

Age modifies the association between physical function decline and depressive symptoms among middle-aged and older adults: A longitudinal analysis of the China Health and Retirement Longitudinal Study

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Research Article

Keywords: healthy aging, middle-aged and older adults, physical function decline, depressive symptoms, age moderation, threshold effect, China Health and Retirement Longitudinal Study (CHARLS)

Posted Date: July 27th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10310402/v1>

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Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Public Health on September 28th, 2026. See the published version at <https://doi.org/10.1186/s12889-026-29489-1>.

Abstract

Objective

To examine how age influences the association between physical function decline and depressive symptoms among middle-aged and older adults, with particular emphasis on its moderating and threshold effects.

Methods

This longitudinal study analyzed five waves (2011–2020) of data from the China Health and Retirement Longitudinal Study (CHARLS), including adults aged ≥ 45 years. Physical function decline was quantified using a composite score derived from principal component analysis of multiple physical function indicators. Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CES-D). Fixed-effects panel regression models were used to estimate the longitudinal association between physical function decline and depressive symptoms while controlling for time-invariant individual characteristics. Moderation and threshold regression analyses were further performed to evaluate the interaction and potential non-linear effects of age.

Results

Physical function decline was significantly associated with increased depressive symptoms. After adjustment for physical function decline, age exhibited a significant inverted U-shaped association with depressive symptoms. Although age was not independently associated with depression, it significantly moderated the association between physical function decline and depressive symptoms, with increasing age attenuating this relationship. Threshold regression identified a significant age threshold of 57 years. Below this threshold, physical function decline had a stronger association with depressive symptoms, whereas the association remained significant but weaker above the threshold. Sex-stratified analyses identified threshold ages of 57 years for men and 55 years for women.

Conclusions

Physical function preservation may represent an important public health strategy for reducing the burden of depression among middle-aged and older adults. Age modifies the psychological impact of physical function decline, suggesting that the effectiveness of prevention and intervention strategies may vary across different stages of aging. Earlier interventions may be particularly important for women, who appear more vulnerable to the adverse mental health effects of physical decline. These findings provide evidence to support age- and sex-specific public health strategies aimed at promoting healthy aging and mental well-being.

Background

Population aging has become one of the most pressing global public health challenges, placing substantial pressure on healthcare systems and increasing the burden of chronic diseases and mental disorders [1, 2]. Driven by increasing life expectancy and declining fertility rates, the proportion of older adults is rising rapidly worldwide. In China, demographic aging, increasing numbers of empty-nest households, and the growing prevalence of chronic diseases have further intensified public health concerns among middle-aged and older adults [3, 4]. Aging is inevitably accompanied by progressive declines in physical function, including reduced muscle strength, impaired mobility, diminished balance, and increased multimorbidity, all of which contribute to loss of independence and reduced quality of life [5]. Maintaining physical function is therefore recognized as a key component of healthy aging and an important public health priority. In contrast, trajectories of mental health during aging are more heterogeneous and influenced by multiple biological, psychological, and social factors [6].

Depression is one of the most common mental disorders among middle-aged and older adults and represents a major contributor to disability and disease burden worldwide [7, 8]. Core manifestations include persistent depressed mood, anhedonia, fatigue, cognitive impairment, and reduced daily functioning. Depression in older adults is associated with increased healthcare utilization, functional disability, poorer management of chronic diseases, and higher risks of suicide and all-cause mortality [9–11]. According to the World Health Organization (WHO), approximately 280 million people worldwide live with depression, affecting more than 5% of the adult population, with women experiencing consistently higher prevalence than men [12]. Given its substantial health, social, and economic consequences, depression remains a major public health priority. As populations continue to age, preventing depression and identifying modifiable risk factors have become increasingly important for promoting healthy aging and reducing healthcare burdens [13, 14].

Growing evidence suggests that declines in physical health adversely affect mental well-being through multiple pathways, including reduced social participation, loss of functional independence, poorer self-rated health, chronic inflammation, neurobiological alterations, and maladaptive cognitive processes [15–18]. Although numerous studies have examined depression in relation to individual chronic diseases, evidence indicates that impaired overall physical function may be an even more important determinant of mental health because it reflects the cumulative impact of multiple health conditions [19–21]. Previous studies have also suggested that age and sex may modify the relationship between physical health and depression [22, 23]. However, most existing studies have been cross-sectional or have focused on specific diseases or single measures of physical function, limiting understanding of how overall physical function decline influences depressive symptoms over time. Moreover, whether age exerts non-linear or threshold effects on this association remains largely unknown.

Using five waves of nationally representative longitudinal data from the China Health and Retirement Longitudinal Study, this study aimed to investigate the longitudinal association between physical function decline and depressive symptoms among middle-aged and older adults. Specifically, we

examined whether age moderates this relationship and whether age-related threshold effects exist. By identifying critical age periods and population subgroups at greater risk, this study provides evidence to support age- and sex-specific public health strategies for depression prevention and healthy aging.

Methods

Research subjects

This study utilized data from five waves (2011–2020) of the China Health and Retirement Longitudinal Study, a nationally representative longitudinal survey of individuals aged 45 years and older. The analysis included respondents with complete data on all items of the Center for Epidemiologic Studies Depression Scale (CES-D). The CHARLS baseline survey began in 2011, and the fifth wave of follow-up data was publicly released in November 2023. The survey covers 450 villages and communities across 150 county-level administrative units in China and provides high-quality, micro-level data on the health, socioeconomic status, and family structure of middle-aged and elderly individuals. The study protocol was approved by the institutional review board at Peking University (IRB00001052-11015) [24]. After excluding cases with missing values, the final balanced panel dataset consisted of 77,601 valid observations across five survey waves.

Variable selection

Measurement of Depression

Mental health status was assessed using the 10-item version of the CES-D, revised by Andresen et al. [25], which serves as a proxy measure for depressive symptoms. Each item is scored on a 4-point scale ranging from 0 to 3, yielding a total score between 0 and 30. Higher scores indicate more severe depressive symptoms and poorer mental health status. The distribution of CES-D scores among the study population is presented in Fig. 1(a).

Measurement of physical function decline score

Previous studies have identified chronic diseases [26], limitations in activities of daily living (ADL) [27], and poor self-rated health [28] as significant risk factors for depression. To comprehensively evaluate physical function decline, four representative variables were selected from the CHARLS dataset based on prior research [29]: (1) number of chronic diseases; (2) ADL limitations; (3) instrumental activities of daily living (IADL); and (4) self-rated health status (rated on a 5-point scale, from 1 = very good to 5 = very poor). Both ADL and IADL scales consist of six items. Each item was scored as follows: responses of "no difficulty" or "difficulty but can still complete" were coded as 0, while "need help" or "unable to complete" were coded as 1.

These four variables were subjected to principal component analysis (PCA) for dimensionality reduction and to construct a composite indicator of physical function decline. The PCA yielded a Kaiser-Meyer-Olkin (KMO) value of 0.637 and a highly significant Bartlett's test of sphericity ($p < 0.001$), indicating that the data were suitable for factor analysis. Higher scores on the resulting index reflect greater physical function decline. The distribution of these scores is shown in Fig. 1(b). Figure 1(c) presents the fitted relationship between depression scores and physical function decline scores. A clear positive correlation was observed, with a narrow confidence interval and strong model fit, suggesting a robust association between declining physical function and increased depressive symptoms.

Mechanistic variable - age

Age was incorporated into the analytical framework as a control variable, a moderator, and a threshold variable to examine its role in the relationship between physical function decline and depressive symptoms. To mitigate the potential influence of extreme age values on the estimation results, the age variable was winsorized at the upper 0.1% quantile, thereby minimizing the impact of outliers while preserving the integrity of the data on the regression estimates. The distribution of the age variable after winsorization is presented in Fig. 1(d).

Control variables

To more accurately assess the relationship between physical function decline and depressive symptoms—and to reduce the influence of potential confounders—this study included a range of demographic, social, and economic characteristics as control variables. These included: marital status (whether living with a spouse or partner), agricultural household registration, participation in social activities during the past month, number of living children, employment status in the past year, household income, official retirement status, and receipt of pension benefits. To account for inter-year inflation, household income was deflated and then log-transformed for regression analysis. This transformation mitigates skewness in the income distribution and enhances the robustness and explanatory power of the model estimates.

Statistical analysis

All statistical analyses were conducted using Stata 17.0 MP, with a significance level set at $\alpha = 0.05$. Depression scores served as the dependent variable (denoted as y), while physical function decline scores were treated as the primary independent variable (denoted as x). The vector of control variables (Z) included age, age squared, and other demographic, social, and economic covariates as described previously. To comprehensively assess the impact of physical function decline on depressive symptoms, three regression models were constructed:

Benchmark Regression Model

To examine the association between physical function decline and depressive symptoms, a two-way fixed-effects panel regression model was fitted, controlling for both individual-specific and time-specific fixed effects. The model is specified as:

$$Y = \alpha + \beta x + Z\delta + \mu + \lambda + \varepsilon$$

where y represents the CES-D depression score; x denotes the physical function decline score; Z is the vector of control variables; α is the intercept; β and δ are the regression coefficients to be estimated; μ represents individual fixed effects; λ denotes time fixed effects; and ε is the random error term.

Moderating effect model

To examine the moderating role of age, an interaction term between age and the physical function decline score ($\text{age} \times x$) was added to the benchmark regression model. The statistical significance of the interaction term was used to determine whether age modifies the association between physical function decline and depressive symptoms.

Panel threshold effect model

To further investigate potential nonlinear effects of age on the association between physical function decline and depressive symptoms, a panel threshold fixed-effects model was employed. The model followed the methodology proposed by Hansen (1999) [30] and subsequently extended by Wang (2015) [31], and was implemented using the `xthreg` command in Stata. Age was specified as the threshold variable (q) to identify potential age thresholds at which the association between physical function decline and depressive symptoms changes. The model allows for the estimation of up to three threshold values and is specified as follows:

$$y = \alpha + \beta_1 x \cdot I(q < \gamma_1) + \beta_2 x \cdot I(\gamma_1 \leq q < \gamma_2) + \beta_3 x \cdot I(\gamma_2 \leq q < \gamma_3) + \beta_4 x \cdot I(q \geq \gamma_3) + Z\delta + \mu + \lambda + \varepsilon$$

Here, γ_1 , γ_2 , and γ_3 denote the threshold values to be estimated, and $I(\cdot)$ is an indicator function that equals 1 when the condition in parentheses is satisfied and 0 otherwise. This model allows the association between physical function decline and depressive symptoms to vary across age intervals defined by the estimated threshold values. The presence of threshold effects was evaluated by testing the statistical significance of the differences among the stage-specific regression coefficients (β_1 , β_2 , β_3 , and β_4), which represent the association between physical function decline and depressive symptoms within each age interval. Bootstrap significance tests and likelihood ratio (LR) tests were used to determine the number of thresholds and to assess the statistical significance of the estimated threshold effects.

Results

Descriptive statistics

This study included 77,601 observations from five waves (2011–2020) of the CHARLS. Women accounted for 51.4% of the sample, and the mean age of participants was 60.22 years. The mean CES-D score was 8.28 (standard deviation [SD] = 6.32), indicating considerable variation in depressive symptoms among participants. Descriptive statistics for all study variables are summarized in Table 1.

Table 1
Variable Description and Descriptive Statistics(N = 77,601)

Variable type	Variable	Assignment	Mean	sd.	Minimum	Maximum
Explained v	Depression score	CES-D 10-point score, ranging 0–30	8.277	6.315	0	30
Core explanatory v	Physical function decline score	Derived from four variables through component analysis	0	0.789	-1.133	4.004
Mechanism v	Age	Year	60.223	9.439	45	94
Grouping v	Female	0 = No, 1 = Yes	0.514	0.5	0	1
Physical health status	ADLimpaired	Sum of 6 items, 0–6	0.344	0.924	0	6
	IADimpaired	Sum of 6item, 0–6	0.459	1.056	0	6
	Chronic diseases	No chronic diseases	1.738	1.58	0	6
	Self-rated health	1 = very good, 2 = good, 3 = fair, 4 = poor, 5 = very poor	2.949	0.978	1	5
Control v	Living with spouse	0 = No,1 = Yes	0.854	0.353	0	1
	Rural household	0 = No, 1 = Yes	0.764	0.425	0	1
	Recent social act	0 = No, 1 = Yes	0.494	0.5	0	1
	Living children	N =	2.556	1.341	0	13
	Employed last year	0 = No, 1 = Yes	0.662	0.473	0	1
	Household income	RMB	36555	167191	-2985090	39100000
	Officially retired	0 = No, 1 = Yes	0.151	0.358	0	1
	Receiving a pension	0 = No, 1 = Yes	0.429	0.495	0	1

Note: sd = standard deviation

Association between physical function decline and depressive symptoms

The longitudinal association between physical function decline and depressive symptoms was examined using panel regression models. Depressive symptoms, measured by the CES-D score, were specified as the dependent variable, while the physical function decline score was the primary independent variable. Age, age squared, and relevant demographic, socioeconomic, and behavioral covariates were included in all models.

Model selection supported the use of a fixed-effects approach. The overall model was statistically significant ($F = 3.07$, $p < 0.001$), and the Hausman test strongly favored the fixed-effects model over the random-effects model ($\chi^2 = 1175.61$, $p < 0.001$). Accordingly, the two-way fixed-effects model, which controlled for both individual- and time-specific effects, was considered the primary analytical model. Regression results from all model specifications are presented in Table 2.

Table 2
Benchmark Regression Results

Effect	Model 1	Model 2	Model 3	Model 4
	Fixed	Two-way fixed	Random	Random two-way fixed
Physical function decline score	2.168***	2.181***	3.074***	3.051***
	(0.052)	(0.053)	(0.034)	(0.034)
Age	0.209***	0.208***	0.180***	0.180***
	(0.044)	(0.062)	(0.028)	(0.028)
Age square	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	2.760*	2.858	4.368***	5.589***
	(1.353)	(2.730)	(0.859)	(0.864)
Control variable	+	+	+	+
Province fixed	-	-	-	+
Time fixed	-	+	-	+
Observations	77,601	77,601	77,601	77,601
Age maximum point	65.592	66.157	54.798	55.578

Note: (1) The values in brackets are robust standard errors; (2) ***, **, and * indicate that the estimated results are significant at the 0.1%, 1%, and 5% levels, respectively.

Across all four models, physical function decline was consistently and positively associated with depressive symptoms, indicating that poorer physical function was associated with higher depression scores after adjustment for potential confounding factors. The consistency of the estimated coefficients across different model specifications indicates that this association was robust.

Age and age squared were both statistically significant in all models, demonstrating a significant non-linear (inverted U-shaped) association between age and depressive symptoms. Based on the two-way fixed-effects model (Model 2), depressive symptoms increased with age until approximately 66 years and then gradually declined thereafter.

Moderating effect of age

To determine whether age modified the association between physical function decline and depressive symptoms, an interaction term between age and physical function decline was added to the two-way fixed-effects model. As shown in Model 5 (Table 3), the interaction term was statistically significant, whereas the independent effects of age and age squared were no longer significant.

Table 3
Regression results for moderating effect

Physical function decline score	Model 5	Model 6	Model 7	Model 8	Model 9
	3.929***	4.122***	4.122***		
	(0.315)	(0.294)	(0.294)		
Age	0.092	0.011		-0.034	0.089
	(0.065)	(0.042)		(0.045)	(0.065)
Age Squared	-0.001				-0.001**
	(0.000)				(0.000)
Physical function decline score * age	-0.028***	-0.031***	-0.031***		
	(0.005)	(0.005)	(0.005)		
Constant	6.456*	8.918***	9.539***	11.114***	7.419*
	(2.810)	(2.367)	(0.199)	(2.527)	(2.890)
Control variables	+	+	+	+	+
Province fixed	-	-	-	-	-
Time fixed	+	+	+	+	+
Observations	77,601	77,601	77,601	77,601	77,601
Age marginal effect	0.092	0.011		-0.034	0.089
	(0.065)	(0.042)		(0.045)	(0.065)

To evaluate the robustness of this finding, age and age squared were sequentially removed from the model. As shown in Models 6 and 7 (Table 3), both physical function decline and its interaction with age remained statistically significant. The interaction coefficient was negative, indicating that the strength of the association between physical function decline and depressive symptoms decreased with increasing age.

Additional analyses excluding both physical function decline and the interaction term (Models 8 and 9, Table 3) showed that age alone was not significantly associated with depressive symptoms, while the quadratic age term remained only marginally significant. These findings suggest that the relationship between age and depressive symptoms is primarily reflected through its interaction with physical function decline rather than through an independent effect of chronological age.

Threshold effect of age

Because the moderating effect of age appeared to be non-linear, a panel threshold fixed-effects model was further applied to identify potential age thresholds in the association between physical function decline and depressive symptoms. Following the approach proposed by Hansen (1999) and subsequently extended by Wang (2015), a balanced panel dataset comprising 31,350 observations (6,270 participants across five survey waves) was constructed for threshold analysis.

Threshold testing identified a single statistically significant age threshold ($p < 0.05$), whereas no evidence supported the presence of double or triple thresholds. The estimated threshold age for the overall sample was 57 years, indicating that the association between physical function decline and depressive symptoms differed across age groups.

Specifically, the association between physical function decline and depressive symptoms was significantly stronger among participants younger than 57 years than among those aged 57 years or older. Threshold estimates from sex-stratified analyses were 57 years for men and 55 years for women (Table 4 and Fig. 2).

Table 4
Significance of a single threshold of age

All	Threshold value	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
	57	457000	14.572	40.210	0.000	10.222	12.327	16.399
Male sample	57	196000	12.879	36.110	0.000	10.126	11.954	18.672
Female sample	55	260000	16.112	21.370	0.003	10.355	13.051	17.818

Detailed threshold regression results are presented in Table 5. Among participants below the threshold age, physical function decline showed a significantly stronger association with depressive symptoms than among those above the threshold. Age itself was not independently associated with depressive symptoms after accounting for the interaction with physical function decline, supporting the moderating role of age identified in the previous analyses.

Table 5
Results of Single-Threshold Panel Regression with Fixed Effects

Age	Model 10	Model 11	Model 12
	0.116	0.046	0.123
	(0.116)	(0.160)	(0.166)
Age squared	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.001)
Physical Function decline score			
Age < threshold	2.612***	2.547***	2.891***
	(0.105)	(0.155)	(0.161)
Age ≥ threshold	1.999***	1.707***	2.226***
	(0.074)	(0.103)	(0.102)
Constant	6.133	7.208	6.620
	(5.715)	(8.069)	(8.058)
Control variables	+	+	+
Province fixed	-	-	-
Time fixed	+	+	+
Observations	31,350	15,195	16,155
Age threshold	57	57	55

Sex-stratified analyses further demonstrated stronger associations between physical function decline and depressive symptoms among women than among men (Models 11 and 12). Women not only exhibited an earlier threshold age (55 years) but also showed larger regression coefficients both below and above the threshold, indicating a stronger association between physical function decline and depressive symptoms in women.

Discussion

Based on five waves of nationally representative longitudinal data from the CHARLS, this study investigated how age influences the association between physical function decline and depressive symptoms among middle-aged and older Chinese adults. Our findings demonstrate that physical function decline is independently associated with increased depressive symptoms, consistent with previous studies linking deteriorating physical health to poor mental health outcomes [32, 33]. From a public health perspective, these findings reinforce the importance of maintaining physical function as a

potentially modifiable factor for reducing the burden of depression in aging populations. One possible explanation is that individuals experiencing greater physical limitations than their peers may face reduced independence, restricted social participation, and increased psychological stress, all of which may contribute to depressive symptoms.

We further observed a significant non-linear association between age and depressive symptoms, characterized by an inverted U-shaped pattern, with depressive symptoms peaking at approximately 66 years of age. This finding is consistent with several previous studies [34, 35], although inconsistent age-related patterns, including positive linear [36, 37] and U-shaped associations [38], have also been reported. Such discrepancies may reflect differences in study populations, longitudinal versus cross-sectional designs, depression assessment tools, socioeconomic contexts, and cultural backgrounds.

Importantly, after incorporating the interaction between age and physical function decline into the regression model, the independent association between age and depressive symptoms was no longer statistically significant, whereas the interaction term remained significant. This finding suggests that age primarily modifies rather than directly influences the association between physical function decline and depressive symptoms. Specifically, the adverse association between physical decline and depression gradually weakened with increasing age. Several mechanisms may explain this pattern. Older adults may gradually adapt to age-related functional limitations through psychological adjustment, modified expectations regarding health, or increased acceptance of age-related physical decline, thereby reducing the emotional impact of functional deterioration. Similar findings have been reported in previous studies [39, 40]. However, conflicting evidence exists. For example, one study found that subjective age, rather than chronological age, did not significantly modify the relationship between physical illness and depression [41]. These inconsistencies highlight the complexity of the relationship and suggest that both biological aging and psychosocial factors may contribute to differences across populations.

Threshold regression analysis further demonstrated that the moderating effect of age was non-linear, identifying a significant age threshold of 57 years. Below this threshold, physical function decline showed a substantially stronger association with depressive symptoms, whereas the association remained significant but was attenuated above this age. Sex-stratified analyses further revealed an earlier threshold among women (55 years) than men (57 years), with consistently stronger associations between physical function decline and depressive symptoms in women across both age groups. These findings suggest that women may experience greater psychological vulnerability to physical function decline and may enter this vulnerable period at an earlier age. This observation is consistent with previous reports of sex differences in depression among older adults [42].

Several biological and psychosocial mechanisms may contribute to these sex differences. The decline in estrogen during the menopausal transition may increase susceptibility to depression through effects on neurotransmitter regulation, neuroinflammation, and stress responsiveness. In addition, women often experience greater caregiving responsibilities, socioeconomic disadvantages, and psychosocial stressors across the life course, which may further amplify the mental health consequences of physical

function decline [43, 44]. These interacting biological and social determinants underscore the importance of adopting a life-course and gender-sensitive approach to depression prevention.

The present findings have several important public health implications. First, maintaining physical function should be considered an integral component of depression prevention and healthy aging strategies. Community-based interventions that promote regular physical activity, balanced nutrition, chronic disease management, and functional independence may provide substantial mental health benefits for middle-aged and older adults. Second, the identification of an age threshold suggests that preventive interventions should begin before substantial physical decline occurs, particularly during late middle age, when the psychological impact of declining physical function appears to be greatest. Early screening and intervention may therefore reduce the future burden of depression. Third, women should be regarded as a priority population for targeted prevention because of their earlier threshold age and stronger association between physical decline and depressive symptoms. Gender-responsive public health programs incorporating functional assessment, exercise promotion, mental health screening, and psychosocial support may improve both physical and mental well-being in this vulnerable population.

Several strengths of this study should be acknowledged. The use of nationally representative longitudinal data from CHARLS enhances the generalizability of the findings to middle-aged and older adults in China. The fixed-effects panel design reduces bias arising from unmeasured time-invariant individual characteristics, and the combined application of moderation and threshold analyses provides novel insights into the complex age-dependent relationship between physical function decline and depressive symptoms.

This study also has several limitations. First, although the longitudinal panel design strengthens temporal inference, causal relationships cannot be definitively established because of the observational nature of the study. Second, depressive symptoms were measured using the CES-D rather than clinical diagnoses of depression, which may have resulted in some degree of outcome misclassification. Third, residual confounding from unmeasured time-varying factors, such as changes in social support, major life events, or healthcare access, cannot be completely excluded. Finally, because the study population consisted of Chinese adults, caution is warranted when generalizing these findings to populations with different cultural, socioeconomic, or healthcare contexts. Future longitudinal and cross-cultural studies are needed to validate these findings and further elucidate the biological and psychosocial mechanisms underlying the observed age- and sex-specific associations.

Abbreviations

ADL

activities of daily living

CES-D

Center for Epidemiologic Studies Depression

CHARLS

China Health and Retirement Longitudinal Study

IADL

instrumental activities of daily living

KMO

Kaiser-Meyer-Olkin

PCA

principal component analysis

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable

Availability of data and materials

All data used in this study are publicly available from the China Health and Retirement Longitudinal Study (CHARLS) (2011–2020). The datasets are available to researchers upon registration and approval through the official CHARLS data repository.

Competing interests

The authors declare that they have no competing interests

Funding

Final evaluation of the three-year (2020-2022) action plan for strengthening the weak links in the public health system in Hubei Province

Authors' contributions

HCY conducted the study, including data acquisition, data analysis, and preparation of the initial manuscript draft. QW conceived and designed the study and provided guidance on the data analysis. YAL supervised the manuscript preparation and critically revised the manuscript. All authors reviewed and approved the final version of the manuscript.

Acknowledgements

None

Authors' information (optional)

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Figures

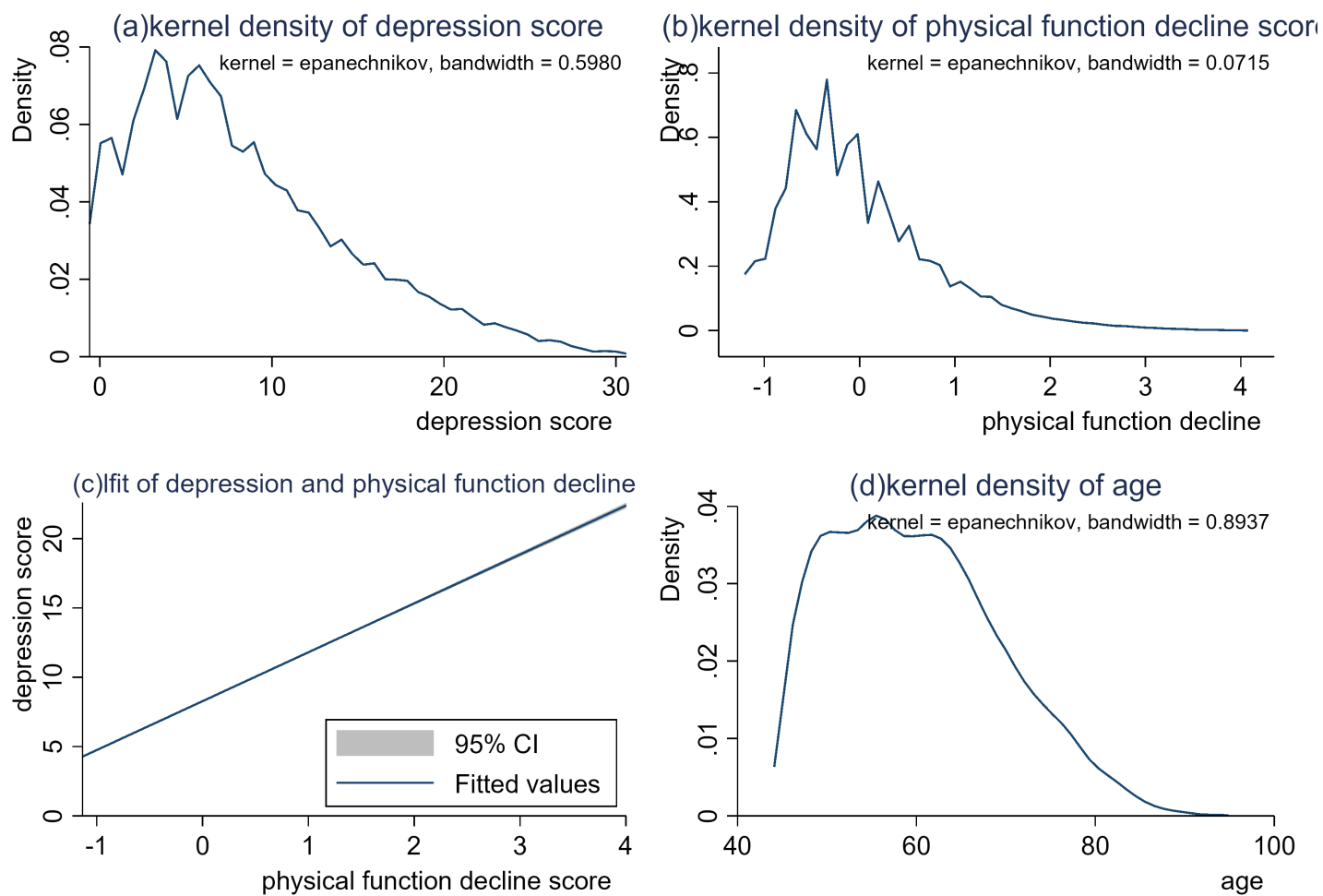


Figure 1

Distribution and correlation of main variables

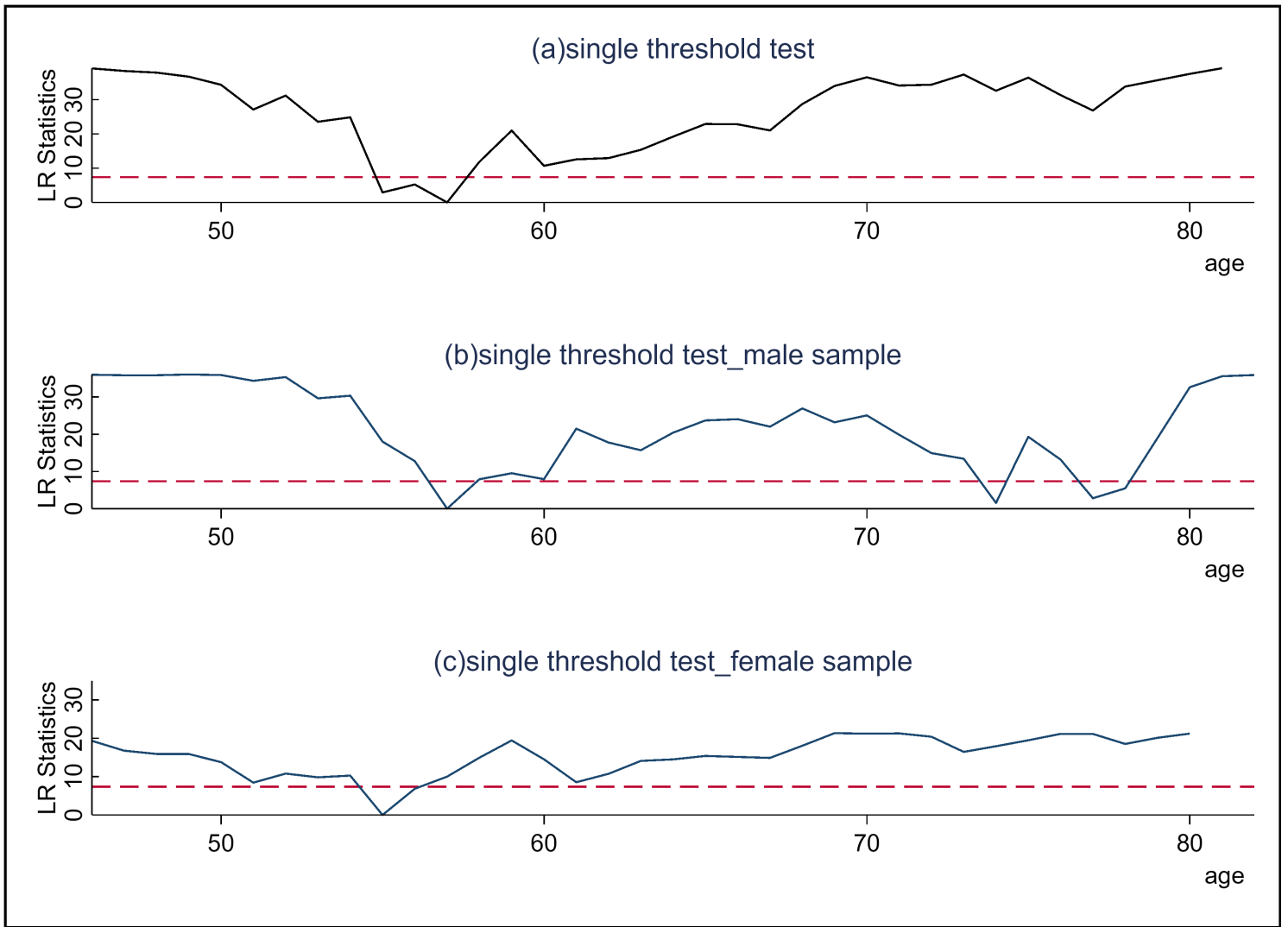


Figure 2

Results of single threshold test. The solid line in the figure indicates the LR value about the threshold confidence interval while the dashed line in the figure indicates the LR value of 7.35 when $\alpha = 0.05$.