

Study on the Influencing Factors of Depression Among Middle-aged and Elderly Individuals Based on CHARLS 2020

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Abstract

Background: The understanding of depression's prevalence in this demographic and the exploration of its influencing factors are crucial in devising effective prevention and intervention strategies. The current study aims to establish a theoretical basis for preventing and intervening in depressive tendencies among middle-aged and elderly individuals, ultimately aiming to reduce the incidence of depression and improve their overall quality of life. **Methods:** The data for this study were obtained from the 2020 China Health and Retirement Longitudinal Study (CHARLS), encompassing a total of 16,165 participants aged 45 years and above. To assess depression tendency, the simplified version of the Epidemiological Depression Scale (CES-D-10), a validated screening tool, was employed. The collected data were then subjected to rigorous statistical analysis using SPSS 25.0 software. Binary logistic regression models were utilized to examine the potential influencing factors associated with depression tendency among the study participants. **Results:** Of the 16,165 participants in the study, 5,321 individuals scored above 10 on CES-D-10, indicating a depression prevalence of 32.90% among the middle-aged and elderly population in China. Binary logistic regression analysis revealed several significant factors associated with depression in this demographic. Specifically, gender, place of residence, marital status, average sleep duration, habitual napping, exceeding average household expenditure, self-reported health status, and presence of bodily pain were identified as potential contributors to depression tendencies among middle-aged and elderly individuals. **Conclusion:** Based on the thorough investigation and analysis of the CHARLS 2020 data, it is evident that depression among middle-aged and elderly individuals is influenced by a multifaceted array of factors. For this specific target population, particular emphasis should be placed on individuals who are female, reside in suburban or rural areas, are divorced or have never married, experience short sleep duration (< 6 hours), habitually nap during the day, report poor self-assessed health, and frequently experience physical pain. Targeted preventive measures focusing on these vulnerable subgroups are paramount. Furthermore, timely psychological intervention for middle-aged and elderly individuals experiencing depressive symptoms is crucial to enhance their overall quality of life. By addressing these risk factors and providing appropriate support, we can contribute significantly to improving the mental health and well-being of middle-aged and elderly individuals in China.

Keywords

Middle-aged and elderly; Depression; Influencing factors; CHARLS

1. Background

As the body's organs undergo the natural process of aging, there is a concomitant decline in various physical functions, often resulting in difficulties in daily living activities for the elderly. Concurrently, the lack of adequate attention and support from both family members and society can lead to a range of psychological concerns among older individuals. Among these, depression stands as a salient indicator for assessing mental health status and remains a prevalent mood disorder among older adults [1-3]. Early manifestations of depression include insomnia [4], loss of appetite [5], persistent feelings of sadness, and suicidal ideation [6].

According to recent statistics, the global prevalence of depression among adults is approximately 5%. In China's mental health survey, the lifetime prevalence of depression among adults is reported as 6.8%, with a current prevalence rate of 3.4%. The observed depression prevalence of 32.90% is higher than the global average of 5% among adults, indicating a significant mental health concern in China's middle-aged and elderly population. This translates to a staggering total of 95 million individuals currently affected by depression in our country.

Alarmingly, approximately 280,000 suicides occur annually, with 40% of these individuals experiencing depression [7].

In this context, investigating the factors that influence depression tendencies among middle-aged and elderly individuals holds significant value for the development of targeted mental health intervention strategies. Such strategies aim to enhance the mental well-being and overall quality of life among this demographic. While previous studies have identified numerous factors associated with depression in the elderly, including gender, age [8-10], and marital status, there remain gaps in the literature. These include limitations in variable selection and sample size, which may hinder the comprehensiveness and reliability of findings.

To address these gaps, our study utilizes data from the China Health and Retirement Longitudinal Study (CHARLS) published in 2020. By analyzing this dataset, we aim to provide a more comprehensive understanding of the factors that influence depression tendencies among middle-aged and elderly Chinese individuals. Our study boasts a larger sample size, wider research scope, and more representative selection of influencing factors compared to previous works. Ultimately, this article aims to deepen our understanding of depression, serve as a reference for improving the mental health of the elderly and reducing depression prevalence, and facilitate the development of effective prevention, control, and intervention strategies.

2. Methods

2.1 Objectives of the study

The dataset utilized in this study is drawn from the China Health and Retirement Longitudinal Study (CHARLS) repository [11], a nationally representative cohort that encompasses Chinese adults aged 45 years and above. Participants were recruited using a stratified multistage probability random cluster sampling strategy, proportional to size, from 450 villages or communities spanning 150 districts in 28 provinces. The specific data for this analysis stem from the newly released 2020 National Tracking Survey conducted by CHARLS.

The inclusion criteria for our study were set as follows: (1) participants must be aged 45 years or older, and (2) they must provide clear and unambiguous responses to the CES-D-10 depression screening instrument. Conversely, individuals were excluded if (1) they had missing information on the depression scales or (2) lacked data on pertinent variables. After applying these criteria, a total of 8,025 middle-aged and elderly individuals were included in our analysis.

Ethical approval for the use of CHARLS data was obtained from the Ethics Review Board of Peking University (No. IRB00001052-11015). All participants provided informed consent as part of the original CHARLS study, ensuring their rights and well-being were upheld throughout the research process. The essential details of the researchers involved in this study are presented in Table 1.

Table 1. Basic information about the study subjects

Subgroup		No depression	Depression
Gender	male	5,780	1,929
	female	5,064	3,392
Residential location	city	2,980	966
	town	1,457	548
	village	6,393	3,799
	special area	13	6
Marital status	married	9,634	4,350
	solitary	1,170	935
	never married	40	36
Average hours of sleep	<6 h	5,893	3,819
	6-9h	4,604	1,353
	>9 h	347	149
Nap	0 min	3,643	2,128
	<=30 min	2,080	951
	> 30 min	5,067	2,212
physical activity level	Low intensity	1,380	826
	Moderate intensity	2,631	1,075
	High intensity	5,494	2,768
Self-rated health	good	3,533	563
	general	5,676	2,522
	not good	1,635	2,236
Pain	seldom	8,815	2,865
	sometimes	953	702
	often	1,076	1,754
Ever Smoked	NO	5,900	3,442
	YES	238	76
Drink	NO	4,533	1,534
	YES	6,311	3,787
Education	Primary school or below	416	238
	Junior high school	227	78
	High school or technical secondary school	199	37
	University or above	20	4

2.2 Investigation content relevant to this study

In the current literature, numerous studies have delved into the multifaceted factors that influence depression among the elderly [12-17]. This present investigation seeks to further explore this complex relationship by selecting specific variables, including gender, education level, residence, marital status, sleep duration, daytime nap habits, smoking status, alcohol consumption, whether monthly expenditure exceeds the average, self-assessed health, and physical

pain. The aim is to analyze the associations between these variables and depression in order to gain a deeper understanding of the risk factors and protective factors among this vulnerable population.

2.3 Assessment of depressive symptoms

The CHARLS employs a condensed version of the CES-D-10 scale, originally devised by RADLOFF, which has demonstrated robust reliability and validity in previous research [9]. This instrument is particularly suited for use in middle-aged and older populations. The CES-D-10 comprises 10 items, each with a four-point Likert scale ranging from "3=always" to "0=never," with the fifth and eighth items scored in reverse. The total score ranges from 0 to 30, where higher scores indicate more severe depression symptoms.

In alignment with prior studies conducted on middle-aged and elderly individuals, the current research adopted a threshold score of 10 as the criterion for identifying depression. Specifically, a score of 10 or above was considered indicative of depression [18].

2.4 Statistical methods

Data from the CHARLS 2020 survey were analyzed using SPSS 25.0 software. Categorical variables were summarized using frequencies. The chi-squared (χ^2) test was employed to compare differences across groups, while binary logistic regression analysis was utilized to assess the associations between various influencing factors and the tendency towards depression in the elderly. Statistical significance was set at a *P*-value of < 0.05. The variable assignments and corresponding coding are detailed in Table 2.

Table 2. Assignment of independent variables

Variables	Assignment
Gender	0=male, 1=female
Residential location	0=city, 1=town, 2=village, 3=special area
Marital status	0=married, 1=solitary, 2=never married
Average hours of sleep	0='<6 h'; 1='6-9 h'; 2='>9 h'
Nap	0= '0 min', 1= '<=30 min', 2= '>30 min'
physical activity level	0='low intensity', 1='Moderate intensity', 2='High intensity'
Self-rated health	1=good, 2=general, 3=not good
Pain	1=seldom, 2=sometimes, 3=often
Ever Smoked	0=NO, 1=YES
Drink	0=NO, 1=YES
Education	0=Primary school or below, 1=Junior high school, 2=High school or technical secondary school, 3=University or above

A univariate analysis was conducted to explore the prevalence of depression among middle-aged and elderly individuals. Of the 16,165 participants, 5,321 (32.90%) were identified as having depression, while the remaining 10,844 (67.10%) did not.

In our analysis, middle-aged and elderly individuals with depression exhibited statistically significant differences in several demographic, lifestyle, and health-related variables compared to those without depression ($P < 0.05$). Specifically, these variables included gender, residence, marital status, average sleep duration, napping habits, exceeding monthly average expenditures, alcohol consumption, smoking status, education level, self-rated health, and physical pain. The comprehensive findings are outlined in Table 3.

To further explore the underlying factors associated with depression in this population, we conducted a binary logistic regression analysis. Our results indicate that gender, place of residence, marital status, average sleep duration, napping habits, exceeding monthly average expenditures, self-rated health, and physical pain are significant predictors of depression occurrence among middle-aged and elderly individuals. The comprehensive findings are outlined in Table 4.

Table 3. Comparison of depression degree among middle-aged and elderly people with different indicators

Subgroup		No depression	Depression	χ^2	<i>P</i> value
Gender	male	5,780	1,929	415.893	<0.001
	female	5,064	3,392		
Residential location	city	2,980	966	243.187	<0.001
	town	1,457	548		
	village	6,393	3,799		
	special area	13	6		
Marital status	married	9,634	4,350	154.03	<0.001
	solitary	1,170	935		
	never married	40	36		
Average hours of sleep	<6 h	5,893	3,819	463.222	<0.001
	6-9h	4,604	1,353		
	>9 h	347	149		
Nap	0 min	3,643	2,128	65.266	<0.001
	<=30 min	2,080	951		
	> 30 min	5,067	2,212		
physical activity level	Low intensity	1,380	826	47.389	<0.001
	Moderate intensity	2,631	1,075		
	High intensity	5,494	2,768		
Self-rated health	good	3,533	563	1,781.198	<0.001
	general	5,676	2,522		
	not good	1,635	2,236		
Pain	seldom	8,815	2,865	1,522.22	<0.001
	sometimes	953	702		
	often	1,076	1,754		
Ever Smoked	NO	5,900	3,442	20.959	<0.001
	YES	238	76		
Drink	NO	4,533	1,534	256.22	<0.001
	YES	6,311	3,787		
Education	Primary school or below	416	238	40.921	<0.001
	Junior high school	227	78		
	High school or technical secondary school	199	37		
	University or above	20	4		

Table 4. Binary logistic regression analysis of depressive symptoms in middle-aged and older adults

Subgroup		OR Value	P Value
Gender	male		
	female	1.646 (1.508~1.798)	<0.001
Residential location	city		
	town	1.219 (1.058~1.405)	0.006
	village	1.729 (1.567~1.908)	<0.001
	special area	2.214 (0.773~6.344)	0.139
Marital status	married		
	solitary	1.530 (1.368~1.712)	<0.001
	never married	1.673 (0.986~2.838)	0.056
Average hours of sleep	<6 h		
	6-9h	0.556 (0.510~0.605)	<0.001
	>9 h	0.680 (0.541~0.855)	0.001
Nap	0 min		
	<=30 min	0.880 (0.786~0.984)	0.025
	> 30 min	0.925 (0.848~1.010)	0.081
physical activity level	Low intensity		
	Moderate intensity	0.867 (0.764~0.984)	0.027
	High intensity	1.040 (0.931~1.163)	0.485
Self-rated health	good		
	general	2.272 (2.034~2.538)	<0.001
	not good	4.625 (4.071~5.253)	<0.001
Pain	seldom		
	sometimes	1.619 (1.432~1.830)	<0.001
	often	2.627 (2.364~2.918)	<0.001
Drink	NO		
	YES	1.171 (1.069~1.282)	0.001

3. Discussion

The current research underscores an alarmingly high prevalence of depression among middle-aged and elderly individuals, reaching 32.90% of the studied population. This finding highlights the gravity of mental health concerns within this demographic group. Self-rated health (SRH), an individual's subjective evaluation of their overall health status, is a widely accepted metric for assessing individual health levels, as advocated by the World Health Organization [19]. Moreover, SRH has been established as a predictive factor for the development of cardiovascular diseases [20, 21] and mental disorders [22], further emphasizing its significance. Our study identified SRH as a crucial factor influencing the occurrence of depression in middle-aged and elderly individuals. Binary logistic regression analysis revealed an inverse relationship between SRH scores and depression, indicating that individuals with higher SRH scores exhibited a lower likelihood of depression, consistent with previous research [23]. Specifically, individuals with poor SRH had a twofold increased risk of depression compared to those with average SRH, and a fourfold increased risk compared to those with good SRH. Given these compelling results, relatives and community workers involved in the care of middle-aged and elderly individuals should prioritize the monitoring and enhancement of SRH. By attending to SRH, we can potentially improve the overall well-being of this vulnerable population and mitigate the risk of depression and its associated negative outcomes.

In this study, sleep duration emerged as a significant determinant of depression among middle-aged and elderly individuals. Our findings indicate that individuals who sleep for between 6 and 9 hours have the lowest risk of depression, whereas those sleeping for less than 6 hours face the highest risk. Conversely, those sleeping for more than 9 hours exhibit a moderate risk of depression. This suggests that both insufficient and excessive sleep contributes to the risk of depression among the elderly, consistent with prior research [18].

One potential explanation for the elevated risk of depression with prolonged sleep may curtail physical activity, reducing endorphin secretion, which is crucial for stress mitigation and mood regulation [24, 25]. Conversely, insufficient sleep can lead to inflammation, which has been linked to increased neural sensitivity to inflammatory responses and thus higher depression risk [26].

Therefore, middle-aged and elderly individuals should monitor their sleep duration and promptly intervene if they experience prolonged insufficient or excessive sleep to prevent depression. Furthermore, napping was also identified

as a notable factor influencing depression. Our results reveal that middle-aged and elderly individuals who nap have a lower risk of depression compared to those who do not. However, excessive napping frequency and prolonged nap durations have been found to hinder concentration, thereby increasing depression risk among the elderly [27]. Hence, elderly individuals should be mindful of regulating the frequency and duration of their naps.

The marital status of middle-aged and elderly individuals constitutes a noteworthy factor in the occurrence of depression. Our study reveals that those living alone, divorced, or widowed have approximately double the risk of depression compared to their married and cohabiting counterparts. Existing research concurs, suggesting that regardless of gender, these individuals tend to experience heightened feelings of loneliness and a perceived decline in quality of life [28], significantly impacting their mental health and emotional well-being. Individuals who are divorced, widowed, or living alone may experience increased loneliness and a perceived decline in quality of life, which are known to significantly impact mental health and emotional well-being.

However, engaging in social activities or remarriage has been shown to positively influence the mental health of single middle-aged and elderly individuals [29]. Consequently, in attending to the mental health needs of this population, community workers should actively encourage participation in social activities, fostering a positive impact on their mental well-being.

Furthermore, there exist substantial variations in the occurrence of depression among middle-aged and elderly individuals across genders, residential locations, monthly average expenditures, and physical pain conditions. Our findings indicate that female middle-aged and elderly individuals have approximately 1.5 times higher risk of depression compared to males, consistent with previous research [30]. This discrepancy may stem from disparities in self-perceived socioeconomic status and social participation [31] between genders.

The residential location also significantly influences depression prevalence among this age group. Middle-aged and elderly individuals residing in suburban or rural areas are more likely to experience depression than those in urban areas. This trend may be attributed to factors such as inconvenient transportation, lower education levels, and income levels among rural residents [32].

Notably, the higher the monthly average expenditure of elderly individuals, the lower their risk of depression. This finding underscores the importance of paying greater attention to the mental health of female middle-aged and elderly individuals, as well as enhancing their income and economic status to mitigate depression risk.

Moreover, a higher frequency of physical pain is associated with a greater likelihood of depression among middle-aged and elderly individuals. Thus, taking effective measures to reduce physical pain frequency can effectively lower depression risk in this population. Additionally, improving physical function in elderly individuals can also contribute to depression prevention [33].

The current study is not without its limitations. Notably, the prevalence of depression among the middle-aged and elderly cohort in this research exceeded the standard benchmark, potentially due to the skewed demographic distribution of the 16165 participants. Specifically, the majority were female and resided in rural areas, resulting in a sample depression prevalence rate that is notably elevated compared to the general middle-aged and elderly population. Furthermore, the reliance solely on variables from the CHARLS 2020 database may constrain the analysis of factors influencing depression occurrence, thereby limiting the generalizability and comprehensiveness of the study findings.

4. Conclusion

In this study, the occurrence of depression among middle-aged and elderly individuals in China is multifaceted, and influenced by diverse factors. Consequently, a multifaceted approach is warranted to enhance the mental health of this population. This includes regular community and hospital-based monitoring of mental health status, with a particular emphasis on those with poor self-rated health, individuals living alone, divorced or widowed, rural residents, those with inadequate sleep, and those experiencing frequent physical pain. For those middle-aged and elderly individuals diagnosed with depression, proactive interventions such as community engagement and regular psychological counseling should be implemented to promptly address their mental health needs and improve their quality of life.

It is noteworthy that the factors examined in this study are derived from the CHARLS 2020 database, with all participants selected from this dataset. As such, the analysis of depression occurrence may be subject to specific limitations stemming from the database's variables and participant pool. Future research should aim to include a more diverse and representative sample to validate the findings. Additionally, exploring the impact of cultural factors and regional variations on depression prevalence could provide a more comprehensive understanding of mental health in China's aging population.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

We agreed to publish, without any dispute.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Authors' contributions

Shuwen Deng wrote the main manuscript text and Qiyu Wang thoroughly analyzed the data from CHARLS 2020. All authors reviewed the manuscript.

Availability of data and materials

The dataset utilized in this study is drawn from the China Health and Retirement Longitudinal Study (CHARLS) repository, a nationally representative cohort that encompasses Chinese adults aged 45 years and above. Participants were recruited using a stratified multistage probability random cluster sampling strategy, proportional to size, from 450 villages or communities spanning 150 districts in 28 provinces. The specific data for this analysis stem from the newly released 2020 National Tracking Survey conducted by CHARLS. The dataset used in this study is publicly available through the CHARLS repository. Interested researchers can access the data by following the procedures outlined on the CHARLS website (<https://charls.pku.edu.cn/>), which includes an application process and data use agreement.

References

- [1] Sjöberg L, Karlsson B, Atti A-R, Skoog I, Fratiglioni L, Wang HX. Prevalence of depression: Comparisons of different depression definitions in population-based samples of older adults. *Journal of Affective Disorders*. 2017;221:123-131.
- [2] Nair P, Bhanu C, Frost R, Buszewicz M, Walters KR. A Systematic Review of Older Adults' Attitudes Towards Depression and Its Treatment. *The Gerontologist*. 2020;60(1):e93-e104.
- [3] Devita M, De Salvo R, Ravelli A, De Rui M, Coin A, Sergi G, Mapelli D. Recognizing Depression in the Elderly: Practical Guidance and Challenges for Clinical Management. *Neuropsychiatric Disease and Treatment*. 2022;18:2867-2880.
- [4] Zhou RJ, Bailey B, Strunk DR. Testing the reciprocal relationship between depressive symptoms and insomnia. *Journal of Clinical Psychology*. 2024;80(6):1391-1404.
- [5] Kawaharada R, Sugimoto T, Uchida K, Murata S, Tsuboi Y, Isa T, Nakatsuka K, Horibe K, Ono R. Indirect effects of social activity on appetite via depressive symptoms in community-dwelling older adults: A cross-sectional study. *Appetite*. 2022;168:105705.
- [6] Trimble DG, Chandran A. Associations Between Sad Feelings and Suicide Behaviors in the 2019 Youth Risk Behavior Survey: A Call for Action. *Frontiers in Pediatrics*. 2021;9.
- [7] Lu J, Xu X, Huang Y, Li T, Ma C, Xu G, Yin H, Xu X, Ma Y, Wang L, et al. Prevalence of depressive disorders and treatment in China: a cross-sectional epidemiological study. *The Lancet Psychiatry*. 2021;8(11):981-990.
- [8] Lim EJ. Sex Differences in Factors Affecting Depressive Symptoms in Older People in the Prefrailty Phase. *International Journal of Environmental Research and Public Health*. 2020;17(12):4207.
- [9] Li MJ, Kechter A, Olmstead RE, Irwin MR, Black DS. Sleep and mood in older adults: coinciding changes in insomnia and depression symptoms. *International Psychogeriatrics*. 2017;30(3):431-435.

- [10] Srivastava S, Debnath P, Shri N, Muhammad T. The association of widowhood and living alone with depression among older adults in India. *Scientific Reports*. 2021;11(1):21641.
- [11] Zhao Y, Hu Y, Smith JP, Strauss J, Yang G. Cohort Profile: The China Health and Retirement Longitudinal Study (CHARLS). *International Journal of Epidemiology*. 2014;43(1):61-68.
- [12] Issler O, Nestler EJ. The molecular basis for sex differences in depression susceptibility. *Current Opinion in Behavioral Sciences*. 2018;23:1-6.
- [13] Mezuk B, Eaton WW, Golden SH, Ding Y. The Influence of Educational Attainment on Depression and Risk of Type 2 Diabetes. *American Journal of Public Health*. 2008;98(8):1480-1485.
- [14] Muhammad T. Life course rural/urban place of residence, depressive symptoms and cognitive impairment among older adults: findings from the Longitudinal Aging Study in India. *BMC Psychiatry*. 2023;23(1):391.
- [15] Capisizu A, Aurelian S, Zamfirescu A, Omer I, Haras M, Ciobotaru C, Onose L, Spiricu T, Onose G. Findings Regarding the Relationships Between Sociodemographic, Psychological, Comorbidity Factors, and Functional Status, in Geriatric Inpatients. In: *GeNeDis 2014: 2015// 2015*; Cham: Springer International Publishing; 2015. Pp. 45-55.
- [16] Amelia VL, Jen H-J, Lee T-Y, Chang L-F, Chung M-H. Comparison of the Associations Between Self-Reported Sleep Quality and Sleep Duration Concerning the Risk of Depression: A Nationwide Population-Based Study in Indonesia. *International Journal of Environmental Research and Public Health*. 2022;19.
- [17] Wu Z, Yue Q, Zhao Z, Wen J, Tang L, Zhong Z, Yang J, Yuan Y, Zhang X. A cross-sectional study of smoking and depression among US adults: NHANES (2005-2018). *Frontiers in Public Health*. 2023;11.
- [18] Dong L, Xie Y, Zou X. Association between sleep duration and depression in US adults: A cross-sectional study. *Journal of Affective Disorders*. 2022;296:183-188.
- [19] Fan Y, He D. Self-rated health, socioeconomic status and all-cause mortality in Chinese middle-aged and elderly adults. *Scientific Reports*. 2022;12(1):9309.
- [20] Rumsfeld JS, Alexander KP, Goff DC, Graham MM, Ho PM, Masoudi FA, Moser DK, Roger VL, Slaughter MS, Smolderen KG, et al. Cardiovascular Health: The Importance of Measuring Patient-Reported Health Status. *Circulation*. 2013;127(22):2233-2249.
- [21] Dong W, Pan X-F, Yu C, Lv J, Guo Y, Bian Z, Yang L, Chen Y, Wu T, Chen Z, et al. Self-Rated Health Status and Risk of Incident Stroke in 0.5 Million Chinese Adults: The China Kadoorie Biobank Study. *J Stroke*. 2018;20(2):247-257.
- [22] Chang-Quan H, Xue-Mei Z, Bi-Rong D, Zhen-Chan L, Ji-Rong Y, Qing-Xiu L. Health status and risk for depression among the elderly: a meta-analysis of published literature. *Age and Ageing*. 2010;39(1):23-30.
- [23] Huang C-Q, Dong B-R, Lu Z-C, Yue J-R, Liu Q-X. Chronic diseases and risk for depression in old age: A meta-analysis of published literature. *Ageing Research Reviews*. 2010;9(2):131-141.
- [24] Janal MN, Colt EWD, Clark CW, Glusman M. Pain sensitivity, mood and plasma endocrine levels in man following long-distance running: Effects of naloxone. *PAIN*. 1984;19(1).
- [25] Salmon P. Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. *Clinical Psychology Review*. 2001;21(1):33-61.
- [26] Irwin MR, Opp MR. Sleep Health: Reciprocal Regulation of Sleep and Innate Immunity. *Neuropsychopharmacology*. 2017;42(1):129-155.
- [27] Cross N, Terpening Z, Rogers NL, Duffy SL, Hickie IB, Lewis SJG, Naismith SL. Napping in older people 'at risk' of dementia: relationships with depression, cognition, medical burden and sleep quality. *Journal of Sleep Research*. 2015;24(5):494-502.
- [28] Pengpid S, Peltzer K, Anantanasuwong D. Marital status, marital transition and health behavior and mental health outcomes among middle-aged and older adults in Thailand: A national longitudinal study. *Archives of Gerontology and Geriatrics*. 2024;117:105196.
- [29] Zulkarnain A, Korenman S. Divorce and health in middle and older ages. *Review of Economics of the Household*. 2019;17(4):1081-1106.
- [30] Muhammad T, Maurya P. Gender differences in the association between perceived income sufficiency and self-rated health among older adults: A population-based study in India. *Journal of Women & Aging*. 2023;35(2):168-182.
- [31] Choi E, Han K-M, Chang J, Lee YJ, Choi KW, Han C, Ham B-J. Social participation and depressive symptoms in community-dwelling older adults: Emotional social support as a mediator. *Journal of Psychiatric Research*. 2021;137:589-596.
- [32] Kim A-R, Park J-H, Park HY. Analysis of Factors Affecting Depression in Older Adults in South Korea. *International Journal of Environmental Research and Public Health*. 2021;18.
- [33] Sim H-S, Lee S-G, Kim T-H. Physical Functioning, Depressive Symptoms, and Suicidal Ideation among Older Korean Adults. *International Journal of Environmental Research and Public Health*. 2021;18.