Postprint: Knowledge-Attitude-Practice Patterns and Cognitive Function Differences in Dementia Risk Reduction Among Community-Dwelling Middle-Aged and Older Adults

Authors: Peng Yan, Liu Xiao, Zhang Jinying, Li Jie, Deng Menghui, Li Yuanyuan, Yang Yanni, Yang Yanni

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Abstract

Background Lifestyle behaviors represent important modifiable risk factors for dementia, while knowledge and beliefs are crucial determinants influencing lifestyle. However, typological research on knowledge, beliefs, and behaviors for dementia risk reduction remains scarce, and it remains unknown whether dementia risk and cognitive function differ among individuals with different knowledge-belief-practice typologies.

Objective To investigate the current status of knowledge, beliefs, and behaviors for dementia risk reduction among community-dwelling middle-aged and elderly populations, explore and characterize knowledge-belief-practice typologies and their cognitive function differences, and provide evidence for developing targeted community-based dementia prevention measures.

Methods From March 2021 to February 2022, middle-aged and elderly residents who participated in free physical examinations and established health management records at community health service centers in 5 communities of Shapingba District, Chongqing, were selected using convenience sampling. Data were collected using a general information questionnaire, Dementia Knowledge Assessment Scale (DKAS), Motivation to Change Lifestyle and Health Behaviors to Reduce Dementia Risk Scale (MCLHB-DRR), Dementia Risk-Reducing Lifestyle Scale (DRRLS), Montreal Cognitive Assessment (MoCA) Beijing version, and Cardiovascular Risk Factors, Aging, and Dementia (CAIDE) Risk Score. K-means cluster analysis was employed to classify residents' knowledge, beliefs, and behaviors regarding dementia risk reduction, and differences in general information, cognitive function, and dementia risk among typologies were compared and analyzed.

Results A total of 232 questionnaires were distributed, with 211 valid questionnaires recovered (effective response rate: 90.9%). Cluster analysis revealed that knowledge, beliefs, and behaviors for dementia risk reduction among community middle-aged and elderly individuals could be classified into three distinct types: optimal knowledge-belief-practice type, low knowledge-poor practice type, and low belief-poor practice type, representing 39.8% (84/211), 37.4% (79/211), and 22.7% (48/211) of the sample, respectively. The optimal knowledge-belief-practice type had significantly more years of education than the low knowledge-poor practice type ($t = 2.703$, $P < 0.001$) and the low belief-poor practice type ($t = 1.524$, $P = 0.022$). CAIDE scores for both the low knowledge-poor practice type and low belief-poor practice type were higher than those for the optimal knowledge-belief-practice type ($t = 1.431$, $P < 0.001$; $t = 1.080$, $P = 0.002$, respectively). MoCA scores for the low knowledge-poor practice type were lower than those for the optimal knowledge-belief-practice type and the low belief-poor practice type ($t = -2.529$, $P < 0.001$; $t = -1.869$, $P = 0.018$, respectively).

Conclusion Knowledge-belief-practice typologies for dementia risk reduction among middle-aged and elderly individuals in Chongqing can be classified into optimal knowledge-belief-practice type, low knowledge-poor practice type, and low belief-poor practice type, with significant differences observed in years of education, dementia risk, and cognitive function scores among typologies. Developing targeted dementia prevention measures based on the characteristics of different knowledge-belief-practice typologies may effectively reduce dementia risk and maintain or slow cognitive decline.

Full Text

Types of Knowledge, Beliefs, and Behaviors for Reducing Dementia Risk in Community-Dwelling Middle-Aged and Elderly Adults: A Study of Cognitive Function Differences

PENG Yan[1], LIU Xiao[1], ZHANG Jinying[1], LI Jie[2], DENG Menghui[1], LI Yuanyuan[1], YANG Yanni[1]*

[1] Department of Fundamental Nursing, School of Nursing, Army Medical University (Third Military Medical University), Chongqing 400038, China
[2] Tongjiaqiao Community Health Service Center, Shapingba District, Chongqing 400038, China

Corresponding author: YANG Yanni, Professor/Doctoral supervisor; E-mail: yangyanni@tmmu.edu.cn

Abstract

Background: Lifestyle behaviors represent important modifiable risk factors for dementia, while knowledge and beliefs critically influence lifestyle choices. However, research on typologies of knowledge, beliefs, and behaviors related to dementia risk reduction remains scarce, and whether dementia risk and cognitive function differ across these typologies is unknown.

Objective: To examine the current state of knowledge, beliefs, and behaviors for dementia risk reduction among community-dwelling middle-aged and elderly adults; to identify distinct typologies of knowledge-belief-practice (KBP) regarding dementia risk reduction; and to analyze differences in cognitive function across these typologies to inform targeted community-based dementia prevention strategies.

Methods: From March 2021 to February 2022, middle-aged and elderly adults ($ $45 years) who participated in free health checkups and established health management records at five community health centers in Shapingba District, Chongqing, were recruited through convenience sampling. Participants completed the General Information Questionnaire, Dementia Knowledge Assessment Scale (DKAS), Motivation to Change Lifestyle and Health Behaviors for Dementia Risk Reduction (MCLHB-DRR), Lifestyle for Dementia Risk Reduction Scale (LDRRS), Beijing version of the Montreal Cognitive Assessment (MoCA), and Cardiovascular Risk Factors, Aging and Dementia (CAIDE) risk score. K-means cluster analysis was used to classify participants based on their knowledge, beliefs, and behaviors related to dementia risk reduction. Differences in demographic characteristics, cognitive function, and dementia risk across clusters were compared.

Results: Of 232 distributed questionnaires, 211 valid responses were collected (90.9% response rate). Cluster analysis identified three distinct typologies: (1) Optimal KBP type (39.8%, 84/211), (2) Low Knowledge-Poor Behavior type (37.4%, 79/211), and (3) Low Belief-Poor Behavior type (22.7%, 48/211). The Optimal KBP group had significantly more years of education than the Low Knowledge-Poor Behavior group (t=2.703, P<0.001) and Low Belief-Poor Behavior group (t=1.524, P=0.022). Both the Low Knowledge-Poor Behavior and Low Belief-Poor Behavior groups had significantly higher CAIDE scores than the Optimal KBP group (t=1.431, P<0.001; t=1.080, P=0.002, respectively). The Low Knowledge-Poor Behavior group had significantly lower MoCA scores than both the Optimal KBP group and the Low Belief-Poor Behavior group (t=-2.529, P<0.001; t=-1.869, P=0.018, respectively).

Conclusion: Community-dwelling middle-aged and elderly adults can be classified into three KBP typologies regarding dementia risk reduction, with significant differences in education level, dementia risk, and cognitive function scores across types. Developing targeted dementia prevention strategies tailored to the specific characteristics of each KBP typology may effectively reduce dementia risk and maintain or slow cognitive decline.

Keywords: Dementia; Cognition; Middle Aged; Aged; Community; Life Style; Cluster analysis

Introduction

Dementia is a leading cause of disability in older adults, significantly impacting quality of life and imposing substantial burdens on families and society [1]. Given its irreversible progression and the absence of curative treatments, primary prevention targeting modifiable risk factors is particularly crucial [2]. Lifestyle behaviors—including smoking, physical inactivity, and excessive alcohol consumption—represent important modifiable risk factors for dementia [3], and healthier lifestyles are associated with lower dementia risk [4]. Notably, even among individuals with genetic risk factors for dementia, maintaining a healthy lifestyle can reduce dementia incidence by 31% [5].

However, previous surveys indicate that adherence to dementia risk-reduction lifestyles among community-dwelling middle-aged and elderly adults is suboptimal, with inadequate cognitive activities and brain-healthy exercise being particularly pressing issues [6]. Promoting changes in unhealthy behaviors is therefore key to enhancing dementia prevention interventions. The Knowledge-Attitude-Behavior (KAB) theory [7] is widely used to explain how knowledge and beliefs influence health-related behavior change. Knowledge exerts significant direct and indirect effects on health behaviors, while individuals' beliefs about dementia prevention also affect their willingness to adopt healthy behaviors [8].

Nevertheless, research on typologies of knowledge, beliefs, and behaviors specifically related to dementia risk reduction is lacking. It remains unclear whether dementia risk and cognitive function differ among individuals with different KBP profiles. To address this gap, this study employed K-means cluster analysis to classify community-dwelling middle-aged and elderly adults based on their knowledge, beliefs, and behaviors regarding dementia risk reduction, and subsequently examined differences in demographic characteristics, dementia risk, and cognitive function across these typologies. The findings aim to provide evidence for developing targeted dementia prevention strategies in community settings.

Methods

Study Design and Participants From March 2021 to February 2022, middle-aged and elderly adults who participated in free annual health checkups and established health management records at five communities in Shapingba District, Chongqing (Tongjiaqiao, Yangguang, Wulingguan, Zhuangzhilu, Hemucun), were recruited through convenience sampling. Inclusion criteria were: (1) age $ $45 years, and (2) ability to complete the survey independently in writing or orally. Exclusion criteria included: (1) diagnosed dementia of any type, and (2) visual, hearing, or communication impairments that would prevent effective participation. Elimination criteria were: (1) participant

request to withdraw data, and (2) incomplete health examination records lacking key data (total cholesterol, blood pressure, BMI).

K-means cluster analysis requires a sample size >100 [9]. A total of 232 questionnaires were distributed, yielding 211 valid responses (90.9% response rate). The study was approved by the Army Medical University Ethics Committee (Approval No. 2021-23-02), and all participants provided written informed consent.

Measures **General Information Questionnaire:** A self-designed questionnaire collecting demographic data, chronic disease history, and family history of dementia.

Dementia Knowledge Assessment Scale (DKAS): Developed by ANNEAR et al. [10] in 2015 and translated into Chinese by ZHANG et al. [11], the DKAS has a Cronbach's α coefficient of 0.840. The scale comprises four dimensions (causes and characteristics, communication and behavior, care and considerations, risk and health promotion) with 25 items scored 0-2 each (total score 0-50), where higher scores indicate greater dementia-related knowledge. For this study, only the risk and health promotion dimension (6 items, total score 0-12) was used to assess participants' knowledge of dementia prevention.

Motivation to Change Lifestyle and Health Behaviors for Dementia Risk Reduction (MCLHB-DRR): Developed by the Australian National University Centre for Ageing and Health Research in 2014 [12], the Chinese version contains seven dimensions (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, general health motivation, self-efficacy) with 27 items scored 1-5 each (total score 27-135) and a Cronbach's α coefficient of 0.763 [13]. The perceived barriers dimension was reverse-scored, with higher total scores indicating stronger motivation to adopt lifestyle changes for dementia risk reduction.

Lifestyle for Dementia Risk Reduction Scale (LDRRS): Based on the Health Promotion Model [14], this scale assesses whether current lifestyle behaviors reduce dementia risk and promote brain health. It includes eight dimensions (health responsibility, brain-healthy exercise, brain-healthy diet, cognitive activities, smoking control, interpersonal relationships, stress management, spiritual growth) with 32 items scored 1-4 each (total score 32-128) and a Cronbach's α coefficient of 0.862. Higher scores indicate more dementia risk-reducing lifestyles.

Montreal Cognitive Assessment (MoCA) Beijing Version: Developed by NASREDDINE et al. [15] in 2004, the MoCA assesses seven cognitive domains (visuospatial executive ability, naming, attention, language fluency, abstract thinking, delayed recall, and orientation) with total scores ranging 0-30. For participants with <12 years of education, 1 point was added to the total score. Higher scores indicate better cognitive function, with $ $26 points considered normal. The Beijing version was used in this study [16].

Cardiovascular Risk Factors, Aging and Dementia (CAIDE) Score: Developed by KIVIPELTO et al. [17], the CAIDE score predicts 20-year dementia risk in middle-aged adults. It has been validated against neuroimaging measures and neuropathology and is recommended in Chinese dementia guidelines for community memory screening and referral [18]. The score includes seven risk factors (age, sex, education, blood pressure, total cholesterol, BMI, physical activity) with total scores ranging 0-15; scores <6 indicate low risk [19].

Data Collection Trained investigators explained the study purpose and obtained informed consent before distributing paper questionnaires. Participants completed questionnaires independently; those unable to do so had items read aloud by investigators who recorded responses. Completed questionnaires were checked immediately for completeness, and missing data were collected on-site. Objective measures (total cholesterol, blood pressure, BMI) were obtained from community health center examination systems.

Statistical Analysis SPSS 25.0 was used for data analysis and visualization. Normally distributed continuous variables were expressed as mean ± standard deviation ($\bar{x}\pm s$). One-way ANOVA was used for multi-group comparisons, with LSD-t tests for post-hoc pairwise comparisons; independent samples t-tests were used for two-group comparisons. Categorical variables were expressed as frequencies and percentages.

DKAS, MCLHB-DRR, and LDRRS scores served as clustering variables. Two-step cluster analysis (TSC) [20] was used to determine the optimal number of clusters, with a maximum of 10 clusters specified. K-means cluster analysis was then performed on standardized Z-scores to classify participants' KBP profiles regarding dementia risk reduction. $P<0.05$ was considered statistically significant.

Results

Participant Characteristics A total of 232 questionnaires were distributed, with 211 valid responses (90.9% response rate). The sample included 71 men and 140 women, aged 45-86 years (mean 67.1$\pm$7.5$years$).$Additionaldemographiccharacteristicsareshownin.Mea$
$DKAS7.27\pm2.69, MCLHB-DRR102.74\pm12.31, LDRRS89.41\pm11.60, MoCA23.94\pm4.42, andCAIDE7.39\pm$

Cluster Analysis of KBP Profiles Two-step cluster analysis using DKAS, MCLHB-DRR, and LDRRS scores as variables identified three as the optimal number of clusters. K-means cluster analysis yielded:

- **Cluster 1 (Optimal KBP type, n=84, 39.8%):** High levels of dementia prevention knowledge, beliefs, and risk-reducing behaviors
- **Cluster 2 (Low Knowledge-Poor Behavior type, n=79, 37.4%):** High dementia prevention beliefs but low knowledge and risk-reducing behaviors

- **Cluster 3 (Low Belief-Poor Behavior type, n=48, 22.7%):** High dementia prevention knowledge but low beliefs and risk-reducing behaviors

The K-means cluster two-dimensional discrimination plot is shown in [Figure 1: see original paper], and cluster variable scores are presented in .

Comparisons Across KBP Types Significant differences were found across the three KBP types in years of education and MoCA and CAIDE scores (F=11.234, P<0.001; F=7.410, P<0.001; F=12.748, P<0.001, respectively). No significant differences were found in other demographic characteristics (all P>0.05).

The Optimal KBP group had significantly more years of education than both the Low Knowledge-Poor Behavior group (t=2.703, P<0.001) and Low Belief-Poor Behavior group (t=1.524, P=0.022). Both the Low Knowledge-Poor Behavior and Low Belief-Poor Behavior groups had significantly higher CAIDE scores than the Optimal KBP group (t=1.431, P<0.001; t=1.080, P=0.002, respectively). The Low Knowledge-Poor Behavior group had significantly lower MoCA scores than both the Optimal KBP group and the Low Belief-Poor Behavior group (t=-2.529, P<0.001; t=-1.869, P=0.018, respectively). Detailed comparisons are shown in .

Discussion

Participant Characteristics The study included 211 community-dwelling middle-aged and elderly adults with a relatively high mean age and greater female representation. The higher mean age likely reflects the study setting in community health centers, where older residents are more likely to participate in free annual health examinations [21]. Additionally, women may be more health-conscious than men [22], resulting in higher female participation. Overall KBP scores were moderate to low, consistent with previous findings [6,8]. Mean MoCA and CAIDE scores were comparable to those of community-dwelling older adults in Beijing [23].

Distinct KBP Typologies in Community-Dwelling Older Adults Targeted lifestyle health education and promotion can reduce all-cause dementia prevalence by approximately 20% [24], and lifestyle interventions represent the most cost-effective approach for primary dementia prevention [25]. According to KAB theory, knowledge forms the foundation for behavior change, beliefs provide the motivation, and the three constitute a continuous process. However, high knowledge does not necessarily translate to strong beliefs, nor do strong beliefs guarantee healthy behaviors; the knowledge-belief-behavior transition is not always sequential or consistent [26].

This study identified three distinct KBP typologies among community-dwelling middle-aged and elderly adults in Chongqing regarding dementia risk reduction: Optimal KBP, Low Knowledge-Poor Behavior, and Low Belief-Poor Be-

havior. Individuals with healthy behaviors (Optimal KBP type) accounted for 39.8%, while those with poor behaviors (the two low types) accounted for 61.2%. Among those with poor behaviors, 62.0% had low knowledge and 38.0% had low beliefs.

The Optimal KBP group demonstrated high levels across all three domains and had higher education levels. Comprising 39.8% of the sample, these individuals exhibited congruence between knowledge, beliefs, and behaviors, with higher education enabling them to actively acquire dementia-related knowledge, identify risks, and seek medical help. This group would benefit from general media campaigns or routine community education without requiring intensive interventions to control dementia risk and maintain cognitive function. This group also showed the highest cognitive function and lowest dementia risk, consistent with previous research demonstrating that healthier lifestyles are associated with lower dementia risk and better cognitive outcomes [27].

The Low Knowledge-Poor Behavior group exhibited low levels of dementia prevention knowledge and risk-reducing behaviors despite relatively high prevention beliefs, resulting in higher dementia risk. Representing 37.4% of the sample, these individuals lacked the knowledge necessary to translate their beliefs into action. For this group, targeted dementia education to improve knowledge and promote healthy lifestyles is essential. This group also showed the poorest cognitive function (22.51$\pm$5.39), indicating existing cognitive decline. Without proper management of mild cognitive impairment, annual conversion rates to dementia can reach 20% [28]. Combined with lower education levels and limited ability to actively seek health information, this group warrants particular attention and support from community health services.

The Low Belief-Poor Behavior group showed high knowledge but low beliefs and risk-reducing behaviors. Comprising 22.7% of the sample, these individuals would not benefit from knowledge education alone. Research indicates that dementia prevention beliefs influence health behavior adherence and are affected by factors beyond knowledge, including age, education, family history of dementia, subjective memory complaints, and willingness to know one's risk [29]. For this group, interventions should target beliefs using motivational/attitudinal approaches such as motivational interviewing [30], behavioral activation [31], and behavioral economics [32]. Motivational interviewing is a collaborative, goal-oriented communication style that addresses ambivalence about behavior change to enhance intrinsic motivation. Behavioral activation strengthens individual responsibility and self-efficacy through actionable goal-setting and has been used to promote brain-healthy behaviors [31]. Behavioral economics combines psychological and economic principles to develop positive, automatic, habit-based behaviors by modifying personal environments or daily structures, an approach widely adopted in primary public health settings [33].

Knowledge and Beliefs as Key Intervention Targets According to the Health Belief Model, beliefs about health behaviors are critical determinants

of behavior change [8]. Our previous research demonstrated that both dementia prevention knowledge and beliefs significantly influence health behaviors in adults [34]. This study found significant differences across the three KBP types in education level and MoCA and CAIDE scores ($P<0.05$). The Optimal KBP group had significantly more education than the other two groups. The Low Knowledge-Poor Behavior group showed significantly poorer cognitive function than the other groups, while both poor behavior groups had significantly higher dementia risk than the Optimal KBP group. Compared with the Optimal KBP group, the Low Knowledge-Poor Behavior group already exhibited significant cognitive decline, while the Low Belief-Poor Behavior group showed comparable cognitive function but similarly elevated dementia risk. These findings indicate that both knowledge and beliefs regarding dementia risk reduction are important targets for intervention.

Conclusion

Community-dwelling middle-aged and elderly adults exhibit distinct KBP typologies regarding dementia risk reduction, with significant differences in education level, dementia risk, and cognitive function across types. Developing targeted dementia prevention strategies tailored to the specific characteristics of each KBP typology may effectively reduce dementia risk and maintain or slow cognitive decline. This study focused on community health examination attendees, which may not fully represent the broader community population. Future research should expand survey locations and sample sizes to more comprehensively characterize dementia risk and brain health-related lifestyle behaviors in community populations.

References

[1] JIA J P, WEI C B, CHEN S Q, et al. The cost of Alzheimer's disease in China and re-estimation of costs worldwide[J]. Alzheimers Dement, 2018, 14(4): 483-491. DOI: 10.1016/j.jalz.2017.12.006.

[2] LIVINGSTON G, HUNTLEY J, SOMMERLAD A, et al. Dementia prevention, intervention, and care: 2020 report of the lancet commission[J]. Lancet, 2020, 396(10248): 413-446. DOI: 10.1016/S0140-6736(20)30367-6.

[3] Chinese Dementia and Cognitive Impairment Diagnosis and Treatment Guidelines Writing Group, Chinese Medical Doctor Association Neurology Branch Cognitive Impairment Disease Professional Committee. Chinese guidelines for primary prevention of Alzheimer's disease[J]. Natl Med J China, 2020, 100(35): 2721-2735. DOI: 10.3760/cma.j.cn112137-20200702-02017.

[4] DHANA K, EVANS D A, RAJAN K B, et al. Healthy lifestyle and the risk of Alzheimer dementia: findings from 2 longitudinal studies[J]. Neurology, 2020, 95(4): e374-e383. DOI: 10.1212/WNL.0000000000009816.

[5] RODRIGUEZ F S, ROEHR S, PABST A, et al. Effects of APOE e4-allele and mental work demands on cognitive decline in old age: results from the German Study on Ageing, Cognition, and Dementia in Primary Care Patients (AgeCoDe)[J]. Int J Geriatr Psychiatry, 2021, 36(1): 152-162. DOI: 10.1002/gps.5409.

[6] ZHANG J Y, PENG Y, LIU X, et al. Current status and influencing factors of lifestyle for reducing dementia risk among middle-aged and elderly adults in communities[J]. Chin Gen Pract, 2023, 26(13): 1577-1583. DOI: 10.12114/j.issn.1007-9572.2022.0748.

[7] LI W Y, LIU J, YU G L, et al. Application status and prospects of the knowledge-attitude-behavior theoretical model in nursing work[J]. J Nurs Sci, 2015, 30(6): 107-110. DOI: 10.3870/hlxzz.2015.06.107.

[8] LI H. Relationship between beliefs and health behaviors for reducing dementia risk through lifestyle changes in adults[D]. Chongqing: Army Medical University, 2021.

[9] LIU X Y. K-means clustering[M]. Beijing: Science Press, 2020.

[10] ANNEAR M J, TOYE C M, ECCLESTON C E, et al. Dementia knowledge assessment scale: development and preliminary psychometric properties[J]. J Am Geriatr Soc, 2015, 63(11): 2375-2381. DOI: 10.1111/jgs.13707.

[11] ZHANG G J, CHEN Y, XIE S T, et al. Translation and psychometric evaluation of the Chinese version of the Dementia Knowledge Assessment Scale[J]. Chin Nurs Res, 2019, 33(1): 42-45. DOI: 10.12102/j.issn.1009-6493.2019.01.009.

[12] KIM S, SARGENT-COX K, CHERBUIN N, et al. Development of the motivation to change lifestyle and health behaviours for dementia risk reduction scale[J]. Dement Geriatr Cogn Dis Extra, 2014, 4(2): 172-183. DOI: 10.1159/000362228.

[13] WANG X F, YANG Y N, TANG B X, et al. Reliability and validity of the Chinese version of the Motivation to Change Lifestyle and Health Behaviors for Dementia Risk Reduction Scale[J]. J Nurs Sci, 2016, 31(21): 13-16. DOI: 10.3870/j.issn.1001-4152.2016.21.013.

[14] ZHANG J Y, LI H, LIU X, et al. Development and psychometric testing of the Lifestyle for Dementia Risk Reduction Scale[J]. Chin Gen Pract, 2022, 25(13): 1595-1602. DOI: 10.12114/j.issn.1007-9572.2022.0083.

[15] NASREDDINE Z S, PHILLIPS N A, BÉDIRIAN V, et al. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment[J]. J Am Geriatr Soc, 2005, 53(4): 695-699. DOI: 10.1111/j.1532-5415.2005.53221.x.

[16] WANG W, WANG L N. Application of the Montreal Cognitive Assessment in screening patients with mild cognitive impairment[J]. Chin J Intern Med, 2007, 46(5): 414-416. DOI: 10.3760/j.issn:0578-1426.2007.05.031.

[17] KIVIPELTO M, NGANDU T, LAATIKAINEN T, et al. Risk score for the prediction of dementia risk in 20 years among middle aged people: a longitudinal, population-based study[J]. Lancet Neurol, 2006, 5(9): 735-741. DOI: 10.1016/S1474-4422(06)70537-3.

[18] TIAN J Z, XIE H G, WANG L N, et al. Chinese guidelines for diagnosis and treatment of Alzheimer's disease dementia (2020 edition)[J]. Chin J Geriatr, 2021, 40(3): 269-283. DOI: 10.3760/cma.j.issn.0254-9026.2021.03.001.

[19] SUN M F, JIA Z Y, WANG L L, et al. Multidomain interventions: latest research progress and future directions for precision implementation of dementia risk reduction—Brain Health Services user manual (Part 4)[J]. Chin J Stroke, 2022, 17(2): 165-175. DOI: 10.3969/j.issn.1673-5765.2022.02.010.

[20] WANG C Y, YU J Y. How SPSS two-step clustering automatically determines the number of clusters[J]. Chin J Health Stat, 2010, 27(2): 202-203. DOI: 10.3969/j.issn.1002-3674.2010.02.038.

[21] LIN Y W, WANG T X, CHU C J. Analysis of the influence of social contact on elderly participation in community free physical examination services[J]. J Guangdong Med Univ, 2021, 39(5): 566-571. DOI: 10.3969/j.issn.1005-4057.2021.05.008.

[22] BAI R H, LIU Y N, ZHANG L, et al. Projections of future life expectancy in China up to 2035: a modelling study[J]. Lancet Public Health, 2023: S2468-S2667(22)00338-3. DOI: 10.1016/S2468-2667(22)00338-3.

[23] MA Y N, XIE W X, HOU Z H, et al. Association between coronary artery calcification and cognitive function in a Chinese community-based population[J]. J Geriatr Cardiol, 2021, 18(7): 514-522. DOI: 10.11909/j.issn.1671-5411.2021.07.002.

[24] SATIZABAL C L, BEISER A S, CHOURAKI V, et al. Incidence of dementia over three decades in the Framingham heart study[J]. N Engl J Med, 2016, 374(6): 523-532. DOI: 10.1056/NEJMoa1504327.

[25] KIVIPELTO M, MANGIALASCHE F, NGANDU T. Lifestyle interventions to prevent cognitive impairment, dementia and Alzheimer disease[J]. Nat Rev Neurol, 2018, 14(11): 653-666. DOI: 10.1038/s41582-018-0070-3.

[26] LÜ Z Z. Environmental health education and health promotion[M]. Beijing: Peking University Medical Press, 2005.

[27] LOURIDA I, HANNON E, LITTLEJOHNS T J, et al. Association of lifestyle and genetic risk with incidence of dementia[J]. JAMA, 2019, 322(5): 430-437. DOI: 10.1001/jama.2019.9879.

[28] LANGA K M, LEVINE D A. The diagnosis and management of mild cognitive impairment: a clinical review[J]. JAMA, 2014, 312(23): 2551-2561. DOI: 10.1001/jama.2014.13806.

[29] SEIFAN A, GANZER C A, VERMEYLEN F, et al. Development and validation of the Alzheimer's prevention beliefs measure in a multi-ethnic cohort-a behavioral theory approach[J]. J Public Health, 2017, 39(4): 863-873. DOI: 10.1093/pubmed/fdw145.

[30] GALVANI S. Motivational interviewing: helping people change (3rd edition)[J]. Soc Work Educ, 2014, 33(6): 854-855. DOI: 10.1080/02615479.2014.894351.

[31] ROVNER B W, CASTEN R J, HEGEL M T, et al. Preventing cognitive decline in black individuals with mild cognitive impairment: a randomized clinical trial[J]. JAMA Neurol, 2018, 75(3): 306-314. DOI: 10.1001/jamaneurol.2018.2513.

[32] THORGEIRSSON T, KAWACHI I. Behavioral economics: merging psychology and economics for lifestyle interventions[J]. Am J Prev Med, 2013, 44(2): 185-189. DOI: 10.1016/j.amepre.2012.10.008.

[33] SHUVAL K, LEONARD T, DROPE J, et al. Physical activity counseling in primary care: insights from public health and behavioral economics[J]. CA Cancer J Clin, 2017, 67(3): 233-244. DOI: 10.3322/caac.21394.

[34] LI H, ZHANG J Y, WANG L, et al. A health promoting-lifestyle prediction model for dementia prevention among Chinese adults: based on the health belief model[J]. BMC Public Health, 2022, 22(1): 2450. DOI: 10.1186/s12889-022-14828-9.

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Note: Figure translations are in progress. See original paper for figures.