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Preparation for future care moderates the relationship between loneliness and depression among Chinese rural older adults: A cross-sectional study

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ABSTRACT

Loneliness has been identified as a risk factor for depression, while preparation for future care (PFC) can be a protective factor. Little is known about their complex relationships in older adults in China. This study aimed to explore whether PFC moderated the association between loneliness and depression. A total of 481 older adults aged 60 years and above were recruited in rural Shandong, China. After excluding those whose data missing rates were over 15%, data were analyzed for a total of 436 participants. Loneliness, PFC, and depression were measured. Statistical analyses included descriptive analysis, and moderating effects analyses. Our findings showed that PFC and its related dimensions can moderate the relationship between loneliness and depression. When the level of PFC and its dimensions were higher, the effect of loneliness on depression was weaker. PFC should be taken into consideration when interventions are being developed to reduce depression in older adults.

Background

Aging populations are a concern throughout the world, and China has the largest population of any country.[1] By 2018, individuals aged 60 years and over accounted for 17.9% of the population of China.[2] As they age, older adults often suffer from physical dysfunction, loneliness, depression,[3] and poor quality of life.[4] Compared with older adults in urban areas, the social and economic conditions of older adults in rural areas are often worse, as they tend to have less education and lower incomes.[5] Furthermore, older adults in rural areas have less access to health care resources and opportunities compared to their urban counterparts,[6] which leads to China's rural older population often experiencing poor physical and mental health and a lower quality of life.[7,8] Moreover, with the increasing urban development in China, most young rural residents have moved to an urban environment, leaving behind a great number of older adults in rural areas.[9] Rural older adults, owing to such factors as poor living conditions, "empty-nest syndrome," and lack of social interactions,[9] may also experience more serious health problems.

Depression is one of the most prevalent mental health issues among older adults,[10] and it is becoming a central public health concern. Depression is characterized by low mood, lack of energy, and/or somatic symptoms.[11] As the body ages, mental cognition and physical functioning decline, which may be related to depression.[12,13] Previous studies indicated that depression could influence physical and mental health, quality of life,[4] and suicidal tendencies.[14] However, depression in old age is often seen as a normal part of aging and neglected by doctors.[12] Thus, it is vital to identify and assess depression and its related factors among older adults.

Loneliness is a subjective emotion related to not having many or good interpersonal relationships,[9] and is often experienced by older adults, especially in rural areas. Traditional Chinese culture values filial piety, and older adults have often been taken care of by their adult children in the home. However, as their adult children find jobs and move to urban areas, rural older adults are experiencing empty-nest syndrome, and suffer from more loneliness than older adults in urban areas.[9] A previous cross-sectional study reported that 78.1% of the older population in Anhui Province experienced moderate to severe loneliness.[15] Previous studies reported that loneliness was a significant risk factor for mental problems among older populations. An Irish longitudinal study conducted from 2009 to 2015 among 5066 older adults showed that loneliness, as a consequence of the

Abbreviations: pfc, preparation for future care; H1, hypothesis 1; H2, hypothesis 2; H3, hypothesis 3; Uls, ucla loneliness scale; Aw, awareness of future care needs; Av, avoidance of care planning; GA, gathering information; MD, making decisions; CP, concrete planning; PHQ-9, Patient Health Questionnaire-9; ANOVA, one-way analysis of variance; CI, confidence interval

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deterioration of social life, could predict anxiety and depression later on.[16] An investigation conducted among Chinese rural empty nest older adults showed that loneliness significantly predicted depression by mediating perceived stress.[17] Wong et al. explained the function mechanism of loneliness on late life depression from the perspective of neurobiology reporting that loneliness had a unique role in relation to the negative affective processing in late life depression at the functional brain connectional and network levels.[18] Gan et al. explained the relationship between loneliness and depression in the context of Chinese Confucian culture, and stated that for older Chinese adults who attached great importance to collective culture, loneliness is more likely to cause depression.[19] However, as not all older adults who experience loneliness also suffer from depression, some protective factors might exist.

As people age, they face a decline in physical functioning, an increase in chronic diseases, and frailty; thus, preparation for future care (PFC) is necessary to cope with increasing care needs. PFC is a concept developed by Sörensen and Pinquart,[20] and is a health-promotion activity that encompasses both thoughts and actions. It includes five factors: awareness of future care needs, gathering information, make decisions, concrete planning, and avoidance of care planning. Older adults who engage in PFC have been shown to have better health outcomes and greater life satisfaction.[21] Sörensen et al.[22] explored whether PFC was related to subsequent mental health (e.g., depression and anxiety), and a two-year longitudinal study indicated that failure to engage in PFC is a remarkable risk factor for depression and anxiety among older populations. Moreover, a qualitative interview research found that late life loneliness is partially caused by the loss of abilities as a consequence of ill health, including the ability of taking care of oneself. Preparation for future care was also mentioned as an efficient strategy for coping with loneliness by older adults.[23] It was proposed that the PFC model was based on proactive coping, which could buffer the stress older adults experience from the aging process[24] and buffer the negative outcomes of loneliness—a mental stressor[25] often experienced by older adults. However, whether PFC could also moderate the relationship between loneliness and depression among rural older populations has scarcely been explored.

Considering this background, the present study aimed to explore the relationships among loneliness, depression, and PFC in community-dwelling older adults in rural China. Additionally, we examined the moderating effects of PFC on the path from loneliness to depression. Therefore, we first hypothesized that loneliness is a risk factor (H1), whereas PFC is a protective factor (H2), for depression. Subsequently, we also hypothesized that PFC would moderate the relationship between loneliness and depression (H3) among Chinese rural older populations (Fig. 1).

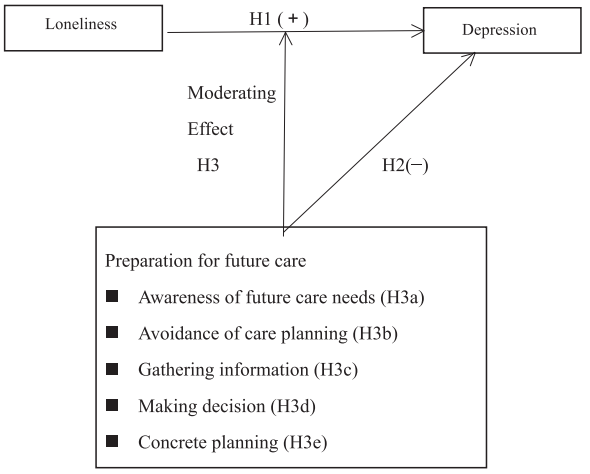

Fig. 1. Theoretical model (*H* = hypothesis).

Methods

Participants

This was a cross-sectional study with older adults living in rural areas in Shandong, China, which is a typical northern Chinese province and has one of the largest aging populations in China. Data were collected from March to May 2015. Four villages were selected for inclusion in the study through convenience sampling after they were approved by the village committees. A total of 789 individuals aged over 60 years registered in the four villages. During the period of investigation, 130 of them lived in nursing homes, 43 lived in hospitals, and 109 lived in their children's or relatives' homes. The rest of the 507 older adults of the four villages comprised the target population. Those who were included in the study fulfilled the following criteria: (1) aged 60 years and above, (2) had the physical and mental abilities to participate in interviews, and (3) were willing to participate in the study and signed an informed consent form. The exclusion criteria were: (1) a severe hearing impairment, and/or (2) a diagnosis of dementia or a severe cognitive deficit.

According to the medical registration system of the village committees, 17 older adults were excluded because of hearing loss and/or a diagnosis of dementia or a severe cognitive deficit (Mini-Mental State Examination a.k.a. MMSE score < 9).[26] Household surveys were then conducted among the remaining 490 elderly people who met the inclusion criteria. However, nine of them refused to participate in the survey. Ultimately, a total of 481 participants were recruited with a response rate of 90.46%. The enrollment of the procedure is shown in Fig. 2. This study was approved by the institutional review board of the School of Nursing, Shandong University (approval number: 2017-R-105).

Measures

Sociodemographic and physical health characteristics

Participants' gender, age, marital status, living status, educational background, self-rated financial status, and medical insurance were obtained in this study.

We also collected participants' physical health information by assessing for a number of illnesses and healthy lifestyle indicators (including smoking, drinking, and exercise). As for illnesses, we selected medical disorders reported to be prevalent among older adults and asked participants whether they had experienced one or more of the following medical conditions during the previous year: diabetes mellitus, hypertension, osteoarthritis, liver disorders, kidney disorders, cancer, congestive heart failure, chronic obstructive pulmonary disease, heart attack, gastrointestinal disorders, hearing problems, or ophthalmologic disorders.[27] The number of medical disorders was summed and categorized as 0, 1, and 2 or more so as to clearly describe its distribution.

Loneliness

Loneliness was assessed with the Chinese version of the UCLA Loneliness Scale (ULS; Version 3).[28] The ULS consists of 20 items and measures feelings of loneliness using a 4-point Likert scale, ranging from 0 ("never") to 4 ("often"). When summing the item scores, items 1, 5, 6, 9, 10, 15, 16, 19, and 20 are reverse scored. The scores in the present study ranged between 20 and 80, with higher scores signifying more intense feelings of loneliness. Cronbach's α of the scale was 0.893 in the current study.

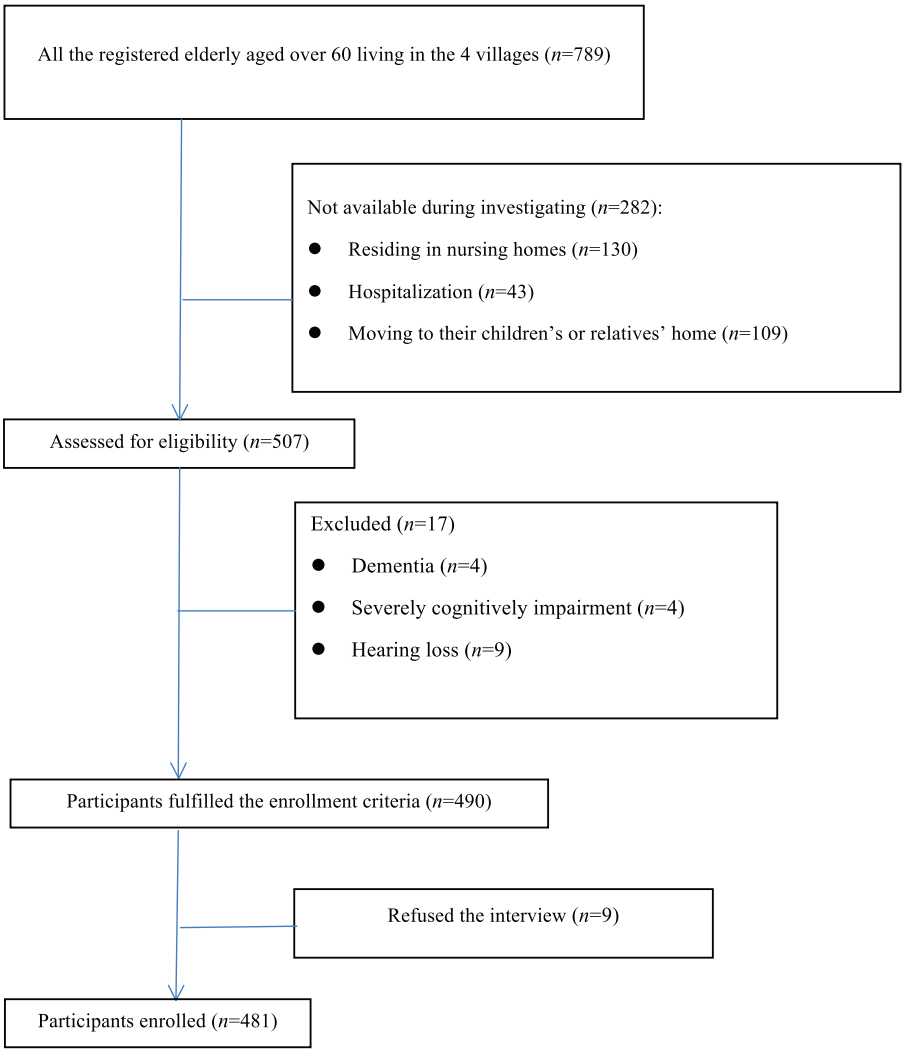

Fig. 2. Enrollment of participants for the study.

Preparation for future care

The short-form of the Preparation for Future Care Needs scale[20,29] was used in this study. This scale has 15 items and 5 dimensions to assess the process of care planning, namely awareness of future care needs (AW), avoidance of care planning (AV), gathering information (GA), making decisions (MD), and concrete planning (CP). This scale has been validated in large samples of older adults, and showed good internal consistency in the current sample (Cronbach's α = 0.879). For the dimensions, the corresponding Cronbach's α were 0.662, 0.765, 0.809, 0.811, and 0.847, respectively. Items are rated on a 5-point Likert scale, with a possible range of scores from 3 to 15 for each dimension (3 items). Additionally, the total PFC score includes the four positive planning behaviors (awareness of future care needs, gathering information, making decisions, and concrete planning), while the negative planning behavior (avoidance of care planning) is regarded as a single item.[29]

Depression

Depression was evaluated using the Patient Health Questionnaire-9 (PHQ-9),[30] which was developed according to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV). The PHQ-9 has been widely used in depression screening, and showed good validity, with a Cronbach's α of 0.866 in the current study. The PHQ-9 consists of 9 items and measures symptoms related to depression using a 4-point Likert scale, ranging from 0 ("never") to 3 ("almost every day"). The total score of PHQ-9 ranged between 0 and 27, with higher scores indicating more serious depressive symptoms.

Quality control

This study adopted some quality control methods while investigating: (1) All researchers were pre-trained to assure the consistency in data collection in terms of the use of scales and standard explanation about difficult or confusing items; (2) Only minimal explanation or guidance was provided to those with lower educational level or severe disabilities; (3) Student performance was assessed using the cross-checking strategy to maximize the consistency among data collectors; (4) No one was present except the respondent and researchers during the investigation, and the interview was conducted in a single living room to ensure the privacy of the environment.

Statistical analyses

First, descriptive analyses were performed to describe participants' basic characteristics and the score of main variables (loneliness, depression, total PFC, and each dimension of PFC). Then, the moderating effects were analyzed using the PROCESS macro for SPSS.[31] The bias-corrected 95% confidence interval (CI) was

calculated with 5000 bootstrapping re-samples. If the 95% CI of the interaction (PFC × Loneliness) did not contain 0, it indicated that the moderating effect of PFC on loneliness and depression was significant. Finally, the significant moderating model was further tested by analyzing the effects of loneliness on depression at different levels of PFC. Specifically, PFC were divided into three levels: low (mean minus one SD), medium (the mean), and high (mean plus one SD). All statistical analyses were conducted using SPSS22.0. Statistical significance was defined as a two-tailed p-value < 0.05. Additionally, the study variables were standardized in moderating models.

Results

Characteristics of participants

A total of 481 older adults were recruited into the study; however, 45 participants were excluded for having over 15% of the data missing on PFC, depressive symptoms, or loneliness. Thus, data were collected from a total of 436 participants in this study, with a mean age of approximately 70.77 years. A majority of the participants were female (52.3%) and/or had at least one illness (66.5%). Four participants (9.1%) were illiterate. More information is provided in Table 1. The score of loneliness, depression, total PFC, and each dimension of PFC are also shown in Table 1.

Table 1
Characteristics of participants (n = 436).

Variables	n (%) or ($M \pm SD$)
Gender	
Female	228 (52.3)
Male	208 (47.7)
Age (mean 70.77, SD 7.31)	
60–69	207 (47.5)
70–79	169 (38.8)
≥ 80	60 (13.7)
Education	
Illiterate	214 (49.1)
Primary school or above	222 (50.9)
Marital status	
Married	339 (77.8)
Unmarried (Single/Widowed/Divorced)	97 (22.2)
Living status	
Alone	63 (14.5)
With spouse	266 (61.0)
With spouse and children	107 (24.5)
Self-rated financial status	
Good	59 (13.5)
Fair	311 (71.3)
Poor	66 (15.2)
Medical insurance	
Yes	419 (96.1)
No	17 (3.9)
Smoking	
Yes	73 (16.7)
No	363 (83.3)
Drinking	
Yes	102 (23.4)
No	334 (76.6)
Exercise	
Usually	165 (37.9)
Sometimes	158 (36.2)
Seldom	113 (25.9)
Number of illnesses (mean 1.17, SD 1.20)	
0	146 (33.5)
1	158 (36.2)
≥ 2	132 (30.3)
Loneliness	36.23 ± 9.51
Total PFC score	9.28 ± 2.90
Awareness of future care needs	8.89 ± 3.04
Avoidance of care planning	6.30 ± 2.86
Gathering information	6.56 ± 3.00
Making decision	5.89 ± 2.98
Concrete planning	28.03 ± 9.48
Depression	13.96 ± 4.78

Note: PFC = preparation for future care
$^{*}p < .05$
$^{**}p < .01$
$^{***}p < .001$.

The relationships among loneliness, PFC and depression

Table 2 reveals that loneliness was significantly positively related to depression (B = 0.151, 95% CI = 0.106–0.197), while the total PFC was not significantly associated with depression (B = −0.044, 95% CI = −0.004–0.091).

As shown in Table 2, the interaction of total PFC with loneliness was statistically significant (B = 0.009, 95% CI = 0.004–0.013). Similar to total PFC, the moderating effects of the dimensions of gathering information (B = 0.033, 95% CI = 0.019–0.047), making decisions (B = 0.027, 95% CI = 0.012–0.042), and concrete planning (B = 0.022, 95% CI = 0.007–0.037) were significant. However, the moderating effects of the dimensions of awareness of future care needs (B = 0.007, 95% CI = −0.009–0.023) and avoidance of care planning (B = 0.003, 95% CI = −0.011–0.017) were not. The final moderating model is shown in Fig. 3.

As shown in Table 3, the effect size of loneliness on depression was largest in the low-level total PFC group (B = 0.232, 95% CI = 0.175–0.290), and smallest in the high-level group (B = 0.070, 95% CI = 0.004–0.137), which was also shown for its three dimensions of gathering information, making decisions, and concrete planning. The results of a simple slope analysis (Fig. 4) also clearly depict the significant moderating effect of PFC on the relationship between loneliness and depression. Therefore, the lower the PFC, the higher the slope (Fig. 4).

Discussion

The main findings

This study explored the relationships among loneliness, depressive symptoms, and PFC among older adults in rural China. We found that older adults in rural China often experience some degree of loneliness and depression. Loneliness was positively associated with depressive symptoms, and total PFC, as well as and its three dimensions of gathering information, making decisions, and concrete planning, were shown to moderate the relationship between loneliness and depression. More specifically, the effect of loneliness on depression was most severe in the low-level PFC group, and least severe in the high-level group, suggesting that the lower the PFC, the stronger the impact of loneliness on depression. Thus, these findings indicate that older adults who are well-prepared for future care are less likely to develop depressive symptoms due to loneliness than those who are not well-prepared.

Many previous studies have reported that loneliness is a significant risk factor for depressive symptoms in older populations,[16] and our results support the positive relationship between loneliness and depressive symptoms in older adults in rural China. With the rapid development of urbanization in China, a large number of the young rural labor force flows to cities, leading many rural older adults to experience empty-nest syndrome,[17] which may be one of the reasons why rural older adults often feel lonely. Compared with the rich and colorful community activities available to older adults in urban areas, the construction of spiritual civilization in rural areas is relatively backward, and the social activities of older adults in rural areas are relatively poor,[32] which may be another reason for the high rates of loneliness in rural older populations. Since loneliness is a risk factor

Table 2
The moderating effect of PFC on loneliness and depression.

Moderator: Total PFC	B	SE	*t*	LLCI	ULCI
Loneliness	0.151	0.023	6.593***	0.106	0.197
Total PFC	−0.044	0.024	1.814	−0.004	0.091
Loneliness × Total PFC	0.009	0.002	3.741***	0.004	0.013
Moderator: Awareness of future care needs (AW)					
Loneliness	0.166	0.023	7.186***	0.121	0.212
AW	−0.164	0.079	2.081*	0.009	0.319
Loneliness × AW	0.007	0.008	0.822	−0.009	0.023
Moderator: Avoidance of care planning (AV)					
Loneliness	0.168	0.023	7.174***	0.122	0.214
AV	0.048	0.073	0.665	−0.095	0.192
Loneliness × AV	0.003	0.007	0.439	−0.011	0.017
Moderator: Gathering information (GA)					
Loneliness	0.146	0.023	6.385***	0.101	0.191
GA	−0.151	0.075	2.007*	0.003	0.299
Loneliness × GA	0.033	0.007	4.583***	0.019	0.047
Moderator: Making decision (MD)					
Loneliness	0.164	0.023	7.177***	0.119	0.209
MD	−0.044	0.075	0.585	−0.104	0.192
Loneliness × MD	0.027	0.008	3.614***	0.012	0.042
Moderator: Concrete planning (CP)					
Loneliness	0.149	0.024	6.331***	0.103	0.195
CP	−0.120	0.079	1.509	−0.036	0.276
Loneliness × CP	0.022	0.008	2.884**	0.007	0.037

Note: Covariates (Sociodemographic and physical health characteristics) were controlled. PFC = preparation for future care; *B* = unstandardized regression coefficient, SE = standard error, LLCI = lower level of confidence interval, ULCI = upper level of confidence interval.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 3
Conditional indirect effects of loneliness on depression per PFC levels.

Moderator: Total PFC				
	Effect (B)	SE	LLCI	ULCI
Low PFC	0.232	0.029	0.175	0.290
Medium PFC	0.151	0.023	0.106	0.197
High PFC	0.070	0.034	0.004	0.137
Moderator: Gathering information (GA)				
	Effect (B)	SE	LLCI	ULCI
Low GA	0.239	0.028	0.184	0.294
Medium GA	0.146	0.023	0.101	0.191
High GA	0.053	0.033	−0.013	0.118
Moderator: Making decision (MD)				
	Effect (B)	SE	LLCI	ULCI
Low MD	0.243	0.031	0.183	0.303
Medium MD	0.164	0.023	0.119	0.209
High MD	0.085	0.033	0.021	0.149
Moderator: Concrete planning (CP)				
	Effect (B)	SE	LLCI	ULCI
Low CP	0.212	0.029	0.154	0.269
Medium CP	0.149	0.024	0.103	0.195
High CP	0.091	0.033	0.026	0.157

Note: Low (mean minus one SD), medium (the mean) and high (mean plus one SD). *B* = unstandardized regression coefficient, SE = standard error, LLCI = lower level of confidence interval, ULCI = upper level of confidence interval.

for developing depressive symptoms, special attention should be paid to the mental health care of lonely older adults.

Previous studies have found that adequate PFC is a protective factor for depression, and inadequate PFC increases the risk of depression.[22] However, previous studies have not explored the mechanism of how PFC affects depression. The current study found that although PFC is not directly related to depression, it can moderate the relationship between loneliness and depression, which can, to some extent, prevent lonely older adults from developing depressive symptoms. The income of older adults in rural areas mainly comes from farming. As these individuals age, their decreased physical functioning impairs their ability to farm; thus, they lose their primary source of income,

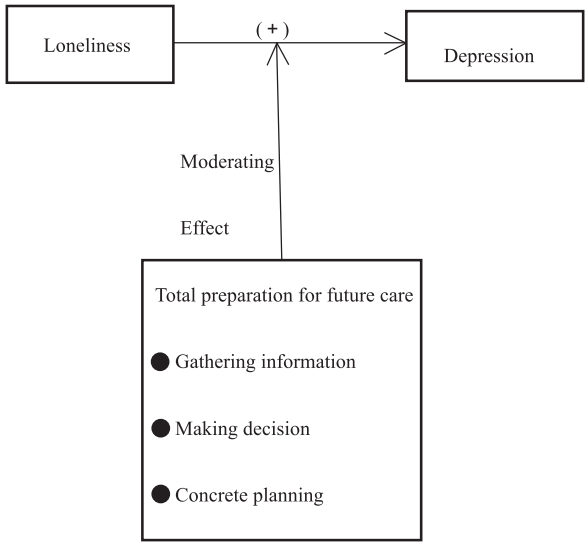

Fig. 3. The final moderating model.

and struggle to remain self-sufficient. Traditional Chinese Confucian culture emphasizes filial piety, which means older adults mainly rely on their adult children for their support and care.[33] As a result, rural older adults whose children work in cities often feel there is no one they will be able to rely on in the future. The absence of a source of income and caregivers makes these individuals worry about how they will be able to look after themselves in the future, which can lead to depressive symptoms. Adequate PFC can enable older adults to have a better sense of control over their lives as they age and alleviate their worries about future care. Therefore, depressive symptoms can be prevented to some extent. Furthermore, PFC is essentially a positive coping style for possible difficulties in the future,[24] which is widely known to be a buffer between stressors (e.g., loneliness) and adverse outcomes (e.g., depression).[34]

PFC includes five aspects: awareness of future care needs, avoidance of care planning, gathering information, making decisions, and concrete planning. Among them, awareness of future care needs and avoidance of care planning describe thoughts, while gathering information, making decisions, and concrete planning describe actions. By analyzing the moderating effects of each aspect, we found that gathering information, making decisions, and concrete planning were more likely to buffer depression, while awareness of future care needs and avoidance of care planning were not. Therefore, it is not enough for older adults to simply realize the importance of PFC, they must also take specific actions, including collecting relevant information, making decisions, and formulating specific future care plans to truly eliminate worries about their future as they age and prevent depressive symptoms.

Implications

The results of this study have many important implications. Chinese older adults in rural areas often experience poor living conditions, empty-nest syndrome, and a lack of social interactions,[9] which can exacerbate feelings of loneliness and depressive symptoms in older people. Depression can lead to a number of adverse health outcomes and even suicide.[14] The Chinese government spends a lot of money every year on the prevention and treatment of depression in the older population.[2] The present study found that PFC could reduce the impact of loneliness on depression, which suggests that education on, and improved

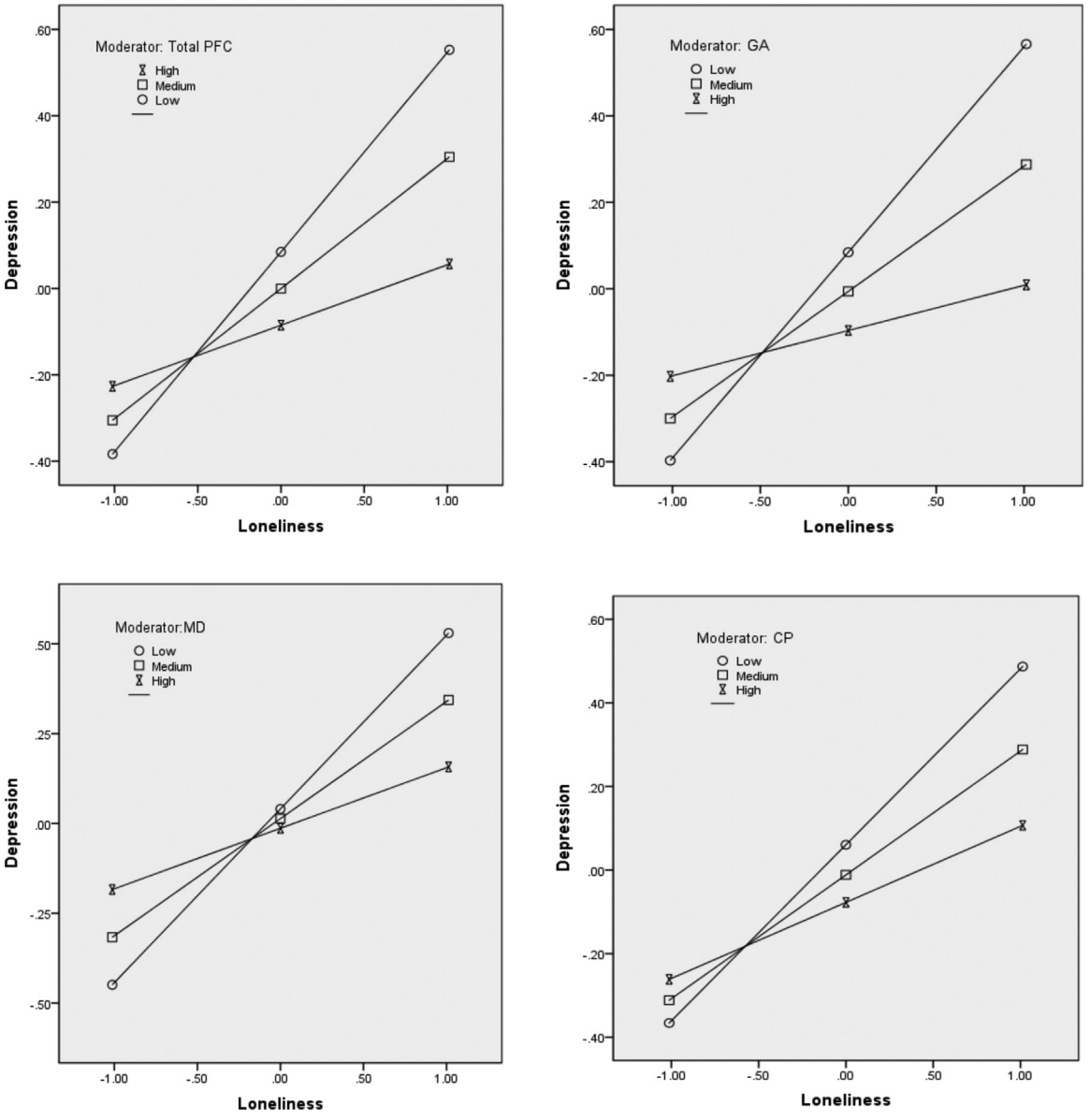

Fig. 4. The simple slope plot of the moderating effects.

Note: low (the mean minus one SD), medium (the mean), and high (the mean plus one SD). PFC = preparation for future care, GA = gathering information, MD = making decision, and CP = concrete planning.

public awareness of, PFC in rural areas could help more older adults prepare for care in advance, and thus prevent loneliness from developing into depression. Compared with the large amount of funds invested by the government every year for depression prevention and treatment, PFC education and publicity is relatively simple, easy to operate, and cost-effective, which has important practical significance and provides novel insight for the prevention and treatment of depression in the rural older population of China. Notably, PFC education should not only make older adults aware of the importance of PFC but also teach them how to collect information, make decisions, and make specific plans.

Although the population samples in this study were from China, previous studies in other countries have also found that PFC is an important protective factor for mental health.[22] Therefore, the findings of this study may have international implications for mental health promotion in older populations.

Limitations

This study has some limitations. First, although we have reported the relationships among loneliness, depression, and PFC, the study had a cross-sectional design; thus, we cannot confirm the causal relationships between variables. For example, loneliness may be a risk factor for depression, but conversely, depressive symptoms may be a predictor of loneliness.[35] Therefore, future research needs to use longitudinal study designs to further explore the causal relationships between variables. Second, in this study, the PHQ-9 was chosen as a measure of depression, which is only a screening tool for depressive symptoms, not the "gold standard" for diagnosing depression. At the same time, all the measurements used were self-report scales, which may cause report bias and recall bias. Third, the geographically may be limited because of the small sample size, and all participants are from just one rural region in Shandong Province. Therefore, multi-

center, large-sample studies are needed in the future to ensure the representativeness and generalization of research findings.

Conclusion

This study found that older adults in rural China often experience some degree of loneliness and depression, and PFC can moderate the relationship between loneliness and depression; when the level of PFC and its dimensions were higher, the effect of loneliness on depressive symptoms was weaker. As a result, older adults who are well-prepared for future care may be less likely to develop depressive symptoms due to loneliness. As one of the few studies on how PFC moderates the association between loneliness and depression in rural older adults, the findings are significant. Although PFC is a protective factor for mental health, the current situation regarding the frequency of use of PFC in rural areas is not optimistic. In the future, health education on PFC in rural areas may be an effective way to increase the use of PFC among rural older adults, and thus promote their mental health.

Declaration of Competing Interest

None.

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Author contributions

XZ, and DZ formulated the research questions. DZ and XZ designed the study. YL performed the experiments. DZ analysed the data. YL and JJ wrote the article.

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