

Review Article

Analysis of Midlife Approaches to Reduce the Risk Factors of Dementia Among Adults in the United Kingdom

Kehinde Francisca Ayandeyi^{1,*} , Sabita Shaha² , Marcus Chilaka¹

¹Faculty of Health Studies, School of Nursing and Healthcare Leadership, University of Bradford, Bradford, UK

²School of Pharmacy and Medical Sciences, University of Bradford, Bradford, UK

Abstract

Dementia is an illness of the brain in which there is deterioration in a person's cognitive abilities. This interferes with one's ability to carry out everyday tasks and maintain social autonomy by adversely affecting memory, behavior, reasoning, and social capacities. The study reviewed the epidemiological literature on dementia and its risk factors as well as the several midlife strategies for lowering the risk of dementia. This is with a view to explore the midlife strategies in lowering the risk factors of dementia among adults in the United Kingdom. The study adopted reviews of literature carried out systematically. The specifications described in the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)” were followed in reviewing the literature to ensure a comprehensive and transparent methodology. Literature search was conducted systematically in scientific databases to identify empirical studies that are pertinent. The comprehensive search strategy aimed to retrieve as many relevant studies as possible within the scope of the review. It employed a combination of keywords related to dementia risk factors, behavioral and psychological impacts, older people, and the UK context. The search terms were adapted to fit the specific requirements of each database, ensuring optimal retrieval of relevant literature. In total, 16 publications were included in the study after the eligibility of these articles was verified. By leveraging the potential advantages of internet-based, individualised health prevention measures, both the general public and primary care providers become more aware of dementia as well as help to solve the issue. Dementia and various cognitive impairments have been repeatedly associated to high blood pressure. Recent findings support the idea that decreasing blood pressure in middle age is an important strategy for preventing dementia in old age. Education has a protective impact and that the majority of previously investigated risk factors including physical inactivity, diabetes, air pollution, hearing loss, hypertension, obesity, social isolation, depression, and smoking increase the incidence of dementia. People who adhered to the MedDiet the best had a 23% reduced risk of dementia than those who adhered the least. The study concluded that significant modifiable risk variables, particularly socioeconomic and lifestyle factors, were more strongly associated with dementia and contributed to higher attributable fractions of dementia cases.

Keywords

Dementia, Midlife, Risk Factors, Analysis, Adults, United Kingdom

*Corresponding author: kehindefrancisca@gmail.com (Kehinde Francisca Ayandeyi)

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1. Introduction

Dementia is an illness of the brain in which there is deterioration in a person's cognitive abilities [1]. This interferes with one's ability to carry out everyday tasks and maintain social autonomy by adversely affecting memory, behavior, reasoning, and social capacities [2, 3]. Dementia is widespread, underdiagnosed in numerous societies, [3] and worldwide, the prevalence of dementia is increasing [4]. The subtypes of dementia include: "Alzheimer's disease" which is the major neurodegenerative condition that causes dementia, causing 60% to 80% of cases [5]. "Vascular dementia" is the second most prevalent form of dementia representing 20% of cases [6, 7]. "Lewy body dementia" accounts for 5% to 15% while "frontotemporal dementia" represents 10–20% of all cases of dementia [7, 8].

Worldwide about 50 million persons live with dementia, this figure is estimated to shoot up to 152,000,000 in the year 2050 [9]. Presently, there are 850,000 persons who live with dementia in the United Kingdom alone. According to the Public Health England [10] forecast, 2 million individuals would develop dementia by the year 2050, up from over 1 million by 2025. According to Pedroza et al. [11], it is roughly calculated that by 2050, the estimated cost of dementia will be about 1.6 trillion dollars globally. Consequently, the general population must learn of its risk factors [12].

In the United Kingdom, people who live with dementia are mostly female and this account for about 62% while 38% are male. This could be that women have a long lifespan in comparison with men and the key risk factor known for this illness is age [10]. The aging population is adding to dementia growth incidence. Roughly 11.4 million persons in the United Kingdom are older than the age of 65, and this is anticipated to accelerate beyond 40% in the coming years (17 years) beyond 16 million. About one in four people in the year 2040 will be aged 65 or over in the UK (24.2%) [10]. However, record shows that young onset dementia, which is the development of symptoms before age 65, approximately accounts for 9% of cases and does not only afflict elderly people [13–15].

However, the purpose of this study is to investigate midlife strategies that lower dementia risk factors. With the aim of exploring midlife strategies in lowering the risk factors of dementia among adults in United Kingdom, the objectives are to review the epidemiological literature on dementia and its risk factors and to assess several midlife strategies for lowering the risk of dementia.

2. Methodology

2.1. Study Design

This study adopts reviews of literature carried out systematically. The specifications delineated in the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)" were followed in reviewing the literature to en-

sure a comprehensive and transparent methodology [16]. The PRISMA framework provides a step-by-step approach for conducting reviews systematically, thereby minimizing bias and enhancing the reliability of the findings [17]. The review aimed to identify and synthesize existing evidence on the several risk factors of dementia and midlife strategy to lowering the dementia in older people in the UK. Therefore, a search of relevant literature was conducted systematically to achieve the study's objective, and a predefined protocol was developed to guide the review process. The review adopted an inclusive approach, encompassing both qualitative and quantitative studies. This broad approach was chosen to comprehensively understand the several risk factors of dementia and midlife strategy to lowering the dementia in older people in the UK, including their subjective experiences and objective measurements [18].

2.2. Search Strategy

Literature search was conducted systematically in scientific databases to identify empirical studies that are pertinent. Databases related to public health, social sciences, nursing, behavioural sciences, and medicine were focused on. Consequently, the databases Web of Science, PubMed, Scopus, CINAHL, PsycINFO, Embase, MEDLINE, NIH, Library Search, and Google Scholar were searched systematically using combinations of Medical Subject Headings (MeSH) terms and relevant keywords [19]. The next step was to identify published research using a search technique based on the risk factors of dementia which are: lifestyle factors, cognitive reserve, ethnicity, gender and sex, health conditions and diseases, genes, and ageing. The search phrase included particular subject headings and indexing terms from various databases together with synonyms, keywords, and a few extra words that best described what was being searched for. The term used to search the database included dementia, midlife, approaches, risk factors, adults, United Kingdom, late life, and epidemiological studies. The search term applied to the title, abstract, keyword and the full text of international and domestic publications. The review also considered Articles written in English covering a period from 2012 to 2023. This timeframe was selected to encompass the most recent and relevant research findings. Referencing list of pertinent reviews and included studies were also screened for further studies [20].

The comprehensive search strategy aimed to retrieve as many relevant studies as possible within the scope of the review. It employed a combination of keywords related to dementia risk factors, behavioral and psychological impacts, older people, and the UK context. The search terms were adapted to fit the specific requirements of each database, ensuring optimal retrieval of relevant literature.

There were 1282 unique articles found after the search

which comprises of publications published up to May 2023.

2.3. Article Selection

The selection process of the articles is shown in [Figure 1](#). All duplicates were eliminated during the initial selection step, and the remaining titles (n=325) reviewed to determine whether they should be included. Articles moved through to the next stage of screening when all criteria for selection were satisfied

or whenever there was any uncertainty. In the second stage, abstracts of the remaining papers (n=26) were evaluated. A similar process was used in the third phase in assessing full-text of the remaining articles (n=16). Finally, using the "snowball method," all the 16 included papers' references were checked for any new potentially pertinent publications. In total, 16 publications were included in this study ([table 1](#)) after the eligibility of the selected articles was once more verified.

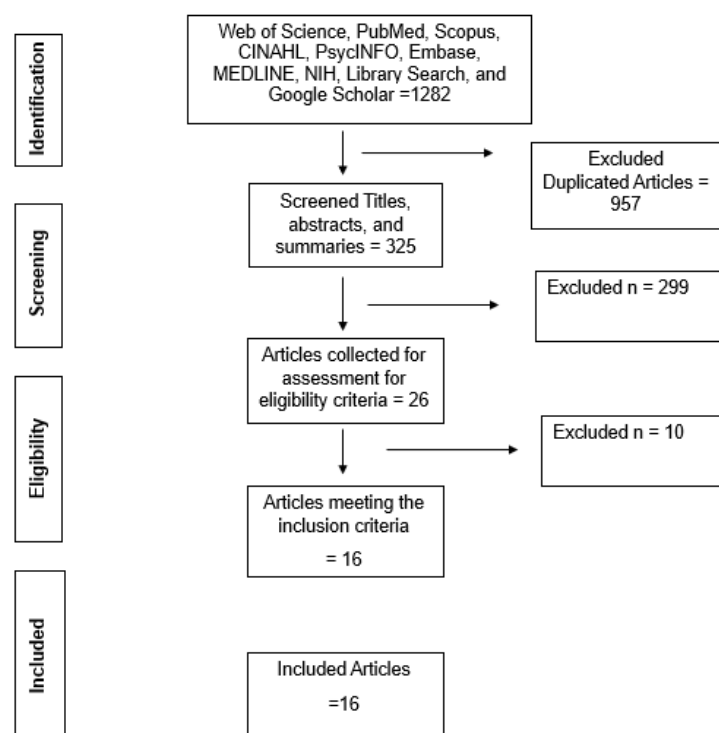


Figure 1. PRISMA Guideline in selecting Relevant Articles.

The features of the reviewed articles are listed in [Table 1](#) below:

Table 1. Characteristics of reviewed articles.

S/N	Author (Year)	Article Title	Methods, MMAT Type	Participants	Setting (Country)	Aim	Results
1.	Berwald S, et al [21]	Black African and Caribbean British Communities' Perceptions of Memory Problems: "We Don't Do Dementia."	Qualitative semi-structured interviews	n= 50 people, range 18 to over 85 years old	United Kingdom	To identify and explore especially within UK Black African and Caribbean communities, the barriers to seeking help for memory problems	No proof of differences between people who have lived longer period in the UK, immigrants who are relatively new and those given birth to in the UK
2.	Bosco A, et al [22]	Changing lifestyle for dementia risk reduction: Inductive content analysis of a national	Online Survey -Inductive content analysis of a national UK survey	n=3,948 people aged over 50 years (mean = 62; SD = 8.0;	United Kingdom	Investigate whether persons over 50 are willing to alter their lifestyle and conduct to lower their dementia risk develop-	The study found that having a personal encounter with dementia and thinking of oneself as leading a "healthy" lifestyle are two

S/N	Author (Year)	Article Title	Methods, MMAT Type	Participants	Setting (Country)	Aim	Results
3	Chen H, et al [23]	UK survey		range 50 years - 93 years)		ment in the future	factors that encourage people to take preventative actions to lower their risk of dementia in late life.
		Age- and sex- specific modifiable risk factor profiles of dementia: evidence from the UK biobank	Cohort study, Questionnaire	n= 497,401 individuals, at baseline the mean age = 56.5 and SD = 8.1	United Kingdom	Characterization of sex-specific and age modifiable dementia's risk factor profiles across sex and age groups (UK).	The research supported stronger relationships and higher attributable fractions of major modifiable risk factors for dementia among comparatively younger persons, especially socioeconomic and lifestyle factors. Identification of a stronger link and higher attributable risk of several dementia's modifiable risk factors among younger adults compared to older individuals.
		Prevention of dementia using mobile phone applications (PRODEMOS): protocol for an international randomised controlled trial	Prospective, randomised, open-label blinded endpoint trial with 18-month intervention and follow up	n = 21, median age = 69 years	UK and China	To evaluate the efficacy and application of smart phone intervention on the risk of dementia in older persons with greater risk from the general population in Beijing, China and from a low-SES population in the UK	The high prevalence of dementia, lower provision of high-quality cardiovascular preventive care in LMIC and lower uptake of such programmes in Western low SES populations require affordable and straight forward preventive strategies. If proven implementable and effective, the pragmatic smartphone intervention will facilitate widespread use and reduction of dementia risk for populations who are hard-to-reach across the universe.
4	Eggink E, et al [24]						
5	Elwood P, et al [25]	Healthy Lifestyles Reduce the Incidence of Chronic Diseases and Dementia: Evidence from the Caerphilly Cohort Study	Cohort study; Modified CAMDEX interview, the Rosen-revised Hachinski Ischaemic Score, a neurological examination with Frontal assessment Battery, the Clinical Dementia Rating, and the Informant Questionnaire on Cognitive Decline in the Elderly	n=2235	South Wales, United Kingdom	Summarises the research on the associations between healthy lifestyles at baseline and the prevalence of cognitive impairment, cancer, vascular disease, diabetes, dementia, and all-cause mortality during follow up. To also look at changes in the 30year trend of healthy behaviour.	Although living a healthy lifestyle is linked to higher disease-free longevity and decreased cognitive impairment, uptake is still low
6.	Gong J	Sex differences in	A cohort study;	A total	United	To investigate differences	At the study's baseline,

S/N	Author (Year)	Article Title	Methods, MMAT Type	Participants	Setting (Country)	Aim	Results
	et al [26]	the association between major cardiovascular risk factors in midlife and dementia: a cohort study using data from the UK Biobank	Questionnaires	502,226 participants (54.4percent of women) without previous diagnosis of dementia. Mean age was 56.7 years (SD was 8.2) for men and 56.3 years (SD was 8.0) for women	Kingdom	in gender in the relationship between the risk of dementia from any cause and the main cardiovascular risk factors in the UK Biobank. Additionally, the study looked at how gender inequalities vary by age and socioeconomic position.	men typically had a worse cardiovascular profile than women. It was discovered that several cardiovascular risk variables were connected to incidence dementia in both sexes.
7.	Malik et al [27]	Midlife vascular-risk factors and risk of incident dementia: Longitudinal cohort and Mendelian randomization analyses in the UK Biobank	Longitudinal cohort and Mendelian randomization analyses	n= 229,976 mean age = 56.5; SD = 8.1 years;	United Kingdom	The study sought to (i) ascertain the baseline LS7 score's relationships with incident all-cause dementia, as well as those of its lifestyle and biological sub scores (ii) find linear relationships and non-linear between all-cause incident dementia and individual vascular risk factors; and (iii) use MR analyses to set-up causal relationships between all-cause dementia and individual vascular risk factors	Mid-life adherence to the AHA LS7 recommendations regarding biological risk factors such as diabetes, hypertension and hypercholesterolemia was associated with a lower dementia risk incident. Genetically increased blood pressure was associated further with a lower risk of dementia. These findings supported the efficacy of blood-pressure lowering strategies for reducing burden of dementia and call for additional trials clinically.
8.	Mukadam N, et al [28]	Risk factors, ethnicity, and dementia: A UK Biobank prospective cohort study of White, South Asian, and Black participants	A prospective cohort study; Interviews and health questionnaires	n=294,162	United Kingdom	To better understand the causes and preventative measures for dementia in these minority ethnic groups, it is crucial to understand the risks for dementia from all causes across ethnic groups. The study also sought to determine whether ethnicity influences the relationship between dementia risk and known risk factors.	According to our findings, there is no evidence to suggest that the three major ethnic groups in the UK have different associations between risk variables and dementia risk.
9.	O'Donnell et al [29]	Reducing dementia risk by targeting modifiable risk factors in mid-life: study protocol for Innovative Midlife Intervention for Dementia Deterrence (In-MINDD) randomised controlled feasibility	Randomised controlled feasibility trial which is single-blinded	Participants are from four European countries, between the ages of 40 years and 60 years and have at least one modifiable risk factor for dementia	France, Ireland, the Netherlands, and the UK	The In-MINDD feasibility RCT'S objective is to evaluate the acceptability and viability of providing people in midlife, between the ages of 40 and 60, with an individualised profile and LIBRA brain health score as well as access to individualised online information on health aimed at support-	A change in dementia risk modification score over the timescale of the trial (which is six months)

S/N	Author (Year)	Article Title	Methods, MMAT Type	Participants	Setting (Country)	Aim	Results
		trial		risk		ing changes in health-related behaviour. The study's second objective is to comprehend participants' perspectives on dementia prevention and investigate the acceptance and incorporation of the In-MINDD intervention into normal routine life practise.	
10.	Oliveira D, et al [30]	Factor and reliability analysis of a brief scale to measure motivation to change lifestyle for dementia risk reduction in the UK: the MOCHAD-10	Cross-sectional survey	n=3948 aged 50 and over	United Kingdom	To develop a quick tool for the evaluation of individual motivation to change lifestyle for dementia risk reduction, the factor structure and reliability scores of the "Motivation to Change Lifestyle and Health Behaviours for Dementia Risk Reduction scale" (MCLHB-DRR) were evaluated.	Change in lifestyle for dementia risk reduction for use in the UK.
11.	Oliveira D, et al [31]	Motivation and willingness to increase physical activity for dementia reduction: Cross-sectional UK survey with people aged 50 and over	A cross-sectional online survey	n=3948 participants mean age= 623; SD = 7.9	United Kingdom	This study sought to determine the health-related and socio-demographic characteristics that were related to participants' (aged 50 and over) degrees of motivation and willingness to improve physical exercises to perhaps reduce their chances of dementia development.	Most persons over the age of 50 report being somewhat or extremely active, according to our research. Males who were much more physically active tended to be older, more educated, and of higher overall health.
12	Qizilbash N, et al [32]	BMI and risk of dementia in two million people over two decades: a retrospective cohort study	A retrospective cohort study	N=1,958,191 people, at baseline, the median age = 55 years; IQR = 45-66	United Kingdom	The association between body mass index (BMI) and risks of dementia was investigated	The research indicates that being underweight in mid-life and later in life significantly increases the risk of dementia over a 20-year period.
13	Rosato M, et al [33]	Factors associated with public knowledge of and attitudes to dementia: A cross-sectional study	A cross-sectional study; questionnaire, face-to-face interview	n=1,211 respondents	United Kingdom	With a focus on the social traits connected to (i) the creation of these attitudes and (ii) the sense of the need for limitation and control for individuals with dementia, the research studied attitudes towards people with dementia and lay knowledge of dementia as potential precursors of public concern.	The researchers discovered that respondents Underlined the difficult nature of the work, citing significant negativity levels on a variety of topics. It also revealed absence of understanding of risk factors of dementia.
14.	Shan-	older UK adults at	Randomised	108 persons	United	The MedEx-UK's objec-	MedEx-UK will inform a

S/N	Author (Year)	Article Title	Methods, MMAT Type	Participants	Setting (Country)	Aim	Results
	non OM, et al [34]	risk of dementia: protocol for the MedEx-UK randomised controlled trial	controlled trial	(55years -74years)	Kingdom	<p>tives are to: (i) Evaluate engagement with the intervention, participants retention, and recruitment, in the trial, to determine the viability and acceptability of this multidomain intervention.</p> <p>To calculate the intervention's effectiveness in terms of PA and MedDiet levels.</p> <p>Evaluate numerous biological, vascular, neurological, and cognitive outcomes and process measures to assist in designing a subsequent full-scale RCT.</p>	larger RCT designed to test the efficacy of physical activity and MedDiet intervention to reduce dementia risk.
15	Shannon et al [35]	Mediterranean diet adherence is associated with lower dementia risk, independent of genetic predisposition: findings from the UK Biobank prospective cohort study	A prospective cohort study	n=60,298 persons	United Kingdom	<p>This study looked at the association between genetic dementia risk and diet, as well as associations between dementia incidence and adherence to MedDiet in a large prospective cohort sample.</p>	Adherence to a MedDiet on a higher level was linked to dementia reduced risk in a prospective cohort study whose population is big.
16.	Wotton CJ & Goldacre MJ [36]	Associations between specific autoimmune diseases and subsequent dementia: retrospective record-linkage cohort study, UK	A retrospective record-linkage cohort study	n=1019 - 316043	United Kingdom	<p>To ascertain whether being admitted to the hospital for an autoimmune disease is related to a higher chance of being admitted again for dementia in the future</p>	The study discovered a link between dementia admission and hospital admission for an autoimmune condition. Although the effect sizes were small, many of the autoimmune disorders investigated were linked to later dementia.

2.4. Data Extraction

- 1) Major findings and conclusions
- 2) Study characteristics: the author, the publication year, the title, the aims and objectives, the country, the size of the sample, the study design, and the data collection tools.

2.5. Data Analysis

The data was analysed using qualitative content analysis. This is because the data are presented using themes and words which makes it possible to infer some interpretations of the results.

2.6. Data Processing

The Mixed Methods Appraisal Tool (MMAT) was used to evaluate the study's methodological qualities because empirical studies were included regardless of their research style [37]. Data was independently retrieved from the 16 included articles. The same data extraction form, which consists of the following categories, was utilised.

- 1) Details on the techniques used to collect data and the (statistical) analyses,
- 2) Evaluation of the methodological qualities.

2.7. Eligibility Criteria

Following the Center for Reviews and Dissemination (CRD) guideline for evaluating health and public health review systematically, the PICO framework (Table 2), which stands for population, interventions, comparators, and outcomes, was adopted to identify pertinent articles relevant to this study [38]. The inclusion and exclusion criteria were established using the PICO framework (Table 2) to guide the selection of relevant studies [39].

An article was confirmed to be eligible and included in the study once it fulfilled the exclusion and inclusion criteria.

2.7.1. Inclusion Criteria

Qualitative and quantitative studies were both included in this review. The inclusion criteria in searching the database were limited to only peer-reviewed English publications published between January 2013 and May 2023. Boolean operators “OR” and “AND” was included, and the search was within the “article title”. Careful review was done on the titles and abstracts of selected studies and full texts of pertinent studies was accessed. The lists of reference of the accessed full texts were further searched for more studies [40].

The keywords used in searching the database were the “Behavioural impact” “or” “psychological impact” AND “Dementia”, “Impacts” AND “Dementia”, “Risk Factors” and “Dementia”, “Older People” or “aged Population”, “UK” or “England” OR “Wales” OR “Northern Ireland” OR “Scotland.”

2.7.2. Exclusion Criteria

The exclusion criteria include:

- 1) Studies conducted outside the UK: Studies conducted in other countries were excluded to maintain the focus on the UK context.
- 2) Irrelevant outcomes: Studies that did not specifically examine the risk factors of dementia and of dementia risk factors in older people were excluded.
- 3) Insufficient data: Studies with insufficient data or relevance to the research question were excluded.
- 4) search that could not be electronically identified.
- 5) Articles published before 2012 were also excluded.

Throughout the study selection process, detailed records were maintained to track the number of articles screened, identified, excluded, and included at each stage.

2.8. Study Selection

The PRISMA flowchart was used to represent the process of study selection visually and ensure transparency in reporting. The search results were assessed to identify studies that might be suitable. The publications were sorted according to the abstract and title. The full text review was limited to eligible papers only. At this stage, studies that are not relevant, lacking pertinence and data that had already been published or

duplicated in other studies were eliminated. Thereafter, articles were evaluated for inclusion from the selected ones using inclusion and exclusion criteria.

2.9. Ethical Approval

Ethical approval form was submitted to Ethics Committee at the University of Bradford via ethics@bradford.ac.uk with the reference number Ethics Checklist: EC27745. Ethics approval was granted by the “Chair of the Biomedical, Natural, Physical and Health Sciences Research Ethics at the University of Bradford” on 31/07/23.

Table 2. Table showing the adoption of PICO guideline.

PICO	Representation
Population	Older People - age 65 and above-
Intervention	Identifying dementia risk Factors and approaches to prevent or curb dementia
Comparison	Comparing the behavioral impact and psychological impact
Outcome	Behavioral and Psychological Impact
Location	UK- England, Wales, Northern Ireland, and Scotland
Language	English
Time Frame	2012 - 2023

3. Results and Discussion

This review is a summary of the data derived from credible observational research that investigated the relationship between certain behavioural risk factors in midlife and the delay or prevention of dementia in later life. The main themes which emerged are blood pressure, smoking, diabetes, education, alcohol, physical activities, age, obesity, and diet.

3.1. Blood Pressure

Dementia and various cognitive impairments have been repeatedly associated to high blood pressure [41, 42]. There was a link between Midlife hypertension and a higher risk of dementia in a study of Kaiser Permanente Northern California (KPNC) participants, although exclusively in women [43]; two additional studies also revealed a link between hypertension and vascular dementia and mild cognitive impairment [44, 45] in women but not in men. Gong et al. (2021) [26] findings of sex differences in blood pressure and dementia could be explained by a number of factors. According to Deegan et al. (2011) [46], females may have cerebral autoregulation that is better than males, and in men decreased cerebral perfusion may be linked to a greater prevalence of hospitalisation due to

orthostatic hypotension, which has been linked to higher dementia risks [47].

Following the biological recommendations of the LS7 score (blood cholesterol, blood pressure, and glycemic status) was linked to decreased risks in dementia [27]. Additionally, a higher risk of all-cause dementia incident was linked to a lifetime of genetically raised systolic blood pressure, supporting a link between elevated blood-pressure and dementia risk. Recent findings support the idea that decreasing blood pressure in middle age is an important strategy for preventing dementia in old age. The findings of Malik et al. (2021) [27] broadly concur with those of the “SPRINT-MIND” trial, which found that intensive blood pressure reduction to <120mmHg was linked to a lower combined risk of probable dementia & cognitive impairment that is mild [48]. The findings of Malik et al. (2021) [27] support a causal effect of genetically elevated systolic blood pressure on dementia risk. Recently, a meta-analysis of 12 clinical trials found that reducing pressure of the blood was strongly linked to lower risks of cognitive impairment [41]. There is evidence from prior observational research that these blood pressure changes are age-dependent and midlife-specific. Systolic blood pressure was linked to the risk of dementia in the Whitehall II cohort at age 50, but not at age 60 or 70 [49]. Similar studies of the Framingham Offspring research reveal that high blood pressure increases the risk of incident dementia between the ages of 40 and 64 but not after 65 [50]. There is ongoing debate over how reducing blood pressure may affect dementia risk [27].

3.2. Smoking

There is a high risk of dying prematurely in smokers, preventing smokers from attaining that age of dementia development; as a result, there is uncertainty in potentially determining this relationship [51]. Cardiovascular disease is assumed to be the underlying cause of elevated risks of dementia and impairment in cognition among persons who smoke [51]. Similar to the findings of [26], a meta-analysis that looked at smoking cigarette effects on dementia revealed that ongoing smokers had a higher risk of AD, vascular dementia, and all-cause dementia, but not for previous smokers in comparison to non-smokers [52]. Gong et al. [26] risk analysis revealed that, compared to non-smokers, ongoing smokers and daily cigarette use of 20 or more cigarettes continue to be significant risk-factors for dementia of any aetiology in both women and men. However, further research is needed to fully understand the relationship between smoking and dementia.

3.3. Diabetes

According to a prior meta-analysis, both men and women with type 2 diabetes had a 60% higher risk of developing any kind of dementia [53]. The current study also revealed that both type 1 and 2 diabetes were linked to an elevated dementia

risk in both sexes when compared to no diabetes. The UK Biobank predicts that 68,000 people will have diabetes by 2027 [54], and that figure is rising globally [55], raising alarms about the relationship between diabetes and dementia. Dementia’s burden in this population-at-risk must be reduced, and while scheduled testing in diabetes for cognitive dysfunctions is vital [56], new prevention and treatment options initiatives are essential.

3.4. Education

According to the Three-City Study, men are not at increased risks of dementia but women are [57]. After taking into account various comorbidities and behaviours, a different study [58] came to the conclusion that educational attainment at lower level was singly related to higher risks of dementia death in women. Reducing socioeconomic disparities may therefore have considerable benefits on prevention of dementia as well as several disorders on a population level, given that deprivation was linked to risks of dementia in both men and women to a similar degree [26].

Mukadam et al. [28] confirmed prior findings that education has a protective impact and that the majority of previously investigated risk factors including physical inactivity, diabetes, air pollution, hearing loss, hypertension, obesity, social isolation, depression, and smoking increase the incidence of dementia. All ethnic groups' average ages at which participants left school were comparable, however the White British group had the greatest percentage of individuals who completed their education up to age 16. Even if attainment levels are increasing among younger generations, this is unlikely to represent the majority of elderly individuals from minority ethnic groups in the UK, which may potentially limit generalizability [28].

In Rosato et al. [33] research, despite significant public health efforts—and media attention—to inform the public that the course of dementia might be dependent on risk factors that are modifiable [13, 25, 59, 60] their results attest to the public's enduringly high levels of negativity [61-63], and greater levels linked to better tacit or general comprehension, and more in-depth understanding of risk variables partly mitigates that risk.

3.5. Alcohol

According to the Whitehall cohort studies, drinking more than 14 units per week and abstaining from alcohol are linked to an elevated risk of dementia, with cardiometabolic disease accounting for some of the dementia risk in abstainers [64]. Mukadam et al. [28] found no indication that moderate drinking causes a clinical issue, despite the fact that results from neuroimaging research imply that any quantity of alcohol causes atrophy and brain damage, including participants in UK Biobank. However, this doesn't equal to dementia clinical diagnosis.

According to studies, older persons who frequently express uncertainty about the viability of dementia prevention have little understanding regarding cognitive impairments [65]. Older persons may be less motivated to improve their lifestyles as a result of their lack of understanding regarding dementia causes and the connection between physical activity, lifestyle, and dementia risk [31]. On the other hand, fewer negative cues to action were associated with professional experience with dementia and higher education levels. According to studies, individuals who are well-informed about a topic or behaviour may respond more favourably to loss- or fear-based cues that aim to influence their health behaviour [66, 67]. The findings of Oliveira et al. [31], however, imply that professional exposure to dementia may actually undermine the beneficial impact that fear-based motivation might have on changing one's lifestyle.

Additionally, the majority of participants in Oliveira et al. [30] study was reactive in terms of what they needed to do to lower their risk of developing dementia because the majority of the elements included in the final model linked to "cues to action". According to earlier research [68, 69], women and older persons are more likely to be motivated to change their lifestyles in order to prevent disease. These findings are supported by this new research, it also implies that if external cues are offered, such as pertinent information and preventative healthcare help, older adults and middle-aged in the UK are generally inclined to take activities to possibly minimise their dementia risk [30].

3.6. Physical Activity

Oliveira et al. [31] research shows that people who consider themselves to be "healthy" typically engage in greater physical activity and are more eager to do so in order to lower their chance of developing dementia. It is likely that individuals who were already exercising at "healthy" levels had higher levels of self-efficacy, which made them more motivated in increasing their activity levels if necessary and more equipped with the information and resources to do so. Despite being less physically active, people who felt less healthy were more motivated to make lifestyle changes to ward off dementia. It's possible that those who believed they were in good health did not think that making extra adjustments to lifestyle to lower their dementia risk was necessary. Instead of increasing their level of physical activities, especially persons whose health is perceived to be lowered may have felt that broader adjustments to lifestyle were more easily achievable. Despite older persons reporting higher level of current physical activities, aging was associated substantially with decreasing readiness to increase physical exercise.

Physical comorbidities that may make it difficult to engage in lifestyle change, particularly physical activity, are frequently associated with older age [70]. According to Rasinaho et al. [71], older persons with limited mobility frequently cite deteriorating health and apprehension about adverse conse-

quences as obstacles to physical activity. According to Moschny et al. [72], adults beyond the age of 80 had reduced levels of physical activities, which was linked with a decline in health. Therefore, it's probable that older people won't feel at ease or capable of increasing their level of physical exercise to fend off dementia. It should be investigated to see whether there are any practical or structural reasons for this, such as a lack of access to activities that are age-appropriate [31]. Additionally, Oliveira et al. [31] discovered a negative correlation between age and the desire to modify one's lifestyle in response to both negative and positive cues to action. This shows that even if older persons report higher levels of current physical exercise, their motivation and willingness to lower dementia risk may diminish over time. When compared to those without professional or personal experience with dementia, they did not discover any variations in the levels of physical activity among them. However, those who were currently caring for or had previously cared for dementia patients were much more eager to elevate their physical activities and more driven to make other improvements in lifestyle.

3.7. Age

In the study of Chen et al. [23], there was no significant differences in sex in dementia's risk factor profiles in the large group of adults in the UK followed from different stages of their adult life. Majority of modifiable risk factors (current smoking, high deprivation, unhealthy sleep duration, non-moderate alcohol intake, physical inactivity, suboptimal diet, diabetes, depressive symptoms and cardiovascular diseases) but not hypertension and less education showed a strong significant association with dementia among younger adults in relation to older adults. In adults of relatively younger ages, the corresponding population attributable factors (PAFs) were high. Overall, their research found that various modifiable risk factors for dementia were more strongly associated and had a higher attributable risk among younger persons than among older people. In general, the relationships studied by Chen et al. [23] between certain risk variables and dementia were like those in other studies in terms of their magnitudes. For instance, they found that smoking was linked to 30% high risk of dementia across the population studied (HR: 1.28; 95%CI: 1.18, 1.40), which was comparable to findings from a prior meta-analysis [73] (1.37 [1.23, 1.52]). Similar to the pooled results of the prior studies, they discovered that diabetes was related to a 1.9-fold increased risks of incident dementia (1.91 [1.76, 2.07]).

Notably, Chen et al. [23] found that these correlations were significantly affected by age but not by sex, which was consistent with other research on specific risk factors for instance diabetes [74] and hypertension [75]. Their findings may be biologically indicative of the irreversible course of dementia and variations in the susceptibilities of the risk factors across adult life stages [76]. Additionally, taking into account that the

majority of dementia cases in the younger individuals may be early onset dementia, which may have a different aetiology from late onset dementia. Another reason might be because underlying methodological explanations are possible. The secular trend of some risk factors, like education (of which in younger persons may reflect intellectual ability better), may also be a factor in the age differences. Older persons who were free of dementia at baseline may be in a better health than the overall population [23].

3.8. Obesity

One of the main conclusions of Qizilbash et al. [32] is that persons who are underweight have a significantly increased chance of acquiring dementia, and that risk continues even fifteen years after underweight is first noted. These findings may come as a surprise given that other authors have found a relationship between dementia risk and midlife obesity. As an illustration, a recent editorial in *The Lancet Neurology* made it crystal clear that “reduction of risk factors such as midlife obesity and physical inactivity could substantially reduce the future prevalence of dementia” [77]. Similarly, a current review [78] finalized that “studies investigating the association between midlife BMI and risk for dementia demonstrated generally an increased risk among overweight and obese adults”, even though the researchers also mentioned that “when measured in late life, increased BMI has been associated with lower risk”. All of these conclusions, however, are based on rather small research. Overall, their data is inconsistent with some research indicating a connection between dementia and BMI [79, 80] & others stating there is no connection or a lower risk [81, 82]. The apparent disparities between late-life and mid-life dementia connections in some studies' findings are not fully understood, but a lengthy follow-up time (such as thirty years) [83] may be required to identify a middle-life overweight and obesity-related elevated dementia risk [32].

According to Qizilbash et al. [32] study, there is an inverse relationship between dementia risk and BMI in midlife and old age. Even after 15 years of follow-up, the association's strength remained largely stable, especially in those who were 40 to 55 years old when their BMI was measured. Qizilbash et al. [32] results cast doubt on the notion that middle age obesity increases dementia risk. Therefore, it may not be true to say that decreasing obesity in middle age can stop dementia from developing later in life [84]. If midlife weight gain protects against dementia, the causes of this inverse connection are still unknown. Numerous factors, including dietary choices, physical activity, frailty, genetics, and weight fluctuations, may be involved. Low blood pressure in later-life, high cholesterol levels in later-life, regulatory changes in carbohydrate that is age-related, higher leptin levels, protein metabolism or lipid, and increased intake of antioxidant of vitamin E and vitamin D [85, 86] are among the hypotheses that have been made to explain the previously noted protective effect of

higher body mass index on dementia in old age.

By leveraging the potential advantages of internet-based, individualised health prevention measures, In-MINDD can help both the general public and primary care providers become more aware of dementia as well as help to solve the issue. A future, full-scale RCT will be made possible by the intervention being tested in a theoretically informed and reliable manner [29].

3.9. Diet

According to Shannon et al. [35] study, people who adhered to the MedDiet the best had a 23% reduced risk of dementia than those who adhered the least, which was comparable to a reduction in risk of 0.55%. Shannon et al. [35] discovered no statistically significant interactions between polygenic dementia risk and MedDiet adherence as measured by the MEDAS continuous and PYRAMID scores. In addition, they discovered that a continuous MEDAS score, as opposed to a binary MEDAS or PYRAMID score, was a more accurate predictor of dementia risk. Previous investigations into the relationships between dementia risk and MedDiet adherence have yielded conflicting results. In fact, a systematic analysis by Limongi and others [87] found that four out of seven studies indicated decreased risk of Alzheimer's disease and zero out of five studies (showing lower risk of all-cause dementia) correspondingly. In a more recent review of cohort studies, those with higher MedDiet adherence had a lowered risk of dementia from any cause and dementia other than Alzheimer's, but not dementia from Alzheimer's [88]. Previous studies have employed several MedDiet scoring systems and diverse methods for gathering information on dietary intake, of which each defines commitment to this pattern of diet in a fundamentally different way. Such diversity can make it difficult to compare and interpret the findings of various investigations [87]. Even though the results across the various MedDiet scores in their study were largely consistent, the association's strength with dementia risk varied. Even though diet may be a significant modifiable dementia's risk factor for, not all dementia preventive recommendation addresses it [13], which may be due to absence of reliable data as regards the dietary habits linked to lower dementia risk.

An increasing number of healthy behaviours was linked to decreasing rates of several major chronic diseases and mortality in a sample of middle-aged men, including an estimation of 50% decline in diabetes, 50% decline in vascular disease, and 60% decline in all-cause mortality [25]. With a reduction in cognitive impairment of around 60% and a reduction in dementia of roughly the same amount. Elwood et al. [25] results so support earlier research and give additional details on the relationship between lifestyle and cognitive impairment and dementia. In an ageing population, these declines—and those in cognitive function in particular—are of utmost significance. The associations describe in their research are very similar to those reported from other cohorts when the 'dilution'

effect of lifestyle changes during followup is taken into account. Accordingly, those who followed the five (5) healthy behaviours saw an 87% decrease in heart diseases among the 43,000 US health professionals (RR: 0.13 CI: 0.09-0.19) [89] and an 85% decrease in the risk of coronary events among the 84,000 females in the United State Nurses' Health Study (RR: 0.17; 95% CI: 0.07-0.41) [90]. The European EPIC study found that persons who followed four (4) healthy behaviours had roughly a-quarter of the mortality of those who did not (95% CI: 0.18,0.34; OR: 0.25), which is equal to differences in chronological age of about 14 years [91].

According to a survey based on "two-thousand" 60-year-old college graduates, adopting three healthy behaviours might add 8.3 years to the time it took for "disability" to set in for eight regular daily activities [92]. A US NHANES study of participants who adopted four (4) healthy behaviours estimated an advancement rate of 11.1 years for all-cause mortality [93], and a UK study of 5,000 adults who adopted four (4) healthy behaviours revealed an all-cause mortality risk that was equal to being 12 years older than persons who had adopted no healthy behaviours [94]. Of particular interest is the relationship between cognitive outcomes and lifestyle. Short-term studies on elderly populations have generally found a link between lifestyle and cognitive impairment [95-98], but it is challenging to interpret these results because there is a chance that reverses causation occurred. In practical terms, very few studies have tracked mid-aged people over an elongated period. In "Whitehall study", it was discovered that smoking, alcohol, and obesity all had an adverse impact on cognitive performance over the course of ten years [99, 100]. Healthy lifestyle was linked to a lower dementia risk over 25 years in the Honolulu-Asia Ageing Study (OR 0.36, 95% CI 0.15, 0.84) [101]. These findings are supported by Elwood et al. [25] data.

Reverse causation is unlikely to play a large role in the correlations reported by Elwood et al. [25], as evidenced by the fact that the significant trends in their sample for dementia and cognitive impairment persisted even after men with early-stage cognitive impairment were excluded. Early pathological changes that have been described decades before the beginning of dementia might not inevitably lead to cognitive change, although it can still be claimed that even 30years of followup may not totally erase the whole cognitive change impact on behaviour [102]. The biopsychosocial effects of illness on a person's health will differ over time and from person to person, affecting the individual's drive to alter their lifestyle [30].

4. Conclusion

This study concluded that significant modifiable risk variables, particularly socioeconomic and lifestyle factors, were more strongly associated with dementia and contributed to higher attributable fractions of dementia cases. Findings on the risk factor profiles of dementia that is age-specific gave

knowledge to direct the creation and application of preventive interventions to lower dementia risk in adults at various stages of life and emphasised the need of early preventive efforts [23]. Positive behavioural factors had a long-term effect on middle-aged to older persons' chances of successfully ageing as well as the delay or primary prevention of dementia, disability, frailty, and non-communicable chronic diseases.

It was discovered that a parental family history of dementia was linked to a number of modifiable risk factors for dementia, such as high cholesterol, hypertension, cardiovascular diseases, diabetes mellitus, depression, obesity, and overweight, independent of educational level, sex, and age. This shows that people in their middle years who have a parental family history of dementia are at risk for developing dementia and may benefit from dementia risk reduction [103]. According to published research, dementia and cognitive impairment are significant causes of death in the UK and are projected to become a bigger issue with aging population [104]. To live with dementia risk is probably a complicated, long-lasting, and social phenomena that can best be understandable via the perspective of a prolonged experience risk connected to a condition that is in between health and disease [105].

This review demonstrates that midlife good dietary modifications are linked to a lower dementia risk. In addition to enhancing other lifestyle factors (such as increased physical activities), investments in public health efforts to promote a healthy diet may have long-term advantages for the prevention of illnesses that are more common with ageing [106]. These findings highlight the important role of dietary treatments in long-term dementia prevention plans, regardless of genetic susceptibility [35]. Physical activities on a regular basis can be a significant and potent preventive factor against dementia and cognitive decline in the elderly, but insufficient activity does not ensure a certain benefit to health. Therefore, it is important to encourage physical exercise of the right kind, intensity, and frequency for a variety of reasons, including its positive effects on mental health as well as the prevention of many common diseases of civilization and chronic or cardiovascular disorders. Obesity, which is linked to geriatric cognitive decline and low levels of physical activity, is a contributing factor. Physical exercise programmes can be used as a strategy to enhance memory and other cognitive abilities [107].

Personally, encountering dementia and thinking of oneself as leading a "healthy" way of life are factors that encourage people to take preventative actions to lower their dementia risk in late life. Having caregiving obligations and living with prolonged conditions are examples of specific problems that could interact with the chance of behavioural change later in life. Programmes on prevention should assist individuals in better accessing dependable information sources to gain understanding on what preventative measures can be taken to avoid developing dementia and risks for the condition. Behavioural change for reduction in dementia risk involves high variability in individuals, and media information about de-

mentia is highly variable [22].

The midlife exposures and health habits that were the subject of this review are significant factors to be considered when interventions to promote healthy behaviours as well as finding potential differential mechanisms of action is being developed [108].

Abbreviations

PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
UK	United Kingdom
MedDiet	Mediterranean Diet
SES	Socioeconomic Status
LMIC	Low-income and Middle-income Countries
AHA	American Heart Association
LS7	Life's Simple 7
MR	Mendelian Randomization
In-MINDD	Innovative Midlife Intervention for Dementia Deterrence
RCT	Randomised Controlled Feasibility Trial
LIBRA	Lifestyle for Brain Health
BMI	Body Mass Index
MMAT	Mixed Methods Appraisal Tool
CRD	Center for Reviews and Dissemination
PICO	Population, Interventions, Comparators, and Outcomes
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
KPNC	Kaiser Permanente Northern California
MEDAS	Mediterranean Diet Adherence Screener

Author Contributions

Kehinde Francisca Ayandeyi: Conceptualization, Data Curation, Methodology, Visualization
Sabita Shaha: Supervision, Writing - review & editing
Marcus Chilaka: Supervision

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Conflicts of Interest

The authors declare no conflicts of interest.

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