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Research Article

The Impact of Age Identity and Value Engagement on the Mental Health of Older Adults

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Background

The rapid aging of China's population has heightened concerns about older adults' mental health, with age identity and value engagement emerging as key but understudied factors influencing psychological well-being.

Objective

This study investigates the associations among age identity, value engagement, and mental health in older adults in China.

Methods

Data were drawn from 6,081 respondents in the 2020 China Longitudinal Aging Social Survey. Age identity was defined as the difference between perceived and chronological age, while value engagement encompassed both social and family components. Baseline regression and bootstrap mediation analyses were applied.

Results

Identifying with a younger age was associated with better mental health, and this relationship was partially mediated by value engagement. Older adults who perceive themselves as younger were more likely to engage meaningfully in life, which enhanced psychological well-being, although a large gap between perceived and chronological age was also linked to psychological strain. Subgroup analyses further demonstrated that the positive association between age identity and mental health held across marital status, gender, and hukou status (a household registration system reflecting socioeconomic environment in China). The mediating role of value engagement was especially pronounced among women, individuals with agricultural hukou, and those without a spouse, implying that strengthening value-based social and familial roles may be especially beneficial for these groups.

Conclusion

These findings offer insights for developing targeted mental health strategies that account for subjective aging perceptions and social engagement disparities in China's aging population.

1. INTRODUCTION

With the accelerated global aging process, the mental health of older adults has become a growing concern worldwide. According to the latest United Nations report, the population aged 60 years and above will increase significantly in the coming decades, with the rate of aging reaching unprecedented levels. This trend is particularly pronounced in China. Data from the National Bureau of Statistics of China indicate that by 2030, nearly one-third of the country's population will be aged 60 years and above.[1] Confronted with such a massive aging population, effectively enhancing the mental health of older adults has become a core issue in social policy, academic research, and public health practice. Improving their mental health not only directly impacts quality of life but also has implications

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for the stability and sustainability of families and society. It is therefore an essential component of achieving active aging and promoting social harmony.[2]

For older adults, the gradual decline in physical function and changes in social roles make maintaining a sense of value and mental health an urgent issue in modern society.[3] Recent research has highlighted age identity – an individual's cognitive and emotional response to their age and the aging process – as a critical factor affecting the mental health of older adults. A positive age identity can reduce negative perceptions of aging, enhance psychological resilience, and improve life satisfaction and overall well-being. Although previous studies have identified a link between age identity and mental health, the underlying mechanisms – particularly the mediating role of value engagement – have not been systematically examined within the Chinese cultural context. Moreover, the formation and effects of age identity do not occur in isolation; their mechanisms of influence are moderated by various social and psychological factors. Among these, value engagement has emerged as a key mediating variable that has received increasing academic attention.

Value engagement refers to the degree to which individuals perceive their self-worth and contributions through participation in social or family activities. In this study, value engagement is conceptualized in two components: social value engagement and family value engagement. Social value engagement reflects older adults' sense of responsibility and proactivity in social life, such as their willingness to contribute to the community or society and their perception of value in social affairs.[4] Examples include participation in community work, engagement in social issues, or the expressed desire to "do something meaningful for society." In contrast, family value engagement emphasizes the contributions of older adults within the family, especially through economic support and caregiving. Illustrative examples include providing financial assistance or gifts to children or spending time caring for grandchildren, all of which reflect the level of family value engagement.

In the context of Chinese traditional culture, the concept of "filial piety" and intergenerational interaction offer a unique framework for understanding family value engagement among older adults. However, with the intensification of modernization, traditional family structures have gradually weakened, and the roles of older adults within families have undergone significant changes.[5] Against this backdrop, social value engagement has become an important mechanism to compensate, helping older adults reconstruct their sense of purpose and improve their mental health. At both the family and societal levels, the degree of value engagement directly influences older adults' sense of self and mental health. Maintaining a positive age identity not only supports acceptance of the natural aging process but also inspires enthusiasm and confidence in life.[6] Research has found that active value engagement can enhance the psychological resilience of older adults, reduce anxiety about aging, and provide opportunities to continue making meaningful contributions within the family and society. Particularly in the Chinese cultural context, value engagement not only satisfies older adults' desire to "remain useful" but also strengthens their sense of identity within both familial and social spheres.

Despite this, it remains unclear whether social and family value engagement play distinct mediating roles in the relationship between age identity and mental health. Therefore, this study aims to systematically examine these mechanisms within the Chinese context. Specifically, it focuses on the dual influence of age identity and value engagement on the mental health of older adults, with an in-depth exploration of the mediating role of value engagement in this relationship. Through a multi-level analysis of social and family value engagement, the research reveals how value engagement, by reinforcing older adults' sense of worth, strengthens positive age identity and subsequently improves their mental health. This study not only expands the theoretical framework of age identity and value engagement but also provides critical empirical evidence to inform policymaking in the context of an aging society. As stated in the *Book of Changes* (an ancient Chinese classic on philosophy and divination), "As heaven maintains vigor through movement, a noble person should strive for self-improvement without rest." Encouraging older adults to maintain active value engagement through social and family activities is an important strategy for addressing the challenges of aging, promoting social harmony, and improving individual well-being. To this end, the present study investigates how age identity influences the mental health of older adults through social and family value engagement, using baseline regression and bootstrap mediation analyses. The goal is to provide empirical evidence for culturally adaptive and targeted mental health interventions in aging societies.

2. LITERATURE REVIEW

2.1. RESEARCH ON THE INFLUENCING FACTORS OF OLDER ADULTS' MENTAL HEALTH

In recent years, academia has extensively explored the factors affecting older adults' mental health, which can be broadly categorized into objective and subjective domains. Objective factors include environmental conditions, living arrangements, social participation, and the use of information and communication technology.

Environmental and living conditions exert significant effects on older adults' mental health. Climate change, indoor air pollution, and environmental contamination increase psychological vulnerability by heightening environmental stress and impairing emotional and cognitive functioning.[7,8] Housing type is another determinant: high-rise residences have been linked to elevated loneliness and anxiety,[9] whereas cohabitation with children or access to community-based elder care can reduce depressive symptoms.[10,11] However, such studies primarily focus on external conditions and provide limited insights into how older adults psychologically interpret or cope with these environmental factors.

Social participation consistently alleviates loneliness and depression in older adults.[12] Sustained engagement in social activities — whether through community groups or long-term participation — exerts protective effects against mental health decline.[13] In the digital era, online networks further strengthen these benefits, particularly among older adults with greater digital competence.[14] Continuous social participation effectively prevents the escalation of depressive symptoms, particularly when maintained over the long term.[13]

Income disparities and physical health are also pivotal. Evidence indicates that the impact of income disparities on mental health diminishes with age, especially among highly disabled older adults, where physical disability becomes a critical moderating factor.[15] Information and

communication technology use, meanwhile, contributes to reduced loneliness, especially among users with high self-efficacy,[16] but its benefits diminish with excessive frequency of use.[17] Yet, research rarely addresses the motivational or identity-based mechanisms through which digital participation supports mental health.

Intergenerational caregiving, when balanced, also contributes to mental health by reinforcing older adults' family roles and sustaining a sense of usefulness and purpose, particularly among the "young-old" adults.[18] However, the psychological mechanisms linking caregiving and well-being remain underexplored.

Subjective psychological constructs are equally important. Self-integrity, defined as a sense of self-worth derived from reflecting on one's life, serves as a buffer against anxiety and depression.[19] Similarly, positive attitudes toward aging significantly reduce depressive symptoms.[20] Despite these insights, most existing studies examine traits in isolation and fail to incorporate broader psychosocial constructs, such as value engagement or identity processes, into explanatory models.

In summary, while prior studies have identified a wide range of objective and subjective factors influencing older adults' mental health, they often remain fragmented and insufficiently integrated. Notably, the mechanisms linking social participation, caregiving, or digital engagement to mental well-being remain under-theorized. To address this gap, the current study introduces value engagement as a key mediating variable and explores its role in linking age identity with mental health outcomes in the context of Chinese aging.

2.2. RESEARCH ON AGE IDENTITY AND VALUE ENGAGEMENT

Age identity, commonly defined as one's subjective perception of being older or younger than their chronological age, is a critical psychological construct influencing older adults' mental health. A youthful age identity has been associated with enhanced self-efficacy, higher life satisfaction, and greater psychological resilience.[21] In China, delayed recognition of aging – often emerging after age 70 – has also been linked to increased employment intention. However, such findings are limited in generalizability and provide little insight into long-term psychological outcomes.[22]

Social engagement plays a prominent role in shaping age identity. Research suggests that moderate levels of participation in social activities are more positively associated with younger age identity perceptions than either low or excessive involvement.[6] While notable, this finding leaves unanswered why moderate participation is optimal. Potential psychological mechanisms, such as perceived control, social affirmation, or purpose, have rarely been investigated in this context.

Family roles, particularly intergenerational caregiving, also contribute to age identity formation. Older adults caring for grandchildren often report feeling younger, especially in urban settings and among women.[23] However, existing studies rarely quantify caregiving frequency or intensity, limiting explanatory power. Moreover, conflicting conclusions about caregiving's psychological impact suggest a need for more nuanced, intersectional approaches.

Cultural and familial dynamics – including filial piety and multigenerational support – further shape how older adults perceive aging. Emotional and financial assistance from children can strengthen age identity by fostering feelings of usefulness and delaying psychological acceptance of aging.[24] However, negative outcomes have also been reported, particularly when caregiving becomes burdensome or when children's financial insecurity generates stress. These findings, though insightful, remain context-dependent and at times contradictory.

Physical health significantly shapes perceptions of age. Chronic illness and medication use often heighten older adults' awareness of aging, whereas physical aids and surgical interventions appear to exert a weaker influence.[25] Nonetheless, most research in this area remains descriptive and lacks theoretical integration into identity frameworks.

In summary, while multiple factors – social participation, caregiving, family support, and health – contribute to age identity, existing studies tend to treat these factors in isolation and overlook their interactions within broader psychosocial systems. Few studies have tested structured mediation models that explain how subjective age perceptions translate into mental health outcomes. To address this gap, the present study introduces value engagement – defined as perceived contributions to family and society – as a mediating construct. This approach offers a theoretically integrated pathway linking age identity with later-life psychological well-being.

2.3. THEORY AND HYPOTHESES

As individuals age, age identity gradually becomes a critical factor influencing their mental health. Age identity refers to an individual's subjective perception of their age – how they perceive themselves relative to their chronological age. According to self-identity theory, an individual's self-perception directly shapes their emotional state and mental health outcomes.[26]

To further explain how older adults maintain or adjust their age-related self-concepts in the face of aging, Identity Process Theory (Breakwell, 1986)[27] provides a valuable framework. This theory posits that individuals strive to preserve four core identity principles – continuity, self-esteem, distinctiveness, and self-efficacy – especially when confronted with challenges such as age-related role loss or health decline. A younger age identity may help maintain these identity principles, thereby reducing perceived identity threats and supporting psychological well-being in later life. A positive age identity, particularly perceiving oneself as "younger," has been shown to enhance psychological resilience, enabling older adults to cope more effectively with the challenges of aging. Empirical studies demonstrate that older adults with a younger subjective age identity report more optimistic emotions, lower levels of loneliness, and greater life satisfaction, all of which more directly improve their mental health. In addition, they tend to engage more actively in social and health-promoting behaviors, which not only delay physical decline but also reinforce their mental well-being. This process highlights the role of a positive age identity as a psychological protective mechanism: by fostering more favorable self-perceptions, it alleviates the psychological stress associated with aging.

Based on this, the following hypothesis is proposed:

> Hypothesis 1: Older adults with a younger age identity have higher levels of mental health. Identifying oneself as "younger" contributes to more positive psychological states, thereby enhancing their mental health.

In addition, Role Theory emphasizes the importance of the social and familial roles that older adults occupy.

This theory posits that the roles individuals assume in social interactions strongly influence their self-perception, social identity, and mental health. For older adults, adapting to and fulfilling evolving social and familial roles is crucial for maintaining their mental health. Active participation in family affairs (e.g., caregiving or family decision-making) and social activities strengthens their sense of role identity while maintaining a sense of personal value and social functionality. For example, within the family, older adults who provide financial support or care for grandchildren not only gain a sense of being "needed" but also alleviate feelings of uselessness and loneliness associated with aging. In society, participation in community affairs, volunteer work, or public welfare activities enables older adults to perceive their contributions to society, thereby reinforcing their self-identity and psychological resilience. According to Role Theory, active role fulfillment mitigates the negative psychological effects of aging. Specifically, when older adults take on social or familial roles, they often feel that they remain an "important member" of their family or community. This role identity significantly enhances their sense of belonging, self-worth, and happiness.

Based on this, the following hypothesis is proposed:

Hypothesis 2: Higher levels of value engagement among older adults are associated with better mental health. By enhancing their sense of contribution and presence in social and familial activities, older adults experience a stronger sense of being "useful" and "needed," which significantly improves their mental health.

Self-Determination Theory (SDT) provides further support for the perspectives outlined above. This theory argues that autonomy, competence, and relatedness are essential components of intrinsic motivation and that meeting these needs can stimulate positive actions and significantly impact mental health. For older adults, autonomy is reflected in their ability to freely choose and express their willingness to participate in social and familial activities; competence is demonstrated in their ability to achieve goals and gain a sense of accomplishment through these activities; and relatedness is manifested in the connections and support they feel within their social and familial environments.[28] SDT emphasizes that when older adults perceive themselves as making meaningful contributions in these contexts, they are more likely to experience a sense of self-worth. This sense of value not only enhances mental health but also helps older adults face aging with a more positive attitude. For instance, research has found that older adults who can autonomously choose and excel in caregiving or social activities often demonstrate higher levels of mental health. By fulfilling their core needs for autonomy, competence, and relatedness, older adults can better adapt to aging and exhibit greater psychological adaptability.

Based on SDT, the following hypothesis is proposed:

Hypothesis 3: Value engagement mediates the relationship between age identity and mental health. Older adults with a younger age identity tend to exhibit higher willingness and levels of value engagement, and this higher level of value engagement further improves their mental health. Through value engagement, older adults not only reinforce their perception of being "younger" but also fulfill their intrinsic needs for autonomy, competence, and relatedness, thereby significantly enhancing their mental health. Figure 1 illustrates the relationships among the variables.

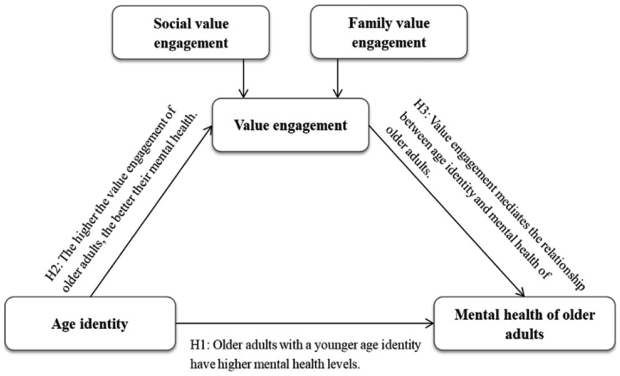

Figure 1. Integrated analytical framework

3. MATERIALS AND METHODS

3.1. DATA SOURCE AND SAMPLE

The current study used data from the 2020 wave of the China Longitudinal Aging Social Survey (CLASS), a nationally representative survey of adults aged 60 and above in mainland China. From the 11,398 respondents, cases with missing data on key variables (age identity, value engagement, and mental health – all defined in Section 3.2) were excluded, resulting in 6,081 valid samples. Sampling weights and stratified multistage random sampling were applied to ensure representativeness. Data processing and analysis were conducted using the statistical software STATA 14.0 (StataCorp, United States), with baseline regression models employed for estimation.

3.2. VARIABLES

3.2.1. MENTAL HEALTH (DEPENDENT VARIABLE)

The dependent variable is mental health, measured using nine questions from the CLASS 2020 survey. The questions and the scoring scale are summarized in Table 1. Items capture emotional states (e.g., distress, loneliness), life satisfaction, and perceived purpose. Scores ranged from 0 to 27, with higher values indicating better mental health.

3.2.2. AGE IDENTITY (INDEPENDENT VARIABLE)

Age identity is operationalized as the subjective age gap, calculated as:

Perceived old age (Question E3-1: "At what age do you consider yourself old?") – chronological age.

Higher values indicate a younger perceived age identity, reflecting a more positive view of one's aging process.

3.2.3. VALUE ENGAGEMENT (MEDIATING VARIABLE)

The mediating variable, value engagement, encompasses two dimensions: social value engagement and family value engagement, measured with the CLASS 2020 scale (Table 1). Together, these questions capture the degree of an individual's engagement in social and family activities, with higher values representing greater levels of value engagement. Value engagement is considered a crucial mediating factor influencing the mental health of older adults.

Table 1. Questions and scoring scales of variables

Variables	Questions	Scoring scale
Mental health	a. Have you felt in a good mood over the past week? b. Have you felt that your life is quite good over the past week? c. Have you found your life to be enjoyable or meaningful over the past week?	Score 1: "No" Score 2: "Sometimes" Score 3: "Often"
	a. Have you felt lonely over the past week? b. Have you felt deeply distressed over the past week? c. Have you experienced a lack of appetite over the past week? d. Have you had trouble sleeping over the past week? e. Have you felt useless over the past week? f. Have you felt that you had nothing to do over the past week?	Score 1: "Often" Score 2: "Sometimes" Score 3: "No"
Social value engagement	a. If given the opportunity, I am willing to participate in certain activities for my village/community committee. b. I often think about doing something for society again. c. I believe I am still a useful person for society.	Score 1: "Strongly disagree" Score 2: "Disagree" Score 3: "Neutral" Score 4: "Agree" Score 5: "Strongly agree"
Family value engagement	a. Over the past 12 months, have you (or your spouse living with you) provided any form of financial support, food, or gifts to your children? If yes, what was the total monetary value of these provisions?	Score 1: 0 CNY Score 2: 1 CNY to 1,999 CNY Score 3: 2,000 CNY to 6,999 CNY Score 4: 7,000 CNY to 19,999 CNY Score 5: More than 20,000 CNY
	a. In the past 12 months, how much time did you spend caring for your grandchildren?	Score 1: None Score 2: <2 h/day Score 3: 2–4 h/day Score 4: 4–8 h/day Score 5: More than 8 h/day

3.2.4. CONTROL VARIABLES

The following variables were included as covariates to control for potential confounding: gender, hukou (a household registration system reflecting socioeconomic environment in China), education, marital status, religious belief, physical health, and retirement status.

3.3. ANALYTICAL STRATEGY

3.3.1. REGRESSION FRAMEWORK

We applied multivariate ordinary least squares regression models to examine the direct and indirect effects of age identity on older adults' mental health. This method was selected because the dependent variable is continuous and approximately normally distributed.

3.3.2. MEDIATION TESTING

To evaluate the mediating role of value engagement, we used bias-corrected bootstrap estimates with 5,000 resamples at the 95% confidence level. This non-parametric technique is recommended for testing mediation effects in non-normally distributed indirect paths.

3.3.3. SOFTWARE AND IMPLEMENTATION

All analyses were conducted using STATA 14.0. Control variables were included as covariates in all models to minimize confounding bias.

3.3.4. MODEL SPECIFICATIONS

To formally assess the relationships among the variables, we constructed two regression models.

- Baseline model

$$MH_i = \beta_0 + \beta_1 * Al_i + \sum \delta_i * CV_{ij} + \varepsilon_i \quad \text{(I)}$$

- Mediation model

$$MH_i = \beta_0 + \beta_1 * Al_i + \beta_2 * VE_i + \sum \delta_i * CV_{ij} + \varepsilon_i \quad \text{(I)}$$

- Model variable definitions
- MH_i: Mental health score
- Al_i: Age identity (perceived old age − chronological age)
- VE_i: Value engagement (mediating variable, including both social and family dimensions)
- CV_{ij}: Control variables (gender, hukou, education, marital status, physical health, retirement)
- β_0: Intercept
- β_1, β_2: Coefficients for age identity and value engagement
- δ_j: Coefficients for control variables
- ε_i: Error term.

4. RESULTS

4.1. RESULTS OF BASELINE REGRESSION ANALYSIS

4.1.1. PRIMARY REGRESSION ANALYSIS

Table 2 summarizes descriptive statistics for all variables. Mental health was measured on a 9-item scale (range = 9–27), with higher scores indicating better psychological well-being. The mean score was 20.26 (SD = 3.18).

Age identity was calculated as the difference between perceived old age and chronological age. Negative scores indicate a younger subjective age, with a mean of −5.49 (SD = 12.01). Value engagement was measured with five items, combining social and family domains. Social value engagement (3 items) had a mean of 8.91 (SD = 2.91), while

Table 2. Variable descriptions and descriptive statistics

Variable	Definition and measurement	Mean	SD	Min	Max
Dependent variable					
Mental health	Measured by 9 questions; higher scores indicate better health	20.26	3.18	9	27
Independent variable					
Age identity	Difference between perceived old age ("At what age do you consider yourself old?") and chronological age	−5.49	12.01	−47	49
Mediating variable					
Value engagement	Measured by 5 questions	14.20	3.50	7	26
Social value engagement	Measured by 3 questions	8.19	2.91	3	15
Family value engagement	Measured by 2 questions	5.29	1.67	4	16
Control variables					
Gender	Male=1, Female=0	0.50	0.50	0	1
Hukou	Non-Agr=1, Agricultural=0	0.37	0.48	0	1
Education	1–3 (higher scores indicate higher levels)	1.10	0.35	1	3
Marital status	Married=1, Unmarried=0	0.75	0.43	0	1
Religious belief	Religious=1, No belief=0	0.04	0.21	0	1
Physical health	1–5 (higher scores indicate better health)	3.37	0.88	1	5
Retirement status	Retired=1, Not retired=0	0.36	0.48	0	1

Note: Mental health: Mental health of older adults; Non-Agr: Non-agricultural.

Table 3. Regression of age identity and value engagement on older adults' mental health

Variables	Model 1	Model 2	Model 3	Model 4
Age identity	–	0.031*** (9.489)	–	0.029*** (8.760)
Value engagement	–	–	0.042*** (4.673)	0.027*** (2.949)
Gender	0.09 (1.16)	0.094 (1.182)	0.096 (1.202)	0.096 (1.207)
Hukou	0.48*** (4.38)	0.455*** (4.206)	0.484*** (4.447)	0.461*** (4.258)
Education	0.56*** (4.85)	0.533*** (4.607)	0.541*** (4.641)	0.520*** (4.489)
Marital status	0.53*** (5.77)	0.438*** (4.783)	0.516*** (5.634)	0.435*** (4.755)
Religious belief	0.38** (2.07)	0.416** (2.254)	0.381** (2.055)	0.412** (2.235)
Physical health	0.96*** (21.91)	0.877*** (19.729)	0.954*** (21.766)	0.878*** (19.748)
Retirement Status	1.00*** (9.16)	0.989*** (9.118)	0.980*** (8.974)	0.977*** (9.000)
Constant	15.29*** (67.76)	15.863*** (68.368)	14.730*** (57.789)	15.472*** (57.926)

Notes: *t*-statistics in parentheses. Significance levels: *p<0.1, **p<0.05, ***p<0.01.

family value engagement (2 items) averaged 5.29 (SD = 1.67). The mean overall score was 14.20 (SD = 3.50), with a range from 7 to 26.

For the control variables: Gender (male = 1, female = 0) had a mean of 0.50 (SD = 0.50); hukou (non-agricultural = 1, agricultural = 1) had a mean of 0.37 (SD = 0.48); education averaged 1.10 (SD = 0.35) on a 3-point scale (1–3); marital status (married = 1, unmarried = 0) averaged 0.75 (SD = 0.43); religious belief (religious = 1, no belief = 0) averaged 0.04 (SD = 0.21); physical health averaged 3.37 (SD = 0.88) on a 5-point scale; and retirement status (retired = 1, not retired = 0) averaged 0.36 (SD = 0.48).

The regression analysis was conducted using four models (Table 3):

- Model 1: Control variables only
- Model 2: Adds age identity
- Model 3: Adds value engagement as a mediating variable
- Model 4: Full model incorporating all variables.

Key findings are summarized as follows:

- Age identity had a significant positive effect on mental health across models (Model 2: B = 0.031, t = 9.49; Model 4: B = 0.029, t = 8.76; p<0.01), supporting Hypothesis 1.
- Value engagement also has a significant positive effect on mental health (Model 3: B = 0.042, t = 4.67; Model 4: B = 0.027, t = 2.95; p<0.01), supporting Hypothesis 2.
- The coefficient for age identity decreased slightly in Model 4, suggesting partial mediation by value engagement.
- Among control variables, non-agricultural hukou, higher education, marital status, religious belief, good physical health, and retirement status all show statistically significant positive associations with mental health across models (all p<0.05 or p<0.01).

These results confirm the robustness of the effects of age identity and value engagement, while also underscoring the importance of socioeconomic and health-related controls in shaping mental health outcomes among older adults.

4.2. MEDIATION EFFECT ANALYSIS

To assess the mediating role of value engagement, a standard three-step mediation framework was used. First, age identity was found to significantly predict mental health. Second, age identity also significantly predicted value engagement. Finally, when both age identity and value engagement were included in the model, both remained significant predictors of mental health. These results satisfy the conditions for testing mediation.

A bootstrap analysis was then conducted to formally test the mediation effect. As shown in Table 4, the indirect effect of age identity on mental health through value engagement was 0.0019 (bootstrap standard error = 0.0007, 95% confidence interval [0.0005, 0.0033], $p<0.01$), accounting for 6.07% of the total effect. The total effect of age identity was 0.0313, and the direct effect was 0.0294. These results confirm that value engagement plays a small but significant mediating role in the relationship between age identity and older adults' mental health, supporting Hypothesis 3.

4.3. ENDOGENEITY ANALYSIS

To address potential endogeneity, instrumental variable regression was performed using two instruments: The presence of handrails and emergency call devices in the home. The rationale is based on ecological systems theory, which links environmental supports with perceived independence and psychological identity. Table 5 reports the results of the instrumental variable regression.

The first-stage regression showed a strong correlation between handrail installation and age identity ($B = 1.576$, $t = 3.10$, $p<0.01$). The F-statistic of 81.33 confirms instrument strength, while the Sargan and Basmann tests ($p=0.6375$, $p=0.6377$) supported instrument exogeneity.

In the second-stage regression, fitted age identity displayed a negative coefficient ($B = -0.405$, $t = -5.3$, $p<0.1$), suggesting dual pathways:

(i) A younger identity enhances psychological well-being (baseline regression).
(ii) A mismatch between subjective age and reality may create stress (instrumental variable model).

4.4. ROBUSTNESS CHECK

4.4.1. EXCLUDING "VIGOROUS OLDER ADULTS"

To test the robustness of findings, respondents under age 75 were excluded (Table 6). Results remained significant:

(i) Age identity: $B = 0.018$ ($t = 3.94$, $p<0.01$)
(ii) Value engagement: $B = 0.023$ ($t = 1.81$, $p<0.1$).

This supports the applicability of the findings among more advanced-age groups.

4.4.2. ALTERNATIVE REGRESSION MODELS

Given the ordered nature of the dependent variable, Ordered Logit (Ologit) and Ordered Probit (Oprobit) models were applied as robustness checks. Results (Table 7) show that:

(i) Age identity remains significant (Ologit: $B = 0.016$, $t = 8.21$; Oprobit: $B = 0.010$, $t = 8.50$).
(ii) Value engagement also remains significant ($p<0.01$).

Thus, the main conclusions are robust across different estimation strategies.

4.5. SUBGROUP ANALYSIS

Subgroup analyses were conducted based on marital status, hukou type, and gender (Table 8). Results show:

(i) Marital status: Age identity positively affects both married and unmarried groups, but value engagement is significant only among the unmarried.
(ii) Hukou: Age identity has positive effects in both agricultural and non-agricultural groups, while value engagement is significant only among agricultural hukou holders.
(iii) Gender: Age identity is beneficial for both genders, but value engagement is significant only among females.

These results suggest that value engagement plays a particularly critical role for unmarried, rural, and female older adults.

5. DISCUSSION AND IMPLICATIONS

This study advances existing theoretical frameworks by providing empirical insights into the relationships among age identity, value engagement, and mental health in older adults within China's unique cultural and social context. Much of the prior research on aging and mental health has focused on individualistic cultures, where subjective aging

Table 4. Mediation effect analysis of value engagement

Value engagement	Effect value	Boot standard error	Boot confidence interval (Lower)	Boot confidence interval (Upper)	Relative effect
Total effect	0.0313	0.0033	0.0248	0.0378	–
Direct effect	0.0294	0.0034	0.0228	0.0360	–
Mediation effect	0.0019	0.0007	0.0005	0.0033	6.07%

Note: Bootstrap estimates are based on 5,000 resamples.

Table 5. Comparison of instrumental variable and baseline regression results

Variables	Age identity (First stage)	Mental health (Second stage)	Mental health (Model 4)
Handrail installation	1.576*** (3.10)	–	–
Emergency call device	−0.034 (−0.05)	–	–
Fitted age identity	–	−0.405* (−5.3)	–
Age identity	–	–	0.029*** (8.760)
Value engagement	0.798*** (19.94)	0.365*** (5.86)	0.027*** (2.949)
Controls	Yes	Yes	Yes
Observations	5,837	5,837	5,837
Pseudo R^2	0.1095	0.1088	0.1177

Notes: Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

theories emphasize personal autonomy and independence. By contrast, the current study highlights the critical role of collective cultural norms such as filial piety, familial responsibilities, and social contribution that shape the aging experience in non-Western societies, particularly China.

Empirically, the results reveal that age identity significantly improves older adults' mental health (coefficient = 0.031, $p<0.01$). This finding aligns with subjective aging theories by confirming the psychological benefits of maintaining a younger subjective age. Importantly, our findings expand these theories by demonstrating their applicability within the collectivist context of China. Promoting positive perceptions of aging may therefore help older adults integrate more fully into family and social roles, while also mitigating age-related stigma and psychological stress.

In addition, value engagement both directly improves older adults' mental health (coefficient = 0.027, $p<0.01$) and mediates the relationship between age identity and mental health (mediation effect = 0.0019, $p<0.01$). This result deepens theoretical understanding of the mechanisms connecting subjective aging perceptions and mental health outcomes. In collectivist societies, older adults' active engagement in social activities may enhance their sense of societal belonging and recognition, further amplifying the psychological benefits associated with a positive age identity.

The analysis further reveals substantial heterogeneity across subgroups. Specifically, unmarried older adults, rural residents (agricultural hukou holders), and women derive greater mental health benefits from value engagement compared to their counterparts. These differences highlight the specific vulnerabilities faced by these groups within China's social and cultural contexts.

For hukou type, age identity was found to significantly promote mental health in both agricultural and non-agricultural groups. However, value engagement was significant only for agricultural hukou holders, reflecting their greater reliance on social value activities to access psychological support due to limited social resources.

For gender, age identity benefited both male and female older adults, but value engagement was significant only among females. This pattern suggests that older women rely more on emotional exchange and social connectedness to sustain mental health, whereas older men appear to be more dependent on self-recognition and economic stability.

These subgroup differences emphasize the need to address the differentiated needs of various groups when designing interventions to improve mental health.

The endogeneity analysis further revealed the complexity of age identity's psychological mechanisms. While a positive age identity typically fosters resilience and confidence, an excessively youthful subjective identity can induce psychological stress due to discrepancies with physical reality. This nuanced finding underscores the importance of culturally sensitive interventions that encourage balanced perceptions of aging among older adults, aligning subjective and objective aging experiences. This highlights the need to encourage a positive age identity while helping older adults confront and accept physical and psychological changes to avoid the negative consequences of unrealistic perceptions.

Through robustness checks – including exclusion of individuals under 75 and the application of alternative regression models (Ologit and Oprobit) – we confirmed the stability and generalizability of our findings, thereby strengthening their policy relevance.

Practically, the differentiated effects observed across subgroups underscore the necessity of targeted public health interventions and community engagement programs. For instance, enhancing social participation opportunities such

Table 6. Regression results after excluding vigorous older adults

Variables	Excluding vigorous older adults (mental health)	Main regression (mental health)
Age identity	0.018*** (3.94)	0.029*** (8.76)
Value engagement	0.023* (1.81)	0.027*** (2.95)
Controls	Yes	Yes
Sample size	3,077	5,837
Pseudo R^2/R^2	0.098	0.118

Notes: Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Table 7. Robustness check – alternative regression models

Variables	Ologit (mental health)	Oprobit (mental health)
Age identity	0.016*** (8.21)	0.010*** (8.50)
Value engagement	0.016*** (3.01)	0.009*** (2.78)
Controls	Yes	Yes
Sample size	5,837	5,837
Pseudo R^2/R^2	0.024	0.024

Notes: Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

Table 8. Heterogeneity test – baseline regression

Variables	Married	Unmarried	Agricultural hukou	Non-agricultural hukou	Male	Female
Age Identity	0.028*** (7.17)	0.033*** (5.15)	0.033*** (7.55)	0.022*** (4.18)	0.028*** (5.68)	0.031*** (6.74)
Value Engagement	0.017 (1.58)	0.053*** (2.95)	0.036*** (3.24)	0.002 (0.13)	0.013 (0.97)	0.040*** (3.17)
Constant	15.826*** (52.01)	15.996*** (29.11)	15.937*** (44.91)	15.682*** (39.16)	15.763*** (40.31)	15.245*** (40.11)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	4,356	1,467	3,692	2,140	2,944	2,893
Pseudo R^2	0.1113	0.1043	0.1146	0.1262	0.1107	0.1217

Notes: Significance levels: *$p<0.1$, **$p<0.05$, ***$p<0.01$.

as lifelong learning programs, hobby groups, or volunteer initiatives would be especially beneficial for unmarried, rural, and female older adults. Policies should prioritize resources for these groups, facilitating their social integration and psychological well-being.

Moreover, translating theoretical insights into actionable policy suggests the development of initiatives aimed at fostering positive age identity. Intergenerational programs, community mentorship, and media campaigns that challenge age stereotypes could reduce psychological distress, enhance life satisfaction, and increase societal participation among older adults.

In summary, policymakers and practitioners should consider incorporating strategies that promote positive age identity and active value engagement into community-based mental health interventions for older adults. Differentiated and culturally-sensitive programs, particularly those targeting vulnerable subpopulations, could effectively address subgroup-specific needs, thereby enhancing psychological health, strengthening social integration, and enhancing overall quality of life. Future research should adopt longitudinal designs to establish causal pathways and explore cross-cultural comparisons, which may further elucidate the effectiveness of these strategies across diverse aging populations.

6. RESEARCH STRENGTHS AND LIMITATIONS

The current study explores the impact of age identity and value engagement on the mental health of older adults. While it offers important contributions, certain limitations remain and warrant further refinement in future research.

First, this study has notable methodological strengths. Specifically, we utilized nationally representative data from CLASS, enhancing the generalizability of the findings to the broader population of older adults in China. In addition, the adoption of the bootstrap estimation strengthens the statistical robustness and reliability of the mediation analysis. Furthermore, the inclusion of heterogeneity analysis by marital status, hukou type, and gender enriches the interpretive depth of our findings, highlighting subgroup-specific differences and implications.

Although some heterogeneous factors were examined, their impacts were not explored in sufficient depth. For example, heterogeneity effects may vary considerably across contexts or over time, but these differences were not thoroughly examined in this study. Moreover, while demographic subgroup differences were identified, broader contextual or environmental factors, such as social network characteristics, regional economic disparities, or cultural variations, were not integrated into the analysis. Future research could refine heterogeneity analysis by incorporating these additional dimensions, thereby offering a more comprehensive understanding of the mechanisms through which age identity and value participation influence the mental health of older adults.

The mediation analysis also has constraints. This study focused primarily on value engagement as a mediating variable, without fully considering multiple mediation pathways or their interactions. In addition, mediators may exhibit dynamic changes over time and function differently across contexts, but these factors were not adequately incorporated into the analysis. Further, the cross-sectional nature of our study restricts the ability to infer causal relationships or explore temporal dynamics in mediation mechanisms. Future research could expand the exploration of mediation mechanisms by integrating longitudinal data or experimental studies to gain deeper insights into the evolution and underlying mechanisms of mediating variables, thereby enhancing the explanatory power and theoretical contributions of the study.

In addition to the points discussed above, several broader methodological limitations must be transparently acknowledged. The reliance on self-reported measures raises concerns regarding potential recall and reporting biases. Integrating objective health indicators or qualitative approaches, such as in-depth interviews or focus groups, could complement the quantitative findings and offer richer context-sensitive insights. In addition, while cultural and contextual influences were discussed conceptually, the absence of direct measurement limits empirical testing. Future research would benefit from explicitly including macro-level factors and conducting comparative cross-cultural analyses to better examine how societal and environmental contexts influence aging experiences and mental health outcomes.

7. CONCLUSION

This study demonstrates that both age identity and value engagement significantly improve the mental health of older adults in China, with value engagement further mediating the effect of age identity. The findings underscore the importance of fostering positive perceptions of aging and promoting active social participation, particularly among vulnerable groups such as unmarried, rural, and female older adults. By integrating culturally-sensitive strategies that align subjective and objective aging experiences, policymakers and practitioners can more effectively support psychological well-being, strengthen social integration, and enhance quality of life in an aging society.

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CONFLICT OF INTEREST

The authors declare no competing interests.

AUTHOR CONTRIBUTIONS

Conceptualization: Li Zheng
Data curation: Juan Luo, Chiyue Huang, Keting Xia
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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All human studies were reviewed and approved by the Institutional Review Board and Ethics Committee of the Faculty of Psychology, Beijing Normal University, and were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all individual participants included in the study. Particularly, the legal guardian of the subjects under the age of 16 was requested to sign the informed consent. Informed consent was obtained from all individual participants included in the study. All participants volunteered to engage in the study.

CONSENT FOR PUBLICATION

Not applicable.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author on reasonable request.

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