

Cognitive Function and Depressive Symptoms Within Marriage: A Longitudinal Study of Middle-Aged and Older Chinese Couples

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Abstract

Objectives

Cognitive function is widely recognized as an important predictor of depressive symptoms. However, few studies have examined whether an individual's cognitive function may also influence his or her spouse's depressive symptoms within a dyadic framework. The present study aimed to explore the longitudinal dyadic associations between cognitive function and depressive symptoms among middle-aged and older couples.

Methods

Data were drawn from three waves of the China Health and Retirement Longitudinal Study (CHARLS). The analytic sample consisted of 3740 middle-aged and older couples aged 45 and above. Actor-Partner Interdependence Models (APIM) were used to estimate the actor and partner effects of cognitive function on depressive symptoms. Marital satisfaction was further incorporated as a potential mediator. In addition, heterogeneity analyses were conducted by age group and residence.

Results

Results indicate significant actor and partner effects. Higher cognitive function predicted lower subsequent depressive symptoms for individuals and their spouses. Marital satisfaction partially mediated these associations, particularly in pathways where wives' cognitive function enhanced husbands' marital satisfaction, thereby reducing husbands' depressive symptoms. Heterogeneity analyses revealed stronger partner effects among older and rural couples, whereas urban couples primarily exhibited actor effects.

Discussion

This study highlights the longitudinal and dyadic associations between cognitive function and depressive symptoms among middle-aged and older couples in China. The findings underscore the interdependent nature of mental health within marriage and suggest that couple-based strategies may be effective in preventing and alleviating depressive symptoms in later life.

Introduction

Compared with other age groups, older adults face elevated risks of physical illness and mental disorders (Sen & Lei, 2023). Amid accelerating global population aging, depression has emerged as a pressing public health concern. It not only substantially undermines older adults' mental health and subjective well-being but also increases the likelihood of a range of adverse health outcomes (Yan et al., 2023). China has the largest population of middle-aged and older adults in the world. Coupled with persistently low fertility rates and rising life expectancy, this demographic group will continue to expand.

The growing prevalence of depression among middle-aged and older adults poses significant challenges for China (Li & Liu, 2025).

The determinants of depression are complex and multifactorial, encompassing gender, age, physical functioning, stressful life events, and social support (Jun et al., 2015; Yan et al., 2023). Among these factors, cognitive function has been widely recognized as a central correlate of depression. A substantial body of research has examined their association at the individual level and consistently documented a robust relationship between the two. On the one hand, depression is regarded as a risk factor for cognitive decline (Donovan et al., 2017), with older adults experiencing depression exhibiting poorer performance in episodic memory, visuospatial ability, and information-processing speed (Szymkowicz et al., 2023). On the other hand, impaired cognitive functioning may itself heighten vulnerability to depression (Zhang & Yang, 2024), whereas better cognitive performance and participation in cognitive intervention programs have been shown to mitigate depressive symptoms (Szymkowicz et al., 2023).

In mid- and later life, marriage remains one of the most intimate and enduring social bonds. Spouses are deeply interdependent with respect to material resources, daily behaviors, emotional experiences, and health trajectories. For instance, Ruan et al. (2025) reported that spousal social participation was significantly associated with partners' chronic conditions, while Li and Liu (2025) documented dyadic associations between internet use and depressive symptoms among middle-aged and older couples. Nevertheless, existing research on cognition and depression has predominantly relied on individual-level analyses (Aichele & Ghisletta, 2019; Zhou et al., 2021), thereby overlooking spousal interdependence. Such an omission may blur the distinction between actor and partner effects and limit the explanatory power of findings within family contexts. Furthermore, marital satisfaction may constitute an important pathway linking cognition and depression, and this association may be further conditioned by gender, age, and place of residence. Yet these issues remain insufficiently examined.

To address these gaps, the present study seeks to advance understanding of the association between cognitive function and depression. Drawing on data from the 2015, 2018, and 2020 waves of the China Health and Retirement Longitudinal Study (CHARLS), we employ the Actor–Partner Interdependence Model (APIM) to examine whether either spouse's cognitive function longitudinally predicts both their own and their partner's depressive symptoms. We further assess the mediating role of marital satisfaction and explore potential subgroup heterogeneity. In contrast to prior research that primarily attributes depression risk to individual characteristics, this study extends the analytical framework to the dyadic level, underscoring the interdependent nature of mental health within couples in mid- and later life. The findings are expected to provide empirical evidence for elucidating the familial mechanisms underlying depression and to offer practical implications for integrating couples and families into screening, intervention, and support efforts within healthcare and social service systems, thereby informing more targeted health promotion and mental health strategies.

Literature review

Association Between Cognitive Performance and Depressive Symptoms

In middle and later life, declines in cognitive function and depressive symptoms frequently co-occur, jointly contributing to functional limitations, reduced social participation, and diminished quality of life (Byers & Yaffe, 2011). Previous research has indicated that the relationship between cognition and depression at the individual level may be bidirectional, complicating causal inference (Zhou et al., 2021). Depression may accelerate cognitive decline through mechanisms such as chronic stress, inflammation, and reduced engagement in activities, whereas impaired cognitive function may increase vulnerability to depression by undermining problem-solving abilities and reducing self-efficacy (Gallagher et al., 2016). This bidirectionality implies that cross-sectional associations are insufficient to establish causal pathways, and accumulating longitudinal evidence increasingly supports a dynamic, mutually reinforcing relationship rather than a unidirectional link between the two (Yin et al., 2024). Moreover, in middle and later life, cognitive decline not only impairs activities of daily living and instrumental functioning but is also often accompanied by sadness, anhedonia, social withdrawal, and related depressive experiences, thereby exacerbating emotional distress (Duarte et al., 2026). Based on this evidence, we focus on the individual-level pathway from cognitive function to depressive symptoms and propose Hypothesis 1 (H1): poorer individual cognitive function is associated with higher levels of self-reported depression.

Although individual-level studies provide a valuable foundation for understanding the cognition–depression relationship, they share a common limitation in overlooking interdependence within intimate relationships. In long-term cohabiting partnerships, middle-aged and older spouses' daily behaviors and emotional regulation mutually influence one another (Li et al., 2025), yielding no independent mental health outcomes. Consequently, depression should be viewed not solely as an individual issue but also as a relationally embedded risk state (Li et al., 2025). Examining only individual-level associations may underestimate or fail to capture the impact of spousal dynamics. Couples function as an interdependent system, and emotional contagion theory posits that emotions within marital relationships are not generated independently but accumulate through ongoing interactions (Hatfield et al., 1993). Similarly, the couples' health interdependence framework indicates that when one partner experiences psychological or physical health problems, the other partner's emotional state and health-related behaviors are correspondingly affected (Kiecolt-Glaser & Wilson, 2017).

Within the marital context, cognitive function may affect not only an individual's own emotional state but also their partner's mental health through partner effects. Declines in one spouse's cognitive function can increase the other spouse's depressive symptoms (Kim et al., 2017). This effect likely occurs because reduced cognitive ability often entails greater reliance on the partner for daily activities, medical decision-making, and social engagement, thereby increasing caregiving burden, stress exposure, and emotional labor, which in turn elevates depression risk. In contrast, higher cognitive functioning may facilitate more effective couple interactions and shared decision-making, reduce family conflict and stress, and enhance the partner's psychological well-being (Pinquart & Sörensen, 2003; Sinclair et al.,

2018). Drawing on these considerations, we further proposes Hypothesis 2 (H2): poorer individual cognitive function is associated with higher levels of depressive symptoms in one's spouse.

Mediating Mechanisms and Heterogeneity in Dyadic Associations

Introducing mediating mechanisms helps explain why cognitive function may exert cross-partner effects on depressive symptoms. As a central dimension of marital experience, marital satisfaction has been consistently associated with depressive symptoms (Goldfarb & Trudel, 2019). However, the direction of its influence and potential gender and contextual differences are complex, underscoring the need for mechanism testing within a longitudinal framework to clarify these pathways (Goldfarb & Trudel, 2019). For instance, prior research indicates that wives' marital satisfaction affects not only their own depressive symptoms but may also spill over to influence their husbands, whereas husbands' marital satisfaction is primarily linked to their own depressive symptoms (Kong et al., 2025). Building on this evidence, we introduce marital satisfaction as a mediating variable and propose Hypotheses 3 and 4: poorer individual cognitive function is associated with lower partner marital satisfaction, which in turn increases both partners' depressive symptoms (H3); and poorer individual cognitive function is associated with lower self-reported marital satisfaction, which in turn elevates both partners' depressive symptoms (H4).

Examining whether these effects differ across subpopulations further illuminates the contextual dependence of the cognition–marriage–depression link. Middle-aged and older adults vary substantially in health burden, role responsibilities, and resource availability, all of which may shape how cognitive changes influence emotional health (Kok & Reynolds, 2017). First, middle-aged individuals frequently contend with simultaneous work and family demands, resulting in higher stress exposure (Alexopoulos, 2019), which may modify the transmission pathways of cognitive impairment within the marital system. In light of the trend toward earlier onset of cognitive impairment and depression, defining the study population as individuals aged 45 and older allows for comparisons of risk exposure and resource allocation between middle-aged and older couples. Accordingly, Hypothesis 5 (H5) proposes that actor effects, partner effects, and mediating pathways differ between middle-aged and older couples. Second, China's longstanding rural–urban dual structure generates systematic disparities in healthcare access, community services, and social support, which may further moderate the extent of stress transmission and the buffering capacity of resources within marital systems (P. Wang et al., 2024; Li & Liu, 2025). Rural–urban differences not only influence individuals' access to medical and caregiving resources but may also shape how couples jointly respond to cognitive decline and emotional stress. Accordingly, Hypothesis 6 (H6) proposes that actor effects, partner effects, and mediating pathways differ between rural and urban couples.

Methods

Data and Sample

Data for the present study were drawn from CHARLS, a nationally representative longitudinal survey of Chinese adults aged 45 and older. CHARLS was initiated in 2011 and has completed five waves of follow-up surveys, covering 150 counties/districts and 450 villages/communities across 28 provinces. The survey provides rich information on health, psychological well-being, and family relationships.. For this study, we used the 2015, 2018, and 2020 waves.

The sample was constructed as follows. The 2015 wave served as the baseline, including 21,100 respondents. After excluding 3,562 individuals who could not be matched with a spouse at the household level, the sample comprised 8,769 couples (17,538 individuals) in 2015. We then excluded couples lost to follow-up in subsequent waves, removing 1,500 couples in 2018 and 845 couples in 2020, yielding a longitudinal sample of 6,424 couples (12,848 individuals). Applying further inclusion criteria for age and completeness of core variables, we excluded an additional 2,684 couples: (1) 1,219 couples in which either partner was younger than 45 years, (2) 836 couples with missing data on key variables including cognitive function, depressive symptoms, or marital satisfaction, and (3) 659 couples with missing data on control variables. The final analytic sample comprised 3,740 couples (7,480 individuals).

Variables

Dependent Variable: Depression (2020)

Depressive symptoms were measured using the CES-D-10 scale. Respondents were asked how frequently they experienced a set of ten negative emotions over the past week. Each item was scored on a scale from 0 to 3, yielding a total score ranging from 0 to 30, with higher scores indicating more severe depressive symptoms.

Independent Variable: Cognitive Function (2015)

Cognitive function was assessed using measures of mental status and episodic memory, including tasks on date orientation, arithmetic, word recall, and drawing. Scores ranged from 0 to 31, with higher scores reflecting better cognitive performance.

Mediating Variable: Marital Satisfaction (2018)

Marital satisfaction was measured with the question, “Overall, how satisfied are you with your marriage?” Responses were scored on a 1–5 scale, with higher scores indicating greater marital satisfaction.

Control Variables

Consistent with prior research and the questionnaire design, the following control variables from 2015 were included: age (continuous), residence (0 = urban, 1 = rural), education (0 = primary school or below, 1 = junior high school or above), self-rated health (continuous), ADL (0 = no functional limitation, 1 = functional limitation), personal wealth (continuous), and number of children (continuous).

Statistical Analysis

Descriptive statistics were first conducted in Stata 17.0 to report the distributions of core variables and control variables for both partners. Given the nonindependence of cognitive function and depressive symptoms within couples, treating individuals as independent observations could underestimate standard errors and bias effect decomposition. To account for this interdependence, the Actor–Partner Interdependence Model (APIM) was employed, allowing simultaneous estimation of actor effects and partner effects (Kenny & Ledermann, 2010). Specifically, cognitive performance in 2015 (CP₂₀₁₅) served as the independent predictor, and depressive symptoms in 2020 (DS₂₀₂₀) served as the dependent variable, with APIM estimated in Mplus 8.3. Each heterosexual couple was treated as a distinguishable dyad, and each partner's control variables were included. Gender differences were tested using a stepwise nested-model comparison strategy. A freely estimated model was first fitted, followed by sequential equality constraints applied to corresponding paths for husbands and wives. The plausibility of these constraints was evaluated using chi-square difference tests and changes in model fit indices (CFI, RMSEA, and SRMR). If model fit did not deteriorate substantially, the more parsimonious constrained model was adopted.

Building on the main APIM, marital satisfaction in 2018 (MS₂₀₁₈) was incorporated to construct a mediation model, allowing the total effects of cognitive function to be decomposed into direct and indirect effects. To examine heterogeneity, multiple-group APIM analyses were conducted across age groups (middle-aged vs. older) and residential contexts (urban vs. rural). Robustness checks were performed by modifying sample inclusion criteria, handling missing data using the full information maximum likelihood (FIML), and re-estimating models with alternative outcome variable, ensuring the stability and consistency of the main findings.

Results

Descriptive Sample Characteristics

Table 1 presents the descriptive statistics on married men and women by their own reports. In our total sample, Wives had higher levels of depressive symptoms (8.51 vs. 6.31), poorer cognitive performance (12.92 vs. 14.38), but higher marital satisfaction (2.71 vs. 2.40) than husbands. Wives were younger (58.16 vs 60.06), less likely to have middle school diploma (26.82% vs 48.37%) and ADL functional limitations (44.47% vs 57.62%), had worse health (3.01 vs 3.17) and wealth (6.53 vs 7.25) than husbands. On average, each household had approximately 2.49 children; 74.68% resided in rural areas, and 25.32% lived in urban areas.

Table 1
Basic characteristics of participants.

Characteristics	Husbands (n = 3740)		Wives (n = 3740)	
	N (%)	Mean (SD)	N (%)	Mean (SD)
Explained variable (2020)				
Depressive Symptoms		6.31 (5.50)		8.51 (6.43)
Explanatory variable (2015)				
Cognitive Performance		14.38 (4.90)		12.92 (5.74)
Mediator variables (2018)				
Marital Satisfaction		2.40 (0.71)		2.71 (0.84)
Control variables (2015)				
Age		60.06 (8.04)		58.16 (7.62)
Education				
Below Middle School = 0	1931 (51.63)		2737 (73.18)	
Middle School and Above = 1	1809 (48.37)		1003 (26.82)	
Health		3.17 (0.95)		3.01 (0.93)
ADL				
No Limitations = 0	1585 (42.38)		2077 (55.53)	
Limitations = 1	2155 (57.62)		1663 (44.47)	
Wealth		7.25 (3.08)		6.53 (3.17)
Children		2.49 (1.27)		2.49 (1.27)
Residence				
Urban = 0	947 (25.32)		947 (25.32)	
Rural = 1	2793 (74.68)		2793 (74.68)	
Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: *p < .05. **p < .01. ***p < .001. The model includes control variables, as detailed in Supplementary Tables 7 & 10.				
Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: *p < .05. **p < .01. ***p < .001. The model includes control variables, as detailed in Supplementary Tables 8 & 11.				

[Table 1]

APIM Analysis

To explore the relationships between cognitive performance and depressive symptoms within couples, we constructed APIMs. We sequentially estimated four models, beginning with the free model (Model 1), the model with constrained actor effects paths (Model 1a), the model with constrained partner effects paths (Model 1b), and the model with constrained actor and partner effects paths (Model 1c) for husbands and wives. Therefore, model 1c was retained as the final model, as it did not differ significantly from the free model in terms of model fit ($p = 0.389$) and showed excellent fit indices (CFI = 1.000, SRMR = 0.000, RMSEA = 0.000), while being more parsimonious. The fit indices and comparisons of all the tested models are provided in Supplementary Table 1.

Figure 2 presented the results of Model 1c. These results suggest that wives' and husbands' cognitive performance ($\beta = 0.323$, $p < .001$) and depressive symptoms ($\beta = 0.263$, $p < .001$) were correlated with each other. In terms of actor effects, husbands' cognitive performance was negatively associated with their own depressive symptoms ($\beta = -0.112$, $p < .001$), and a similar pattern was observed for wives ($\beta = -0.083$, $p < .001$). Significant partner effects were also identified. Husbands' cognitive performance was negatively associated with wives' depressive symptoms ($\beta = -0.034$, $p < .01$), while wives' cognitive performance also exhibited significant partner effect ($\beta = -0.046$, $p < .01$).

[Fig. 2]

Figure 2. Results from actor–partner interdependence model of cognitive performance on depressive symptoms.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Tables 2 & 3.

Indirect Paths: The Mediating Role of Marital Satisfaction

We next conducted path analysis within the actor–partner interdependence framework to examine the indirect effects of cognitive performance on depressive symptoms through marital satisfaction. The significance of indirect effects was evaluated using bias-corrected bootstrapped confidence intervals based on 1,000 resamples.

Figure 3 includes the potential mediator of marital satisfaction. Neither husbands' nor wives' cognitive performance was significantly associated with their own marital satisfaction. In contrast, both spouses' cognitive performance showed significant partner effects on marital satisfaction. Specifically, husbands' cognitive performance was positively associated with wives' marital satisfaction ($\beta = 0.043$, $p < .05$). Higher wives' marital satisfaction, in turn, was associated with lower levels of depressive symptoms for both husbands ($\beta = -0.041$, $p < .05$) and wives ($\beta = -0.162$, $p < .001$). Similarly, wives' cognitive

performance was positively associated with husbands' marital satisfaction ($\beta = 0.077$, $p < .001$). Higher husbands' marital satisfaction was subsequently associated with lower depressive symptoms among husbands ($\beta = -0.114$, $p < .001$), whereas its association with wives' depressive symptoms was not statistically significant.

[Fig. 3]

Figure 3. Results from actor–partner interdependence model of cognitive performance on depressive symptoms, with marital satisfaction as a mediating variable.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Tables 4 & 5.

Heterogeneity Analysis

In the heterogeneity analysis, we examined two subgroups: middle-aged and older adult couples, as well as urban and rural couples. The results are presented in Figs. 4 and 5.

For the two subgroups of middle-aged couples and older adult couples, after model comparison (see Supplementary Table 6 for details), Model 2c and Model 3b was retained. Among middle-aged couples, significant actor effects were observed, but partner effects were not significant. For older adult couples, partner effects were significant. However, only husbands' cognitive performance significantly affecting their own depressive symptoms, while actor effect was not found for wives. Additionally, within both the middle-aged and older adult couples' groups, there was only one significant mediating pathway: wives' cognitive performance positively influenced husbands' marital satisfaction, which in turn significantly reduced husbands' depressive symptoms.

In the analysis of two subgroups, urban and rural couples, after model comparison (see Supplementary Table 9 for details), Model 4c and Model 5c were retained. The results showed that there was no significant rural–urban difference in the actor effect, with significant actor effects observed in both subgroups. However, partner effects were only significant in the rural group. Additionally, in the urban group, marital satisfaction did not serve as a mediating variable for either husbands or wives. In contrast, in the rural group, only one significant mediating pathway was observed: wives' cognitive performance significantly positively influenced husbands' marital satisfaction, which in turn significantly reduced husbands' depressive symptoms.

[Fig. 4]

Figure 4. Results from actor–partner interdependence model of cognitive performance on depressive symptoms for middle-aged and older adult couples, as well as urban and rural couples.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Tables 7 & 10.

[Fig. 5]

Figure 5. Results from actor–partner interdependence model of cognitive performance on depressive symptoms, with marital satisfaction as a mediating variable, for middle-aged and older adult couples, as well as urban and rural couples.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Tables 8 & 11.

Robustness analysis

We conducted robustness checks to ensure the stability of our results. First, we re-included the data with missing values on non-key variables, specifically by re-adding cases with missing control variables. We then performed the analysis using FIML estimation to handle missing data effectively and reduce biases due to incomplete cases. This resulted in a total of 4,399 couples being included in the analysis (see Supplementary Figs. 1–2, Supplementary Tables 12–16). Second, we re-estimated the APIMs by excluding cases from mixed-age couples, where one spouse was middle-aged and the other was an older adult. This was done to ensure that the results were not influenced by the potential heterogeneity of couples with significant age differences. This resulted in a total of 3,300 couples being included in the analysis (see Supplementary Figs. 2–3, Supplementary Tables 17–21). Finally, following previous literature classification standards, we transformed the depressive symptoms variable into a binary outcome: scores below 10 were classified as the "no depression" group, and scores above 10 were classified as the "at-risk for depression" group. This analysis was conducted to assess the impact of a binary classification on the results (see Supplementary Figs. 4–5, Supplementary Tables 22–26). All results show no significant differences when compared to our original analysis, which also validates the robustness of our conclusions to some extent.

Discussion

Traditionally, research on depression has taken a pathological perspective, treating depressive symptoms primarily as an individual-level concern. Numerous studies have documented associations between individual characteristics and depressive outcomes (Jun et al., 2015; Yan et al., 2023). Although some research has considered factors beyond the individual, such studies have largely focused on residential or broader social environments (Chou et al., 2010; Kou et al., 2024), with comparatively little attention given to marital relationships. Drawing on nationally representative longitudinal dyadic data, we

reveal significant actor and partner effects of cognitive function on depressive symptoms among middle-aged and older Chinese couples, highlighting the interdependent nature of cognition and emotional well-being within couples.

Regarding actor effects, previous research has shown that poorer cognitive performance is significantly associated with higher depressive symptoms (Wang et al., 2024). However, cross-sectional designs limited causal inference. By leveraging a five-year lag, this study demonstrates that individual cognitive function negatively predicts subsequent depressive symptoms. This association may arise because cognitive decline impairs problem-solving ability, heightens perceived loss of control, and reduces self-efficacy, thereby increasing vulnerability to depression (Gallagher et al., 2016). Conversely, better cognitive performance supports effective health management and sustained social engagement, which are crucial for emotional regulation and can mitigate depressive symptoms (Gautam et al., 2024). Moreover, actor effects did not differ significantly between husbands and wives, suggesting that cognitive interventions may be equally effective in reducing depressive symptoms among both middle-aged and older men and women.

With respect to partner effects, the study finds that one spouse's cognitive function significantly influences the other spouse's depressive symptoms, demonstrating a consistent negative relationship. This effect likely reflects the high interdependence of emotional and daily life within middle-aged and older couples. Superior cognitive function facilitates smooth communication, effective joint decision-making, and lower family conflict. In contrast, cognitive decline in one partner often shifts household responsibilities and emotional labor onto the other, increasing caregiving burden, stress exposure, and role strain, while reducing social participation and elevating depression risk (Pinquart & Sörensen, 2003; Kim et al., 2017; Sinclair et al., 2018). Participation in social activities not only directly improves mood but also provides social support from friends and neighbors, serving as a protective factor against depression (Gautam et al., 2024). Additionally, cognitive function and depressive symptoms were positively correlated within couples, consistent with theories of emotional contagion and mutual influence in spousal health (Hatfield et al., 1993; Kiecolt-Glaser & Wilson, 2017), suggesting that shared living environments, joint stress exposure, and reciprocal emotional influence contribute to concordance in mental health (Li et al., 2025).

However, partner effects are not universally observed across contexts. For example, Monin et al. (2018) found no partner effect between individual cognition and spousal depression in samples from the United States and Mexico, indicating cultural variation in the visibility of partner effects. In China, Confucian collectivist values and moral norms emphasizing lifelong marital commitment ("holding hands until old age") reinforce family responsibility and co-residence (Xiao et al., 2014). Older Chinese couples tend to form tightly knit living units, making health and behavior more mutually influential (Chiu et al., 2022). Furthermore, given relatively limited formal care resources, households rely heavily on spousal mutual support and joint coping with illness (Huang et al., 2023). In this cultural context, cognitive decline in one spouse can limit communication, reduce decision-making efficiency, and increase caregiving burden,

which may be transmitted to the partner through emotional contagion and stress spillover, thereby raising the partner's depression risk (Monin et al., 2017).

The present study also examines marital satisfaction as a potential mediator between cognitive function and depressive symptoms. Findings indicate that one's cognitive function does not significantly predict their own marital satisfaction but positively influences their partner's satisfaction. Marital satisfaction is fundamentally a relational evaluation, reflecting the partner's responsiveness and quality of support in interactions, particularly in daily communication, conflict management, and emotional support (Whisman, 2001). Positive and meaningful emotional interactions can regulate mood (Chiu et al., 2022), whereas cognitive decline can disrupt established interactions, reducing responsiveness, emotional support, and practical assistance, which in turn lowers marital satisfaction (Brown et al., 2020). Furthermore, higher marital satisfaction subsequently reduces one's own depressive symptoms, as intimate relationships buffer the negative effects of stress (Feeney & Collins, 2015), providing more emotional support, less conflict, and more effective stress communication and coping (Robles et al., 2014). Notably, wives' marital satisfaction also negatively affects husbands' depressive symptoms, whereas the reverse effect is not observed. This asymmetry likely reflects the greater emotional labor and relationship-maintenance role typically undertaken by wives, which shapes family interaction patterns and emotional climate, spilling over to influence husbands' psychological states.

Heterogeneity analyses reveal that age and place of residence moderate the association between cognitive function and depressive symptoms across spouses. Among middle-aged couples, actor effects are consistently observed, while partner effects are more pronounced among older couples. From a life-course perspective, middle-aged couples are often still active in the labor market, with diverse social roles and relatively broad social networks, so their emotional regulation and support are not confined to the family. Paid work and external social ties can mitigate caregiving stress and depressive symptoms, limiting the spillover effect of one partner's health changes on the other (Glauber & Day, 2018). In contrast, older couples experience shrinking social networks that increasingly center on the partner, making spouses more influential in daily interactions and emotional support (Carstensen, 2006; Fuller et al., 2020), thereby enhancing partner effects. The mediation mechanism, however, remained consistent across age groups: wives' cognitive function influences husbands' depressive symptoms through their marital satisfaction, whereas wives' marital satisfaction does not mediate this relationship. Traditional household roles often assign more unpaid cognitive labor to women (Krstić et al., 2025), making their cognitive function directly relevant to household coordination, communication, and emotional regulation, which in turn affects husbands' marital evaluation and depressive outcomes (Kong et al., 2025). Conversely, wives' marital satisfaction may be more influenced by other stressors such as caregiving burden, health, and resource constraints (Toma & Nedelcea, 2025), and less dependent on husbands' cognitive function.

Place-of-residence heterogeneity revealed that urban couples exhibited only actor effects, whereas both actor and partner effects are significant in rural couples. Prior research suggests that rural older adults exhibit higher levels of depression than their urban counterparts, partly due to disparities in public

services, healthcare resources, and social support networks (Hu et al., 2018). Our findings suggest that urban residents can leverage diversified external support networks to share caregiving and emotional burdens (P. Wang et al., 2024), reducing reliance on spousal cognition for depression protection. In contrast, rural couples remain heavily dependent on marital support because of scarcer support resources (Liu et al., 2020), making changes in one partner's cognition more likely to affect the other, producing significant partner effects. Moreover, marital satisfaction did not mediate effects in urban couples, further indicating that in contexts with ample external support, the marginal role of marital satisfaction in regulating emotional and mental health may be reduced; conversely, in resource-limited settings, marital relationships serve as a critical source of psychological regulation and support (Mäki et al., 2025).

In summary, this study demonstrates that associations between cognitive function and depression are embedded within the highly interdependent system of the couple rather than occurring solely at the individual level. These findings have practical implications: depression prevention and intervention should extend beyond individual-centered approaches to focus on couples and families as key units, incorporating symptom screening and relational support into service frameworks. Previous research highlights that family-centered interventions, offering a combination of stress management, social support, and respite services, can alleviate caregiver burden and improve mental health (Jeon & Jun, 2024; Gautam et al., 2024; Walga, 2019). Our findings further highlight that enhancing communication quality, joint decision-making, and stress coping strategies within couples, thereby improving marital satisfaction, can strengthen the family system's buffering capacity against cognitive decline and emotional risk. Interventions should also be stratified and tailored: precise, subtype-matched primary care and community interventions are more effective in improving mental health and quality of life (Feng & Huang, 2025). This is especially important for older adults and rural residents, whose social networks are concentrated within the family and external support is limited, making partner effects more pronounced. Strengthening community support networks and family-oriented comprehensive services can reduce the accumulation and transmission of depression risk within the couple (Gautam et al., 2024).

Several limitations should be acknowledged.

First, although the current study used longitudinal data from three waves of CHARLS, supporting the impact of cognition on depression, bidirectional relationships cannot be entirely ruled out. Second, key variables rely primarily on CES-D-10 and MMSE scales, which are widely used but may not capture the multidimensional nature of depressive symptoms and cognitive function, and self-reports may introduce reporting bias. Future research could explore specific cognitive domains in relation to depressive outcomes. Third, due to data constraints, the study only incorporates marital satisfaction, without directly including caregiving intensity, burden, or detailed interaction processes, leaving the precise mechanisms linking spousal cognition to depression to be further elucidated. Future studies could integrate qualitative interviews to deepen understanding at the level of daily family interactions and caregiving practices. Despite these limitations, this study expands understanding of the interconnections

among marital relationships, cognitive function, and depression, emphasizing the importance of incorporating couple-level dynamics into mental health risk assessment and intervention frameworks in the context of rapid population aging.

Declarations

Author Contribution

All authors contributed to this study. Jiaxin Liu conceived and designed the study, conducted the data analysis, and drafted the manuscript. Congcong Cao carried out the literature review and contributed to revising the manuscript. Shi Juan assisted with data analysis and manuscript revision. Mingwei Wang contributed to the theoretical framing and conceptual development of the study and provided critical revisions and editorial input.

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Figures

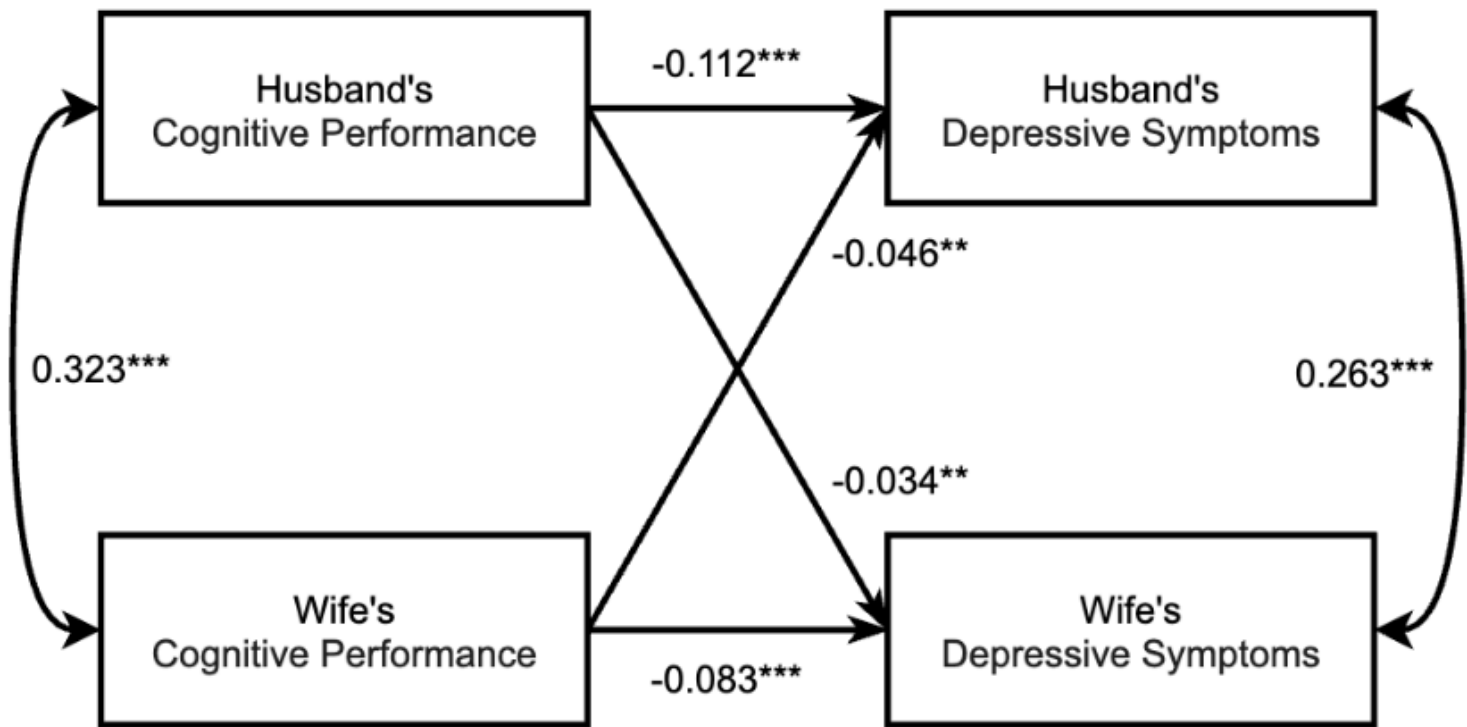


Figure 1

Figure 2. Results from actor–partner interdependence model of cognitive performance on depressive symptoms.

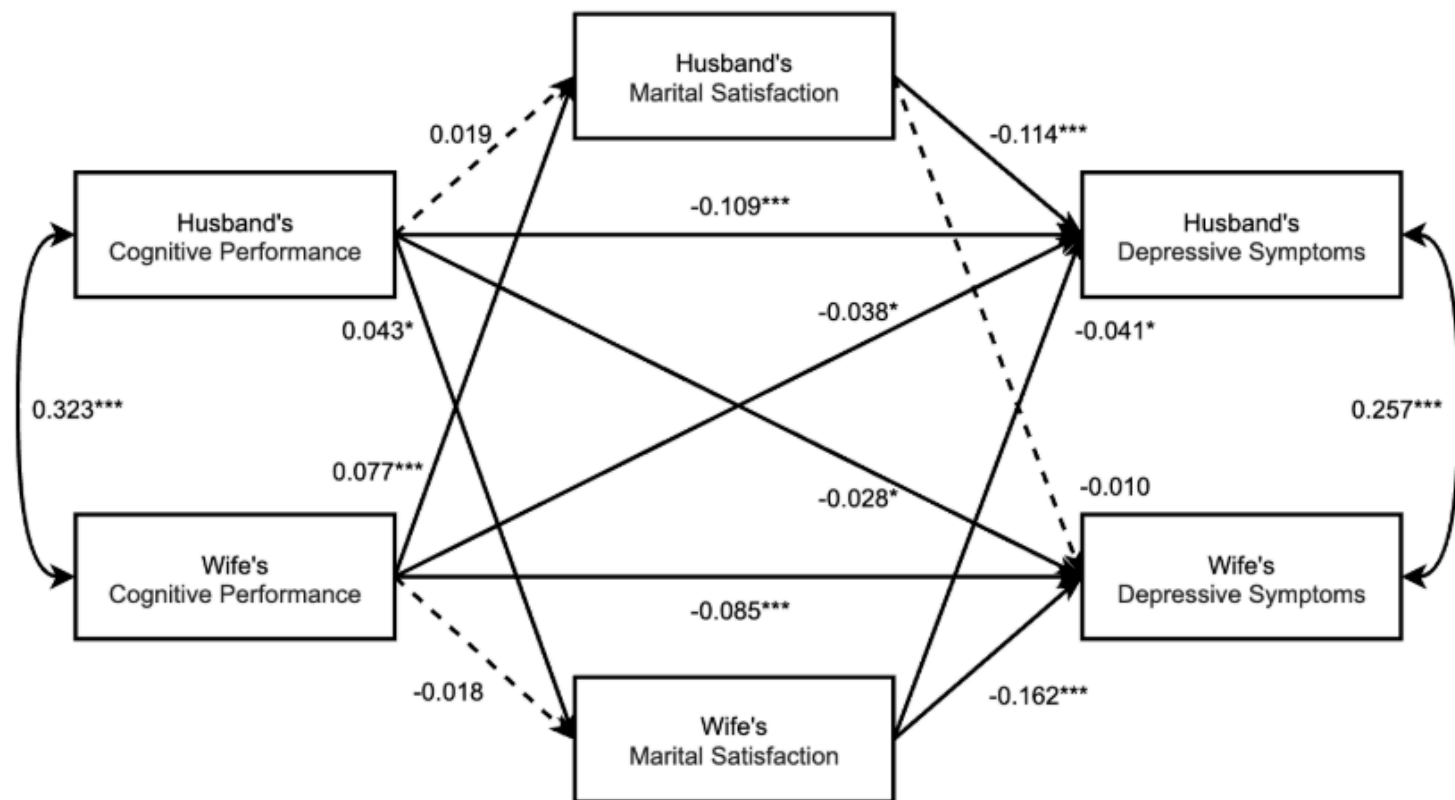


Figure 2

Figure 3. Results from actor-partner interdependence model of cognitive performance on depressive symptoms, with marital satisfaction as a mediating variable.

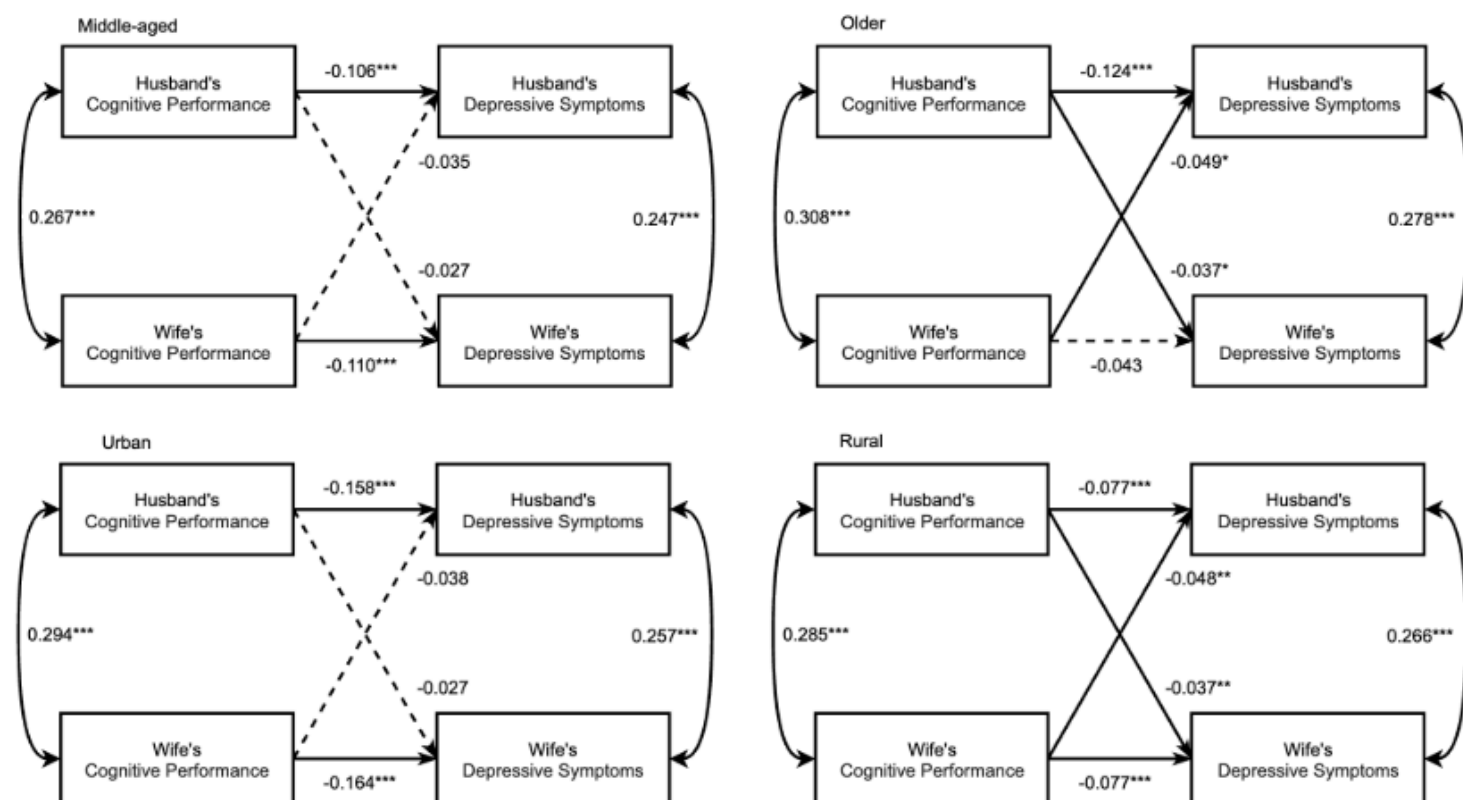


Figure 3

Figure 4. Results from actor–partner interdependence model of cognitive performance on depressive symptoms for middle-aged and older adult couples, as well as urban and rural couples.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Table 7 & 10.

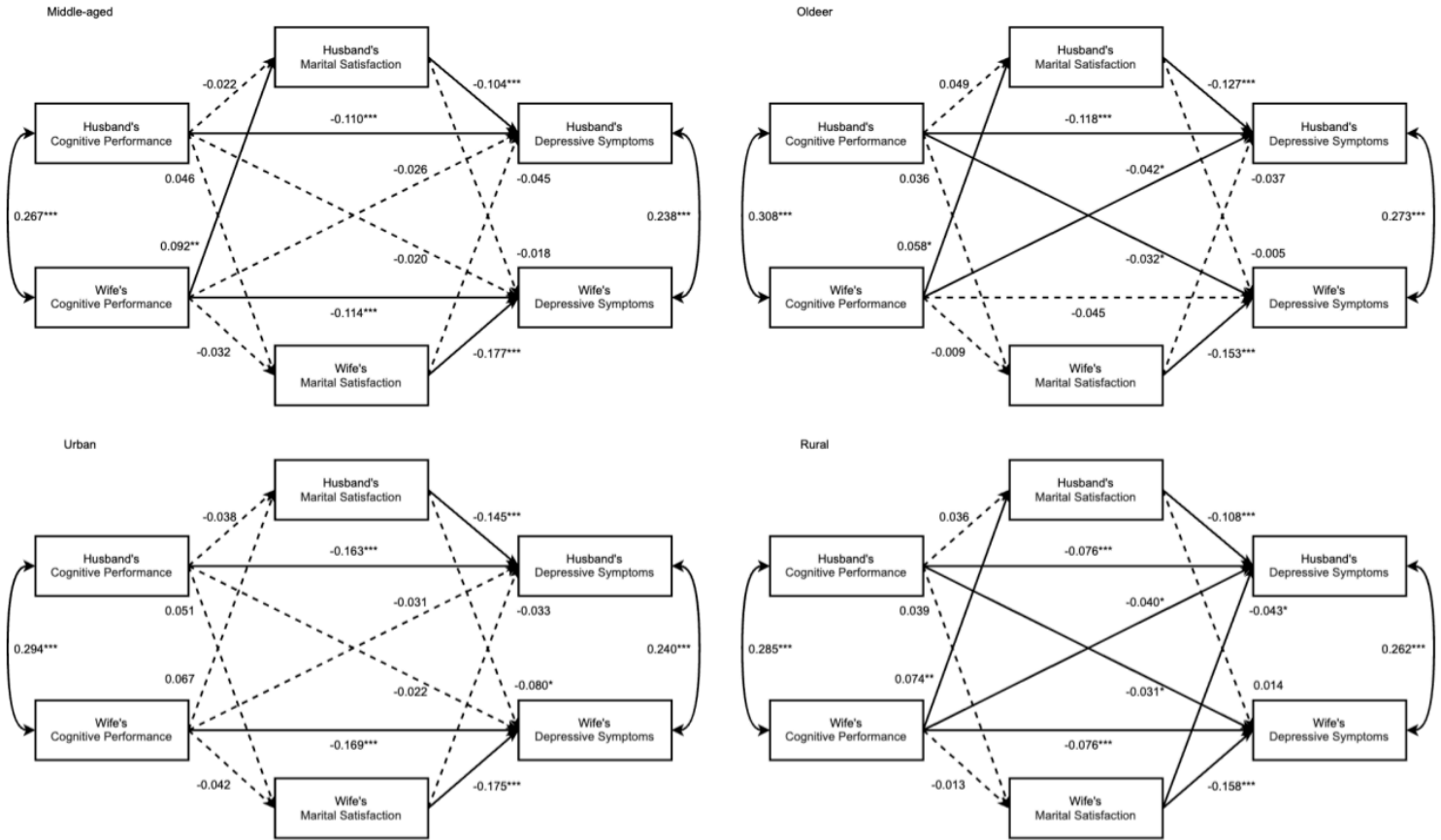


Figure 4

Figure 5. Results from actor–partner interdependence model of cognitive performance on depressive symptoms, with marital satisfaction as a mediating variable, for middle-aged and older adult couples, as well as urban and rural couples.

Notes: The full line represents a significant path; the dashed line represents an insignificant path. Single-headed arrows represent regression paths. Double-headed arrows represent correlations. All path coefficients were labeled with significance: * $p < .05$. ** $p < .01$. *** $p < .001$. The model includes control variables, as detailed in Supplementary Table 8 & 11.

Supplementary Files

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