwanese qualitative study on women who have been diagnosed with breast cancer in the last 2 years, three themes emerged for FCR: "Trapped in insecurity," "Suffering in silence," and "Pretending as if nothing happened" (Lai et al., 2019). These women did not mention their feelings surrounding cancer to their families to maintain family balance and continued to perform their roles in the family as before the cancer (Lai et al., 2019).

3.4 Social interactions' relationship with FCR

Some researchers prefer not to limit social interactions that relate to FCR to partners and family members. They, thus, explore the social support construct in their studies, which refers to the support that an individual gets from family, friends, and other people she may feel close to, such as colleagues, neighbors, and her medical team. This expansion makes sense since many people feel closest to their significant others who are not family members or partners. In this case, these significant others probably play a bigger role in supporting the CS. Also, this type of research's findings apply to a family context. Therefore they are included in the current review.

Many studies from different countries and various cancer types have shown that CSs with higher social support experience lower FCR (Mehnert et al., 2013; Koch-Gallenkamp et al., 2016; Şengün İnan and Üstün, 2019; Hu et al., 2021; Liu et al., 2022; Shin et al., 2022; Zheng et al., 2022; Zhong et al., 2022). Likewise, a significant negative relationship has been observed between the number of significant others and FCR, along with a strong link between the number of significant others CSs identify as understanding her health concerns and FCR (Northouse, 1981). Fear of loneliness and fear of relying on strangers for daily activities in case of cancer recurrence has also been mentioned as an important part of FCR, which confirms the idea that social support is a determining factor in FCR (Götze et al., 2019; Şengün İnan and Üstün, 2019). How social support may link to lower FCR can have multiple answers, one of which is extracted from qualitative studies showing that CSs find social support an effective coping strategy in the face of FCR, using it more than any other coping strategy (Johnson Vickberg, 2001; Thewes et al., 2016). Another way of social support influencing FCR can be through resilience, as suggested by Zhong et al. (2022).

An important part of social support, which researchers address, is communication. Failure to disclose is reported to be inversely correlated to social support and positively associated with receiving unsupportive responses (Figueiredo et al., 2004). There seem to be two sides to disclosing FCR-related thoughts and emotions: In a study by Thewes et al. (2016), some participants from all levels of FCR reported that disclosure to friends, family, and support groups provided opportunities for emotional ventilation and mutual support, while some others found it anxiety-producing because of the perceived impact of these discussions on others. Due to the adverse effect that talking about cancer-related worries may have on others, some CSs withhold these worries in order to protect family and friends (Şengün İnan and Üstün, 2019). Taking into account worries about the effect of cancer talk on family and friends, some patients opt to disclose their worries to professionals, which seems to reduce FCR: emotional talk of breast cancer patients during their second review appointment with their therapeutic radiographers is negatively associated with follow-up FCR, which is measured 6–8 weeks after the end of treatment (Humphris et al., 2019). We can again interpret these associations in the social-cognitive processing model framework, which suggests that sharing concerns with a close other is an adaptive response to adversity since it facilitates cognitive processing (Lepore, 2001; Lepore and Revenson, 2007).

In its broad sense, social constraints not limited to spouses discussed previously can increase FCR (Shen et al., 2022; Yeung and Lu, 2022). Mediating factors between social constraints and FCR for which evidence has emerged are illness perception, self-stigma, bodily pain, and ambivalence over emotional expression (Shen et al., 2022; Yeung and Lu, 2022). Both studies that link social constraints and FCR have been done on Chinese samples, which may limit the generalizability of these findings. For instance, the Chinese tend to translate their inhibited emotions into somatic symptoms (e.g., pain), which means that the mediating effect of bodily pain in the link between social constraints and FCR could be limited to the Chinese culture (Mak and Zane, 2004). So, in order to generalize these findings, more research has to be done in other cultures, along with a quest for other possible mediating factors in the relationship between social constraints and FCR, such as cognitive processing, coping behaviors, optimism, self-efficacy, and threat appraisal.

Although getting help from their support circle can assist CSs in reducing their FCR, sometimes, this support circle triggers FCR. Women from a study by Thewes et al. (2016) identified talking to unsupportive or negative people as an ineffective coping strategy for FCR, and women from a study by Şengün İnan and Üstün (2019) think that behaving as if they were still ill after treatment by people around them was a trigger for FCR. Moreover, detrimental interactions (including over-protective behavior, dismissive, conflictual behavior patterns, and pessimism) have been identified to predict higher FCR (Mehnert et al., 2013). Hence, disclosing cancer-related thoughts and feelings to others does not decrease FCR unconditionally, and potential harm underlies some social interactions.

4 Discussion

This narrative review paper aimed to categorize family-related factors associated with survivors' FCR under partner-related factors, including subgroups of disclosure to partner, cognitions of partner, and partner's sources of support; parenthood-related factors, including having children and parenting stress; family-related factors, including living situation, family history of cancer, family's perception of the illness, and family characteristics; and social interactions including social support, disclosure, social constraints, and attitudes of others.

The results of this narrative review of quantitative and qualitative literature signify a variety of family-related factors greatly affecting survivors' fear of recurrence. Although relatively few studies account for familial aspects of FCR, the results promise at least some family-related factors to account for FCR variations. This means that in the near future, we may be able to have a family-based model of FCR and base a family-oriented intervention on it.

We chose narrative review over systematic review because the inclusion and exclusion criteria required by systematic review limit the breadth of the papers included. Some reviewed papers that offer insightful contributions to the field have used unconventional scales, do not have a rigorous methodology, or are unsuitable for quantitative synthesis. We aimed to bring attention to all the family-related constructs correlated with FCR to lay the grounds for original research that models potential contributing factors. So, we refrained from a methodology that would dismiss a paper with relevant findings that could inspire us to find other constructs in the same category. Moreover, not many papers explore the familial aspect of FCR; therefore, excluding a few papers affects the take-home message of this review more than it usually does.

The most prominent feature of this literature review is that it gathers together studies from different countries, various cancer types, and various methodologies that have one thing in common, which is the key to looking at FCR in a new way: accounting for family resources. This review intends to lead researchers to look for resources for improving the mental health of survivors in the family and even community instead of looking for what resources an individual has. No single person can bear the burden of dealing with cancer and its consequences alone since this disease makes them physically and mentally vulnerable.

The obvious limitation of this study is that it has yet to use rigorous methodologies. Thus, regardless of the authors' attempts to stay impartial, it is inclined to bias.

Researchers in the FCR field have addressed many family-related variables that have proved to be linked to FCR. However, most of them cannot be generalized to all CSs due to the dominance of research on women and cultural gulfs that are very important in family matters. Also, our knowledge of how parenthood, especially fatherhood, can affect the nature and intensity of FCR is extremely limited, which calls for further investigation. The current literature review attempted to critically analyse the most significant results of the previous studies on family-related factors associated with FCR and categorize them in a way that reveals the strengths and limitations of the current models and sets the stage to elaborate on them (please see Figure 1 for an overview).

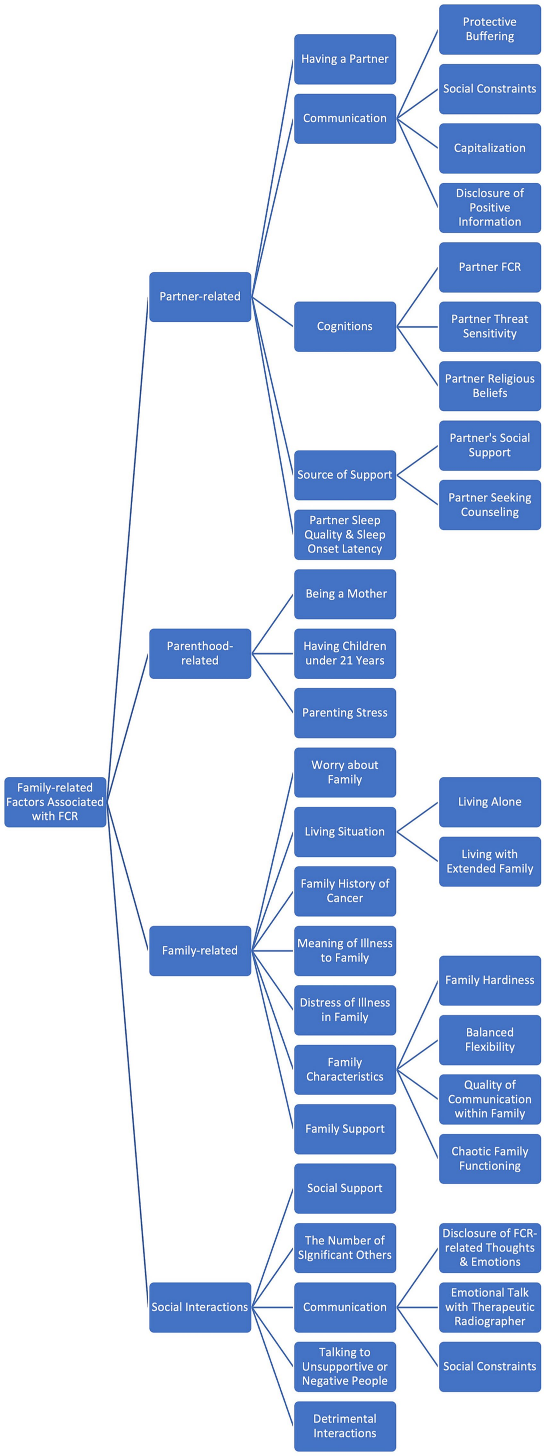

FIGURE 1
The Categorisation of family-related factors associated with FCR (Fear of Cancer Recurrence).

5 Conclusion

In brief, we categorized family-related factors associated with survivor FCR into partner-related factors, including subgroups of disclosure to partner, cognitions of partner, and partner's sources of support; parenthood-related factors, including having children and parenting stress; family-related factors, including living situation, family history of cancer, family's perception of the illness, and family characteristics; and social interactions including social support, disclosure, social constraints, and attitudes of others. Knowing how and why each factor relates to survivor FCR helps us to construct a more comprehensive family-based model in completion of Mellon et al.'s (2007) model, which can, in turn, assist clinicians in designing family interventions for managing FCR. Researchers in the FCR field have addressed many family-related variables that have proved to be linked to FCR. However, most of them cannot be generalized to all CSs due to the dominance of research on women and cultural gulfs that are very important in family matters. Also, our knowledge of how parenthood, especially fatherhood, can affect the nature and intensity of FCR is extremely limited, which calls for further investigation. The current literature review attempted to critically analyse the most significant results of the studies on family-related factors associated with FCR and categorize them in a way that reveals the strengths and limitations of the current literature.

Author contributions

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The effect of gender in binge eating behavior in Chinese culture: the serial mediation model of body dissatisfaction and self-acceptance

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Introduction: The gender difference of binge eating behavior been highlighted by previous studies. However, psychological mechanisms underlying the gender difference of binge eating behavior remain unclear. This study addressed this issue from a sociocultural perspective.

Methods: Firstly, we investigated the mediation effect of body dissatisfaction on the gender difference of binge eating behavior. Secondly, we examine the serial mediating role of body dissatisfaction and self-acceptance in gender differences of binge eating behavior. Here, we analyzed data from 703 Chinese university students using SPSS 26.0 and SPSS PROCESS.

Results: In Chinese culture, body dissatisfaction and self-acceptance independently or through a serial way mediate the gender differences in binge eating behaviors.

Discussion: We discussed the implications and limitations of the present study.

KEYWORDS

gender difference, body dissatisfaction, self-acceptance, binge eating behavior, social culture

Introduction

Binge eating behavior refers to a person eating much more than majority of the people under similar circumstances, often accompanied by a sense of loss of control. It is a common feature of several eating disorders, including binge eating disorder (BED), anorexia nervosa (AN) and bulimia nervosa (BN) (American Psychiatric Association, 2013; Peat et al., 2017). The life-time prevalence of binge eating disorder were 1.9% across 14 World Health Organization World Mental Health (WMH) countries (Kessler et al., 2013). Binge eating behaviors are associated with many health-related problems, such as weight gain or obesity (Herpertz-Dahlmann, 2015), depression and anxiety (Udo and Grilo, 2019), non-suicidal self-injury behaviors (Pak et al., 2021), as well as lower levels of happiness and quality of life (Pak et al., 2021). There is ample evidence to suggest that binge eating behavior is more prevalent in females. The lifetime prevalence estimates of BED among 14 WMH countries were 2.4% in females and 1.0% in males (Kessler et al., 2013), and 5.3% for females as well as 0.7% for males in Italy (Pace Serena and Muzi, 2019). In addition, one study found that 53.6% of girls reported engaging in at least one key eating disorder behavior, compared to 30.5% of boys in Australia (White et al., 2014). In China, there is also a significant gender difference in the occurrence of binge eating behavior. Based on a study conducted with 1,103 Chinese university students, it is estimated that the prevalence of binge eating behavior is three times higher in females compared to males (Yan et al., 2018). Given the serious consequences of binge eating, it's important to understand why there are gender differences.

In the existing theoretical and empirical research, the gender differences of binge eating behavior have been examined from three perspectives: neurophysiological, cognitive, and sociocultural. Neurophysiological studies have provided evidence linking gonadal steroid hormones to the occurrence of binge eating behavior. For instance, estrogen is known to interact with various central and peripheral signals, influencing brain pathways that are involved in the motivational and rewarding aspects of eating behaviors (Richard et al., 2017; Rivera and Stincic, 2018; Breton et al., 2023). Both animal and human studies have shown that lower levels of estradiol were associated with higher levels of emotional eating and binge eating frequency (Klump et al., 2013, 2018). Moreover, neuroimaging studies and non-invasive neuromodulation approaches have revealed that males and females differ in neural mechanisms and brain activation underlying food choice. Animal studies have observed differential responses to food cues in the orbitofrontal cortex and hippocampal-amygdala system between female and male rodents (Anderson and Petrovich, 2017, 2018; Anderson and Petrovich, 2018). Research focusing on adults has indicated that compared with males, females often exhibit greater activation in brain regions associated with sensory processing, executive control and inhibition, as well as reward functions, following exposure to visual and gustatory stimuli (Culbert et al., 2021).

Cognitive theories as a psychological perspective emphasize the role of negative automatic thoughts in relation to aspects of eating disorders. It has been suggested that females have a greater tendency to adopt maladaptive schemas than males, which may lead to a higher risk of eating disorders (Molina et al., 2023). Females typically show higher levels on perfectionistic schemas (e.g., Pursuing a perfect ideal body image or following strict dietary rules) (Deas et al., 2010; Jackson and Vares, 2013). Besides, females may more easily internalize other-directedness and rejection schemas. It means that compared to males, females have more negative self-perception, more concern of negative evaluation from others and may priorities the approval of others over their own personal preferences and needs (Sarin and Abela, 2003; Molina et al., 2023). Therefore, females may strive to adhere more closely to societal expectations which consequently increases their susceptibility to developing eating disorders.

In recent years, sociocultural factors have received increasing attention as a crucial influence on the gender difference of binge eating behavior. Cross-cultural research suggests that individuals, under the influence of family, peers, and media, internalize societal beauty standards. The perfect figure of idols always reflects gender differences in ideal body image. Male idols are expected to be thin but muscular (Pope et al., 1999), while female idol always receives an expectation of being 'thin and light' in body shape and weight (Jackson et al., 2021; Monocello, 2023). Under these aesthetic tendencies, men experience their muscles as ornamental, while women are dissatisfied with their normal body and always aspire to be thinner and slimmer (Hoodbhoy et al., 2015; Jackson et al., 2021; Kim and Han, 2021). For example, the 'A4 challenge,' which means a person can completely hide their waist with a width of 8.27″, has become a social media expression of a slim body. Young women are more likely than young men to be interested in and take up this challenge (Jackson et al., 2021). It means that men and women are both subject to socio-cultural pressures, but they face different standards of the ideal body image (Jackson and Vares, 2013). As a result, men and women use different strategies to achieve their ideal body image. Women may control their eating behavior to achieve an ideal body image, whereas men may engage in physical exercise to build muscle (McCabe and Ricciardelli, 2003; McCabe and Ricciardelli, 2005). Excessive dieting is an important trigger of binge eating behavior (Elran-Barak et al., 2015; Chen et al., 2020). Therefore, women may be at higher risk of binge eating.

In fact, Chinese culture's impact on gender differences in binge eating goes beyond gender differences in ideal body image. In the Chinese cultural context, women are often expected to conform to an ideal body image and appearance, while intelligence and achievement have always been associated with men. For example, when expressing that a couple is well-matched, the Chinese idiom "郎才女貌" is often used. In this idiom, "郎" refers to a man, "才" signifies talent or ability, "女" refers to a woman, and "貌" represents appearance. This idiom is used to describe a situation where the man possesses remarkable talent and the woman possesses a beautiful appearance, making them an ideal and harmonious couple. It seems that Chinese culture places more emphasis on the appearance of women than men. Thus, women in Chinese culture have higher standards regarding appearance and body image, which may lead to a higher risk of body dissatisfaction. Body dissatisfaction refers to a negative emotional state resulting from the discrepancy between one's current body image and the idealized body state (Gao et al., 2019; Liu et al., 2019). Existing research has demonstrated that in China, female adolescents are more susceptible to distress from appearance evaluations and teasing, all of these may lead them have higher body dissatisfaction (Menzel et al., 2010; Chen et al., 2012). Our previous research indicated that body dissatisfaction contributes to binge eating behavior (Yan et al., 2022). Therefore, we propose that body dissatisfaction mediates the relationship between gender and binge eating behavior in Chinese culture (H1).

Self-acceptance refers to individual accepting all aspects of themselves (Ryff and Singer, 1996), including psychological and physical attributes (Meireles et al., 2021), and it usually results from an appropriate self-evaluation (Carson and Langer, 2006). The body is a part of the self. People with positive self-evaluations of their bodies have a correct self-knowledge; conversely, people who have negative body image tend to have negative self-evaluations, the latter leads to lower levels of self-acceptance. Therefore, it seems that body dissatisfaction may decrease self-acceptance, which was supported by the results of previous studies. For example, men who perceive themselves as overweight have lower levels of self-acceptance in the United States (Tager et al., 2006); body dissatisfaction is negatively correlated with self-acceptance (Cai et al., 2021; Romano et al., 2021; Zhao et al., 2023). On the other hand, not only has research shown a negative relationship between self-acceptance and binge eating (Tomba et al., 2014), but self-acceptance is often cited as an important factor in assessments of binge eating recovery (Fairburn et al., 2003; de Vos et al., 2017). Based on these evidences, we hypothesized that body dissatisfaction affect binge eating behavior through self-acceptance. That is to say, body dissatisfaction and self-acceptance might serve as a serial mediation between gender and binge eating behavior (H2).

To sum up, the present study aims to understand the underlying psychological mechanism for gender differences of binge eating behavior in the Chinese culture. We suppose that Chinese women might pay more attention to their body image than men, which may lead to a higher risk of body dissatisfaction. Then the latter lower women's self-acceptance, which finally result in more binge eating behavior. The research model is illustrated in Figure 1, and we intend to examine the following hypotheses:

> *H1*: Body dissatisfaction mediates the relationship between gender and binge eating behavior.
>
> *H2*: Body dissatisfaction and self-acceptance serve as a serial mediation between gender and binge eating behavior.

Materials and methods

Participants and procedures

The data were collected in June 2021. We recruited a sample of 715 university students from six randomly selected universities in China. Participants conducted pencil and paper questionnaire surveys in classroom, and received a small snack as compensation upon completion. They do not know the specific compensation until they receive it. All of them voluntarily participated in this survey and signed an informed consent form before completing the questionnaire. To ensure data quality, the exclusion criteria was: (1) The answer of equal or greater than half the length of the total scale are same (Curran, 2016); (2) Those who are non-undergraduate students. Finally, 703 students (227 males and 476 females) aged 18–25 were included in data analyses. The research was approved by the Ethics Committee of Guizhou Medical University. (Specific demographics are shown in Table 1).

Measures

Body dissatisfaction

The scale I in self-rating scale of aesthetic mental state (Zhou et al., 2000) was used to assess individuals' level of satisfaction with their own body image (e.g.: 'I was always afraid of being ugly and being judged ugly'). It is a 5-item self-report, using a 5-Likert point scale. The total score of all items is used as an indicator of body dissatisfaction. In the current study, Cronbach's α was 0.796.

Self-acceptance

The self-acceptance subscale of Self-Acceptance questionnaire (SAQ) (Cong and Gao, 1999) was employed to assess individuals' acceptance of reality (e.g.: 'I'm always worried about being criticized and blamed by others'). It consists of 8 items, using a 4-point Likert scale. The total score of each participant reflects their level of self-acceptance, with higher scores indicating higher levels of self-acceptance. In the present study, Cronbach's α was 0.825.

Binge eating behavior

Binge eating behaviors were assessed using the Chinese version of the Binge Eating Scale (BES) revised in 2014 (Gormally et al., 1982; Jin-Bo et al., 2014). The scale comprises 16 items, with a total score ranging from 0 to 46. A higher score indicates a more severe level of binge eating behavior. In our study, Cronbach's α was 0.850.

Statistical analysis

Data were analyzed with the Statistical Package for the Social Sciences for Windows, Version 26.0, according to Hayes described in his book (Hayes, 2017). Descriptive statistics and correlation analyses were conducted on all variables. Then according to Hayes, Model 4 in PROCESS v3.3 was used to test the mediation of body dissatisfaction, and Model 6 was used to test the serial mediation of body dissatisfaction and self-acceptance.

Results

Testing for common method bias

To address the issue of common method bias, a Harman's single-factor test was conducted, incorporating all items from the four variables. The results indicated that the first factor accounted for 24.96% of the total variance, which fell below the 40% threshold proposed by Podsakoff et al. (2003). Consequently, the likelihood of significant common method bias confounding the interpretation of the data analysis is minimal.

Descriptive statistics and correlation analyses

Table 2 displays the descriptive statistics and correlations among variables in the present study. Date revealed gender was positively

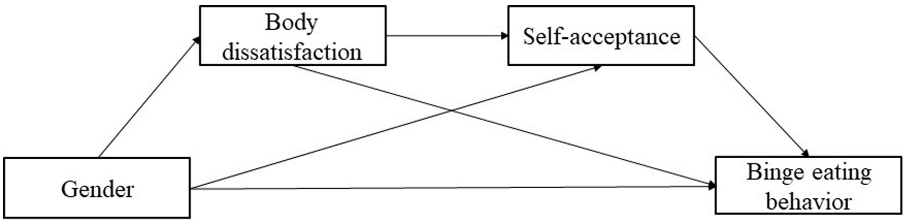

FIGURE 1
The serial mediation model hypothesized in the present study.

TABLE 1 Descriptive statistics.

Variable		N	(%)	Variable	M	SD
Gender	Male	227	32.3	Age	19.89	1.18
	Female	476	67.7			
Grade	Freshman year	475	67.6			
	Sophomore year	140	19.9			
	Junior year	88	12.5			
Birthplace	City	145	20.6			
	Country	558	79.4			

Male = 1, Female = 2, Freshman year = 1, Sophomore year = 2, Junior year = 3, City = 1, Country = 2.

TABLE 2 Descriptive statistics and correlation analyses of variables.

	M	SD	1	2	3	4
1 Gender			1			
2 BD	3.52	2.58	0.12**	1		
3 SA	19.59	3.44	−0.11**	−0.46**	1	
4 BEB	9.05	7.20	0.15**	0.41**	−0.34**	1

$N = 703$. BD, body dissatisfaction; SA, self-acceptance; BEB, binge eating behavior. Male = 1, Female = 2. $^{*}p < 0.05$; $^{**}p < 0.01$.

associated with body dissatisfaction ($r = 0.12$, $p < 0.01$), binge eating behavior ($r = 0.15$, $p < 0.01$). It means that the score of body dissatisfaction and binge eating behavior are higher in females than males. Meanwhile, gender was negatively associated with self-acceptance ($r = -0.11$, $p < 0.01$). It means that the score of self-acceptance is lower in females than males. Body dissatisfaction was negatively associated with self-acceptance ($r = -0.46$, $p < 0.01$), while positively associated with binge eating behavior ($r = 0.41$, $p < 0.05$). In addition, there had significant negative correlations between self-acceptance and binge eating behavior ($r = -0.34$, $p < 0.01$).

Testing for mediation effect

After Chinese college students enter university, the supervision from parents and teachers during high school decreases sharply. They begin to arrange their own study and life independently, and they quickly socialize and mature (Geng et al., 2018). Therefore, the psychology and behavior of college students vary greatly with grade. On the other hand, the birthplace can seriously affect the self-esteem or self-acceptance (Weisskirch, 2007; Gonzalez-Guarda et al., 2013). Besides, subjects were not evenly distributed in terms of age. Therefore, we selected these three potential confounding factors as covariates in the data analysis. In fact, our own data in the present study does find that these variables affect the main variables we focus on. We use independent samples T-test /ANOVA analysis the effect of these sociodemographic factors on other variables. The results revealed that birthplace significantly affects self-acceptance ($p < 0.05$), and grade has a significant effect body dissatisfaction ($F = 3.10$, $p < 0.05$) as well as self-acceptance ($F = 3.51$, $p < 0.05$).

We used Model 4 in PROCESS v3.3 to test hypothesis 1, with age, grade, and birthplace as covariates (Hayes, 2017). The specifications are shown in Table 3. Gender was significantly associated with binge eating behavior ($\beta = 0.19$, $p < 0.01$. see Model 2 of Table 3) and body dissatisfaction ($\beta = 0.25$, $p < 0.01$. see Model 1 of Table 3). And the relationship between body dissatisfaction and binge eating behavior was also significant ($\beta = 0.42$, $p < 0.001$. see Model 2 of Table 3). The indirect effect reached a significance level, since CI of the above indirect effect did not include the zero value (as shown in Table 3). Therefore, H1 is supported. Body dissatisfaction partly mediated the relationship between body dissatisfaction and binge eating behavior.

Testing for serial mediation effect

Gender, body dissatisfaction, self-acceptance, and binge eating behavior are all significantly associated, meeting the statistical requirements for mediation analysis of gender and binge eating behavior (Wen and Ye, 2014). With age, grade and birthplace as covariates, the mediating role of body dissatisfaction and self-acceptance in the relationship between gender and binge eating behavior was analyzed by using PROCESS v3.3 Model 6 in SPSS 26.0 compiled by Hayes (2017). The detailed results are presented in Table 4. Gender was a significant predictor of body dissatisfaction ($\beta = 0.25$, $SE = 0.08$, $p < 0.01$). Gender and body dissatisfaction are also significant predictors of self-acceptance ($\beta = -0.15$, $SE = 0.07$, $p < 0.05$; $\beta = -0.45$, $SE = 0.03$, $p < 0.001$). Finally, gender and body dissatisfaction, as well as self-acceptance, significantly predicted binge eating behavior ($\beta = 0.17$, $SE = 0.07$, $p < 0.05$; $\beta = 0.35$, $SE = 0.04$, $p < 0.001$; $\beta = -0.15$, $SE = 0.04$, $p < 0.01$), supporting H2. The results of the path coefficient test in the hypothetical model are shown in Figure 2.

The mediating effect sizes of body dissatisfaction and self-acceptance in the relationship between gender and binge eating behavior are shown in Table 5. Body dissatisfaction (path 1) and self-acceptance (path 2) significantly mediated the effect of gender on binge eating behavior. Further, body dissatisfaction and self-acceptance serve as a serial mediation between gender and binge eating behavior (Path 3). The total effect value of gender on binge eating behavior was 0.30, and the direct effect value of gender on binge eating behavior was 0.17, and the total mediate effect accounted for 43.33% of the total effect. The mediating effect concludes three indirect effects: Path 1: Gender → Body dissatisfaction → Binge eating behavior (0.09), Path 2: Gender → Self-acceptance → Binge eating behavior (0.02), and Path 3: Gender → Body dissatisfaction → Self-acceptance → Binge eating behavior (0.02). The ratios of indirect effects of pathway 1, 2, and 3 to the total effect were 30, 6.67 and 6.67%. These three indirect effects reached a statistical significance level, since CIs of the above indirect effects did not include the value of zero.

Discussion

The relationship between gender and binge eating behavior has been confirmed by numerous studies (Murnen and Smolak, 2015; Schaefer et al., 2019; Culbert et al., 2021). However, psychological mechanisms underlying the gender difference of binge eating behavior remain unclear. The present study further addressed this issue. Firstly, we examined the mediation effect of body dissatisfaction on the relationship between gender and binge eating behavior. Then we test a serial mediation role of body dissatisfaction and self-acceptance on the relationship between gender and binge eating behavior.

TABLE 3 Regression coefficients, standard errors, and model summary information for the mediation effect of body dissatisfaction on binge eating behavior.

	Model 1 (BD)				Model 2 (BEB)			
	β	*t*	*SE*	95%CI	*β*	*t*	*SE*	95%CI
Constant	−1.07	−1.40	0.77	−2.58 ~ 0.43	−1.27	−1.83	0.69	−2.64 ~ 0.09
Age	0.04	1.02	0.04	−0.04 ~ 0.12	0.04	−0.98	0.04	−0.03 ~ 0.11
Grade	−0.15	−2.28*	0.07	−0.28 ~ −0.02	−0.01	−0.13	0.06	−0.13 ~ 0.11
Birthplace	0.03	−2.28	0.07	−0.15 ~ 0.22	0.11	1.24	0.09	−0.06 ~ 0.27
Gender	0.25	2.84**	0.08	0.09 ~ 0.41	0.19	2.66**	0.07	0.05 ~ 0.34
BD					0.42	12.28***	0.04	0.35 ~ 0.49
R^2	0.02				0.20			
F	3.80				34.40			

BD, Body dissatisfaction; BEB, Binge eating behavior. Male = 1, Female = 2. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

TABLE 4 Regression coefficients, standard errors, and model summary information for the influence of gender in a model of binge eating behavior.

	Model 1 (BD)			Model 2 (SA)			Model 3 (BEB)		
	β	*t*	*SE*	*β*	*t*	*SE*	*β*	*t*	*SE*
Constant	−1.07	−1.40	0.76	1.95	2.87	0.68	−0.98	−1.41	0.69
Age	0.04	1.02	0.04	−0.08	−2.11*	0.03	0.03	0.75	0.03
Grade	−0.15	−2.28	0.07	0.11	1.83	0.06	0.01	0.14	0.06
Birthplace	0.03	0.34	0.09	−0.19	−2.32*	0.08	0.08	0.90	0.08
Gender	0.25	3.10**	0.08	−0.15	−2.15*	0.07	0.17	2.35*	0.07
BD				−0.45	−13.47***	0.03	0.35	9.25***	0.04
SA							−0.15	−3.98**	0.04
R^2	0.02			0.23			0.22		
F	3.80			42.52			31.91		

BD, body dissatisfaction; SA, self-acceptance; BEB, binge eating behavior. Male = 1, Female = 2. $*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

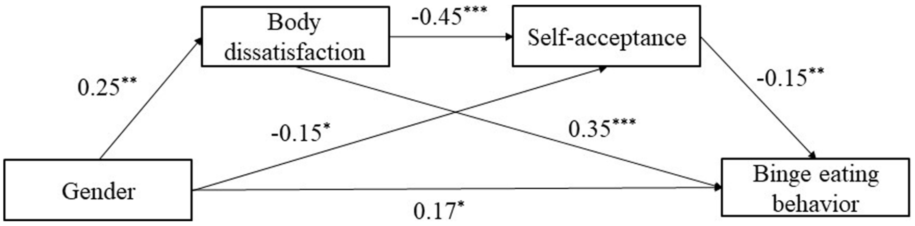

FIGURE 2
Theoretical research model with standard coefficients. Regression coefficients were obtained with age, grade, and birthplace in covariates in PROCESS Procedure for SPSS, where *** denotes that $p < 0.001$, ** means $p < 0.01$, * means $p < 0.05$, $N = 703$.

The powerful role of sociocultural factors in the development and maintenance of eating disorders has been documented in numerous studies (Jackson and Chen, 2007; Weissman, 2019). Today's media and social culture, particularly Korean pop music TV programs popular in Asia countries, promote the idea that thinness is more attractive. In this context, body dissatisfaction becomes an important risk factor of eating disorders (Weissman, 2019; Yan et al., 2022). However, it is not clear that whether body dissatisfaction mediate gender difference in binge eating behavior.

Compared with boys, girls invest more in appearance-related activities such as photo editing (Mahon and Hevey, 2021), talking about weight with peers (Vincent and McCabe, 2000), and have higher desire to lose weight (Kashubeck-West et al., 2005). Compared with girls, boys are more active and acceptance. A qualitative research reported that boys could regard ideal image which posed on website in positive ways and have more confidence to improve their body image (Vincent and McCabe, 2000; Payne et al., 2011; Mahon and Hevey, 2021). It appears that boys might have a higher level of

TABLE 5 Direct and indirect effects of gender on binge eating behavior.

Path way	Estimate	SE	95% CI	Relative effect (%)
Total effect	0.30	0.08	0.14 ~ 0.46	
Direct effect	0.17	0.07	0.03 ~ 0.31	56.67
Total indirect effect	0.13	0.04	0.06 ~ 0.21	43.33
Gender → BD → BEB	0.09	0.03	0.03 ~ 0.15	30
Gender → SA → BEB	0.02	0.02	0.00 ~ 0.05	6.67
Gender → BD → SA → BEB	0.02	0.01	0.01 ~ 0.03	6.67

BD, body dissatisfaction; SA, self-acceptance; BEB, binge eating behavior. Male = 1, Female = 2.

self-acceptance on body image, girls might have a higher level of body dissatisfaction. Many studies have supported this point (Vincent and McCabe, 2000; Ando and Osada, 2009; Jackson et al., 2021). On the other hand, the gender difference of body dissatisfaction might be further exacerbated in China. In Chinese culture, women are often expected to have ideal body image, while men are often expected to have high intelligence and achievement. This culture makes women pay more attention to body image, while men pay less attention to body image and more to talent. Our data confirm the gender difference in body dissatisfaction in China. Female's body dissatisfaction is higher than that of male among Chinese college students.

Although boys are also subject to sociocultural pressures regarding their appearance (Xiaojing, 2017; Hicks et al., 2022), the details of such pressure are different between boys and girls. Girls are expected to be thin and slim whereas boys are often encouraged to be thin but muscular (Leit et al., 2001; Fischetti et al., 2020). Thus, men and women might use different strategies to achieve their ideal body image. Women may control their eating behavior to achieve an ideal body image, whereas men may engage in physical exercise to build muscle (Adrian et al., 2002; Pace Serena and Muzi, 2019). In China, dietary restraint is a very popular way to keep in shape in adolescent females (Jackson and Chen, 2014; Chen et al., 2020), and studies have shown that dietary restraint for too long can induce binge eating behavior (Elran-Barak et al., 2015; Chen et al., 2020). Thus, body dissatisfaction might play an important role on gender differences in eating disorders. Our data support this hypothesis, showing that body dissatisfaction mediated gender differences in binge eating behavior.

Body acceptance is often an important component of self-acceptance. Previous studies found that self-acceptance is negatively associated with negative body image (de Vos et al., 2017; Romano and Ebener, 2019). Consistently, our data show that self-acceptance is significantly negatively correlated with body dissatisfaction. In contrast, positive body image such as body appreciation increase self-acceptance (Levine and Smolak, 2016). More importantly, the improvement of self-acceptance frequently features as a crucial element in evaluating recovery from binge eating (Wilson, 1996; Fairburn et al., 2003). Reduction in binge eating was associated with increase in self-acceptance (Smith et al., 2006). Hence, it appears that body dissatisfaction mediates gender difference of binge eating behavior through self-acceptance. This hypothesis was supported by the results of present study. We found a serial mediation effect of body dissatisfaction and self-acceptance on gender difference of binge eating behavior. These results suggest that self-acceptance interventions targeting body image may help alleviate binge eating behaviors, but further research is needed.

This study has several contributions. At a theoretical level, it improves our understanding of the mechanisms of gender differences in binge eating behavior in a sociocultural perspective. In Chinese culture, body dissatisfaction and self-acceptance independently or through a serial way mediate the gender differences in binge eating behaviors. At a practical level, our results in the present suggested that self-acceptance interventions targeting body image may be an effective treatment for binge eating in women, although further experiments are still needed.

The present study has several limitations. First, the cross-sectional study design could not determine a causal relationship. Although significant differences were found in the data results, further longitudinal research is necessary to further confirm these conclusions. Second, body dissatisfaction, self-acceptance, and binge eating behavior were assessed by a self-report questionnaire, emphasizing the need for cautious interpretation of the research findings due to the possible biases that could arise from data analysis. Third, the convenience sampling employed in this study, which included only college students and had a gender imbalance with 73.1% female participants, highlights the need for future research to broaden the sample and address gender ratio disparities.

Conclusion

Women's body dissatisfaction is higher than men's; while their self-acceptance is lower than that of men; body dissatisfaction and self-acceptance mediates the gender differences in binge eating behaviors independently. Further, they also mediate the gender differences in binge eating behaviors in a serial way. Therefore, special emphasis should be placed on the acceptance of body image in the prevention and intervention of binge eating disorder in China, especially among women.

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 authors.

Ethics statement

The studies involving humans were approved by the Ethics Committee of Guizhou Medical University. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

CL: Conceptualization, Funding acquisition, Project administration, Supervision, Writing – original draft, Writing – review & editing. SL: Conceptualization, Formal analysis, Investigation, Writing – original draft. JY: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. XM: Conceptualization, Funding acquisition, Writing – review & editing, Supervision.

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Conflict of interest

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

Publisher's note

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Gender differences in social networks and physical and mental health: are social relationships more health protective in women than in men?

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Background: Individuals' relationships are characterized by multidimensional aspects and the unique make-up of different features is more or less supportive of physical and mental health. The current study derived social network types based on an extended set of indicators reflecting the structure, function, and quality of relationships, then examined their associations with diverse physical and mental health outcomes separately for men and women.

Methods: Using samples of 620 South Korean adults ($M_{age} = 53.52$), Latent Profile Analysis (LPA) was used to uncover distinct social network types, and multiple regression analyses were conducted to examine the link between network types and health outcomes.

Results: LPA analysis derived four network types: *diversified, family-(un) supported, friend- based*, and *restricted*. The prevalence and configuration of network types differed between men and women: the *family-unsupported* type was more prevalent in women than in men whereas the *restricted* type was more prevalent in men than in women. An individual's network type membership was significantly associated with one's physical and mental health and the positive effects of an optimal network type and the negative effects of a non-optimal network type on mental health were much greater for women than they were for men.

Discussion: The findings suggest that women benefit more from supportive networks but that they are also more vulnerable to a lack of supportive (or the presence of conflict-filled) relationships, and highlight that having diversified and greater quality relationships, and avoiding conflicts are critical for women to have enhanced health.

KEYWORDS

social relationships, social networks, physical health, mental health, gender

Introduction

Individuals' social networks provide them with a key resource over the adult life span as a form of social capital that can influence exchanges of social support (Antonucci et al., 2010). Individuals' social networks vary in terms of the size and composition of network members as well as in terms of contact frequency with others. These structural aspects of social networks reflect an indication of social integration as well as the available support and resources in times of challenges (Smith and Christakis, 2008). In general, a large and diffuse social network is considered to be more helpful for alleviating difficult problems than a small and family-based social network (Litwin and Shiovitz-Ezra, 2011; Windsor et al., 2016). However, an individual's social network is multidimensional in nature and characterized by different aspects of the structure, function, and quality of social relationships (Antonucci et al., 2010). Moreover, the features of interpersonal relationships vary by gender and depend on other forms of social capital such as marital status, education, and occupation (Ajrouch et al., 2005). Hence, the presence of social resources could differ by the nature of individuals' social networks and their interdependent relationships with others.

In this study, we examine how multifaceted features of individuals' social relationships characterize their distinct social network types, and how these heterotypic network types are related to physical and mental health among both men and women. Specifically, we examine how social resources–as indicated by social network structure, function, and quality–differ by gender and have varying implications on their physical and mental health. This study accordingly assessed multiple indicators of social networks in a sample of South Korean men and women. In deriving distinct network types, a person-oriented latent profile analysis was used to consider interpersonal relationships in a naturally interdependent and aggregated state. After deriving network types, we investigated their links with different aspects of physical and mental health outcomes. Considering an individual's social networks as a multidimensional construct and investigating their link to multiple aspects of health in this way is expected to illuminate the nuanced associations between social relationships and health. Moreover, by identifying network types separately for men and women, this study could provide a useful lens for understanding the different constellations of interpersonal relationship attributes that characterize men's and women's social networks, and describe the effects of network type on health outcomes.

Multifaceted social networks and health

Individuals' social networks are often complex, interdependent with multiple social relationships, and characterized by different aspects of structure, function, and quality. As discussed above, the structural aspect of social networks refers to the size and composition of networks, frequency of contact with others, and participation in social activities, which indicate the level of social integration (Smith and Christakis, 2008). Studies focusing on the impact of network structure on health have consistently demonstrated that a high level of social integration has protective benefits for physical and mental health outcomes such as inflammation (Uchino et al., 2018), loneliness (Litwin and Shiovitz-Ezra, 2011), depressive symptoms (García-Peña et al., 2013), life satisfaction, and psychological well-being (Amati et al., 2018).

Meanwhile, the functional aspect of social networks refers to the features or types of social interactions, such as receiving advice and guidance, providing material aid, and expressing comfort and caring (Uchino, 2004). Studies focusing on network functions have also considered the extent of perceived or actual support (Nguyen, 2021) as well as the source of support such as spouse, family, and friends (Ali et al., 2022). Research investigating the impact of network functions on health has shown evidence indicating that both perceived and received support are positively linked to health benefits and that different sources of support are associated with physical and mental health to varying degrees (Windsor et al., 2014; Shin and Gyeong, 2023).

In addition to the network structure and function, the quality of social networks can also play a critical role in individuals' health outcomes (Uchino, 2006). There is both theoretical and empirical evidence substantiating the claim that social support is not universally beneficial, as the satisfaction and quality associated with such support matters substantially (Holt-Lunstad et al., 2008). Accumulating empirical evidence indicates that perceived quality and satisfaction about relationships have greater impacts on health than the size or composition of social networks (Gallo et al., 2003; Grewen et al., 2005; Shin and Gyeong, 2022).

Despite the empirical support for the importance of considering comprehensive dimensions of social networks in characterizing individuals' social networks, most prior research on network types has focused on one or two components of social networks (Li and Zhang, 2015; Fang et al., 2020; Ali et al., 2022; Torres et al., 2022; see Fiori et al., 2007, 2008; Nguyen, 2021 for exceptions). Further, in identifying network types, researchers have rarely considered social conflict in tandem with social support despite the fact that conflict and tension can have more potent effects on health than social support (Chen and Feeley, 2014; Shin and Gyeong, 2023). Because individuals maintain different relationships that vary in terms of satisfaction and quality, and because people often experience conflict as well as support within certain relationships (Holt-Lunstad and Uchino, 2019), it can be expected that individuals with the similar structural or functional features of network types can still experience different levels of satisfaction or the levels of support or conflict (Fiori et al., 2007). Such differences in the qualitative aspects or co-occurrence of support and tensions can drive the impact of network types on health outcomes.

Gender differences in the nature of social networks and health

Research has generally identified four distinct patterns of social networks: a large and diffuse network type characterized by diversified relationships, a relatively large network type characterized by friend-based relationships, a small and narrow network type characterized by family-based relationships, and a restricted and attenuated network type characterized by very few relationships (Fiori et al., 2006; Nguyen, 2021). Depending on the level of diversity and support, researchers have also distinguished sub-clusters within these four network types, including moderately diverse and diverse network types (Windsor et al., 2016) or friend focused-supported and friend focused-unsupported network types (Fiori et al., 2007).

Regardless of the number of network types, distinct network types have been shown to be associated with individuals' physical and mental health outcomes. Those who were in the diversified network types characterized by interpersonally connected relationships generally reported better health and higher health promoting behaviors along with lower psychological distress, anxiety, depression, and morbidity than those who were in the restricted and attenuated network types (Litwin and Shiovitz-Ezra, 2011; Fang et al., 2020; Wilson et al., 2021). However, scant attention has been paid to possible gender-related differences in the features of network types and their differential link to health outcomes between men and women.

Research has noted the existence of gender differences in social network features, and these differences extend to the structure and function of support networks. In general, women tend to have larger as well as more diffused social networks than men, who tend to have smaller, less intensive, and more limited social networks (Milner et al., 2016; Ang, 2019). Social networks are also assumed to serve different functions for men and women: Women's social networks are more variable and serve more diverse functions than men's (Finkel et al., 2018). It has been reported that women generally have more sources for confidant relationships; that is, compared to men, women provide and receive more emotional and health-related support from multiple social ties such as family and friends during times of stress (Liebler and Sandefur, 2002). By contrast, men's social networks are less affective and intensive than women's, and men often report that their spouses are their only confidants (Dykstra and de Jong Gierveld, 2004).

Empirical evidence has further indicated that social relationships have different effects by gender, such as the findings that women draw more satisfaction from large and close social networks but that they are also more intensely affected by social events than men (Leach et al., 2008). In general, women are often socialized to be providers of support to multiple network members, and they devote more time and energy to cultivating close interpersonal relationships (Finkel et al., 2018; Ang, 2019). Hence, women can benefit more from the advantages of having access to supportive relationships than men. However, women can also feel increased stress from the additional role they are expected to play as support providers and their involvement in the lives of others (Dalgard et al., 2006). Women can also suffer more when they experience social conflict with close others or experience a lack of support compared to men due to high expectations and devotion toward social relationships (Davis and Greenstein, 2009).

Previous studies have found paradoxical patterns such as those described above, particularly in the context of marital relationships. For instance, research has shown that women feel more responsible toward their spouses than men, which causes women to feel more burdened and overloaded (Neff and Karney, 2005). Greater involvement and feelings of responsibility in family matters and interpersonal problems within the family have been associated with higher depression in women than in men (Orth-Gomér and Leineweber, 2005). Marital relationships lower mortality risks for men but not for women, and the physical health of married men is better than those of their spouses because men benefit more from positive health behaviors that are learned with marriage and their spouses' efforts to improve health (Donato et al., 2018). By contrast, women often experience everyday social strain in marriage, which leads to greater physiological effects that undermine the health benefits of marriage (Liu and Waite, 2014).

Collectively, the results described above suggest that interpersonal relationships seem to provide women with greater opportunities for more support, which is a protective factor for physical and mental health, but that such relationships are also coupled with increased demands, a greater chance of stresses, and depletion of resources. This suggests that the positive effects of the structural features of social networks could be negated by the burdened roles and demands within those social relationships. Therefore, there is a need for a simultaneous investigation of the structure, function, and quality of diverse relationships (e.g., spouses, family, and friends) as prior research has suggested that both quantitative and qualitative aspects of interpersonal relationships are important, and that men and women have different expectations, experiences, and evaluations of their social relationships (Cornwell, 2011).

Therefore, in the current study, we considered multifaceted aspects of men's and women's social networks in both marital and nonmarital forms of interpersonal relationships. By uncovering network types for men and women separately, the results of this study could elucidate which different configurations of structural, functional, and qualitative aspects of marital and nonmarital relationships characterize the nature of gender-specific network types and describe their differential link to diverse physical and mental health outcomes.

The present study

The overall aim of this study was to uncover distinct network types of men and women and examine their differential associations with physical and mental health. Based on previous evidence (Fiori et al., 2006, 2007; Litwin and Shiovitz-Ezra, 2011), we hypothesized that diversified, family-based, friend-based, and restricted patterns of network types would emerge in the present sample. Moreover, we hypothesized that individuals in network types characterized by diversified relationships and higher relationship quality would exhibit better physical and mental health than individuals in network types characterized by restricted relationships and lower relationship quality. Lastly, we hypothesized that the positive effect of optimal network types and the negative effect of non-optimal network types on health would be greater for women than they would be for men.

Methods

Procedures and participants

After receiving approval from the university's Institution Review Board, we recruited adult participants from an online sampling system that features a panel of 1,663,404 South Korean adults. Using the large sampling pool of respondents living in South Korea, it uses census data to invite, screen, and stratify participants by age and gender. The invitation for recruitment of the national sample was distributed to those who qualified to fill one of 10 subgroups defined by five strata for age (20–29, 30–39, 40–49, 50–59, and 60–69 years) and two strata for gender (men and women) between January 29 and February 5, 2021. Demographic variables such as marital status, retirement status, education, and income were collected but they were not used for stratification. Informed consent was obtained from all participants before they participated in the survey. Participants completed a survey that took about 30 min and they were provided gift certificates upon survey completion. The original sample comprised 1,033 adults (50.1% females) aged between 20 and 69 years. Because individuals aged 40 or over generally tend to be married and have relatively stable relationship patterns, we focused on middle-aged and older adults. The final sample comprised 620 adults (49.19% female; $M_{age} = 53.52$; 40–49 years, $n = 204$; 50–59 years, $n = 209$; 60–69 years, $n = 207$). There were no missing data, and all participants responded to items measuring social network characteristics and health.

Measures

We used information on the social network characteristics of structure, function, and quality to identify network types, and we set positive and negative physical and mental health as outcomes. Individuals' demographic information was included as covariates. We used the translated and validated version of the original measures. All of the measures were validated in equivalence in meaning and psychometric properties between the English and Korean versions.

Social network characteristics

To assess the *structural* aspect of social networks, we used the Berkman-Syme Social Network Index (Berkman and Syme, 1979). It is a validated measure that assesses an individual's social integration, including the size of their social network, their marital status, the number of children they have, their contact frequency with their family and friends, and the number of social activities in which they are engaged. We assessed the size and contact frequency with family and friends in terms of the prior 4 weeks. We also included the total number of children and the social activities in which participants were engaged.

To assess the *functional* aspect of social networks, we measured perceived and received support, and conflict. To assess the levels of perceived support, we used the Perceived Social Support Scale (Zimet et al., 1988), which is a 12-item measure that assesses perceived support from family, friends, and close others. A sample item is "I get the emotional help and support I need from my family." Each item was scored from 1 (not at all true) to 5 (very true). The average score was calculated for each subscale, with higher scores indicating greater perceived support. The Cronbach's αs for perceived support from family, friends, and close others were 0.91, 0.93, and 0.91, respectively. To assess the levels of received support and conflict, we used the Positive and Negative Social Support Scale (Smith et al., 2017). It is a 24-item measure that assesses support and conflict from one's spouse, friends, children, and siblings. Sample items are "How much do they really understand the way you feel about things?" for support and "How much do they get on your nerves?" for conflict. Each item was scored from 1 (not at all true) to 5 (very true). The average score was calculated for each subscale, with higher scores indicating greater support and conflict. For the subscales for spouse, friend, child, and sibling, the respective Cronbach's αs were 0.86, 0.83, 0.82 and 0.88 for support and 0.83, 0.86, 0.83, and 0.90 for conflict.

To assess the *qualitative* aspect of social networks, we measured marital quality and friendship quality. Marital quality was assessed using the Quality Marriage Index (Norton, 1983), which consists of six items measuring the global quality and satisfaction of one's spousal relationship. A sample item is "I really feel like part of a team with my partner." Each Item was scored from 1(not at all true) to 5 (very true), and the average score was calculated with higher scores indicating greater marital quality. The Cronbach's α of this scale in this study was 0.95. Friendship quality was measured using an adapted version of the Friendship Quality Questionnaire (Rose, 2002). The original measure consists of 19 items, and we used 12 items that are applicable to adults that assess positive and negative relationship qualities with friends. A sample item is "I am satisfied with my relationship with my friend." Each item was scored from 1(not at all true) to 5 (very true), and the average score was calculated with higher scores indicating greater friendship quality. The Cronbach's α of this scale in this study was 0.90.

Health outcomes

We assessed six indicators of health outcomes including physical health, loneliness, depressive symptoms, happiness, life satisfaction, and psychological well-being. *Physical health* was assessed using the Perceived Health Status Scale (Speake et al., 1989), which is a 3-item measure that reflects an individual's assessment and evaluation of one's general health. Participants rated the extent to which they agreed with each statement using a 5-point scale (1 = very poor to 5 = very good). A sample statement includes "Generally speaking, would you describe your present health as…." The average score was calculated with higher scores indicating greater health. The Cronbach's α of this scale in this study was 0.88.

Loneliness was assessed using the UCLA Loneliness Scale (Russell et al., 1980), which is a 20-item measure for assessing subjective feelings of loneliness and social isolation. Participants rated the extent to which they agreed with each statement using a 5-point scale (1 = *not at all true* to 5 = *very true*). A sample statement includes "I am unhappy being so withdrawn." The average score was calculated, with higher scores indicating higher levels of loneliness. The Cronbach's α of this scale in this study was 0.94. *Depressive symptoms* were assessed using the CES-D Scale (Radloff, 1977). It is a 20-item measure for assessing depressive symptoms experienced over the prior week. A sample statement includes "I felt I could not shake off the blues." Each item was scored from 0 (*rarely*) to 3 (*most or the time*), and scores were summed to create a scale that ranged from 0 to 60, with higher scores indicating higher levels of depressive symptoms. The Cronbach's α of this scale in this study was 0.94.

Happiness was assessed using the Oxford Happiness Questionnaire developed by Hills and Argyle (2002), which is a 29-item measure to assess levels of happiness as indicated by positive mood. Participants reported to what extent they felt the way explained in each statement using a 5-point scale (1 = *not at all true* to 5 = *very true*). A sample item is "I often experience joy and elation." The average score was calculated with higher scores indicating greater happiness. Cronbach's α of this scale in this study was 0.93. *Life satisfaction* was assessed with the Satisfaction with Life Scale (Diener et al., 1985), which is a 5-item measure for assessing global cognitive judgments of one's life satisfaction. Participants rated the extent to which they agreed with each statement using a 5-point scale (1 = *not at all true* to 5 = *very true*). A sample item is "In most ways my life is close to my ideal." The average score was calculated, with higher scores indicating greater life satisfaction. The Cronbach's α of this scale in this study was 0.90.

Psychological well-being was assessed with the shortened version of the Psychological Well-being Scale developed by Ryff (1989), which is a 54-item measure comprising six sections to assess levels of autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Participants rated the extent to which they agreed with each statement using a 5-point scale (1 = *not at all true* to 5 = *very true*). A sample item is "In general, I feel confident and positive about myself." The average score was calculated with higher scores indicating greater psychological well-being. Cronbach's α in this study was 0.94.

Demographic information

The collected demographic information included age, gender, marital status, retirement status, education, and income. Age in years was used as a continuous variable. Gender, marital status, and retirement status were all dichotomized (1 = female; 1 = married; 1 = retired). Education was classified from 1 (≤elementary school) to 5 (graduate school). Income was classified from 1 (≤$10,000) to 5 (5 ≥ $40,000).

Analytic strategy

All statistical analyses were conducted with SPSS 25.0 and Mplus 8.6. We used SPSS 25.0 for descriptive statistics, independent *t* test, and regression analyses. We used Mplus 8.6 to conduct Latent Profile Analyses (LPA). LPA is a person-oriented analytic method that derives latent profiles into which individuals with similar characteristics can be assigned (Muthén and Muthén, 2000). Identified profiles can be incorporated into the LPA model to build a mixture model to examine the link between profiles and distal outcomes (BCH method; Asparouhov and Muthén, 2021). The LPA analytic models were estimated using full information maximum likelihood estimation (FIML), which treats missing data (e.g., marital quality, number of children) under missing (not) at random assumptions (Asparouhov and Muthén, 2021), allowing derivation of all 620 adults into network types.

Using LPA, we first uncovered network types based on structural, functional, and qualitative aspects of social networks with the total sample. Then we examined whether gender moderate the association between derived network types and health outcomes by running regression models. Results indicated that gender significantly moderated the link between network types and health (e.g., $\beta = 0.32$; $p < 0.01$ for loneliness). Thus, we proceeded to run LPA using splitted data by gender.

A series of models with profiles from two to five were estimated, separately for men and women, and these models were compared to determine the final solution for the data. After estimating models, we compared multiple fit indices across different profiles based on Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample-size adjusted BIC (SABIC), entropy, and Lo–Mendell–Rubin adjusted likelihood ratio test (LMR-LRT; Collins and Lanza, 2009). We evaluated profile solutions based on the suggestions that the profiles with the lowest AIC, BIC, and SABIC provided the best-fit, and the significant test of LMR-LRT indicated that the $k+1$ profile was better to the *k*-profile solution. Also, we take into account the entropy values (i.e., the higher the entropy value, the more accurate the profile classification). More importantly, we followed the suggestion that if the additional profile provides a qualitatively differentiated profile that is consistent with the theoretical or empirical evidence to the prior profiles, the new profile should be kept. In contrast, if the additional profile adds only minor differences to the prior profiles, the new profile should not be kept to provide the parsimonious model (Jung and Wickrama, 2008; Marsh et al., 2009; Spurk et al., 2020).

After we identified network types separately for men and women, we investigated if health outcomes in one network type were significantly different from those in other network types using the BCH method (Asparouhov and Muthén, 2021). Then, we conducted multiple regression analyses to examine the link between distinct network types and health outcomes, while controlling for demographic indicators.

Results

Gender differences in the nature of social networks and health

To examine gender differences in social network characteristics as well as physical and mental health outcomes, we conducted independent *t* tests and calculated effect-size using Cohen's *d* for all comparisons. Cohen's *d* values of 0.2, 0.5, and 0.8 are indicative of small, medium, and large effect sizes, respectively. The results indicated that women reported higher contact frequency with family ($t = -2.96$, $p < 0.001$, $d = 0.24$) and friends ($t = -2.24$, $p < 0.05$, $d = 0.18$), along with higher received support from children ($t = -5.39$, $p < 0.001$, $d = 0.48$), while men reported higher received support from spouse ($t = 2.54$, $p < 0.05$, $d = 0.23$) and higher levels of friend conflict ($t = 3.79$, $p < 0.001$, $d = 0.31$), along with higher levels of relationship satisfaction with their spouses ($t = 5.09$, $p < 0.001$, $d = 0.47$) and friends ($t = 3.10$, $p < 0.01$, $d = 0.19$). In terms of physical and mental health, a significant gender difference was found in life satisfaction: men reported greater life satisfaction than women ($t = 3.49$, $p < 0.01$, $d = 0.28$).

Latent profiles of network types in men and women

Network types were identified separately for men and women. We provided the fit indices and profile distributions for different models in Table 1. For men, results indicated that the three- to five-profile models appropriately fit the data. They indicated high entropy values (0.91–0.92), showing high levels of profile classification accuracy. Although the AIC, BIC, and SABIC values suggest that the five-profile model showed a better fit, the small size of the five-profile solution (4.76% of the sample) provides statistical justification for the four-profile model. For women, results indicated that the two- to five-profile models appropriately fit the data. They indicated high entropy values (0.88–0.93), showing high levels of profile classification accuracy. Although the significant test of LMR-LRT showed that the two-profile solution was better to the three- or four-profile solution, the AIC, BIC, and SABIC values suggest that the four- or five-profile model showed a better fit. While the five-profile solution marginally improved the overall fit, this model produced one nearly identical and less differentiated profile that contained only 6 to 15 cases. In contrast, the four-profile solution provided a substantively meaningful profile that aligns well with existing literature. Thus, based on the interpretability and meaningfulness of profiles, we selected the four-profile solutions as the final model for men and women. The entropy of the final model was 0.91 and 0.88 for men and women, respectively, indicating that 91 and 88% of the men's and women's sample were correctly classified.

As provided in Figure 1, four network types emerged for men and women, respectively: *diversified*, *family-(un)supported*, *friend-based*, and *restricted*, which correspond to the network types that have generally found in the literature. However, between men and women, the proportion ($\chi^2 = 9.92$, $p < 0.05$) and composition of network types differed, specifically for *family-(un)supported* and *restricted* network types; we discuss the both common and distinctive features of the gender-specific descriptions of each network type below.

The *diversified* network type comprised individuals with the highest network size and contact frequency in terms of family and friends. They reported the highest levels of support and below-average levels of conflict from all relationship sources, as well as above-average levels of marital and friendship quality. The *diversified* network type was the most prevalent type in both men (40.32%) and women (41.97%). Individuals in the *family-(un)supported* network type had an average network size and contact frequency with family but below-average

TABLE 1 Fit indices and profile distributions for different latent profile solutions.

		Fit indices					Profile proportion (%)	
		AIC	BIC	SABIC	Entropy	LMR-LRT	Max	Min
Men ($n = 315$)	2 Profiles	15057.68	15286.59	15093.11	0.87	$p = 0.15$	57.46	42.54
	3 Profiles	14559.39	14867.10	14607.02	0.92	$p < 0.01$	53.33	19.68
	4 Profiles	14336.48	14722.99	14396.31	0.91	$p < 0.05$	40.32	15.56
	5 Profiles	14144.89	14610.21	14216.92	0.91	$p = 0.30$	38.41	4.76
Women ($n = 305$)	2 Profiles	15023.37	15250.31	15056.85	0.93	$p < 0.001$	71.80	28.20
	3 Profiles	14801.98	15107.04	14846.00	0.91	$p = 0.22$	56.07	17.38
	4 Profiles	14631.04	15014.23	14687.56	0.88	$p = 0.75$	41.97	16.39
	5 Profiles	14497.93	14959.25	14565.98	0.91	$p = 0.45$	31.80	14.10

Note: AIC, Akaike Information Criteria; BIC, Bayesian Information Criteria; SABIC, sample adjusted BIC; LMR-LRT, Lo-Mendell-Rubin likelihood ratio test.

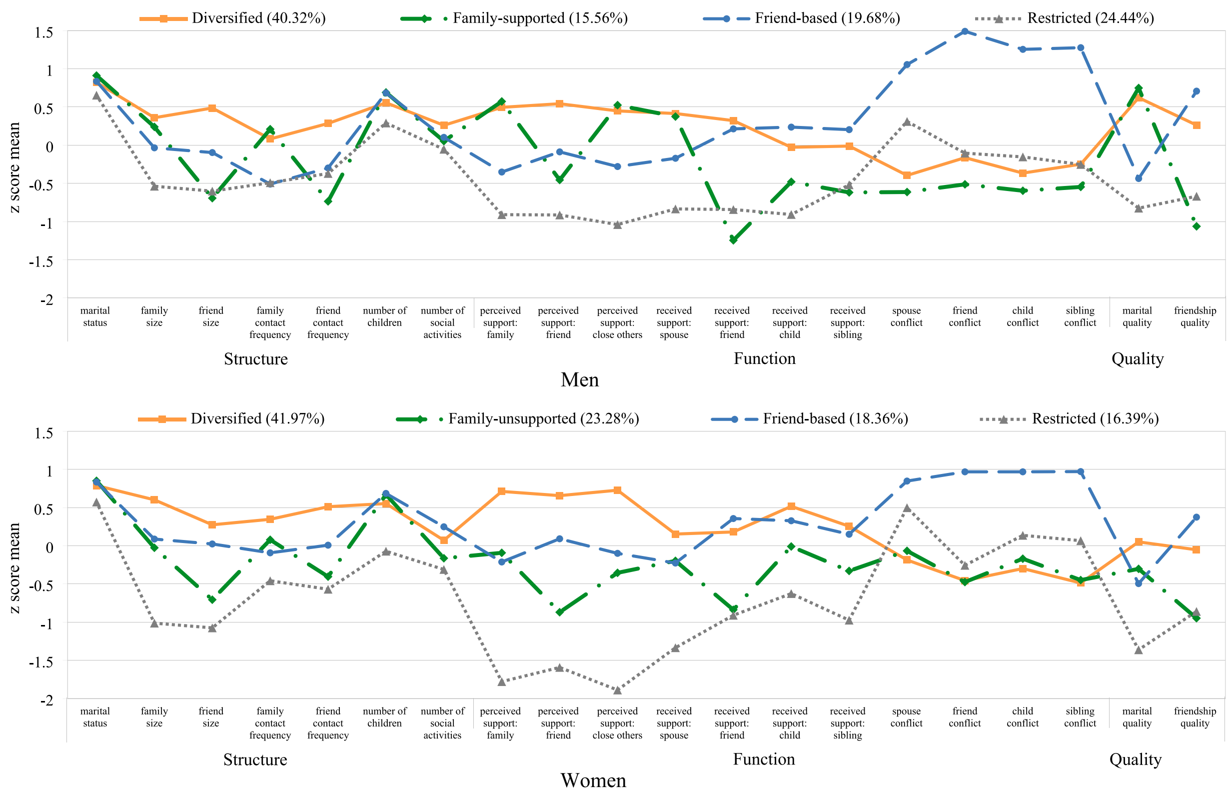

FIGURE 1
Identified social network types in men and women. Note: For marital status, we used the original score of 0 (*not married*) and 1 (*married*).

network size and contact frequency with friends. Although men in this type (i.e., *family-supported;* 15.56%) reported higher perceived support from family, spouse, and close others, and the highest marital quality, women in this type (i.e., *family-unsupported;* 23.28%) reported below-average perceived support from family, spouse, and close others, and reported below-average martial quality.

The *friend-based* network type comprised individuals with an average network size and the highest engagement in social activities. Individuals in this type reported above-average received support from children, siblings, and friends, but below average perceived support from spouses, family, and close others. Notably, they described their interpersonal relationships as highly negative; they reported the highest levels of conflicts with spouses, family, and friends. Moreover, although they reported the highest levels of friendship quality, they reported below-average levels of marital quality. The *friend-based* network type was similarly prevalent in men (19.68%) and in women (18.36%). Individuals in the *restricted* network type had comparatively small social networks. They had infrequent contacts with family and friends, reported low levels of perceived and received support, and had above-average spousal conflict as well as the lowest marital quality. Although the *restricted* network type was more prevalent in men (24.44%) than in women (16.39%), women in this type reported substantially lower perceived support from all relationship sources as well as lower marital quality than men in this type.

Differences in physical and mental health by network type

As presented in Figure 2, we found significant mean level differences in physical and mental health outcomes across the four network types. In general, for both men and women, individuals in the *diversified* network type had the highest levels of physical health, happiness, and psychological well-being, and the lowest levels of loneliness and depressive symptoms, followed by individuals in the *family-(un)supported*, *friend-based*, and *restricted* network types. The overall pattern was similar between men and women, but there were significant gender differences in the mean levels of mental health outcomes, mostly in the *family-(un)supported* and *restricted* network types; compared to men in the *family-supported* and *restricted* network types, women in the *family-unsupported* and *restricted* network types reported higher loneliness and depressive symptoms as well as lower happiness, life satisfaction, and psychological well-being.

Associations of network types with physical and mental health

As presented in Tables 2, 3, an individual's network type membership was found to be significantly associated with their physical and mental health outcomes, after controlling for demographic information (i.e., age, marital status, retirement status,

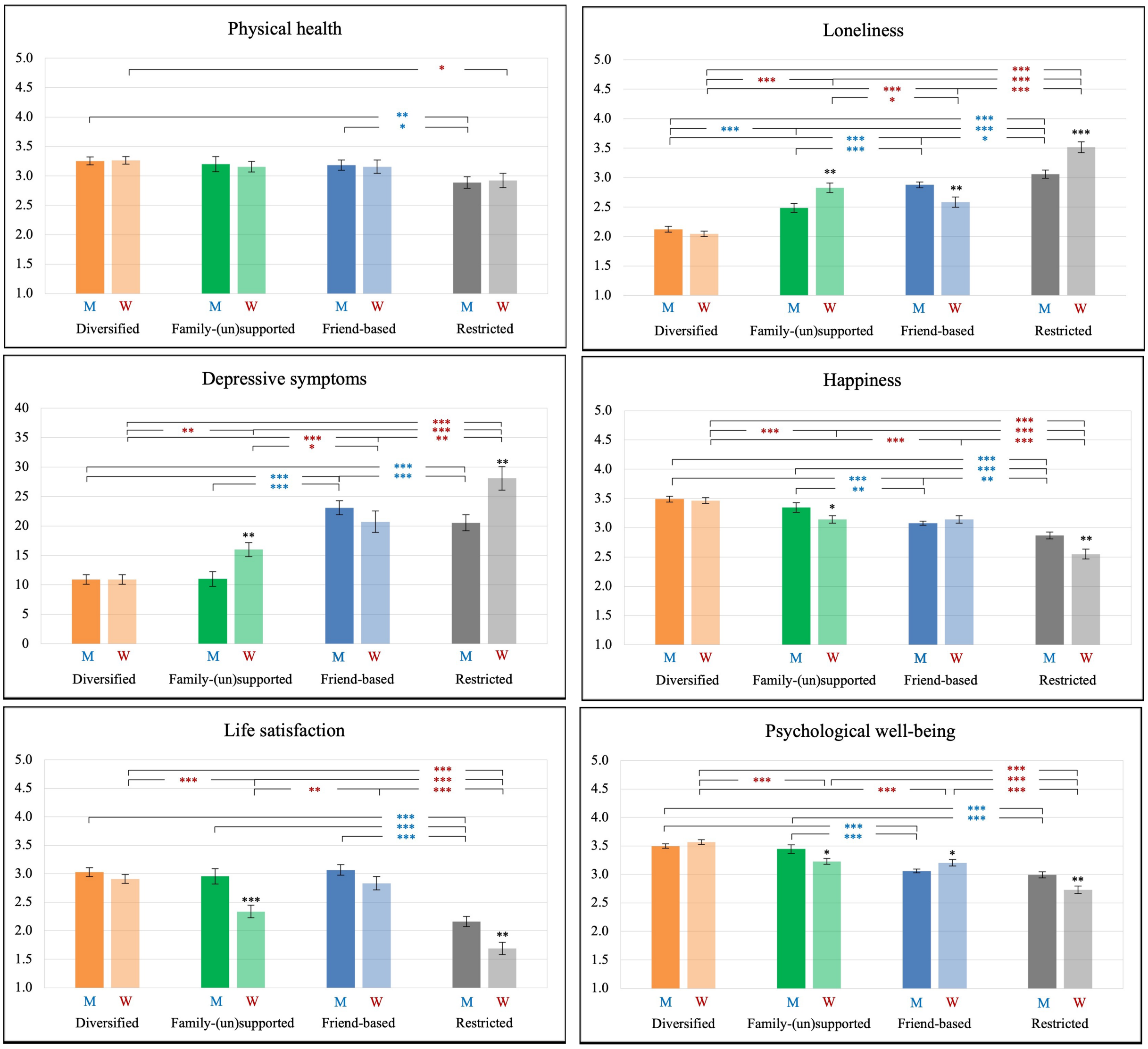

FIGURE 2
Significant differences in mean levels of physical and mental health outcomes across four network types in men and women. Note: M, * = men; W, * = Women; Analyses were conducted with the BCH method; Differences in mean scores of physical and mental health outcomes between network types were significant at *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$; Gender differences within each network type were also reported above the bar of women. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

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TABLE 2 Regression coefficients for predicting physical health, loneliness, and depressive symptoms.

	Physical health		Loneliness		Depressive symptoms	
	β_{men}	β_{women}	β_{men}	β_{women}	β_{men}	β_{women}
Social network type[a]						
Diversified	0.18*	0.19*	−0.68***	−0.91***	−0.40***	−0.65***
Family-(un)supported	0.08	0.12	−0.31***	−0.37***	−0.28***	−0.40***
Friend-based	0.10	0.11	−0.10†	−0.46***	0.09	−0.24**
Age	0.03	0.11	−0.09	0.01	−0.18**	−0.09
Marital status[b]	0.16*	0.02	−0.08	−0.02	−0.10†	0.01
Retirement status[c]	−0.05	−0.11	0.11*	−0.05	0.07	0.10†
Education	0.09	0.13*	0.04	−0.03	0.01	−0.06
Income	0.02	0.05	0.01	−0.03	−0.04	−0.10†
R^2	0.08	0.05	0.37	0.44	0.27	0.26
$adj\ R^2$	0.05	0.03	0.36	0.43	0.25	0.24
F	3.16**	2.04*	22.94***	29.34***	14.35***	12.79***
Cohen's f^2	0.09	0.05	0.59	0.79	0.37	0.35

Note: β = standardized coefficient; R^2 = the proportion of the variance in the dependent variable explained by the independent variables in the model, serving as an indicator of model fit; adj R^2 = Adjusted R^2 is modification of R^2 that considers the number of independent variables in the model.

[a] Restricted network type was specified as the reference group.

[b] Marital status is coded 0 = not married.

[c] Retirement status is coded 0 = not retired. The scale ranges are as follows: age = 40–69; education, 1≤ elementary school, 2 = middle school, 3 = high school, 4 = some college, 5 = graduate school; income, 1≤ \$10,000, 2 = \$10,000–\$20,000, 3 = \$20,000–\$30,000, 4 = \$30,000–\$40,000, 5 ≥ \$40,000; physical health, 1–5; loneliness, 1–5; depressive symptoms, 0–3. †$p < 0.10$. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

TABLE 3 Regression coefficients for predicting happiness, life satisfaction, and psychological well-being.

	Happiness		Life satisfaction		Psychological well-being	
	β_{men}	β_{women}	β_{men}	β_{women}	β_{men}	β_{women}
Social network type[a]						
Diversified	0.52***	0.69***	0.41***	0.60***	0.48***	0.74***
Family-(un)supported	0.28***	0.39***	0.25***	0.28***	0.30***	0.38***
Friend-based	0.13*	0.37***	0.33***	0.45***	0.04	0.35***
Age	0.10	0.14*	−0.07	0.02	0.09	0.08
Marital status[b]	0.10†	0.01	0.11†	0.05	0.11†	−0.02
Retirement status[c]	−0.02	−0.08	0.07	−0.06	−0.02	0.01
Education	0.03	0.18***	0.12*	0.17**	0.06	0.17**
Income	0.05	0.11*	0.11*	0.06	0.02	0.09†
R^2	0.24	0.31	0.21	0.26	0.25	0.33
$adj\ R^2$	0.22	0.29	0.19	0.24	0.23	0.31
F	12.07***	16.75***	10.41***	12.69***	12.99***	18.23***
Cohen's f^2	0.32	0.45	0.27	0.35	0.33	0.49

Note: β = standardized coefficient; R^2 = the proportion of the variance in the dependent variable explained by the independent variables in the model, serving as an indicator of model fit; adj R^2 = Adjusted R^2 is modification of R^2 that considers the number of independent variables in the model.

[a] Restricted network type was specified as the reference group.

[b] Marital status is coded 0 = not married.

[c] Retirement status is coded 0 = not retired.The scale ranges are as follows: age = 40–69; education, 1≤ elementary school, 2 = middle school, 3 = high school, 4 = some college, 5 = graduate school; income, 1≤ \$10,000, 2 = \$10,000–\$20,000, 3 = \$20,000–\$30,000, 4 = \$30,000–\$40,000, 5 ≥ \$40,000; happiness, 1–5; life satisfaction, 1–5; psychological well-being, 1–5. †$p < 0.10$. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

education, and income). Specifically, compared to being in the *restricted* network type (which was a reference group in the regression model), being in the *diversified* and *family-(un)supported* network type was associated with higher levels of happiness, life-satisfaction, and psychological well-being, along with lower levels of loneliness and depressive symptoms. Moreover, compared to being in the *restricted* network type, being in the *friend-based* network type was associated with higher levels of happiness and life-satisfaction. In women only, being in the *friend-based* network type was additionally associated with higher levels of psychological well-being and lower levels of loneliness and depressive symptoms. Although the general pattern of the associations between network types and health outcomes was comparable between men and women, the effect sizes of the network type impact on health were greater in women than they were in men.

Discussion

In this study, we identified distinct network types among men and women that reflect different configurations of structural, functional, and qualitative aspects of relationships. We then examined whether such heterotypic network types were differentially associated with diverse physical and mental health outcomes. By incorporating a person-oriented analysis and considering different aspects of relationship characteristics in identifying network types, we were able to achieve a more nuanced understanding of individuals' different relationship profiles.

Latent profiles of network types in men and women

In line with the results of previous research (Litwin and Shiovitz-Ezra, 2011; Wilson et al., 2021) as well as our hypotheses, we uncovered four distinct network types: *diversified*, *family-(un)supported*, *friend-based*, and *restricted*. However, the prevalence and composition of network types differed between men and women. For instance, the *family-unsupported* network type was found to be more prevalent in women than in men, and the nature of relationships were more positive in men's *family-supported* than in women's *family-unsupported*. Compared to men in this type, women in this type reported lower perceived support from family and spouses, as well as lower marital quality. These findings are consistent with the idea that women, compared to men, generally provide more support to their family and spouses whereas they receive less support from their spouses and close others (Neff and Karney, 2005; Leach et al., 2008).

We also found some differences by gender in terms of the *restricted* network type; specifically, it was more prevalent in men than it was in women, which is in line with previous evidence showing that the social networks of men are more limited and smaller than those of women (Finkel et al., 2018; Ang, 2019). However, although less women than men belonged to the *restricted* network type, women in this type reported a much smaller network size, substantially lower perceived and received support from family and friends, along with lower marital quality than men in this type. These women could be considered to be individuals who are at risk for health problems given that women are more vulnerable to a lack of supportive networks due to their higher expectations and emphasis toward social relationships and emotional closeness than men (Davis and Greenstein, 2009). This idea is further substantiated by our findings (i.e., women in this type reported higher loneliness and depressive symptoms, as well as lower happiness, life satisfaction and psychological well-being than men in this type).

The *friend-based* network type was similarly prevalent in men and women. Men and women in this type both reported below-average perceived support from family and below-average marital quality. Although both men and women in this type reported above-average conflict with family and friends, men in this type reported relatively higher conflict than women in this type. Given that the *friend-based* network type comprised individuals with the highest social engagement, these findings are consistent with the idea that spread-out social networks can provide not just benefits but also costs (Antonucci et al., 2010; Wan and Antonucci, 2016). That is, extended social networks could impose added obligations on an individual and multiple relationships may serve to exacerbate stresses or conflicts because interpersonal relationships are costly in nature (e.g., energy expenditure) and have possible risks (e.g., negative affect). And, men can experience added stress from the additional relationships and social roles because they draw less satisfaction from large and diverse social networks than women (Ang, 2019).

The *diversified* network type was the most prevalent type in both men and women, and the composition of the network structure and function was also comparable between men and women in this type. Individuals in this type reported frequent contact with family and friends, above-average perceived and received support, and below-average conflict with all relationship sources. In terms of relationship quality among individuals in this type, men reported higher marital quality than women. Collectively, the results of the current study suggested that the *diversified* network type was the most common and optimal network type in both men and women. And, the prevalence and features of network types differed by gender, particularly within the *family-(un)supported* and *restricted* network types; this could drive the impact of network types on men's and women's health outcomes, which is further discussed below.

Associations of network types with physical and mental health

As anticipated, heterotypic network types–which are characterized by different constellations of social relationship features–were differentially associated with diverse physical and mental health outcomes. Individuals in the *diversified* network types reported the highest levels of physical health, happiness, and psychological well-being, as well as the lowest levels of loneliness and depressive symptoms, followed by individuals in the *family-(un)supported*, *friend-based*, and *restricted* network types. These findings could be related to the theory and research emphasizing the importance of structural aspects of social networks (Moen, 2001). Our findings support that *diversified* social networks indeed have beneficial effects in promoting physical and mental health. Because having multiple relationship sources and a broader network structure indicates the availability of more support and resources in times of challenges, individuals in the *diversified* network types could find helpful solutions for difficult problems more easily than those in small or *restricted* network types (Windsor et al., 2016).

For men, individuals in the *family-supported* network type had significantly higher happiness, and psychological well-being and lower loneliness, and depressive symptoms than those in the *friend-based* network type. In contrast, for women, although individuals in the *family-unsupported* network type had similar levels of physical health and happiness as those in the *friend-based* network type, they had significantly higher loneliness but lower depressive symptoms, and life-satisfaction than those in the *friend- friend-based* network type. Such findings should be interpreted in consideration of the fact that the *friend-based* network type was characterized by both high levels of support and conflict with family and friends. Although high engagement in the community and increased interactions with friends can reduce perceived isolation and provide positive emotions (Cohen and Pressman, 2006), extended social interactions across multiple relationships can also induce conflict and tension. Because increased social strain can lead to detrimental effects on health that outweigh the benefits of support, accumulated conflict within enlarged networks is likely to reduce the positive effects of support and lead to increased depressive symptoms and lower life satisfaction.

The overall patterns of the associations between network types and health outcomes were found to be similar between men and women. However, the positive effects of an optimal network type and the negative effects of a non-optimal network type on health outcomes were much greater for women than they were for men. This finding highlights that women benefit more from supportive social networks but also are more vulnerable to a lack of supportive (or the presence of conflict-filled) relationships (Dalgard et al., 2006; Leach et al., 2008). Interestingly, the findings further showed that belonging to the *friend-based* network type was linked to lower loneliness and depressive symptoms as well as higher psychological well-being only for women, and not for men. These findings can be interpreted to indicate that, for women, relationship with friends do have significant effects on their physical and mental health. It is likely that men and women are differentially affected by friend support. Given that women generally have more confidant relationships with friends than men, and that women's psychological well-being is more closely related to the positive and negative aspects of both marital and friend relationships than that of men (Liebler and Sandefur, 2002).

Among individuals in the *family-(un)supported* network type, women generally reported lower marital quality than men, along with significantly higher loneliness and depressive symptoms than men. These results suggest that women–particularly those who belong to the *family-unsupported* type–have greater involvement and responsibility for taking care of their spouses and family, which can cause them to feel more burdened and thus have more mental health problems, such as depressive symptoms (Orth-Gomér and Leineweber, 2005). With the modernization of South Korea, women in the current society tend to have higher educational status, and have a more active role in the labor market than women in the past (Lee et al., 2008). However, because public support for childcare services has been lacking, women who are socially active should have additional burden of taking care of their child and family in addition to their work responsibilities (Hyun et al., 2002). Thus, although modernization has provided women with more opportunities, women with multiple roles and responsibilities could be more burdened and overloaded.

The existing body of research has demonstrated that women who experience everyday social strain and challenges in marriage can have increased physiological problems that undermine the health benefits of marriage (Liu and Waite, 2014). The current findings further substantiate that perceived quality and satisfaction about relationships can have more critical impacts on women's health than the size or composition of networks (Grewen et al., 2005; Holt-Lunstad et al., 2008). Given that relationship quality varied by network type and gender, and that those who belonged to network types characterized by high relationship quality reported positive health outcomes, it is likely that the positive health benefits of belonging to an optimal network type mainly stem from the perceived support, emotional closeness, and care from their supportive networks.

The current study has limitations that should be noted. First, this study was based on a cross-sectional research design. Thus, caution should be taken when interpreting the directionality of the research variables. Second, although the current sample is deemed to be representative of South Korean adult population based on age and gender with the use of a stratified probability sampling, it might not be representative in all respects. For instance, the type of individuals who would be willing to participate in a research platform may not be typical of the general population. Future research should replicate our results based on different cohorts using diverse methods of administration (online vs. face-to-face) to allow for the generalization of the link between network types and health.

Despite the limitations, this study makes an important contribution to the literature by uncovering distinct network types of men and women based on multidimensional aspects of social relationships. Substantial evidence points to the robust linkage between relationships and health (Uchino, 2013). A large body of this work considers different aspects of social relationships and highlights the structural or functional components of relationships as having significance for health in adulthood. This study builds on the importance of relationships for health by considering multifaceted social network features and an extended set of health outcomes separately for men and women. Results from this study reveal that the effect of social relationships on health could be contingent upon gender. Many previous studies, either ignored or controlled for gender as a covariate. By examining different associations between heterotypic network types and diverse physical and mental health and important gender-related differences in these associations, we found that men and women may actually perceive and experience social relationships differently, and that such differences become important in shaping their health.

The current findings provide important practical implications. Our profile-based approach identified women who belonged to the *restricted* type; these women reported having attenuated social networks characterized by very few social relationships and experiencing low perceived and received support from family and friends. Those women who may need help but not having close or supportive confidants also reported high levels of loneliness and depressive symptoms. These women could be considered to be individuals who are at risk for developing more serious mental health problems. Based on the results, health practitioners should aim to distinguish these women from others as a means to detect and assist at-risk group of individuals.

Our results further suggest that friends are influential and important social relationships, especially for women. Our findings demonstrate that even though women experience some levels of tension and conflict with friends, their mental health is closely related to the positive and negative aspects of friendships. As people age, they rely on fewer relationship partners for social and emotional needs. Having recognized this, our findings underscore that older adults (especially women) should be encouraged to develop and maintain supportive relationships with friends because they are important social resources to promote positive mental health. Implementation of programs designed to promote social interactions within their existing social networks may reduce the risks of mental health problems, especially for women at old ages.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, with modest request.

Ethics statement

The studies involving humans were approved by Jeonbuk National University/IRB. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

HS conceived of the study, helped analyses and interpretation of the data, and drafted the manuscript. CP did analyses and interpreted the data. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1216032/full#supplementary-material

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Perceived discrimination as a mediator between cultural identity and mental health symptoms among racial/ethnic minority adults in the United States: insights from the Health Information National Trends Survey 6

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Objective: This study examined the role of perceived discrimination as a mediator between cultural identity and mental health symptoms among adults from racial/ethnic minority groups in the United States.

Methods: Data were gathered from the National Cancer Institute's (NCI) Health Information National Trends Survey (HINTS) 6, a nationally representative survey. The mediating role of perceived discrimination was investigated using structural equation modeling (SEM) analysis.

Results: The study found significant associations between demographic and lifestyle factors and mental health symptoms. Non-Hispanic Blacks or African Americans and Hispanics were less likely than Non-Hispanic Whites to have mental health symptoms. Individuals between the ages of 35 and 49, 50 to 64, 65 to 74, and 75 and older had lower odds of mental health symptoms. Gender differences revealed that females had a higher risk of mental health issues than males. Socioeconomic factors, such as household income and employment status, played a significant role, with higher household income and employment status being associated with a decreased likelihood of mental health symptoms. The study emphasizes the role of perceived discrimination as a mediator, suggesting that it fully mediated the association between cultural identity and mental health symptoms. These findings highlight the significance of addressing discrimination experiences in fostering the mental health of adults from diverse backgrounds.

Conclusion: The findings highlight the need to take racial, ethnic, and socioeconomic inequities, as well as cultural identity and prejudice, into account in mental health research and interventions. The identified risk and protective factors can guide interventions and policies to enhance this population's mental health.

KEYWORDS

cultural identity, perceived discrimination, mental health symptoms, racial/ethnic minority adults, socioeconomic factors

1 Introduction

In the United States, mental health symptoms among racial/ethnic minority populations have garnered increasing attention due to their significant impact on individual well-being and public health (Mongelli et al., 2020). The intricate interplay between cultural identity, perceived discrimination, and mental health outcomes highlights the need for exhaustive research into the underlying mechanisms contributing to mental health disparities (Adams and Miller, 2022). Using data from the Health Information National Trends Survey (HINTS) 6 (National Cancer Institute, 2023), this study seeks to investigate the mediating role of perceived discrimination in the relationship between cultural identity and mental health symptoms among racial/ethnic minority adults in the United States.

Mental health disorders affect millions worldwide, with significant regional and cultural differences (Liu et al., 2020; Nutakor et al., 2021). The prevalence and impact of mental health disorders have prompted international organizations and governments to make concerted efforts to address the problem (Kopinak, 2015; Nutakor et al., 2023a,b,c). Despite these efforts, deviations from global targets persist, especially among populations of racial/ethnic minorities (Mongelli et al., 2020). Recent studies have highlighted the importance of understanding the factors contributing to disparities in mental health among minority adults. Adams and Miller (2022) discovered disparities in mental health outcomes among racial/ethnic minority populations, highlighting the need for targeted interventions and research to address these disparities. These findings highlight the significance of investigating the intricate relationships between cultural identity, perceived discrimination, and mental health symptoms.

Numerous attempts have been made by state and non-state actors in the United States to address mental health disparities among racial/ethnic minority populations (American Public Health Association, 2018). Policies, programs, and actions have been implemented to enhance mental health and prevent discrimination (American Public Health Association, 2018). For instance, the National Alliance on Mental Illness (NAMI) has advocated for culturally sensitive mental health services to meet the unique requirements of minority populations (Watts et al., 2023). Additionally, initiatives such as the Minority Mental Health Programme of the Substance Abuse and Mental Health Services Administration (SAMHSA) seek to improve access to quality mental health care and reduce disparities (Yang et al., 2020). These efforts are consistent with the global agenda outlined in the Mental Health Action Plan of the World Health Organization, which emphasizes the importance of equity and inclusion in mental health services (WHO, 2022). In a research conducted by Schwartz and Jahn (2020), the effectiveness of regions in addressing mental health inequalities among racial/ethnic minority groups was ranked. This ranking provides insights into the effectiveness of various interventions and policies implemented by various regions, providing valuable teachings for enhancing mental health outcomes. Understanding these regional differences may inform the design and implementation of targeted strategies, considering the successful approaches employed in high-performing regions.

Relevant and current literature highlights gaps in methods, data, analytical approaches, and study areas about the mediating role of perceived discrimination in the association between cultural identity and mental health symptoms among racial/ethnic minority adults (Vines et al., 2017; Woo et al., 2019; Eylem et al., 2020; Vargas et al., 2020). While previous research has investigated the individual associations between cultural identity, perceived discrimination, and mental health outcomes, there is a dearth of research examining their comprehensive interrelationships. In addition, methodological and analytical approaches must consider the complexity of these relationships. This study seeks to address these gaps by utilizing the nationally representative HINTS 6 dataset, which provides a robust platform for investigating the role of perceived discrimination as a mediator.

Understanding the challenges faced by racial and ethnic minority populations in the United States requires examining the relationship between cultural identity, mental health, and perceived discrimination. Cultural identity plays a significant role in an individual's psychological well-being and resilience. However, perceived discrimination can have serious detrimental effects on mental health. A study by Ricci et al. (2023) highlights the negative impact of racism and discrimination on ethnic minorities' health, underscoring the need for anti-racism policies and the importance of embracing pluralistic societies to address mental health disparities. In addition, the research conducted by Huey et al. (2023) has shown that Cognitive Behavioral Therapy (CBT) is generally effective. However, the efficacy of CBT might be lower for ethnic minorities. This suggests that there is a need for cultural adaptations and sensitivity training for therapists. These studies highlight the significance of incorporating cultural sensitivity and anti-racism frameworks into mental health interventions. Ensuring that these interventions are effective and equitable for all communities, especially those most vulnerable to the harmful effects of discrimination, is crucial.

Furthermore, while the main focus of this study is to examine the role of perceived discrimination in mediating the relationship between cultural identity and mental health symptoms among adults from racial and ethnic minority groups, it is also essential to analyze the demographic variables of the participants for several reasons. Firstly, understanding the demographic makeup of the sample population is crucial in interpreting the study findings in a broader societal context. Factors such as age, gender, race, ethnicity, and socioeconomic status can significantly impact individuals' experiences, perceptions, and responses. Secondly, analyzing the demographic variables helps identify potential disparities or patterns within different subgroups, highlighting areas where targeted interventions or policies may be necessary to address inequities. By examining the participant demographics alongside the study outcomes, we aim to provide a comprehensive understanding of the complex dynamics involved and ensure that our findings are relevant and applicable to diverse populations.

This study's primary objective is to examine the role of perceived discrimination as a mediator in the association between cultural identity and mental health symptoms among racial/ethnic minority adults in the United States. The HINTS 6 dataset, which offers a diverse and representative sample, will be used to investigate these complex associations. Statistical analyses, such as structural equation modelling (SEM), will be used to investigate the fundamental mechanisms and pathways. The findings of this study will provide evidence for the development of targeted interventions aimed at reducing mental health disparities and promoting the well-being of racial/ethnic minority populations, which have significant implications for policy design and implementation. Understanding the mediating role of perceived discrimination enables policymakers to implement strategies to combat discrimination, increase cultural inclusivity, and ultimately improve mental health outcomes among racial/ethnic minority adults in the United States.

2 Materials and methods

2.1 Participants

The Health Information National Trends Survey (HINTS) (National Cancer Institute, 2023), a nationally representative survey conducted by the National Cancer Institute (NCI) since 2003, provided the data for this study. HINTS offers valuable insights into the American public's knowledge, attitudes, and use of cancer- and health-related information to enhance health communication strategies across diverse populations. For this study, the HINTS 6 survey information was utilized. The HINTS 6 survey targeted 18-year-old or older non-institutionalized civilians residing in the United States. The strategy for sampling consisted of a two-stage plan. In the initial phase, a stratified sample of residential addresses was selected, considering both rural and urban areas and areas with high and low concentrations of minority adult populations. The addresses were randomly selected from a database maintained by Marketing Systems Group (MSG) that contains all non-vacant residential addresses in the United States, including P.O. boxes and seasonal addresses. The sampling frame was divided into four explicit sampling strata: (1) urban areas with high concentrations of minority adults; (2) urban areas with low concentrations of minority adults; (3) rural areas with high concentrations of minority adults; and (4) rural areas with low concentrations of minority adults. This stratification made it possible to oversample the high-minority and rural strata to enhance estimates for these subpopulations. Within each stratum, an equal-probability sample of addresses was chosen, totaling 29,600 addresses for HINTS 6. The compilation of data for HINTS 6 occurred between March 7 and November 8, 2022. A modified Dillman approach was used for the mailing protocol, which consisted of four mailings to selected households: the initial mailing, a reminder postcard, and two subsequent mailings. A subsample of nonresponders were sent a third follow-up mailing in response to a lower-than-anticipated response rate.

2.2 Measures

The 4-item Patient Health Questionnaire for Depression and Anxiety (PHQ-4), a combination of the Patient Health Questionnaire-2 (PHQ-2) and the Generalized Anxiety Disorder-2 (GAD-2) scales, was adopted to measure the psychological distress of respondents (Huang et al., 2023). For the PHQ-2, respondents were asked, "Over the past 2 weeks, how often have you been bothered by the following: a little interest or pleasure in doing things, feeling down, depressed, or hopelessness?" Each item is scored on a 4-point Likert scale ranging from 0 (nearly every day) to 3 (not at all). Similarly, for GAD-2, respondents were asked, "Over the past 2 weeks, how often have you been bothered by: Feeling nervous, anxious, or on edge and unable to stop or control worrying?" The total PHQ-4 score can range between 0 and 12, and the total PHQ-2 and GAD-2 scores can range between 0 and 6. Higher scores indicate higher depression and anxiety levels. Based on the total score (0–12), psychological distress is classified as none (0–2), mild (3–5), moderate (6–9), or severe (10–12). A score of 3 or higher indicated at least mild anxiety and depression symptoms. All four items served as observed variables for the latent construct of mental health symptoms in structural equation modeling (SEM) analyses.

Race or ethnicity was used to assess cultural identity. Respondents were requested to select their race from the options: Non-Hispanic White, Non-Hispanic Black or African American, Hispanic, Non-Hispanic Asian, and Non-Hispanic Other. Respondents were asked if they had ever received unfair treatment or discrimination in medical care because of their race or ethnicity, with a yes or no response choice, in order to measure perceived discrimination. To ensure that the measures for cultural identity and perceived discrimination are valid, we took additional steps. Regarding cultural identity, we followed established demographic research practices and used race or ethnicity as the basis for classification. This provided a clear framework for assessing how cultural identity influences mental health. Regarding perceived discrimination, we used a binary choice approach that effectively captures instances of unfair treatment linked to race or ethnicity. This is important for understanding the mental health implications of such experiences. The U.S. Census Bureau has conducted extensive research to improve data on race and ethnicity, and we used their approach for our study. This research emphasizes the evolution of race and ethnicity classification, ensuring that data collection methods remain relevant and accurately reflect the diversity of the American population (United States Census Bureau, 2017).

Age, gender, marital status, education, household income, occupation, smoking status, alcohol status, physical activity, and body mass index (BMI) were considered sociodemographic variables. Age was classified into five ranges, gender as male or female, and marital status as married, divorced/separated, widowed, or single/never married. Based on educational attainment, the level of education was divided into five categories and household income was divided into five quintiles. The occupation classifications included employed, homemaker, student, retired, disabled, multiple occupation status, unemployed for 1 year or more, unemployed for less than 1 year, and other occupation. Current, former, or non-smokers were classified according to their smoking status. Alcohol consumption was categorized as never or currently, and BMI as underweight, normal weight, overweight, or obese.

2.3 Statistical analysis

STATA SE version 14.2 (Stata Corp, College Station, TX) and Intellectus Statistics were used to analyze the data for this study (Nutakor et al., 2020). A descriptive statistical analysis was conducted to provide a summary of the relevant variables. This analysis entailed a summary of the variables' distributional characteristics. A binary logistic regression was conducted to investigate the association between the variables of interest and mental health symptoms. This regression analysis aimed to determine the relationship between the independent variable (cultural identity) and the dependent variable (mental health symptoms). In addition, structural equation modelling (SEM) was used to investigate the role of perceived discrimination as a mediator in the relationship between cultural identity and mental health symptoms. SEM is a statistical method that permits the simultaneous examination of complex relationships between multiple variables. The following regression formula was used for this analysis: Mental Health Symptoms $= \beta0 + \beta1$(Cultural Identity) $+ \beta2$(Perceived Discrimination) $+ \beta3$(Cultural Identity * Perceived Discrimination) $+ \varepsilon$. The intercept $\beta0$ represents the expected value of the dependent variable when all other variables are zero, and ε represents the error term accounting for unexplained variation in mental health symptoms not captured by the independent variables. This study sought to understand the relationships between cultural identity, perceived discrimination, and mental health symptoms by employing these statistical methods. The application of rigorous statistical analyses permitted the examination of direct and mediated effects, yielding valuable insights into the underlying mechanisms at play.

3 Results

The study's results revealed intriguing patterns in demographic characteristics across various racial and ethnic groups (Table 1). The highest proportion of non-Hispanic Whites was identified in the age range of 50 to 64, whereas the highest proportion of non-Hispanic Asians was discovered in the age range of 18 to 34. While Non-Hispanic Blacks or African Americans were predominately male, Non-Hispanic Whites were predominately female. Additionally, the majority of non-Hispanic Whites were married, compared to the majority of single or never married Hispanics. Education levels vary among racial/ethnic groups, with Non-Hispanic Whites and Non-Hispanic Asians having the most significant percentages of Bachelor's and post-Baccalaureate degree holders, respectively. The majority of non-Hispanic Whites reported household incomes of \$75,000 or more, whereas the majority of Hispanics reported household incomes of under \$20,000. Most Non-Hispanic Whites were employed, compared to the majority of Non-Hispanic Blacks or African Americans who were retired. The majority of Non-Hispanic Whites had never smoked and were current drinkers, while the majority of Hispanics were current smokers and had never smoked. The majority of Non-Hispanic Whites were inactive, whereas the majority of Hispanics were physically active. In comparing body mass index (BMI) categories across racial/ethnic groups, most Non-Hispanic Whites fell into the normal overweight category. On the other hand, most Non-Hispanic Blacks or African Americans fell into the obese category.

Figure 1 compares mental health assessments of various ethnicities using a logarithmic scale to represent a broad range of scores from tools that measure depression and anxiety, such as PHQ and GAD. The scores of Non-Hispanic whites are higher, indicating fewer symptoms, especially in the 'Normal' range, while they are lower for severe symptoms, implying better mental health overall. In contrast, Non-Hispanic Black or African American individuals show higher scores in the 'Severe PHQ-4' category, which suggests a higher prevalence of severe mental health conditions. On the other hand, Hispanic scores are generally lower across the board, which could be due to underreporting or limited access to mental health services. The chart uses different colors to represent each group - blue for Non-Hispanic White, orange for Non-Hispanic Black or African American, grey for Hispanic, brown for Non-Hispanic Asian, and green for Non-Hispanic Other - making it easy to distinguish between them.

The data in Figure 2 displays data on reported experiences of discrimination in medical care among various ethnic groups, measured on a logarithmic scale to accommodate a wide range of responses. The chart shows a significant difference in the reported experiences of discrimination between those who responded 'Yes' to experiencing discrimination and those who answered 'No'. The Non-Hispanic White group, indicated by the blue bars, has a substantial number of responses denying discrimination in MedCare, with a considerably lower number reporting discrimination. This trend is consistent across all ethnic groups, with the number of 'No' responses exceeding 'Yes' responses by a significant margin. However, each ethnic group has a non-negligible fraction of individuals who report experiencing discrimination. Among the ethnic groups, Non-Hispanic Black or African American respondents, represented by the orange bars, have a relatively higher count than Non-Hispanic Asians and Non-Hispanic Others, as evidenced by the height of the bars corresponding to a 'Yes' response.

Table 2 displays the results of a binary logistic regression analysis that examined the probabilities of mental health symptoms concerning various demographic and lifestyle factors. Non-Hispanic Blacks or African Americans have 36% lower odds of mental health symptoms than Non-Hispanic Whites [OR $=$ 0.64, 95% CI: (0.53–0.77), $p < 0.001$], while Hispanics have 27% lower odds [OR $=$ 0.73, 95% CI: (0.60–0.87), $p < 0.001$]. Regarding age groups, individuals aged 35–49 have 41% lower odds of mental health symptoms [OR $=$ 0.59, 95% CI: (0.47–0.74), $p < 0.001$], those aged 50–64 have 63% lower odds of mental health symptoms [OR $=$ 0.37, 95% CI: (0.29–0.46), $p < 0.001$], individuals aged 65–74 have 72% lower odds of mental health symptoms [OR $=$ 0.28, 95% CI: (0.21–0.37), $p < 0.001$], and individuals aged 75 and older have 71% lower odds of mental health symptoms [OR $=$ 0.29, 95% CI: (0.21–0.41), $p < 0.001$]. Females have a 29% higher risk of mental health issues than males [OR $=$ 1.29, 95% CI: (1.13–1.46), $p < 0.001$]. Individuals who have never been married or have never been married have a 20% increased risk of mental health symptoms [OR $=$ 1.20, 95% CI: (1.00–1.44), $p < 0.043$]. Individuals with a household income between \$35,000 and less than \$50,000 have 24% lower odds of mental health symptoms [OR $=$ 0.76, 95% CI: (0.59–0.98), $p < 0.041$], whereas those with a household income of \$75,000 or more have 37% lower odds [OR $=$ 0.63, 95% CI: (0.49–0.80), $p < 0.001$]. When compared to those who are employed, disabled individuals have a 79% higher risk of mental health symptoms

TABLE 1 Summary statistics of study variables.

Variable	*N* = 4,762 n (%)	Non-Hispanic White *n* = 2,817	Non-Hispanic Black or African American *n* = 722	Hispanic *n* = 809	Non-Hispanic Asian *n* = 254	Non-Hispanic Other *n* = 160
Age						
18–34	763 (16.02)	345 (12.25)	101 (13.99)	208 (25.71)	75 (29.53)	34 (21.25)
35–49	1,032 (21.67)	536 (19.03)	149 (20.64)	230 (28.43)	78 (30.71)	39 (24.38)
50–64	1,385 (29.08)	822 (29.18)	249 (34.49)	211 (26.08)	55 (21.65)	48 (30.00)
65–74	1,014 (21.29)	677 (24.03)	168 (23.27)	112 (13.84)	31 (12.20)	26 (16.25)
75 +	568 (11.93)	437 (15.51)	55 (7.62)	48 (5.93)	15 (5.91)	13 (8.12)
Gender						
Male	1937 (40.68)	1,206 (42.81)	233 (32.27)	311 (38.44)	129 (50.79)	58 (36.25)
Female	2,825 (59.32)	1,611 (57.19)	489 (67.73)	498 (61.56)	125 (49.21)	102 (63.75)
Marital status						
Married	2,557 (53.70)	1,627 (57.76)	249 (34.49)	443 (54.76)	161 (63.39)	77 (48.12)
Divorced/Separated	836 (17.56)	467 (16.58)	156 (21.61)	161 (19.90)	14 (5.51)	38 (23.75)
Widowed	433 (9.09)	296 (10.51)	72 (9.97)	37 (4.57)	16 (6.30)	12 (7.50)
Single/never been married	936 (19.66)	427 (15.16)	245 (33.93)	168 (20.77)	63 (24.80)	33 (20.62)
Education						
Less than High school	248 (5.21)	86 (3.05)	48 (6.65)	95 (11.74)	11 (4.33)	8 (5.00)
High school graduate	784 (16.46)	451 (16.01)	118 (16.34)	170 (21.01)	21 (8.27)	24 (15.00)
Some College	1,358 (28.52)	741 (26.30)	275 (38.09)	247 (30.53)	39 (15.35)	56 (35.00)
Bachelor's degree	1,396 (29.32)	870 (30.88)	179 (24.79)	193 (23.86)	110 (43.31)	44 (27.50)
Post - Baccalaureate degree	976 (20.50)	669 (23.75)	102 (14.13)	104 (12.86)	73 (28.74)	28 (17.50)
Household income						
Less than $20,000	703 (14.76)	288 (10.22)	181 (25.07)	169 (20.89)	34 (13.39)	31 (19.38)
$20,000 to < $35,000	602 (12.64)	313 (11.11)	115 (15.93)	132 (16.32)	19 (7.48)	23 (14.37)
$35,000 to < $50,000	617 (12.96)	353 (12.53)	102 (14.13)	120 (14.83)	21 (8.27)	21 (13.12)
$50,000 to < $75,000	840 (17.64)	496 (17.61)	131 (18.14)	145 (17.92)	43 (16.93)	25 (15.62)
$75,000 or more	2000 (42.00)	1,367 (48.53)	193 (26.73)	243 (30.04)	137 (53.94)	60 (37.50)
Occupation						
Employed only	2,424 (50.90)	1,397 (49.59)	353 (48.89)	432 (53.40)	162 (63.78)	80 (50.00)
Homemaker only	165 (3.46)	86 (3.05)	10 (1.39)	53 (6.55)	10 (3.94)	6 (3.75)
Student only	54 (1.13)	22 (0.78)	9 (1.25)	8 (0.99)	9 (3.54)	6 (3.75)
Retired only	1,290 (27.09)	923 (32.77)	182 (25.21)	121 (14.96)	36 (14.17)	28 (17.50)
Disabled only	212 (4.45)	109 (3.87)	53 (7.34)	38 (4.70)	1 (0.39)	11 (6.88)
Multiple Occupation statuses selected	384 (8.06)	181 (6.43)	74 (10.25)	91 (11.25)	19 (7.48)	19 (11.88)
Unemployed for 1 year or more only	128 (2.69)	48 (1.70)	22 (3.05)	38 (4.70)	13 (5.12)	7 (4.38)
Unemployed for less than 1 year only	78 (1.64)	34 (1.21)	15 (2.08)	24 (2.97)	3 (1.18)	2 (1.25)
Other Occupation only	27 (0.57)	17 (0.60)	4 (0.55)	4 (0.49)	1 (0.39)	1 (0.62)
Smoking status						
Current	496 (10.42)	300 (10.65)	102 (14.13)	55 (6.80)	14 (5.51)	25 (15.62)
Former	1,192 (25.03)	856 (30.39)	133 (18.42)	139 (17.18)	24 (9.45)	40 (25.00)
Never	3,074 (64.55)	1,661 (58.96)	487 (67.45)	615 (76.02)	216 (85.04)	95 (59.38)

(Continued)

TABLE 1 (Continued)

Variable	*N* = 4,762 n (%)	Non-Hispanic White *n* = 2,817	Non-Hispanic Black or African American *n* = 722	Hispanic *n* = 809	Non-Hispanic Asian *n* = 254	Non-Hispanic Other *n* = 160
Drinking status						
Never	2,446 (51.36)	1,327 (47.11)	421 (58.31)	438 (54.14)	161 (63.39)	99 (61.88)
Current	2,316 (48.64)	1,490 (52.89)	301 (41.69)	371 (45.86)	93 (36.61)	61 (38.12)
Physical activity						
Inactive	2,969 (62.35)	1,658 (58.86)	514 (71.19)	531 (65.64)	158 (62.20)	108 (67.50)
Active	1793 (37.65)	1,159 (41.14)	208 (28.81)	278 (34.36)	96 (37.80)	52 (32.50)
Body Mass Index (BMI)						
Underweight	53 (1.11)	39 (1.38)	6 (0.83)	1 (0.12)	4 (1.57)	3 (1.88)
Normal weight	1,395 (29.29)	894 (31.74)	139 (19.25)	181 (22.37)	137 (53.94)	44 (27.50)
Overweight	1,594 (33.47)	947 (33.62)	242 (33.52)	279 (34.49)	83 (32.68)	43 (26.88)
Obese	1720 (36.12)	937 (33.26)	335 (46.40)	348 (43.02)	30 (11.81)	70 (43.75)

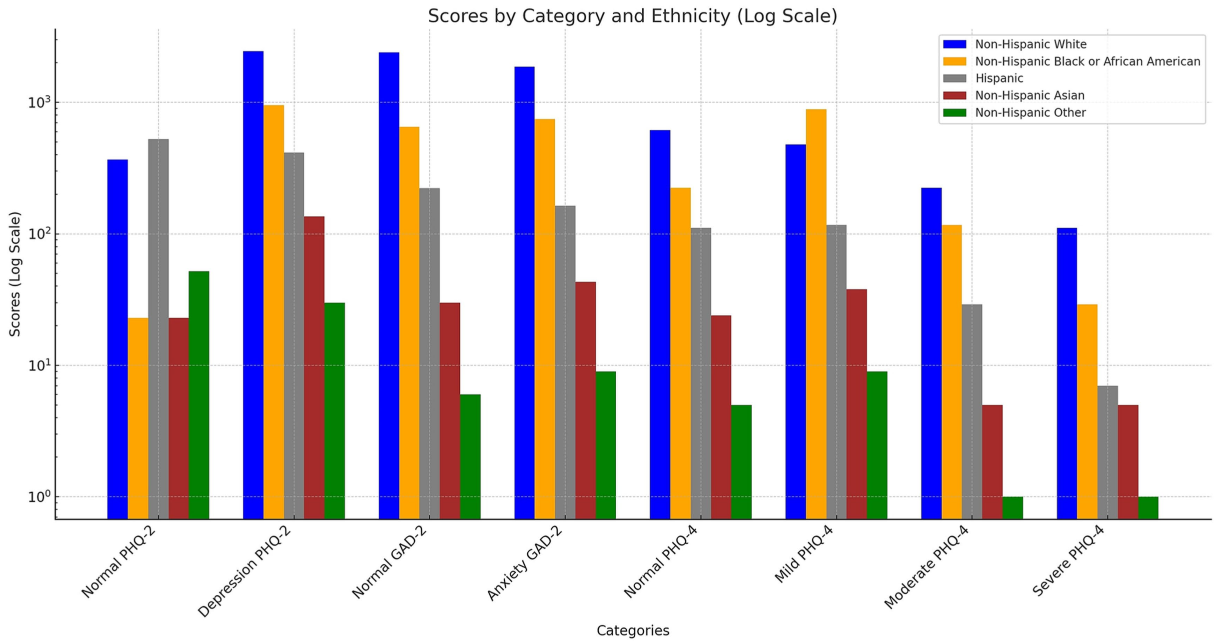

FIGURE 1
The distribution of mental health outcomes across various racial/ethnic groups.

[OR = 1.79, 95% CI: (1.25–2.55), $p < 0.001$], and individuals with multiple occupation statuses have a 37% higher risk of mental health symptoms [OR = 1.37, 95% CI: (1.07–1.75), $p < 0.012$]. Furthermore, individuals who have been unemployed for a year or more had a 127% increased risk of developing mental health problems [OR = 2.27, 95% CI: (1.42–3.61), $p < 0.001$]. Taking lifestyle factors into account, former smokers have 30% lower odds of mental health symptoms than current smokers [OR = 0.70, 95% CI: (0.55–0.90), $p < 0.005$], and individuals who have never smoked have 46% lower odds [OR = 0.54, 95% CI: (0.43–0.68), $p < 0.001$]. In addition, compared to those who have never consumed alcohol, current drinkers have a 35% increased risk of mental health symptoms [OR = 1.35, 95% CI: (1.19–1.54), $p < 0.001$]. Finally, levels of physical activity were associated with mental health symptoms. Physically active individuals have a 33% lower risk of mental health symptoms than inactive individuals [OR = 0.67, 95% CI: (0.59–0.76), $p < 0.001$].

The results of the mediation analysis examining the relationship between cultural identity, perceived discrimination, and mental health symptoms are presented in Table 3. With a significance level of $\alpha = 0.05$, a mediation test was conducted to determine whether perceived discrimination mediated the relationship between cultural identity and mental health symptoms. The direct relationship between cultural identity and mental health symptoms was not shown to be significant, suggesting that experienced discrimination may act as

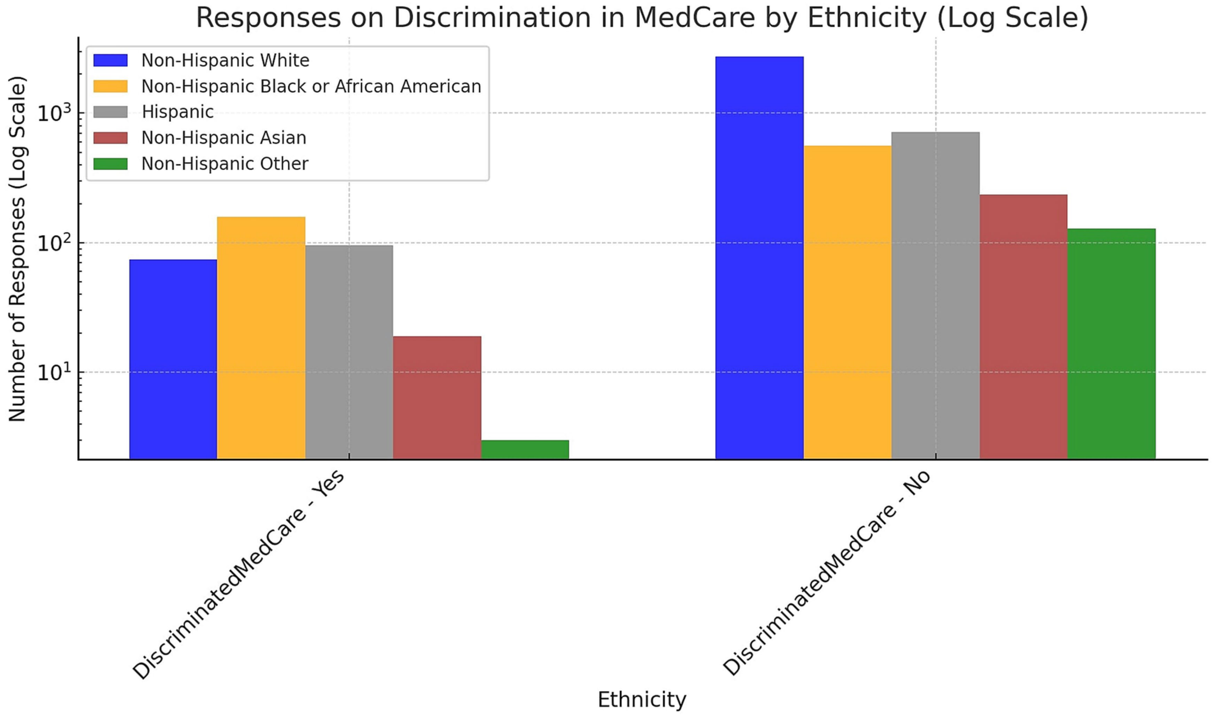

FIGURE 2
The prevalence of experienced discrimination in medical care among various racial/ethnic groups.

a full mediator. Following established methods (Preacher and Hayes, 2004; Zhao et al., 2010; Gunzler et al., 2013), the indirect and total effects of perceived discrimination on the association between cultural identity and mental health symptoms were investigated to assess full mediation. The results demonstrated that the indirect effect of perceived discrimination on the association between cultural identity and mental health symptoms was statistically significant ($B = 0.01$, $z = 5.59$, $p < 0.001$). This suggests that a one-unit increase in cultural identity, as measured by its effect on perceived discrimination, is associated with a 0.01-unit increase in mental health symptoms. In addition, the total effect of cultural identity on mental health symptoms was significant ($B = 0.03$, $z = 2.73$, $p < 0.006$), indicating that a one-unit increase in cultural identity is associated with a 0.03-unit increase in mental health symptoms. Given the significance of both the indirect and total effects, the findings support full mediation by perceived discrimination (Preacher and Hayes, 2004; Zhao et al., 2010; Gunzler et al., 2013). The node diagram for the path analysis model is shown in Figure 3.

4 Discussion

The binary logistic regression analysis results presented in Table 2 provide significant associations between demographic and lifestyle factors and adult mental health symptoms. These findings have significant implications for understanding the mental health outcomes of this population and may influence the development of targeted interventions and policies.

According to the study, non-Hispanic Blacks or African Americans, and Hispanics have significantly lower odds of mental health symptoms than non-Hispanic Whites. This suggests a positive association between minority racial and ethnic group membership and adult mental health outcomes. Recent studies conducted by Weaver et al. (2015) and Ettman et al. (2020) also observed lower rates of mental health symptoms among minority populations, confirming the results of this study. These findings highlight the significance of addressing disparities and providing culturally sensitive mental health services to adult populations from different cultural backgrounds. Regarding age groups, our research revealed significant associations between age groups and adult mental health symptoms. In particular, individuals aged 35 to 49, 50 to 64, 65 to 74, and 75 and older had significantly lower odds of mental health symptoms than individuals in other age groups. These findings are of the most significant importance for understanding the mental health outcomes of the adult study population and have implications for the development of targeted interventions and policies. The significance of these associations suggests that increasing age positively influences adult mental health outcomes. Recent studies by Schönfeld et al. (2017) and Lorem et al. (2017) reported comparable relationships between age and mental health symptoms, which are consistent with our findings. In addition, these studies found lower rates of mental health symptoms among older individuals, indicating the consistency and robustness of the association. The findings suggest that advancing age may protect the mature population from developing mental health symptoms.

In contrast to our findings, Dowdy et al. (2005) found no significant correlation between adult age and mental health symptoms. However, it is essential to note that their study focused on a specific subpopulation and utilized different measurement scales, which may account for the disparate results. Nonetheless, the overall body of evidence, which includes our study and the studies mentioned above,

TABLE 2 Binary logistic regression analysis examining the probabilities of mental health disorders concerning various demographic and lifestyle factors.

	Odds Ratio	95% CI	*p* - value
Cultural identity			
Non-Hispanic White	ref		
Non-Hispanic Black or African American	0.64	[0.53–0.77]	0.001
Hispanic	0.73	[0.60–0.87]	0.001
Non-Hispanic Asian	0.97	[0.72–1.28]	0.810
Non-Hispanic Other	0.77	[0.54–1.09]	0.142
Perceived discrimination			
Yes	ref		
No	0.66	[0.52–0.85]	0.001
Age			
18–34	ref		
35–49	0.59	[0.47–0.74]	0.001
50–64	0.37	[0.29–0.46]	0.001
65–74	0.28	[0.21–0.37]	0.001
75 +	0.29	[0.21–0.41]	0.001
Gender			
Male	ref		
Female	1.29	[1.13–1.46]	0.001
Marital status			
Married	ref		
Divorced/Separated	1.12	[0.94–1.35]	0.187
Widowed	1.13	[0.89–1.43]	0.301
Single/never been married	1.20	[1.00–1.44]	0.043
Education			
Less than High school	ref		
High school graduate	0.96	[0.70–1.32]	0.830
Some College	1.04	[0.77–1.42]	0.770
Bachelor's degree	1.05	[0.77–1.44]	0.733
Post - Baccalaureate degree	1.14	[0.82–1.59]	0.425
Household income			
Less than $20,000	ref		
$20,000 to < $35,000	0.80	[0.63–1.03]	0.086
$35,000 to < $50,000	0.76	[0.59–0.98]	0.041
$50,000 to < $75,000	0.78	[0.61–1.00]	0.051
$75,000 or more	0.63	[0.49–0.80]	0.001
Occupation			
Employed only	ref		
Homemaker only	0.96	[0.67–1.35]	0.806
Student only	1.39	[0.70–2.74]	0.335
Retired only	0.86	[0.69–1.05]	0.145
Disabled only	1.79	[1.25–2.55]	0.001
Multiple Occupation statuses selected	1.37	[1.07–1.75]	0.012
Unemployed for 1 year or more only	2.27	[1.42–3.61]	0.001
Unemployed for less than 1 year only	1.57	[0.92–2.66]	0.093
Other Occupation only	0.78	[0.35–1.74]	0.550
Smoking status			
Current	ref		
Former	0.70	[0.55–0.90]	0.005
Never	0.54	[0.43–0.68]	0.001
Drinking status			
Never	ref		
Current	1.35	[1.19–1.54]	0.001
Physical activity			
Inactive	ref		
Active	0.67	[0.59–0.76]	0.001
Body Mass Index (BMI)			
Underweight	ref		
Normal weight	0.84	[0.46–1.56]	0.601
Overweight	0.81	[0.44–1.49]	0.508
Obese	1.01	[0.55–1.87]	0.957

OR, Odds Ratio; CI, Confidence Intervals.

supports the notion that older adults have a reduced risk of mental health symptoms. In addition, gender differences emerged as a significant determinant, with females having a higher incidence of mental health symptoms than males. This result is consistent with Thapa et al. (2020) and Ma et al. (2021), who found higher rates of mental health symptoms among adult females (Nutakor et al., 2023a,b,c). Understanding these gender differences is essential for tailoring mental health interventions and support services to meet the unique requirements and challenges faced by women.

Recent studies have brought to light significant gender discrepancies in mental health outcomes, particularly amongst racial and ethnic minorities (Salk et al., 2017; Fox et al., 2020). For example, research indicates that women often report higher rates of mental health issues than men, a trend that our findings support. This difference can be partly attributed to the unique stressors faced by women, including gender-based discrimination and the simultaneous burden of cultural and societal expectations (Salk et al., 2017; Fox et al., 2020). Additionally, theories such as the differential exposure hypothesis suggest that women may experience a higher frequency and intensity of stressors, including perceived discrimination, which ultimately has a more severe impact on their mental health (Ruglass et al., 2020). It has been observed that coping mechanisms differ between genders, with females possibly relying more on social support (Piccinelli and Wilkinson, 2000). Although social support can be beneficial, it may also increase exposure to stressors in interpersonal

TABLE 3 Unstandardized loadings (standard errors), standardized loadings, and significance levels for each parameter in the path analysis model.

Parameter Estimate	Unstandardized	Standardized	*p*
Regressions			
Cultural identity → Mental health	0.02 (0.01)	0.02	0.097
Cultural identity → Perceived discrimination	−0.04 (0.003)	−0.16	< 0.001
Perceived discrimination → Mental health	−0.29 (0.04)	−0.09	< 0.001
Indirect effect of mental health on cultural identity by perceived discrimination	0.01 (0.002)	0.02	< 0.001
Total effect of mental health on cultural identity	0.03 (0.01)	0.04	0.006
Errors			
Error in cultural identity	1.23 (0.03)	1	< 0.001
Error in perceived discrimination	0.07 (0.001)	0.97	< 0.001
Error in mental health	0.67 (0.01)	0.99	< 0.001

p, Significance level.

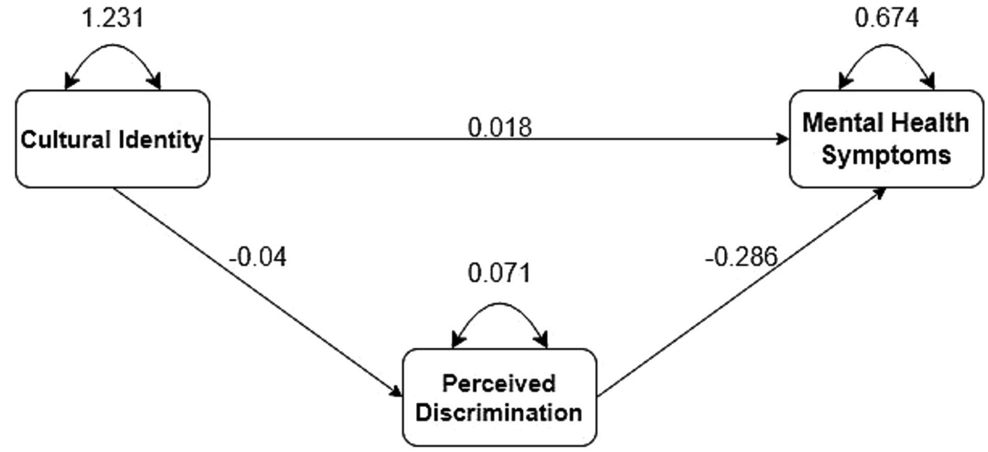

FIGURE 3
Node diagram for the path analysis model.

relationships. Our study supports this by showing that females in our sample experienced higher rates of mental health issues, which is consistent with previous studies. This highlights the importance of taking gender-specific approaches in mental health interventions, particularly for racial and ethnic minority populations, where gender, culture, and discrimination intersect to add multiple layers of complexity to mental health outcomes.

The study identified several socioeconomic factors associated with adult mental health symptoms. Higher household incomes were associated with a decreased likelihood of mental health symptoms, indicating a positive relationship between income and mental health outcomes. However, disability status, multiple occupation statuses, and long-term unemployment were associated with an increased risk of mental health symptoms. Consistent with recent studies by Reiss et al. (2019) and Henssler et al. (2021) that emphasize the impact of socioeconomic factors on mental health outcomes among adults, these findings demonstrate the influence of socioeconomic factors on adult mental health outcomes. The findings highlight the significance of addressing socioeconomic disparities and supporting vulnerable populations to promote mental health.

There were also significant associations between lifestyle factors and mental health symptoms. Ex-smokers and never-smokers had lower odds of mental health symptoms than current smokers, indicating a positive effect of smoking cessation on mental health. These findings are consistent with those of Xie et al. (2022) and Kock et al. (2023), indicating smoking cessation's positive effects on adult mental health. Physical activity was also protective against mental health symptoms, with physically active individuals having a lower risk than inactive individuals. Similar findings were reported by McKeon et al. (2022) and Jacob et al. (2020), highlighting the significance of promoting physical activity for adults mental health (Xu et al., 2021).

Table 3 presents the mediation analysis results that cast light on the relationship between adult cultural identity, perceived discrimination, and mental health symptoms. The results suggest that discrimination experiences fully mediate the impact of cultural identity on mental health symptoms. This finding has significant implications for understanding the underlying mechanisms by which cultural identity influences mental health outcomes in this population. Hashemi et al. (2019, 2020) found evidence of the mediating effect of perceived discrimination on mental health disparities among individuals from diverse backgrounds. Understanding the effects of discrimination may inform interventions and policies to reduce discrimination and promote adult mental health.

To better understand the critical role of perceived discrimination in mediating the relationship between cultural identity and mental health symptoms, it is necessary to explore the complex dynamics of this process. Perceived discrimination is a significant stressor that may worsen mental health symptoms by reinforcing negative self-perceptions and increasing psychological distress (Szaflarski and Bauldry, 2019). This indicates that individuals from racial or ethnic minority groups may internalize experiences of discrimination, leading to a heightened sense of vulnerability and isolation, which in turn can have negative impacts on their mental health. The study's mediation analysis emphasizes the significance of addressing perceived discrimination in interventions that aim to improve mental health outcomes for racial and ethnic minority adults. When professionals and policymakers understand the mechanisms through which cultural identity affects mental health symptoms through perceived discrimination, they can design culturally sensitive interventions that address not only symptoms but also the root causes of mental health disparities. This approach requires a comprehensive understanding of an individual's cultural background and experiences of discrimination, highlighting the importance of integrated care models that consider the multifaceted nature of mental health in diverse populations.

In terms of policy implications, the findings of this study highlight the need for targeted interventions and policies to address disparities in adult mental health. When devising mental health programs and services, it is crucial to consider racial, ethnic, and socioeconomic factors, as demonstrated by the findings (Alegría et al., 2018; Eylem et al., 2020; Xu et al., 2022). Culturally sensitive approaches, such as providing mental health resources in multiple languages and ensuring that diverse populations are represented in the mental health workforce, may help reduce disparities and enhance mental health outcomes for adult populations (Gopalkrishnan, 2018). In addition, efforts should be made to combat discrimination and encourage social inclusion to enhance the mental health of adults from diverse cultural backgrounds. Implementing community-based mental health programs that cater specifically to the requirements of adults is one of the real-world solutions suggested by the findings (Killaspy et al., 2022). Individuals at higher risk for mental health symptoms, such as those with reduced incomes, disabilities, or discrimination experiences, may receive education, support, and access to mental health services through these programs. Collaborations between healthcare providers, community organisations, and policymakers may facilitate the formulation and implementation of such initiatives. In addition, efforts should be made to increase adult awareness of the mental health benefits of quitting smoking, physical activity, and healthy lifestyle choices (Kumar and Preetha, 2012). Public health campaigns and educational initiatives may empower adults to adopt healthier lifestyles by promoting behavior modification (Kumar and Preetha, 2012).

In our study, we adopt an interdisciplinary approach combining sociology, psychology, and data science knowledge to enhance our analysis of the complex interrelationship between cultural identity, perceived discrimination, and mental health. By utilizing this approach, we can comprehensively understand our research questions, which may be overlooked if we focus on a single discipline. Furthermore, we suggest extending our research to include comparative analysis across diverse geographical and cultural settings. This would allow us to examine the universality or specificity of our findings, providing us with a more profound insight into how cultural context influences the relationship between perceived discrimination and mental health.

Based on the insights we gained from our research, we propose a new intervention that aims to reduce the negative effects of perceived discrimination on mental health. This intervention is based on an interdisciplinary analysis and comparative findings, and it has been designed to be culturally sensitive and adaptable to different community needs. Its objective is not only to address the immediate psychological impacts of discrimination but also to foster resilience and community support among racial and ethnic minority adults. Through this intervention, we aim to illustrate the practical applications of our research, highlighting its potential to contribute to more inclusive and effective mental health support services.

This study has several strengths. First, it is based on the Health Information National Trends Survey (HINTS) 6 data. This study is nationally representative and increases the generalizability of the results to the larger adult population in the United States. The large sample size and rigorous methodology of HINTS 6 provide solid evidence for the identified associations in this study. Second, the study employed binary logistic regression analysis and mediation analysis, enabling a comprehensive examination of the relationships between demographic and lifestyle variables, perceived discrimination, and mental health symptoms. This method provides a nuanced understanding of the complex factors influencing adult mental health outcomes.

Despite these strengths, the study has limitations that must be considered. First, because the data are cross-sectional, it is not easy to establish causal relationships (Nutakor et al., 2023a,b,c). Longitudinal studies would help investigate the temporal relationships between the indicated factors and mental health symptoms. Second, the research employed self-reported measures susceptible to recall and reporting biases. Future research could include objective measures of mental health symptoms and other pertinent variables to strengthen the validity of the findings. In addition, the study was limited to the United States, so the findings may not be directly applicable to other nations or cultural settings. Although our study has found significant associations between demographic factors and mental health symptoms, we acknowledge that these variables could have been included within the mediation analysis to enhance our understanding of the complex ways in which demographic disparities influence mental health outcomes. Therefore, future research should thoroughly examine demographic variables in mediation analyses to understand better the mechanisms driving mental health disparities. By doing so, future studies can contribute to developing more targeted and effective interventions for diverse populations.

5 Conclusion

In conclusion, the findings of this study shed light on the significant associations between demographic and lifestyle factors, perceived discrimination, and mental health symptoms among adults. In adult mental health research and interventions, it is essential to consider racial, ethnic, and socioeconomic disparities, cultural identity and discrimination. The study adds to the existing body of knowledge by identifying specific risk and protective factors and highlighting the potential for interventions and policies to enhance mental health in this population. Future research should continue to investigate the intricate interplay of these factors and evaluate the effectiveness of targeted interventions in promoting adult mental health. It is crucial to emphasize the importance of adopting an intersectional perspective when designing public policies and developing mental health interventions. By recognizing and addressing the complex interplay of factors such as racial, ethnic, and socioeconomic disparities, cultural identity, and discrimination, we can work towards achieving more equitable outcomes in mental health care. Embracing intersectionality enables us to move beyond simplistic one-size-fits-all approaches and tailor interventions to individuals' and communities' diverse needs and experiences. By focusing on intersectionality in policy formulation and intervention strategies, we can work towards dismantling systemic barriers and promoting mental health equity for all.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: https://hints.cancer.gov/data/Default.aspx.

Ethics statement

The studies involving human participants were reviewed and approved through expedited review by the Westat Institutional Review Board, and subsequently deemed exempt by the U.S. National Institutes of Health Office of Human Subjects Research Protections. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JN and LZ contributed to conception and design of the study. LZ applied for funding to support this study and supervised the research. JN and EL organized the database. JN, EL, and ND performed the statistical analysis. JN and SA-D wrote the first draft of the manuscript. JN, SA-D, and YC wrote sections of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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

Publisher's note

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