Social alienation and self-care ability in old age among rural empty-nest elderly multiple mediating effects through psychological resilience and subjective well-being

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Abstract

Background

This study aims to explore the roles of psychological resilience and subjective well-being as multiple mediators in the relationship between social alienation and the ability for self-care in elderly individuals living alone in rural areas, particularly focusing on the empty-nest segment of this population.

Methods

From February 17, 2021, to April 20, 2023, a multistage stratified sampling approach was utilized to conduct a survey among 425 elderly individuals (aged 60 and above) living in rural areas without the company of their children, commonly referred to as 'empty-nesters'. These participants were recruited from rural areas of Liaoning Province, China. The questionnaire included the Generalized Social Alienation Scale, the Psychological Resilience Scale, the Subjective Well-being Scale, and the Self-care Ability In Old Age Scale. The analysis was designed to define the characteristics of the sample. We employed linear regression to examine how social alienation influences self-care capabilities in the elderly. To assess the compound mediating effects of psychological resilience and subjective well-being, the PROCESS macro (Model 6) was utilized.

Results

Social alienation significantly impacts self-care ability in the elderly living alone in rural areas, with a direct effect size of $\beta = 0.678$ (95% CI = 0.750–0.607), accounting for 66.67% of the total influence. Additionally, three indirect pathways play a role in shaping self-care ability in old age: 1) The psychological resilience route, contributing 42.37% of the total effect ($\beta = 0.431$, 95% CI = 0.515–0.350); 2) The subjective well-being route, adding 4.32% to the total effect ($\beta = 0.044$, 95% CI = 0.010–0.089); and 3) A combined pathway involving both psychological resilience and subjective well-being, which adds 4.71% to the overall effect ($\beta = 0.048$, 95% CI = 0.029–0.073). The cumulative mediating effect of these pathways is 33.33%.

Conclusions

In rural areas, the well-being and self-care capabilities of older adults living alone are significantly influenced by their psychological resilience and sense of subjective well-being. As such, it's imperative for healthcare professionals and relevant stakeholders to focus on the mental health and psychological resilience of these individuals. By doing so, and by prioritizing their subjective well-being, targeted interventions can be effectively implemented to bolster the resilience and overall happiness of these elderly members of our rural communities.

Background

China currently holds the distinction of having the world's largest population of elderly citizens, coupled with the fastest rate of aging. The unique scenario of aging prior to achieving widespread wealth, combined with the rapid pace of this demographic shift and the substantial size of its elderly population, are set to remain long-term defining characteristics of the nation[1]. According to the data from the seventh census in 2020, the proportion of rural residents aged 60 and above, and 65 and above, are 23.81 percentage points and 17.72 percentage points respectively, which is 7.99 and 6.61 percentage points higher than that in urban areas[2]. In comparison to the 2010 sixth census, there has been an approximate 8 percentage point increase in the population of rural residents aged 60 and above, highlighting a more pronounced and acute aging issue in rural areas of China[3]. As the economy and social productive forces continue to develop, urbanization of the population naturally occurs. Influenced by rapid urbanization, a large number of rural young and middle-aged laborers migrate to various cities seeking better and more opportunities for development. The white paper "The Youth of China in the New Era" released by China's State Council Information Office in 2022 shows that there were nearly 170 million migrant workers in 2020, most of whom are young people[4]. More and more young people are flowing into cities and integrating into urban life in recent years. With the deepening of China's aging population and the continuous progress of urbanization, the degree of "empty nest" is serious, and "hollow villages" are increasingly common[5]. More and more elderly people in rural areas choose to live alone, either actively or passively, due to various factors, increasing the pressure and challenges of elderly care in rural areas. "Rural empty-nest elderly" refers to the elderly who live without their children nearby, including those without children and those living separately from their children[6–7]. As the main characters in the aging population issue, how to better motivate the elderly to play a more important role in the process of elderly care is a current research hotspot. The Strength-based Perspective Theory focuses on viewing the research subject from a positive perspective. This theory advocates that everyone has internal and external potential strengths and resources, and the ability to solve problems, encouraging service recipients to realize and make good use of these resources and advantages. In the context of the heavy burden of elderly care in rural China, fully tapping the advantages and potential of rural empty nesters and improving their self-care ability in old age is of great significance for relieving the pressure of elderly care and promoting positive aging. Self-care ability in old age refers to the ability of the elderly to utilize their existing strengths and potential to meet various needs in the process of elderly care, which includes the ability to be economically independent, to take care of oneself, and to maintain health[8]. Rural empty nesters often face challenges of loneliness and social alienation due to the independence of their children. Social alienation refers to a state where an individual is unable to establish positive interactions with others or the surrounding environment, leading to negative emotions[9]. Social alienation can be considered a source of stress, causing psychological stress in empty nesters, and is a predictive factor for various diseases and adverse health outcomes. Recent studies have shown that social alienation is an important factor leading to loneliness and depression, which may affect the psychological health and quality of life of the elderly, thereby reducing the self-care ability of rural empty nesters[10–11].
Psychological resilience, defined as an individual's ability to recover from stress, challenges, or adversity, is a key factor in coping with life's difficulties[12]. Among the elderly, psychological resilience is considered a vital protective factor that helps alleviate negative emotions and psychological stress. Studies have shown that psychological resilience plays a positive role in reducing feelings of social isolation in elderly individuals living alone[13–14]. Research indicates that high levels of psychological resilience can help older adults better adapt to loneliness, reducing negative emotions caused by feelings of social disconnection[15–16]. Furthermore, psychological resilience is closely linked to the self-care ability of the elderly. Self-care ability involves managing one's daily life and health, including maintaining physical health, handling finances, and performing household activities[17–18]. When older adults possess higher levels of psychological resilience, they are more likely to actively face health challenges, adapt to physical changes, and effectively manage various tasks and responsibilities in daily life. Conversely, elderly individuals with lower psychological resilience may feel more overwhelmed when facing life's challenges, thereby impacting their self-care ability[19–20].

Recent studies suggest a strong correlation between psychological resilience, social alienation, and self-care capabilities in elderly individuals living alone in rural areas. Yet, there is a notable lack of research exploring if psychological resilience acts as a mediator in the link between social alienation and the ability for self-care in the elderly.

The primary characteristic of "empty nest" elderly individuals is the absence of their children nearby[21–22]. This distinguishes them from other older adults, as they often lack emotional solace and timely fulfillment of their psychological needs. This situation can lead to emotional disorders and mental health issues. Studies indicate that the mental well-being of empty nesters is generally poorer compared to their counterparts with family close by[23–24]. Due to the lack of emotional support, these individuals may experience loneliness, depression, anxiety, and pessimism, leading to various psychological disorders[26]. If empty nesters remain in a negative emotional state for an extended period, it can adversely affect their quality of life and sense of happiness. Research by Wang, P. N., and others also shows that loneliness is inversely related to the subjective well-being of empty nesters[27]. Alleviating loneliness can enhance their quality of life and self-reliance in aging[28–29]. Based on the foregoing discussion, it is plausible to consider subjective well-being as a potential mediator in the relationship between social alienation and the capacity for self-care in the elderly.

In this context, this study aims to explore the mediating role of psychological resilience and subjective well-being between feelings of alienation and self-care ability in elderly people living alone. Although existing research has focused on the psychological health issues of the elderly living alone, in-depth studies on the relationships between psychological resilience, subjective well-being, feelings of alienation, and self-care ability are still relatively scarce. Psychological resilience, as an individual's capacity to adapt to stress and challenges, may play a key role in improving the feelings of alienation and enhancing the quality of life of the elderly living alone. Meanwhile, subjective well-being, as an important indicator for assessing life satisfaction, may play a significant role in helping the elderly living alone adapt to their living environment. The purpose of this study is to fill this research gap by using quantitative methods to explore how psychological resilience and subjective well-being affect the feelings of alienation and self-care ability of the elderly living alone. We anticipate that by enhancing psychological resilience and subjective well-being, it is possible to effectively reduce feelings of alienation, thereby improving the self-care ability of the elderly living alone. Theoretically, this study is based on Social Support Theory and Positive Psychology, exploring the dynamic relationships among these variables. In this study's conceptual framework (see Fig. 1), three key hypotheses were proposed. The first hypothesis (H1) posits that social alienation may impact elderly self-care capabilities via psychological resilience. The second hypothesis (H2) suggests that subjective well-being could serve as a moderating factor in the relationship between social alienation and self-care ability among the elderly. Lastly, the third hypothesis (H3) proposes that psychological resilience and subjective well-being might jointly mediate the effect of social alienation on self-care ability in the older population. We anticipate that psychological resilience and subjective well-being can act as buffering factors, reducing the negative impact of alienation and enhancing the self-care capabilities of the elderly. Through this study, we aim to provide a theoretical basis for the formulation of targeted intervention measures to improve the quality of life for elderly people living alone, and to offer valuable information for policymakers to better support this unique group. Moreover, our research will also contribute new perspectives and data for future studies in mental health.

**Methods**

**Participants**

Between February 17, 2021, and April 20, 2023, a multistage stratified sampling approach was employed for data collection across ten townships in Chaoyang County, Chaoyang City, located in Liaoning Province, China. This process utilized a random digit table for all necessary calculations. Select the rural empty-nest elderly in Chaoyang City, Liaoning Province (a total of 8 counties) as the research population. First, number the 8 counties and randomly select 3 counties using a random number table (the results of this study are Chaoyang County, Beipiao County, and Jianping County); second, number the townships in Chaoyang County (25 townships), Beipiao County (27 townships), and Jianping County (24 townships), and use the random number table again to select 3 townships. For the study, we systematically selected elderly individuals living alone from each township's civil affairs department who met our specific criteria. These criteria included willingness to participate, the ability to communicate clearly and verbally without impediments, and no documented history of neurological or psychiatric conditions. In total, 450 questionnaires were distributed in a dedicated survey room, and we received 425 valid responses, yielding a high response rate of 94.44%; (iv) registered as rural residents and as permanent residents (continuously residing for ≥ 6 months), age 60 or older, and (iv) children for a long time (within a year, children in the elderly side time for less than three months) are not around or no children. Before conducting the survey, twenty investigators underwent standardized training to enhance their communication abilities and grasp of the scoring system. The rural elderly living alone were approached with questionnaires. After providing informed consent, these individuals engaged in one-on-one interactions with the researchers and subsequently completed the surveys themselves. Throughout this process, all methods adhered to the principles of the Helsinki Declaration.

**General Social Alienation Scale**
The Generalized Social Alienation Scale (GSAS), developed by Jessor and colleagues[30], serves as a tool to gauge individual feelings of alienation and hesitance in engaging with activities. In our research, we utilized the 15-item version of this scale, which is known for its robust validity and reliability, evidenced by a Cronbach's alpha of 0.77. This scale is divided into four distinct subscales[31]: feelings of social alienation, self-alienation, meaningfulness, and powerlessness. Responses are recorded on a four-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree), allowing for a total score between 15 and 60. Higher scores on this scale indicate greater social alienation. In our study, the overall Cronbach's alpha for the GSAS was 0.805, with the subscales varying from 0.614 for powerlessness to 0.772 for self-alienation.

**Psychological Resilience Scale**

The Psychological Resilience Scale, originally developed in English by Wagnild and Young[32], was later translated into Chinese by Huang Weixiao[1]. This scale comprises five dimensions: equanimity, persistence, self-reliance, meaningful life experiences, and ease of being, totaling 25 items. Each item is scored on a scale from ‘1’ indicating complete disagreement to ‘7’ indicating complete agreement. The total score ranges from 25 to 175, with higher scores indicating higher levels of resilience. A total score below 125 indicates a low level of psychological resilience, between 125 and 145 indicates a moderate level, and above 145 indicates a high level of resilience. The scale's Cronbach's alpha is 0.943, with subscale Cronbach's alphas ranging from 0.797 to 0.913.

**Subjective Well-being Scale**

The Memorial University of Newfoundland Scale of Happiness (MUNSH), developed by Kozma et al[33], is a tool for measuring subjective well-being, particularly in older populations. First implemented in Newfoundland in 1980, it targeted individuals aged 65–95 across urban and rural areas, as well as those in senior living facilities. The MUNSH is notable for its high reliability and validity[34]. This scale has proven effective for assessing the subjective well-being of elderly people in China as well. Comprising 24 items, the MUNSH is divided into four subscales: positive affect (PA) and negative affect (NA), each with five items, and positive experience (NE) and negative experience (PE), each with seven items. The scoring system ranges from −24 to +24, with a constant of 24 added for ease of calculation, resulting in a final score range of 0–48. Higher scores indicate greater subjective well-being. According to the scale's criteria, a total score of ≥36 suggests high subjective well-being, ≤12 indicates low subjective well-being, and scores in between reflect a medium level of well-being. In this study, the Cronbach's α for the MUNSH's four sub-dimensions were 0.790, 0.827, 0.746, and 0.810, respectively. Additionally, a KMO coefficient of 0.936 underscores the scale's good reliability.

**Self-care Ability In Old Age Scale**

The Self-Care Ability Scale for the elderly in China was developed by Pang Shuqin[35], drawing on Dorothea Orem's theory[36] of self-care deficit within her self-care theory framework, and incorporating the Active Aging Theory[37]. This Chinese scale is tailored to measure self-care capabilities in the elderly. This scale mainly consists of three dimensions: economic independence, daily living skills, and health self-maintenance, with a total of 45 items. Each item is scored from 1 (Not at all applicable) to 5 (Completely applicable), with the total score ranging from 45 to 225. The higher the score, the stronger the self-care ability of the rural empty-nest elderly. In this study, the Cronbach's α for the MUNSH's four sub-dimensions were 0.790, 0.827, 0.746, and 0.810, respectively. Additionally, a KMO coefficient of 0.936 underscores the scale's good reliability.

**Covariates**

Age, gender, education level, monthly income, the contact situation between children and parents, marital status, and types of chronic diseases, were included in our study as covariates. Age was categorized into three groups: 60–70 years, 70–80 years, and ≥80 years. Gender was classified into two groups: male and female. Education level was segmented into three types: elementary school or lower, middle school or less, and high school or higher. Monthly income was divided into three categories: less than 1000 CNY, 1000–2000 CNY, and above 2000 CNY. For the contact situation between children and parents, we recognized four levels: daily contact, weekly contact, monthly contact, above monthly contact. Marital status was categorized into two: married, widow or widower. Finally, types of chronic diseases were parsed into four categories: 0 diseases, 1 disease, 2 diseases, greater than or equal to 3 diseases.

**Statistical analysis**

The data analysis was conducted using IBM SPSS version 26.0 (IBM Corp, Armonk, NY). Quantitative data were presented as means ± standard deviations, and qualitative data were shown as frequencies and percentages. To explore the relationships between variables, Pearson correlation analysis was utilized. We conducted regression analysis to examine the link between social alienation and self-care capabilities in the elderly. To deepen our understanding of this link, we developed four distinct models. These models incrementally adjusted for various potential confounding factors, offering a clearer view of each covariate's independent impact on the outcomes. Each model included different covariates, elucidating the extent and direction of the primary factors' effects. We also constructed a structural equation model using the PROCESS macro (Model 6), as recommended by Hayes, incorporating the Bootstrap method to confirm mediating effects. An alpha level of 0.05 was set for significance testing.

**Results**

**Characteristics of participants**

Our study involved 425 participants, and Table 1 displays the demographic characteristics of this group. Additionally, it includes univariate analyses examining the factors influencing self-care abilities in the elderly, based on various participant traits. Out of the 425 rural empty-nest elderly, 194 (45.72%) were men and 231 (54.28%) were women. The rural empty-nest elderly' ages ranged from 61 to 82 years, with a mean age of 70.34 ± 8.86 years. The univariate analyses of the self-care ability in old age for different characteristics are detailed in Table 1.
Table 1
One-way analysis of the self-care ability in old age among rural empty-nest elderly with different characteristics (N = 425)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>N(%)</th>
<th>Mean ± SD</th>
<th>F/t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>194</td>
<td>147.07 ± 19.73</td>
<td>1.664</td>
<td>0.097</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>231</td>
<td>143.89 ± 19.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>60~</td>
<td>214</td>
<td>148.44 ± 18.89</td>
<td>23.134</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>70~</td>
<td>126</td>
<td>148.41 ± 15.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80~85</td>
<td>85</td>
<td>133.01 ± 22.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>Elementary school or lower</td>
<td>123</td>
<td>139.54 ± 25.39</td>
<td>12.502</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Middle school or less</td>
<td>230</td>
<td>149.56 ± 15.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High school or higher</td>
<td>72</td>
<td>141.77 ± 18.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly income</td>
<td>Less than 1000 CNY</td>
<td>149</td>
<td>139.66 ± 23.91</td>
<td>10.169</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>1000 ~ 2000CNY</td>
<td>210</td>
<td>148.77 ± 16.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above 2000CNY</td>
<td>66</td>
<td>147.25 ± 14.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The contact situation between children and parents</td>
<td>Daily contact</td>
<td>53</td>
<td>155.30 ± 19.67</td>
<td>21.814</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Weekly contact</td>
<td>267</td>
<td>147.20 ± 16.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monthly contact</td>
<td>65</td>
<td>141.46 ± 19.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Above monthly contact</td>
<td>40</td>
<td>126.07 ± 25.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>278</td>
<td>149.77 ± 17.07</td>
<td>6.720</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Widow, widower</td>
<td>147</td>
<td>136.96 ± 21.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of chronic diseases</td>
<td>0</td>
<td>104</td>
<td>150.42 ± 19.53</td>
<td>17.007</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>141</td>
<td>149.27 ± 15.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>118</td>
<td>143.62 ± 17.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater than or equal to 3</td>
<td>62</td>
<td>131.16 ± 24.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation analysis of key variables

According to the Pearson correlation study, social alienation was negatively related to self-care ability in old age and negatively related to psychological resilience and subjective well-being (p < 0.01). Psychological resilience exhibited a positive association with self-care ability in old age and a positive link with subjective well-being (p < 0.01); subjective well-being and self-care ability in old age had a positive correlation (p < 0.01). See Table 2.

Table 2
Descriptive statistics and correlation analysis of GSAS, PRS, SWS, and SAIOAS

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean ± SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSAS</td>
<td>40.01 ± 14.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRS</td>
<td>131.33 ± 23.16</td>
<td>-0.506**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWS</td>
<td>28.38 ± 12.18</td>
<td>-0.347**</td>
<td>0.444**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SAIOAS</td>
<td>145.34 ± 19.64</td>
<td>-0.734**</td>
<td>0.777**</td>
<td>0.250**</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: ** represents P < 0.01

Multiple linear regression analysis

A series of four distinct multiple linear regression analyses were conducted, focusing on the capacity for self-care in the elderly as the primary dependent variable. These analyses incorporated sociodemographic factors as control variables and examined the influence of social alienation, psychological resilience, and subjective well-being as main independent variables (refer to Table 3 for detailed data). In Model 1, the analysis revealed that education level, monthly income, and the frequency of interactions between children and their parents significantly influenced self-care ability among the elderly. This model, predominantly based on general information, accounted for 16.3% of the variance in the dependent variable (F = 12.837, ΔR2 = 0.177, P < 0.001). Progressing to Model 2, the addition of social alienation indicated a substantial negative association with elderly self-care capability. This model explained a substantial 64.1% of the standard variance (F = 95.721, ΔR2 = 0.648, P < 0.001). Model 3 expanded upon Model 2 by including psychological resilience. It was observed that social alienation and psychological resilience were inversely related, with psychological resilience showing a strong positive correlation with self-care ability in the elderly. This model significantly increased the explanatory power, accounting for 79.8% of the standard variance (F = 187.174, ΔR2 = 0.802, P < 0.001). Finally, Model 4 integrated subjective well-being into the framework established in Model 3. The findings indicated that while social alienation and
psychological resilience remained inversely related, both psychological resilience and subjective well-being were positively correlated with self-care ability in the elderly, explaining 80.9% of the standard variance ($F = 175.179, \Delta R^2 = 0.809, P < 0.001$). The overall analysis suggests that psychological resilience and subjective well-being serve as critical mediators in the linkage between social alienation and the ability for self-care in the elderly. For a comprehensive view, Table 3 provides detailed insights into these findings.

### Table 3: Multiple linear regression analysis results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>S. E</td>
<td>B</td>
<td>t</td>
<td>p</td>
<td>S. E</td>
<td>B</td>
<td>t</td>
<td>p</td>
<td>S. E</td>
<td>B</td>
<td>t</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>2.137</td>
<td>-0.884</td>
<td>-0.414</td>
<td>0.679</td>
<td>1.402</td>
<td>1.100</td>
<td>0.785</td>
<td>0.433</td>
<td>1.053</td>
<td>0.171</td>
<td>0.163</td>
<td>0.871</td>
<td>1.037</td>
</tr>
<tr>
<td>Age</td>
<td>1.537</td>
<td>-1.635</td>
<td>-1.064</td>
<td>0.288</td>
<td>1.038</td>
<td>4.351</td>
<td>4.191</td>
<td>0.000</td>
<td>0.795</td>
<td>1.508</td>
<td>1.897</td>
<td>0.059</td>
<td>0.783</td>
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<tr>
<td>Education level</td>
<td>2.273</td>
<td>-5.498</td>
<td>-2.419</td>
<td>0.016</td>
<td>1.501</td>
<td>-10.092</td>
<td>-6.724</td>
<td>0.000</td>
<td>1.150</td>
<td>-5.934</td>
<td>-5.162</td>
<td>0.000</td>
<td>1.173</td>
</tr>
<tr>
<td>Monthly income</td>
<td>2.148</td>
<td>8.646</td>
<td>4.025</td>
<td>0.000</td>
<td>1.410</td>
<td>10.994</td>
<td>7.795</td>
<td>0.000</td>
<td>1.204</td>
<td>0.643</td>
<td>0.534</td>
<td>0.593</td>
<td>1.191</td>
</tr>
<tr>
<td>The contact situation between children and parents</td>
<td>1.782</td>
<td>-7.462</td>
<td>-4.187</td>
<td>0.000</td>
<td>1.167</td>
<td>-7.790</td>
<td>-6.674</td>
<td>0.000</td>
<td>0.926</td>
<td>-2.353</td>
<td>-2.541</td>
<td>0.011</td>
<td>0.912</td>
</tr>
<tr>
<td>Marital status</td>
<td>3.208</td>
<td>-2.793</td>
<td>-0.871</td>
<td>0.385</td>
<td>2.102</td>
<td>-1.161</td>
<td>-0.553</td>
<td>0.581</td>
<td>1.582</td>
<td>-3.304</td>
<td>-2.089</td>
<td>0.037</td>
<td>1.557</td>
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<td>Types of chronic diseases</td>
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<td>1.192</td>
<td>1.526</td>
<td>1.279</td>
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<td>4.829</td>
<td>0.000</td>
<td>0.921</td>
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<td>GSAS</td>
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<td>-23.585</td>
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<td>0.039</td>
<td>-0.709</td>
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<td>0.516</td>
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<td></td>
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</tr>
<tr>
<td>$F$</td>
<td>12.837</td>
<td>95.721</td>
<td>187.174</td>
<td>175.179</td>
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<td></td>
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<td></td>
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<tr>
<td>$\Delta R^2$</td>
<td>0.163</td>
<td>0.641</td>
<td>0.798</td>
<td>0.804</td>
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<td></td>
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</tbody>
</table>

### Mediating effect analyses

To construct a structural equation model, let’s start with social alienation as the exogenous latent variable. This model will then branch into three key endogenous latent variables: psychological resilience, subjective well-being, and self-care ability in old age. Referencing Fig. 2 for the model layout and Table 4 for mediation effect analysis results, we find some notable outcomes. The direct effect of social alienation on the self-care ability in old age is notably negative (-0.678), representing a significant 66.67% of the total effect. Additionally, there’s a substantial mediating influence of both psychological resilience and subjective well-being in the relationship between social alienation and self-care ability in the elderly. The effect value here is -0.338, contributing to 33.23% of the total effect. Delving deeper, the total mediating effect is comprised of indirect effects from three distinct pathways: Social alienation leading to psychological resilience, then impacting self-care ability in old age (path 1), shows a mediating effect of -0.431 (42.37% of the total effect). Social alienation influencing subjective well-being, which in turn affects self-care ability in old age (path 2), with a mediating effect of 0.044 (4.32% of the total effect). The pathway from social alienation through psychological resilience and subjective well-being, finally impacting self-care ability in old age (path 3), with a mediating effect of 0.048 (accounting for 4.71% of the total effect). The significance of these paths is confirmed as the model tests indicate confidence intervals that do not include 0, underscoring the importance of these relationships.
alienation and strengthen their psychological resilience through various means are necessary. Consequently, reducing the self-care ability in old age of rural elderly living alone. Therefore, enhancing psychological resilience might be key to mitigating the more likely to adopt negative coping strategies. Thus, a decline in psychological resilience directly affects their ability to handle daily tasks and self-care, activities requiring mental motivation and decision-making abilities. Elderly individuals with lower psychological resilience may struggle more with daily living skills such as personal hygiene and dietary management, as these challenges and recover from them.

The findings revealed the high social alienation experienced by rural empty-nest elderly, a sound psychological state is crucial for maintaining self-care ability in old age. Mental health problems not only diminish their motivation and capability to handle daily life challenges but can also affect their willingness to take proactive steps to improve their quality of life. Contrarily, rural empty-nest elderly who exhibit lower levels of social alienation frequently have better self-care abilities in old age[41]. Firstly, their solitary lifestyle necessitates continual development and maintenance of daily living skills, such as managing household chores and farming activities, enhancing their ability to live independently. Secondly, they are psychologically more adaptable to solitude and independence, aiding in maintaining mental well-being and self-care capacity. Furthermore, they often build social networks through neighborhood relations and community activities, reducing feelings of isolation and providing support when needed. Additionally, long-term solitary living deepens their understanding and control over personal habits and routines, aiding in making more appropriate daily life decisions. Finally, some of these elders might have some degree of financial independence, like managing land or engaging in small-scale farming, enabling more autonomous choices in their elderly care.

Therefore, future research should prioritize the social alienation of rural elderly living alone as a key area of study, aiming to identify targeted intervention measures to reduce their levels of social alienation, thereby enhancing their self-care ability in old age. To achieve this goal, we need to delve into how effective interventions can be implemented to lower the social alienation experienced by these elderly individuals in rural areas, ultimately improving their quality of life.

Our investigation revealed that social alienation significantly and directly diminishes self-care capabilities in rural empty-nest seniors, aligning with findings from previous studies [38, 39]. Specifically, those in this group facing higher levels of social alienation often exhibit weaker self-care skills in their later years [40]. The reason for this: On the one hand, social alienation typically signifies reduced interactions with other members of society, which is particularly evident among rural empty-nest elderly. Their children often relocate to urban areas for work, not only diminishing daily family interactions but also limiting immediate familial support when needed. Beyond the family network, they might also lack effective community or social networks. This absence of social networks restricts their ability to access material assistance and medical services and impacts their avenues for emotional support and essential information. On the other hand, social alienation can also induce or exacerbate mental health issues such as loneliness, depression, or anxiety. These psychological states are detrimental to an individual's physical and mental well-being, potentially leading to cognitive decline, reduced activity levels, and even self-neglect. For the elderly, a sound psychological state is crucial for maintaining self-care ability in old age. Mental health problems not only diminish their motivation and capability to handle daily life challenges but can also affect their willingness to take proactive steps to improve their quality of life. Contrarily, rural empty-nest elderly who exhibit lower levels of social alienation frequently have better self-care abilities in old age [41]. Firstly, their solitary lifestyle necessitates continual development and maintenance of daily living skills, such as managing household chores and farming activities, enhancing their ability to live independently. Secondly, they are psychologically more adaptable to solitude and independence, aiding in maintaining mental well-being and self-care capacity. Furthermore, they often build social networks through neighborhood relations and community activities, reducing feelings of isolation and providing support when needed. Additionally, long-term solitary living deepens their understanding and control over personal habits and routines, aiding in making more appropriate daily life decisions. Finally, some of these elders might have some degree of financial independence, like managing land or engaging in small-scale farming, enabling more autonomous choices in their elderly care.

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In our study, we investigated how social alienation impacts the self-care abilities of the elderly living alone in rural areas. We found a strong negative association between social alienation and these individuals’ capacity for self-care. Significantly, our analysis revealed that psychological resilience and subjective well-being play a partial mediating role in this relationship.

Discussion

Table 4

<table>
<thead>
<tr>
<th>Path</th>
<th>Effect Value</th>
<th>S.E</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
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<tbody>
<tr>
<td>Direct effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X→Y</td>
<td>-0.678</td>
<td>0.036</td>
<td>-0.750</td>
<td>-0.607</td>
</tr>
<tr>
<td>X→M1→Y</td>
<td>-0.431</td>
<td>0.041</td>
<td>-0.515</td>
<td>-0.350</td>
</tr>
<tr>
<td>X→M2→Y</td>
<td>0.044</td>
<td>0.019</td>
<td>0.010</td>
<td>0.089</td>
</tr>
<tr>
<td>X→M1→M2→Y</td>
<td>0.048</td>
<td>0.011</td>
<td>0.029</td>
<td>0.073</td>
</tr>
<tr>
<td>Total intermediation effect</td>
<td>-0.338</td>
<td>0.042</td>
<td>-0.420</td>
<td>-0.255</td>
</tr>
<tr>
<td>Total effect</td>
<td>-1.017</td>
<td>0.045</td>
<td>-1.107</td>
<td>-0.927</td>
</tr>
</tbody>
</table>

Note: X is Social alienation; M1 is Psychological resilience; M2 is Subjective well-being; Y is Self-care ability in old age.

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Therefore, future research should prioritize the social alienation of rural elderly living alone as a key area of study, aiming to identify targeted intervention measures to reduce their levels of social alienation, thereby enhancing their self-care ability in old age. To achieve this goal, we need to delve into how effective interventions can be implemented to lower the social alienation experienced by these elderly individuals in rural areas, ultimately improving their quality of life.

The findings revealed the high social alienation experienced by rural elderly living alone negatively impacts their self-care ability in old age, with psychological resilience playing a key mediating role. These elders, often living alone due to children moving to cities or other reasons, are prone to feelings of loneliness and neglect, leading to increased social alienation[42]. On one hand, heightened social isolation exacerbates emotional issues like anxiety and depression, draining the psychological resources needed to cope with adversity and diminishing their ability to tackle difficulties. Additionally, prolonged social alienation can impair cognitive functions such as attention and memory, further weakening their psychological adaptability. Also, increased social alienation can lead to a decline in social skills and self-efficacy, collectively reducing their psychological resilience to life's challenges. These factors contribute to the weakened psychological resilience of rural elderly living alone. Psychological resilience is the ability to adapt mentally to adversity, including the capacity to cope with challenges and recover from them.

Elderly individuals with lower psychological resilience may struggle more with daily living skills such as personal hygiene and dietary management, as these activities require mental motivation and decision-making abilities[43]. As they age, they may face various health issues, and those with lower resilience are more likely to adopt negative coping strategies. Thus, a decline in psychological resilience directly affects their ability to handle daily tasks and self-care, consequently reducing the self-care ability in old age of rural elderly living alone. Therefore, enhancing psychological resilience might be key to mitigating the impact of social alienation and improving their self-care ability in old age. To improve the quality of care for this group, measures to reduce their social alienation and strengthen their psychological resilience through various means are necessary.
Our findings suggested that among rural empty-nest elderly, high social alienation not only directly diminishes their sense of subjective well-being but also indirectly weakens their self-care ability in old age. When rural elderly individuals living alone experience high levels of social alienation, they may feel forgotten and neglected by society[44]. This feeling stems from a lack of effective contact and interaction with family, friends, and the community. Prolonged social isolation not only intensifies feelings of loneliness but can also trigger doubts about self-worth and the meaning of life, thereby reducing individual subjective well-being. Additionally, social alienation can lead to the loss of social roles, such as the loss of work identity post-retirement, which also impacts the elderly's self-identity and happiness. Elderly individuals with high subjective well-being typically possess a more positive attitude towards life and greater vitality. They are more likely to motivate themselves and engage in activities that promote health, such as moderate exercise and social interactions, which are crucial for maintaining physical health and cognitive function. Conversely, those with low subjective well-being may lack the motivation for self-care, be reluctant to participate in health-beneficial activities, and might even neglect basic self-care needs like a balanced diet and regular health check-ups.

Furthermore, prolonged social alienation can lead to cognitive decline and mental health issues like depression, which are significant factors affecting self-care capabilities. Therefore, reducing social alienation and enhancing subjective well-being is vital for improving the self-care abilities of the rural elderly living alone. Effective social interventions are needed, such as establishing comprehensive social support networks, providing mental health counseling services, increasing health promotion activities, and encouraging social participation. These measures can reduce the elderly's feelings of social alienation, enhance their sense of happiness, and thereby improve their self-care abilities. Through such interventions, the negative cycle between social alienation, subjective well-being, and self-care ability can be effectively broken, promoting overall well-being for the elderly.

Furthermore, the main finding of this study was that social alienation affects the self-care ability in old age among rural empty-nest elderly through a psychological resilience-subjective well-being chain mediating role. This result can be better explained by the Social Support Theory[45], Stress-Coping Model[46], Positive Psychology Theory[47], and Self-determination Theory[48]. Firstly, according to Social Support Theory, social relationships and support are crucial for an individual's mental health. For rural elderly living alone, the reduction in social support (such as children moving away and weakened community connections) can lead to increased loneliness and feelings of social isolation. This in turn might intensify psychological stress, thereby impacting their mental health. The Stress-coping Model further explains how individuals recognize and deal with stress. Within this framework, social alienation is seen as a source of stress, and psychological resilience is key to managing this stress. Elderly with lower psychological resilience may struggle to effectively handle the emotional and behavioral issues arising from social alienation, potentially leading to mental health problems like depression and anxiety. Positive Psychology Theory emphasizes the positive aspects of life, such as happiness and satisfaction. Subjective well-being, which is an individual's assessment of their life satisfaction, is closely related to psychological resilience and feelings of social alienation. Social alienation and low psychological resilience can lead to an increase in negative emotions and a decrease in life satisfaction, thus reducing the subjective well-being of the elderly. Finally, Self-determination Theory suggests that autonomy, competence, and relatedness are essential for individual behavior and motivation. Social alienation might weaken the elderly's experience in these areas, especially in terms of relatedness and competence, which could directly affect their ability to care for themselves. For instance, feeling unneeded by society or lacking opportunities for social interaction might lead to a lack of initiative and engagement in daily life, thereby impacting their self-care ability.

In summary, social alienation can affect the psychological resilience and subjective well-being of rural elderly living alone, and in turn, impact their ability to care for themselves. This chain effect highlights the importance of enhancing social support and psychological resilience to improve the well-being and self-care capacity of this group. Strengthening community ties, providing mental health support, and promoting active social participation can effectively address this social issue.

This study was dedicated to thoroughly exploring the interplay between social alienation and the capacity for self-care in older age among rural empty-nest seniors. Its aim was to provide valuable insights for the early detection and mitigation of declines in self-care abilities in this demographic, offering both theoretical and practical value. From our findings, we recommend that healthcare professionals should focus on addressing not only the social isolation experienced by these rural elders but also enhance their psychological resilience and subjective well-being as a means to improve their self-care capabilities. One effective approach could be integrating psychological support with engaging social activities. Based on the Social Support Theory, social networks play a vital role in an individual's mental health. Regular psychological counseling sessions led by professional therapists can be organized, encouraging the elderly to engage in community activities such as interest groups, craft classes, or cultural events. This not only helps to strengthen their psychological resilience but also enhances their sense of belonging and overall life satisfaction and happiness. Second, health promotion and life skills training. According to Positive Psychology, an individual's well-being is closely linked to their life skills and health status. Offering basic health education and daily life skills training to the elderly, such as simple home care and healthy cooking, can be highly beneficial. Such training helps them to take better care of themselves, improving their quality of life. It also boosts their confidence and self-sufficiency in daily activities, thereby enhancing their sense of subjective well-being. These measures integrate psychological theories with practical applications, aiming to improve the elderly's mental health and happiness by bolstering social support, self-efficacy, and life skills.

The main strengths of this study are as follows: first, this study was specifically designed for rural empty-nest elderly, emphasizing the important value of decreasing social alienation, improving psychological resilience and subjective well-being on the self-care ability in old age of this specific population, and providing a theoretical basis for clinicians and caregivers. Second, this study is the first to use a multiple mediator model to explore the relationship between social alienation, psychological resilience, subjective well-being, and self-care ability in old age among rural empty-nest elderly. Compared with the traditional single model, this approach allowed us to consider the interactions between these factors more comprehensively.

In the current study investigating the psychological state of elderly individuals living alone in rural areas, several limitations have been identified. Firstly, the relatively small sample size and limited geographical scope may affect the generalizability and external validity of the findings. Future studies should consider broader regional surveys and expanding the sample size to enhance representativeness. Secondly, the reliance primarily on questionnaire surveys may introduce subjective biases. Future research could employ a variety of methods, such as in-depth interviews and case studies, to mitigate these biases and provide a more comprehensive understanding.
Moreover, the study has limitations in terms of variable control, failing to fully consider other variables that might affect the outcomes, such as socio-economic status and cultural background. Thus, it’s recommended that future research includes these variables to explore their impact more deeply. Regarding the long-term effects of the study, as it was designed as a cross-sectional study, it’s impossible to explore long-term changes in the relationships between variables. Therefore, a longitudinal study design is suggested for future research, to track subjects over time and understand the evolution of these variables.

Finally, the current study might not have covered all relevant aspects. Subsequent research should delve into more areas, such as the long-term effects of psychological interventions and how cultural differences impact the results. These recommendations would enable future research to build upon the existing foundation, improve, and expand, providing a more comprehensive understanding of the psychological conditions of elderly individuals living alone in rural areas.

Conclusions

The purpose of this study was to investigate the role of psychological resilience and subjective well-being as mediators in the link between social alienation and the capacity for self-care in older age, particularly among rural empty-nest seniors. Findings indicated that social alienation significantly impacts the ability for self-care in older individuals, a process partially mediated by psychological resilience and subjective well-being, with a combined mediation effect of 33.23%. Considering the typically diminished self-care abilities in older rural empty-nesters, it’s crucial to implement comprehensive strategies to enhance their self-care capabilities. Healthcare providers and concerned parties should focus on improving psychological resilience and subjective well-being in this demographic, acknowledging the impact of social alienation. Furthermore, interventions and treatments should be tailored for those with lower levels of psychological resilience and subjective well-being.

Abbreviations

GSAS  General Social Alienation Scale
PRS  Psychological Resilience Scale
SWS  Subjective Well-being Scale
SAIOAS  Self-care Ability In Old Age Scale
SD  Standard Deviation
SE  Standard Error
B  Unstandardized
CI  Confidence interval
ANOVA  Analysis of Variance
ΔR  Amount of R2 change

Declarations

Acknowledgments

We value the involvement of each participant and the engagement of all study members.

Authors’ contributions

Conceived and designed the research: Z-q J. Wrote the paper: Z-q J. Analyzed the data: Z-q J, Hj Z, Q S, S-x Z. Revised the paper: Z-q J. All authors reviewed the manuscript.

Funding

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Availability of data and materials

The corresponding author can provide the datasets utilized and examined in this study, subject to a reasonable request.

Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee of Jinzhou Medical University (approval number JZMULL2022017), and written informed consent was obtained from all participants. All methods were performed by the Declaration of Helsinki.

Consent for publication
Competing interests

The authors declare no competing interests.

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References


Hypothesized model

Figure 1

The moderated mediation model. Note: The values shown are the standardized coefficients.