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# Lifestyle Intervention Strategies to Maintain Cognitive Health in Middle-aged Adults: A Scoping Review

**CVR Abimanyu[1], Aisyah Kamila[2]**
Universitas Katolik Soegijapranata, Indonesia[1]
Universitas Diponegoro, Indonesia[2]
Email: cvr_abimanyu@unika.ac.id, aisyahkamila@students.undip.ac.id

**Abstract**
Cognitive decline in middle-aged adults (40–60 years old) represents a significant public health challenge with implications for quality of life and dementia prevention. The research problem centers on the limited attention given to this critical age group compared to elderly or adolescent populations, despite this being a crucial transition period during which preventive interventions can have maximum impact. This study aims to map lifestyle intervention strategies to maintain the cognitive health of this age group. The method used was a scoping review based on PRISMA-ScR, with literature from Scopus, PUBMED, and SpringerLink. Of the 94 articles found, 11 met the criteria for analysis. The results showed that a healthy diet, physical activity, cognitive stimulation, social interaction, as well as management of physical conditions such as chronic pain and frailty, were effective in slowing down the decline in brain function. The multidomain approach and personalization through shared decision-making have proven to be more optimal than a single strategy. In conclusion, healthy lifestyle interventions in middle-aged adults play an important role in preventing dementia and improving quality of life; therefore, they need to be integrated into public health programs.
**Keywords:** lifestyle, cognitive health, intermediate adult

## INTRODUCTION

The development of digital technology also affects aspects of cognitive health, especially in middle adults (40–60 years old) who are prone to experiencing physical decline, memory, and psychosocial challenges (Ferdyansyah & Masfufah, 2023). Sanches & Fernandes (2021) states that almost all cognitive functions decline with age, including numerical abilities, verbal, spatial orientation, Delayed recall, to reason. Naylor et al., (2024) emphasizing that this happens globally, characterized by a slowdown in the information process and a reduced ability to recall new information (Shidiqie et al., 2023). Cognitive decline at the age of 50–60 affects concentration, memory, attention span, and problem-solving skills, as well as interferes with the organization of daily information (Pramadita et al., 2019) that impacts all functional aspects (Park et al., 2019). This condition emphasizes the importance of implementing a healthy lifestyle as an effort to maintain cognitive health, while increasing the satisfaction and quality of life of middle adults.

According to Walker et al. in Muzadi & Febriani (2024) A healthy lifestyle is a pattern of perception and behavior that individuals apply to maintain and improve well-being, self-actualization, and self-fulfillment. Research shows that middle adults who adopt a healthy lifestyle well tend to have high levels of life satisfaction (June et al., 2023). Other studies confirm that healthy lifestyle behaviors, such as a balanced diet, regular exercise, not smoking, and limiting alcohol consumption, are associated with better health-related life satisfaction (Tian & Tien, 2020). Meanwhile, research in the middle-aged population in rural Africa found that unhealthy behaviors, such as alcohol dependence, low physical activity, and tobacco use, increase the risk of ongoing depression and decrease persistent life satisfaction (Peltzer & Pengpid, 2022).

The primary research problem lies in the insufficient focus on middle-aged adults (40-60 years) in cognitive health research, despite this being a critical period for implementing

preventive interventions. While extensive research exists for elderly populations and younger adults, middle-aged individuals represent a unique demographic experiencing initial cognitive changes where early intervention could significantly impact long-term outcomes. This research gap is urgent because the global aging population is expanding rapidly, with projections indicating that cognitive decline cases will increase dramatically from 55 million currently to 139 million by 2050. Early intervention during middle age could substantially reduce this burden.

Previous research has predominantly focused on either elderly populations already experiencing significant cognitive decline or younger adults for cognitive enhancement. Studies have examined individual lifestyle factors such as diet (Mediterranean diet studies), exercise (aerobic training research), or social engagement separately. However, there is a significant gap in comprehensive, multidomain intervention research specifically targeting middle-aged adults. Most existing systematic reviews concentrate on single interventions or focus on populations over 65 years old, leaving middle-aged adults underrepresented in the literature despite being at a crucial intervention window.

This study contributes novel insights by: (1) specifically focusing on middle-aged adults as a distinct demographic requiring targeted intervention strategies, (2) employing a comprehensive scoping review methodology to map multidomain lifestyle interventions, (3) synthesizing evidence across multiple intervention domains (nutritional, physical, cognitive, and social) within a single framework, (4) identifying personalized intervention approaches through shared decision-making models, and (5) providing evidence-based recommendations for public health policy targeting this underserved population.

This study aims to systematically map lifestyle intervention strategies that focus on maintaining cognitive health in the middle adult group, which has received less attention than the elderly or adolescent adults. This approach is expected to provide guidance for the implementation of effective strategies to improve the quality of life and maintain the cognitive function of middle adults in an increasingly complex society.

The benefits include: providing healthcare professionals with evidence-based intervention strategies, informing public health policy development for cognitive health promotion, offering middle-aged individuals practical guidance for maintaining cognitive function, contributing to the theoretical understanding of cognitive reserve during middle age, and establishing a foundation for future randomized controlled trials in this population.

## RESEARCH METHOD

This study used the Scoping Review, which is designed based on PRISMA-ScR Checklist as developed by Mcgowan et al (2020). This method is an adaptation of the PRISMA Statement, which emphasizes the systematic process of reviewing the literature, including the stage of article selection, data filtering, and analysis of literature content (Chiu et al., 2023). PRISMA, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses, including four main steps: identification of research problems, search for relevant literature, selection of data sources, and preparation and reporting of study results in a transparent and structured manner (Pourkiaei & Romain, 2022).

In this study, the literature search strategy follows the framework Population, Concept, and Context (PCC) recommended by Joanna Briggs Institute (JBI), which aims to ensure that the focus of the study remains relevant and comprehensive (Santos & Secoli, 2018). Literature data was collected from internationally reputable databases, namely Scopus, PUBMED, and SpringerLink, with inclusion and exclusion criteria. This approach allows researchers to systematically review current evidence, identify research gaps, and provide a comprehensive map of the literature in the area studied.

**Table 1. Format PCC**

| No | PCC Element | Keywords |
|---|---|---|
| 1 | Population | Middle-aged Adults |
| 2 | Concept | Lifestyle interventions to prevent cognitive decline, including nutrition, physical activity, stress management, and social relationships |
| 3 | Background | Studies on the application of lifestyle strategies, support cognitive health in community, clinical, or research settings worldwide. |

Inclusion and exclusion criteria are used to filter out articles that are not relevant to the research objective

**Table 2. Inclusion and Exclusion Criteria**

| No | Criterion | Keywords |
|---|---|---|
| 1 | Inclusion Criteria | Articles contain keywords in the title, abstract, or full text<br>Published in an accredited journal<br>Published in the period 2020–2025<br>Articles are available in *full text* and *are open access* |
| 2 | Exclusion Criteria | The article does not contain keywords in the title, abstract, or *full text*<br>Publications in the form of books, essays, editorials, or opinions that do not go through *a peer-review process* |

Of the total 94 articles found through the search process, 11 articles were declared feasible and met the criteria for further analysis.

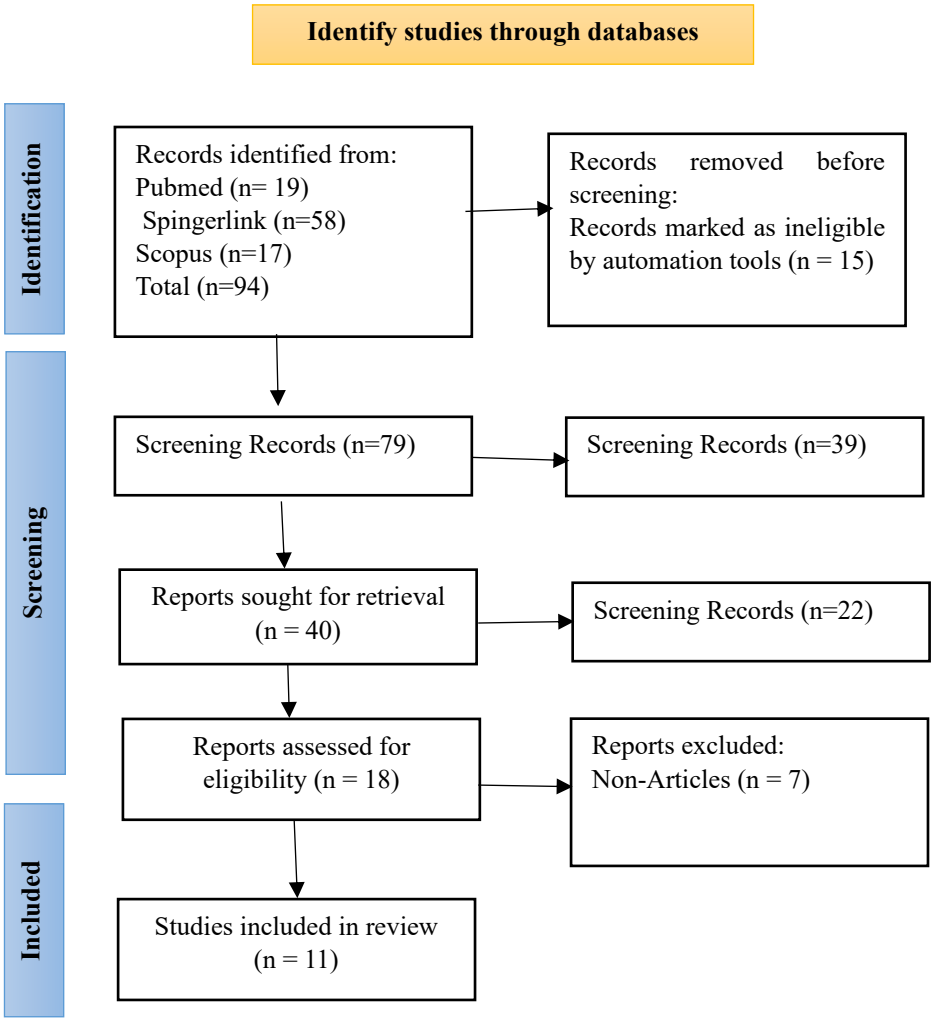


**Figure 1. PRISMA-ScR Flowchart**

The instruments used in this study are in the form of content analysis of publications related to the study topic, including aspects such as the number of publications per year, the main research focus, and the country of origin of the publication. The collected data is then systematically compiled in the form of a table to facilitate the interpretation process.

**Table 3. Observed Journals**

| No | Heading | Writer | Year |
|---|---|---|---|
| 1 | Sustainable Participation in Community Health Programs to Promote a Healthy Lifestyle and Prevent and Protect against Dementia among Rural Taiwanese Middle-Aged and Older Adults | L. Chang *et al* | 2024 |
| 2 | Older adults' community participation, physical activity, and social interactions during and following COVID-19 restrictions in Australia: a mixed methods approach | Claire Gough *et al* | 2023 |

| | | | |
|---|---|---|---|
| 3 | Association Between Healthy Lifestyle and Cognitive Function in Middle-Aged and Older Adults | Rouba Khalil Naaman *et al* | 2025 |
| 4 | Healthy Lifestyle and the Likelihood of Becoming a Centenarian | Yaqi Li *et al* | 2024 |
| 5 | Adherence to dietary guidelines and cognitive decline from middle age: the Doetinchem Cohort Study | Astrid CJ Nooyens *et al* | 2021 |
| 6 | General practitioners' perspectives on lifestyle interventions for cognitive preservation in dementia prevention | Josefine Kappe *et al* | 2024 |
| 7 | Community participation in activities and places among older adults with and without dementia | Habib Chaudhury *et al* | 2021 |
| 8 | Temporal association between chronic pain and frailty occurrence, and the modifiable role of a healthy lifestyle in Chinese middle-aged and older population: a community based, prospective cohort study | Chao Li *et al* | 2025 |
| 9 | Healthy Aging Nutrition Matters: Start Early and Screen Often | Susan B Roberts *et al* | 2021 |
| 10 | Effects of multidomain lifestyle interventions on cognitive decline and Alzheimer's disease prevention: A literature review and future recommendations | Sasja Noach *et al* | 2023 |
| 11 | Practical approaches to lifestyle interventions for enhancing brain health in older adults: A selective narrative review | Raymond L Ownby & Joshua Caballero | 2025 |

## RESULTS AND DISCUSSION

According to the WHO, there are currently around 55 million people in the world who are experiencing cognitive decline, with projections increasing to 78 million by 2030 and reaching 139 million by 2050. The main risk factors that contribute to this condition include old age, lifestyle, and health conditions. In Indonesia alone, more than 20% of middle adults are reported to show symptoms of memory impairment, including dementia (Sigh) et al., 2024). In the early stages, the decline in cognitive function in middle adults is often not obvious. This condition is generally triggered by a reduced number of brain cells, exposure to free radicals, pollution, and decreased quality of nutrition and physical activity. These changes can trigger impaired brain function which usually begins with mild symptoms, such as forgetfulness (Unity) et al., 2021). Cognitive impairment has a direct impact on the decline in the quality of life of the elderly, among other things, by causing stress and anxiety. This condition also increases the need for support from health workers in carrying out daily activities, which if not met can further worsen the quality of life (Fridolin et al , 2022).

Lifestyle has a significant role in overall health conditions. The lifestyle for middle adults emphasizes a balanced diet rich in nutrients, regular physical activity, and avoidance of smoking. A comprehensive approach that combines diet, exercise, and cognitive exercise interventions has been shown to be more effective in maintaining brain health and delaying the decline in cognitive function (Naaman et al., 2025). Research conducted by L. Chang (2024)

It shows that the application of healthy lifestyle factors makes the body more energetic. In addition, it is important for public health centers to provide ongoing and varied activities through wellness programs that cover a wide range of aspects to strengthen understanding of the prevention of cognitive decline in function. For example, participants engage in physical and musical activities (such as laughter yoga, drumming, or playing kazoos) using popular songs. During the activity, they gain praise, motivation, and greater opportunities for social interaction, which gradually improves physical function while fostering healthy living behaviors. These results are in line with the findings of the study Gough et al., (2023); Kappe et al, (2024): Chaudhury et al, (2021).

Maintaining cognitive health in middle adulthood is very important because this period is a transition phase to the elderly, where various risk factors for degenerative diseases begin to emerge. A number of studies have shown that lifestyle interventions have a central role in slowing down the decline in cognitive function. Yaqi Li et al (2024) found that healthy lifestyle scores that included five aspects of non-smoking, controlled alcohol consumption, physical activity, diverse dietary patterns, and balanced body mass index (BMI) were associated with an increased chance of reaching old age with better health conditions. Of these five factors, quitting smoking, exercising regularly, and maintaining a diverse diet have proven to be the dominant factors that support brain health, so they can be used as the main target in lifestyle interventions for middle adults.

The nutritional aspect also plays an important role in supporting cognitive reserves (Cognitive Reserve). Longitudinal studies show that adherence to healthy dietary patterns of both the Mediterranean diet, WHO guidelines, and the Dutch diet is associated with better cognitive function and a slowdown in cognitive decline (Nooyens et al, 2021). Further Roberts et al (2021) emphasizing that a healthy plant-based diet, rich in nutrients, low glycemic index, and avoiding the consumption of energy-dense but nutrient-poor foods, has been proven to be effective in preventing various age-related diseases, including dementia. Therefore, lifestyle intervention strategies for middle adults need to emphasize nutrition education and the selection of foods that are able to meet nutritional needs without increasing the risk of obesity or malnutrition.

In addition to nutrition, physical activity, cognitive stimulation, and social interaction are also important components in maintaining brain health. Multidomain intervention research, such as FINGER and MAPT, shows that a combination of healthy diet, regular exercise, cognitive training, social activity, and vascular risk factor management contributes to improved global cognition scores and reduced risk of dementia (Noah) et al., 2023). Physical activity, both in the form of aerobic exercise and body-awareness-based exercise (mind-body exercise), is proven to support memory and executive functions. These findings confirm that intervention strategies cannot focus only on one dimension, but need to be multidomain in order to have a more significant impact on cognitive health.

Another aspect that needs to be considered is the link between physical condition, frailty, and cognitive health. Li et al. (2025) reports that chronic pain in middle age significantly increases the risk of frailty in old age, which can accelerate the decline in brain function. Nevertheless, adopting a healthy lifestyle can lower these risks. Interventions that include pain management, regular exercise, and a nutritious diet not only strengthen physical health, but also serve as protection against cognitive degradation. Thus, a healthy lifestyle plays a dual role, namely preventing frailty while maintaining brain health.

Furthermore, lifestyle intervention strategies in middle adults need to be personalized according to individual needs. Ownby & Xue (2025) emphasizing the importance of implementing shared decision making (HR) in health practice, where patients are actively involved in determining intervention options according to their values, preferences, and conditions. The integration of human resources into the promotion of a healthy lifestyle can

increase compliance, satisfaction, and effectiveness of interventions. In this way, cognitive health strategies are not only based on scientific evidence, but also according to the individual's personal context.

## CONCLUSION

Lifestyle interventions play a crucial role in maintaining cognitive health and preventing brain function decline during the transition to older age in middle-aged adults. Effective strategies include a healthy diet, regular physical activity, cognitive stimulation, social interaction, and management of physical conditions such as chronic pain and frailty, which together strengthen cognitive reserves and reduce dementia risk. A multidomain approach combining nutritional, physical, mental, and social elements—personalized through shared decision-making—offers a comprehensive and adaptive way to support cognitive health, enabling middle-aged adults to lead more productive and meaningful lives. Future research should focus on developing standardized multidomain intervention protocols tailored to this age group, with long-term randomized controlled trials and longitudinal studies spanning 10–15 years to determine optimal timing and duration. Additionally, healthcare systems ought to incorporate routine cognitive assessments and lifestyle counseling for adults aged 40–60, while public health programs should promote community-based initiatives that integrate nutrition, physical activity, cognitive training, and social engagement.

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