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LIFESTYLE AND BRAIN HEALTH: EVIDENCE-BASED STRATEGIES FOR PREVENTION AND WELL-BEING: A NARRATIVE REVIEW

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Abstract:
Introduction: Brain health is a multidimensional construct encompassing cognitive, emotional, and behavioral functioning across the lifespan. Increasing evidence highlights the role of modifiable lifestyle factors in maintaining brain health and reducing the risk of neurological and psychiatric disorders. **Objective:** This narrative review aims to synthesize recent evidence on lifestyle-related determinants of brain health, focusing on evidence-based strategies for prevention and well-being. **Methods:** A narrative review of the literature was conducted using the PubMed database. Peer-reviewed articles published between January 2015, and March 2026 were identified using combinations of keywords related to brain health, lifestyle, prevention, and well-being. Studies were selected based on relevance to modifiable lifestyle factors, including physical activity, nutrition, sleep, cognitive engagement, and social interaction. Both observational and interventional studies were considered to provide a comprehensive and up-to-date overview. **Results:** Recent evidence consistently demonstrates that lifestyle behaviours play a critical role in brain health. Regular physical activity is associated with improved cognitive performance and reduced risk of neurodegenerative disorders. Adherence to healthy dietary patterns, such as Mediterranean-type diets, is linked to better cognitive outcomes and lower incidence of cognitive decline. Adequate sleep supports memory consolidation and emotional regulation, while cognitive stimulation and social engagement contribute to neuroplasticity and psychological resilience. Multidomain interventions targeting multiple lifestyle factors simultaneously appear to yield greater benefits than single-domain approaches. **Conclusions**: Lifestyle-based strategies represent a feasible and effective approach to promoting brain health and preventing cognitive and mental health disorders. Incorporating these strategies into public health policies and educational programs is essential. Future research should prioritize longitudinal designs and culturally adapted interventions to further clarify causal mechanisms and optimize prevention efforts.

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1. Introduction

Brain health has increasingly been recognised as a central component of healthy ageing, public health, and overall well-being. The World Health Organization defines brain health as the state of brain functioning across cognitive, sensory, social-emotional, behavioural, and motor domains, enabling individuals to realise their full potential across the life course (World Health Organization, 2022). This broader conceptualisation moves beyond the absence of neurological disease and highlights the importance of prevention, resilience, and lifelong functioning (Alexopoulos *et al.*, 2026; Livingston, G., *et al.*, 1017).

The growing burden of cognitive decline, dementia, depression, and other neurological and mental health conditions has intensified interest in modifiable determinants of brain health (Alexopoulos *et al.*, 2026). Recent evidence suggests that a substantial proportion of dementia cases may be preventable or delayed through interventions targeting lifestyle and environmental risk factors. The 2024 Lancet Commission reported that approximately 45% of dementia cases may be attributable to 14 potentially modifiable risk factors, including physical inactivity, smoking, obesity, depression, low social contact, excessive alcohol consumption, diabetes, hypertension, hearing loss, air pollution, traumatic brain injury, lower education, high LDL cholesterol, and untreated vision loss (Livingston *et al.*, 2024).

Lifestyle behaviours represent one of the most promising and accessible pathways for promoting brain health. Physical activity has been consistently associated with better cognitive functioning and reduced risk of cognitive decline, although effects may vary across populations and study designs (Iso-Markku *et al.*, 2022; Lourida *et al.*, 2019). Similarly, dietary patterns such as the Mediterranean diet and MIND diet have been linked to more favourable cognitive outcomes, with greater adherence associated with reduced risk of age-related cognitive disorders (Van Den Brink *et al.*, 2019).

Sleep is another key lifestyle-related determinant of brain health. Adequate sleep supports memory consolidation, emotional regulation, and metabolic clearance processes, whereas sleep disturbances, including insomnia and obstructive sleep apnoea, have been associated with cognitive decline and dementia risk (Livingston *et al.*, 2020; Scarmeas, *et al.* 2018)). Recent evidence further highlights sleep management as a potentially important modifiable target for reducing the risk of cognitive impairment (Robbins *et al.*, 2021).

Beyond physical and biological lifestyle factors, cognitive engagement and social connection are also central to brain health. The WHO framework identifies learning and social connection as major determinant clusters for optimising brain health across the life course (World Health Organization, 2022). Social isolation and loneliness have been associated with poorer cognitive outcomes, while cognitive and social participation may

contribute to cognitive reserve, neuroplasticity, and psychological resilience (Sommerlad *et al.*, 2019; Livingston *et al.*, 2024).

Taken together, current evidence supports a multidimensional view of brain health in which physical activity, nutrition, sleep, cognitive stimulation, and social engagement interact with biological, psychological, and environmental determinants. However, the literature remains fragmented across neuroscience, public health, psychology, ageing research, and behavioural medicine (Kivipelto *et al.*, 2020). Therefore, the present narrative review aims to synthesise PubMed-indexed evidence published between January 2015 and March 2026 on lifestyle-related strategies for promoting brain health, with particular emphasis on prevention, well-being, and modifiable behavioural pathways. To provide a conceptual overview of the relationships between lifestyle factors, underlying mechanisms, and brain health outcomes, a graphical representation is presented in Figure 1.

2. Methods

This study employed a narrative review design to synthesise current evidence on the role of lifestyle factors in brain health. A narrative approach was selected to enable the integration of findings across diverse disciplines, including neuroscience, public health, psychology, and behavioural medicine, and to provide a comprehensive and interpretative overview of the topic.

A structured literature search was conducted using the PubMed database. The search included peer-reviewed articles published between January 2015 and March 2026, with the aim of capturing the most recent and relevant evidence. A combination of keywords and Boolean operators was used, including terms related to “brain health” and “cognitive health,” in conjunction with lifestyle-related variables such as “lifestyle,” “physical activity,” “diet,” “nutrition,” “Mediterranean diet,” “sleep,” “social engagement,” and “cognitive stimulation,” as well as outcome-related terms including “prevention” and “well-being.” An example search string was: (“brain health” OR “cognitive health”) AND (“lifestyle” OR “physical activity” OR “diet” OR “sleep” OR “social engagement” OR “cognitive stimulation”) AND (“prevention” OR “well-being”). Studies were included if they met the following criteria: (a) peer-reviewed articles indexed in PubMed; (b) publication between January 2015 and March 2026; (c) written in English; (d) examination of modifiable lifestyle factors related to brain health; and (e) reporting outcomes related to cognitive functioning, mental health, or neurological risk. Both observational studies (e.g., cross-sectional and cohort designs) and interventional studies (e.g., randomised controlled trials and lifestyle interventions) were considered eligible. Studies were excluded if they were non-empirical (e.g., editorials or commentaries without primary data), did not directly address lifestyle-related determinants, focused exclusively on pharmacological interventions, or involved non-human samples.

Titles and abstracts were initially screened for relevance, followed by full-text review of eligible articles. Given the narrative nature of the review, a formal PRISMA flow diagram was not applied; however, the selection process was conducted systematically to ensure the inclusion of studies that were relevant, recent, and of sufficient scientific quality.

Data were extracted and organised thematically according to key lifestyle domains, including physical activity, nutrition and dietary patterns, sleep, cognitive engagement, and social interaction. In addition, cross-cutting themes such as multidomain interventions and preventive frameworks were identified. A narrative synthesis approach was employed to summarise and interpret findings across studies, with emphasis on the consistency of evidence, proposed biological and psychological mechanisms, and implications for prevention and public health.

Although a formal risk-of-bias assessment was not conducted due to the narrative design of the review, particular emphasis was placed on the inclusion of studies with robust methodological quality, such as systematic reviews, meta-analyses, and randomised controlled trials, as well as publications in high-impact, peer-reviewed journals. Consistency of findings across studies was also considered in the interpretation of the evidence *Table 1*.

Table 1: Lifestyle Factors, Mechanisms, Evidence, and Implications for Brain Health

Lifestyle Factor	Key Mechanisms	Evidence (2015–2026)	Implications for Brain Health
Physical Activity	↑ Neurogenesis (hippocampus), ↑ BDNF, improved cerebral blood flow, reduced inflammation	Strong evidence from meta-analyses and longitudinal studies; RCTs (e.g., multidomain interventions) support cognitive benefits	Improves cognitive performance, delays cognitive decline, reduces risk of dementia
Nutrition (e.g., Mediterranean Diet)	Antioxidant effects, anti-inflammatory pathways, vascular protection, gut–brain axis modulation	Consistent evidence from cohort studies and meta-analyses; high adherence linked to lower cognitive decline	Supports cognitive functioning, reduces risk of neurodegenerative diseases
Sleep	Memory consolidation, glymphatic clearance of neurotoxins, emotional regulation	Increasing evidence from systematic reviews linking sleep disturbances to cognitive decline and dementia risk	Essential for cognitive and emotional health; sleep interventions may reduce risk
Cognitive Engagement	Neuroplasticity, cognitive reserve enhancement, synaptic strengthening	Observational and interventional evidence supports protective effects of lifelong learning and mental stimulation	Enhances resilience to cognitive decline and promotes healthy ageing
Social Interaction	Stress reduction, emotional regulation, cognitive stimulation, reduced loneliness	Strong evidence linking social isolation with increased dementia risk; social engagement protective	Promotes psychological well-being and cognitive resilience
Multidomain Interventions	Synergistic effects across behavioural pathways	RCT evidence (e.g., FINGER-type studies) shows combined interventions more effective than single-domain	Most promising approach for prevention and public health strategies

3. Results

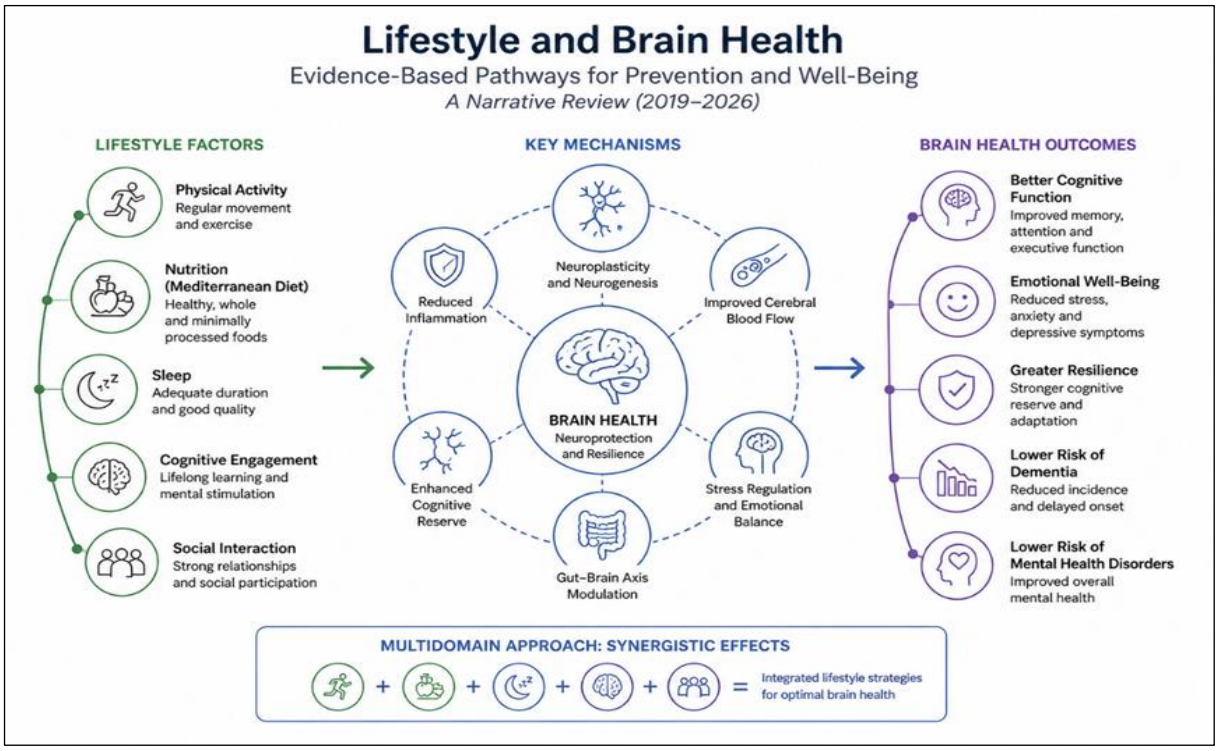

Figure 1: Conceptual model illustrating the pathways linking modifiable lifestyle factors (physical activity, nutrition, sleep, cognitive engagement, and social interaction) to brain health outcomes through interconnected biological and psychological mechanisms. Multidomain interventions demonstrate synergistic effects and represent the most effective strategy for prevention and well-being

The synthesis of the literature revealed a consistent and converging body of evidence supporting the central role of modifiable lifestyle factors in shaping brain health outcomes. Across studies published between 2015 and March 2026, five core domains emerged as key determinants: physical activity, nutrition, sleep, cognitive engagement, and social interaction. In addition, multidomain lifestyle interventions demonstrated synergistic effects, suggesting that integrated approaches may be more effective than isolated behavioural changes.

Physical activity was identified as one of the most robustly supported lifestyle factors associated with brain health. Evidence from meta-analyses and longitudinal studies consistently indicates that regular physical activity is associated with improved cognitive performance, particularly in executive functioning and memory domains (Iso-Markku *et al.*, 2022; Robbins *et al.*, 2021). These benefits are supported by biologically plausible mechanisms, including enhanced neurogenesis, increased levels of brain-derived neurotrophic factor (BDNF), improved cerebral blood flow, and reduced neuroinflammation. Furthermore, interventional evidence suggests that structured exercise programs can delay cognitive decline and improve outcomes across both healthy and at-risk populations (Kivipelto *et al.*, 2020).

Dietary patterns also emerged as a critical determinant of brain health. Adherence to Mediterranean-type diets has been consistently associated with better cognitive outcomes and reduced risk of neurodegenerative disorders (Van Den Brink *et al.*, 2019). These associations are thought to be mediated through antioxidant and anti-inflammatory pathways, as well as vascular and metabolic regulation. In addition, emerging evidence highlights the role of the gut–brain axis, suggesting that dietary patterns may influence brain function through modulation of gut microbiota and related neurobiological processes (Cryan *et al.*, 2019).

Sleep was identified as another key, yet often under-recognised, factor influencing brain health. Systematic reviews indicate that both insufficient and poor-quality sleep are associated with increased risk of cognitive decline and dementia (Cao *et al.*, 2025; Livingston *et al.*, 2020). Mechanistically, these effects are linked to impaired memory consolidation, dysregulation of emotional processing, and reduced efficiency of glymphatic clearance systems responsible for the removal of neurotoxic waste products. Cognitive engagement was consistently associated with enhanced cognitive reserve and resilience to age-related decline. Evidence suggests that individuals who regularly engage in mentally stimulating activities may experience delayed onset of clinical symptoms despite underlying neuropathology (Stern *et al.*, 2020). These effects are attributed to increased neuroplasticity, synaptic efficiency, and compensatory neural network activation. Interventional studies further support the role of cognitive training in improving specific cognitive domains, although transfer effects to everyday functioning remain variable.

Similarly, social interaction and connectedness were identified as significant protective factors. A substantial body of evidence indicates that social isolation and loneliness are associated with increased risk of cognitive decline, dementia, and mental health disorders (Sommerlad *et al.*, 2019; Livingston *et al.*, 2024). Conversely, active social engagement contributes to emotional regulation, stress reduction, and cognitive stimulation, supporting both psychological well-being and cognitive resilience.

Importantly, a key finding across the literature is the superior effectiveness of multidomain lifestyle interventions targeting multiple behavioural pathways simultaneously. Randomised controlled trials, such as the FINGER study, demonstrate that combined interventions incorporating physical activity, dietary modification, cognitive training, and vascular risk monitoring yield greater cognitive benefits compared to single-domain approaches (Ngandu *et al.*, 2015). These findings highlight the importance of synergistic and cumulative effects across lifestyle behaviours.

Across all domains, several common mechanisms were identified, including reduced inflammation, improved vascular health, enhanced neuroplasticity, and strengthened cognitive reserve. The convergence of evidence across multiple domains strengthens the plausibility of underlying causal pathways, despite the predominance of observational designs. Moreover, these mechanisms appear to interact dynamically rather than independently, reinforcing the need for holistic and integrative models of brain health. Contextual factors such as age, education, socioeconomic status, and

cultural influences were also found to moderate the relationship between lifestyle behaviours and brain outcomes.

4. Discussion

The present narrative review synthesised recent evidence (2015–March 2026) on the role of modifiable lifestyle factors in brain health, highlighting the multidimensional and interactive nature of behavioural determinants across the lifespan. The findings converge with high-impact literature, including the Lancet Commission (Livingston *et al.*, 2024), reinforcing the view that a substantial proportion of cognitive decline and dementia risk may be preventable through lifestyle modification. Importantly, the current synthesis extends this perspective by integrating evidence not only on risk reduction but also on positive brain health outcomes, including cognitive resilience, emotional well-being, and functional capacity (Sommerlad *et al.*, 2019).

A key finding of this review is the robust association between physical activity and brain health outcomes. This aligns with meta-analytic evidence demonstrating that regular physical activity enhances cognitive functioning and may delay neurodegenerative processes (Iso-Markku *et al.*, 2022; Erickson *et al.*, 2019; Voss *et al.*, 2019). The identified mechanisms—such as increased neurogenesis, improved vascular function, and reduced neuroinflammation—provide biologically plausible pathways through which behavioural interventions exert their effects (Kivipelto *et al.*, 2020).

Similarly, nutrition emerged as a critical determinant of brain health, with Mediterranean-type dietary patterns consistently associated with favourable cognitive outcomes (Van Den Brink *et al.*, 2019; Jacka, F. N.; *et al.* 2017). These findings are consistent with broader evidence indicating that dietary quality influences brain health through anti-inflammatory, antioxidant, and metabolic pathways, while emerging research highlights the importance of the gut–brain axis (Sampath *et al.*, 2022).

Sleep also represents a fundamental, yet underemphasised, component of brain health. The current findings support evidence linking sleep disturbances with increased risk of cognitive decline and neurodegenerative disease (Cao *et al.*, 2025). Despite this, sleep remains relatively under-integrated in public health strategies, highlighting a gap between scientific evidence and real-world implementation (Sabia *et al.*, 2021).

Beyond biological lifestyle factors, the present review underscores the importance of cognitive engagement and social interaction as key contributors to brain health. These domains are closely linked to the concept of cognitive reserve, which explains variability in clinical outcomes despite similar levels of neuropathology (Stern *et al.*, 2020). Social and cognitive stimulation appear to enhance neural efficiency and adaptability, supporting resilience against age-related decline (Holt-Lunstad, J., *et al.* 2015).

One of the most significant contributions of this review is the emphasis on multidomain lifestyle interventions. Evidence from randomised controlled trials demonstrates that combined interventions targeting multiple behavioural domains are

more effective than single-domain approaches (Ngandu *et al.*, 2015). This supports a shift from reductionist models toward integrated, systems-based prevention strategies.

Despite these advances, several important gaps remain. First, the predominance of observational designs limits causal inference (Sommerlad *et al.*, 2019). Second, most evidence derives from high-income countries, raising concerns about generalisability. Third, lifestyle behaviours are often studied in isolation, whereas in real-world settings they co-occur and interact (Sommerlad *et al.*, 2019; Ngandu, T., *et al.*, 2015).

Additionally, the lack of standardised definitions and measurement tools for brain health complicates comparisons across studies and limits the development of unified prevention frameworks. Future research should prioritise validated multidimensional assessment tools and explore emerging areas such as digital health interventions and personalised prevention strategies (World Health Organization, 2023).

From a public health perspective, the findings highlight the importance of early and sustained lifestyle interventions across the life course (Konstantopoulou *et al.*, 2026). Brain health should be conceptualised as a dynamic, lifelong process influenced by behavioural, social, and environmental factors. Integrating lifestyle-based strategies into education, healthcare systems, and public policy may provide scalable and cost-effective approaches to reducing the global burden of neurological and mental health disorders.

5. Conclusion

This narrative review underscores the central role of modifiable lifestyle factors in shaping brain health across the lifespan. Converging evidence indicates that physical activity, nutrition, sleep, cognitive engagement, and social interaction exert meaningful and interrelated effects on cognitive functioning, emotional well-being, and resilience to neurological and psychiatric disorders. Importantly, multidomain approaches appear to offer the greatest benefit, highlighting the need to move beyond single-risk-factor models toward integrated, systems-based prevention strategies.

Despite substantial progress, gaps remain in establishing causal pathways, standardising brain health metrics, and translating evidence into scalable, real-world interventions. Addressing these challenges will require longitudinal, culturally sensitive research and closer integration of behavioural, clinical, and public health frameworks.

Brain health should be reframed as a lifelong, modifiable trajectory rather than an outcome of ageing alone. Embedding lifestyle-based strategies into education, healthcare, and policy has the potential to deliver significant individual and societal benefits. Advancing this agenda represents a critical priority for reducing the global burden of cognitive and mental health disorders.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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