

Research Article

Factors Associated with Mild Cognitive Impairment in Community-Dwelling Elderly Individuals: A Re-evaluation of Systematic Reviews

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Abstract

Objective This study aims to re-evaluate systematic reviews on factors associated with mild cognitive impairment (MCI) in community-dwelling elderly individuals to inform prevention and intervention strategies in community settings. **Methods** Comprehensive searches were conducted across multiple databases, including CNKI, Wanfang Data, VIP Journal Integration Platform, PubMed, Scopus, Web of Science, and Cochrane Library, to identify systematic reviews on factors contributing to MCI in community-dwelling elderly individuals. Dual reviewers screened the literature, and the methodological quality was assessed using A Measurement Tool to Assess Systematic Reviews (AMSTAR 2). Relevant factors were summarized and analyzed. **Results** Eleven systematic reviews were included in the analysis. Of these, two were classified as high quality, two as low quality, and the remaining seven as very low quality. Protective factors against MCI included the consumption of tea, fish, and shellfish, physical exercise, and social participation. Risk factors encompassed a history of chronic diseases, depression, sleep disorders, smoking, and alcohol consumption. **Conclusion** The methodological quality of systematic reviews on factors associated with MCI in community-dwelling elderly individuals is generally low. MCI is closely linked to various aspects of physiological health, psychological health, dietary nutrition, and lifestyle behaviors. It is crucial to focus on high-risk groups, particularly the elderly and females, as well as individuals experiencing subjective cognitive decline, and conduct psychological screenings and assessments of dietary quality. These factors may serve as early indicators for MCI in community-dwelling elderly individuals.

Keywords

Community-Dwelling, Elderly, Mild Cognitive Impairment, Systematic Review, MCI

1. Introduction

Mild cognitive impairment (MCI) is a cognitive state that lies between normal aging and dementia. Over the past decade, the prevalence of MCI among the elderly in China has increased to approximately 20.8%, reflecting a growing public health concern exacerbated by the country's aging population [1]. MCI is strongly associated with severe cognitive disorders,

such as dementia and Alzheimer's disease, and is also linked to mental health conditions like depression [2] and anxiety [3]. Once individuals progress from MCI to dementia, cognitive decline becomes irreversible. Currently, there are no effective treatments for MCI, underscoring the importance of identifying potential risk factors and implementing targeted

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interventions to delay disease progression and enhance the quality of life for the elderly.

In recent years, a substantial body of research has focused on the risk factors for MCI among community-dwelling elderly individuals. These studies aim to facilitate the early identification of high-risk populations and explore preventive strategies. However, due to the sporadic studies on the factors influencing MCI and varying findings among regions [1, 4, 5], intervention studies targeting these factors have yet to reach a consensus [6, 7]. Re-evaluation of systematic reviews involves re-assessing previously published reviews to identify and correct biases or errors, yielding more reliable and accurate conclusions. This study aims to conduct a comprehensive re-evaluation of systematic reviews on the factors associated with MCI in community-dwelling elderly individuals, so as to provide robust references for the prevention and intervention of MCI within community setting.

2. Materials and Methods

2.1. Literature Search Strategy

To investigate the factors associated with MCI in community-dwelling elderly individuals, we performed a comprehensive search across domestic and international databases, including CNKI, Wanfang Data, VIP Journal Integration Platform, PubMed, Scopus, Web of Science, and the Cochrane Library. The search utilized a combination of con-

trolled vocabulary and free-text terms, covering publications from the inception of each database up to October 31, 2023. For Chinese databases, search terms included "轻度认知障碍," "轻度认知功能障碍," "MCI," "轻度认知损害," "轻度认知功能损害," "影响因素," "相关因素," "危险因素," "保护因素," "高危因素," "老年人," "老年," "老人," "社区老年人," "社区老年人群," "社区居家老人," "社区居家老年人," "meta," "meta 分析," and "meta-分析." For English databases, search terms included: "mild cognitive dysfunction," "cognitive dysfunction," "mild cognitive impairment," "MCI," "elderly," "elderly people," "aged people," "elderly person," "older adults," "older people," "elderly living at home," "elderly people living at home," "aged people living at home," "older adults living at home," "community elderly living at home," "elderly living in the community," "elderly people living in the community," "aged people living in the community," "older adults living in the community," "older people in the community," "community-dwelling elderly," "community-dwelling elderly people," "community-dwelling aged people," "community-dwelling older adults," "community-dwelling older people," "risk factors," "influence factors," "related factors," "protective factors," "hazard factors," "factors," "high-risk factor," "high-risk factors," "meta-analysis," "meta-analyses," and "systematic review." Taking PubMed as an example, the detailed search strategy is outlined in Table 1. The search strategies for other databases were adjusted to align with their specific requirements and indexing systems.

Table 1. PubMed database search strategy.

Step	Search Query
#1	("Cognitive Dysfunction" [Mesh]) OR (mild cognitive impairment [Title/Abstract]) OR (mild cognitive dysfunction [Title/Abstract]) OR (MCI [Title/Abstract]) OR (cognitive dysfunction [Title/Abstract])
#2	(elderly [Title/Abstract]) OR (elderly people [Title/Abstract]) OR (aged people [Title/Abstract]) OR (elderly person [Title/Abstract]) OR (older adult [Title/Abstract]) OR (older people [Title/Abstract]) OR (elderly living at home [Title/Abstract]) OR (elderly people living at home [Title/Abstract]) OR (aged people living at home [Title/Abstract]) OR (older adults living at home [Title/Abstract]) OR (community elderly living at home [Title/Abstract]) OR (elderly living in the community [Title/Abstract]) OR (elderly people living in the community [Title/Abstract]) OR (aged people living in the community [Title/Abstract]) OR (older adults living in the community [Title/Abstract]) OR (older people in the community [Title/Abstract]) OR (community-dwelling elderly [Title/Abstract]) OR (community-dwelling elderly people [Title/Abstract]) OR (community-dwelling aged people [Title/Abstract]) OR (community-dwelling older adults [Title/Abstract]) OR (community-dwelling older people [Title/Abstract])
#3	(risk factors [Title/Abstract]) OR (influence factors [Title/Abstract]) OR (related factors [Title/Abstract]) OR (protective factors [Title/Abstract]) OR (hazard factors [Title/Abstract]) OR (high-risk factors [Title/Abstract]) OR (factors [Title/Abstract])
#4	(meta-analysis [Title/Abstract]) OR (meta-analyses [Title/Abstract]) OR (systematic review [Title/Abstract])
#5	#1 AND #2 AND #3 AND #4

2.2. Inclusion and Exclusion Criteria

Inclusion criteria were set as follows: 1) Research involv-

ing community-dwelling elderly individuals or older adults, 2) studies where the primary outcome is MCI, or MCI is included as one of the outcome variables, 3) meta-analyses or systematic reviews with meta-analysis components, and 4)

publications available in either Chinese or English. Exclusion criteria included: 1) Studies that are unrelated to the research topic, 2) traditional reviews, guidelines, and conference papers, 3) studies focusing on secondary cognitive impairments, dementia, or Alzheimer's disease, 4) research involving patients already diagnosed with MCI, dementia, or Alzheimer's disease, or 5) documents that are in the planning or proposal stages.

2.3. Data Extraction

All identified literature was imported into EndNote software for deduplication. Two researchers independently performed literature screening and data extraction. Extracted data included title, first author, publication date, types of included studies, number of studies included, identified influencing factors, quality assessment tools, statistical analysis metrics, and main conclusions. In cases of disagreement during data extraction, the researchers resolved the conflicts through discussion or by consulting a third expert.

2.4. Quality Assessment of the Literature

The methodological quality of the included studies was

evaluated using AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews) [8]. AMSTAR 2 is an updated version of the original AMSTAR, encompassing 16 items designed to appraise systematic reviews. Each item is rated as yes (Y), no (N), or partially yes (P). A "no" (N) rating indicates non-compliance with the specific criterion. Of the 16 items, seven are deemed critical for the validity of a systematic review [9].

3. Results

3.1. Literature Screening Process and Results

A comprehensive search of domestic and international databases yielded a total of 1158 meta-analyses related to the factors influencing MCI in community-dwelling elderly individuals. After importing these articles into literature management software and removing 221 duplicates, 937 unique articles remained. A screening process was then conducted, ultimately including 11 articles that met the study's inclusion criteria. Of these, 4 were published in Chinese and 7 in English. The detailed process of literature retrieval and screening is illustrated in Figure 1.

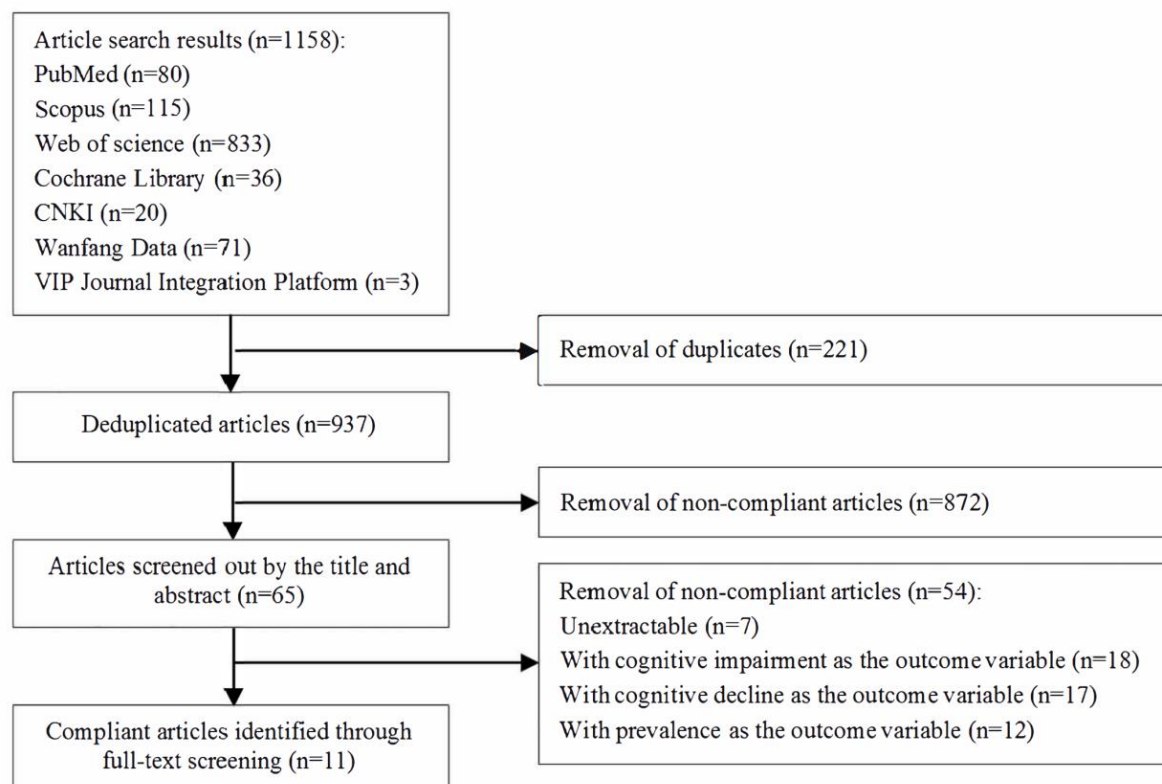


Figure 1. Flowchart of literature retrieval and screening.

3.2. Methodological Quality Assessment of Included Studies

The methodological quality of the included studies was assessed using AMSTAR 2, which revealed variability in the quality of the reviews. Out of the 11 studies evaluated, two were classified as high quality, two as low quality, and the

remaining seven as very low quality. Detailed results are provided in Table 2. All studies reported their funding sources, but only two studies detailed the list of excluded articles and the reasons for their exclusion. Common issues identified in more than half of the studies included incomplete reporting of the initial study design and limited search strategies.

Table 2. AMSTAR-2 quality assessment results.

Study	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	Quality Rating
Lau K ¹⁰	Y	P	Y	P	Y	Y	Y	P	P	N	Y	Y	Y	Y	Y	Y	High
Lao Y ¹¹	Y	P	Y	Y	Y	Y	N	Y	P	N	Y	Y	Y	Y	Y	Y	Low
Cao GY ¹²	Y	N	Y	P	Y	Y	N	Y	P	N	Y	Y	Y	Y	Y	Y	Very Low
Ma QP ¹³	Y	N	Y	P	Y	Y	N	P	P	N	Y	Y	Y	Y	Y	Y	Very Low
Hu MY ¹⁴	Y	P	Y	P	Y	Y	N	Y	P	N	Y	Y	Y	Y	Y	Y	Low
Zhu XX ¹⁵	Y	N	Y	P	Y	Y	N	P	P	N	Y	Y	Y	Y	Y	Y	Very Low
Zhang YF ¹⁶	Y	N	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	Y	Very Low
Pei JY ¹⁷	Y	N	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	Y	Very Low
Yuan LL ¹⁸	Y	N	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	N	Very Low
Shang QQ ¹⁹	Y	N	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	N	N	Very Low
Pike KE ²⁰	Y	P	Y	P	Y	Y	Y	Y	P	N	Y	Y	Y	Y	Y	Y	High

Note: Y: Yes (Compliant); N: No (Non-compliant); P: Partially compliant; Critical items: T2, T4, T7, T9, T11, and T15; T1: Detailed research question and inclusion criteria; T2: Presence of a review protocol and description of deviations from the protocol; T3: Specification of the types of studies included; T4: Comprehensive literature search; T5: Dual independent study selection; T6: Dual independent data extraction; T7: Provision of a list of excluded studies and reasons for exclusion; T8: Detailed description of included studies; T9: Use of appropriate tools to assess the risk of bias in included studies; T10: Reporting sources of funding for included studies; T11: Appropriate methods for statistical analysis and synthesis; T12: Assessment of the impact of risk of bias on the results; T13: Consideration of risk of bias in interpreting results; T14: Discussion and explanation of heterogeneity; T15: Assessment of publication bias; T16: Reporting of all potential conflicts of interest.

3.3. Factors Associated with MCI in Community-Dwelling Elderly Individuals

An analysis of the 11 included studies revealed various factors associated with MCI in community-dwelling elderly individuals. These factors spanned across physiological health,

psychological health, dietary nutrition, and lifestyle behaviors. Identified protective factors included tea consumption, male gender, physical exercise, and social participation. Conversely, risk factors encompassed a history of chronic diseases, depression, sleep disorders, smoking, and alcohol consumption. Detailed information is presented in Table 3.

Table 3. Factors associated with MCI in community-dwelling elderly individuals.

First Author	Publication Year	Number of Studies Included	Sample Size	Quality Assessment Tool	Factor	Effect Size [95% Confidence Interval (95%CI)]	Main Conclusion
Lau K ¹⁰	2022	34	48017	The Newcastle-Ottawa Scale tool	Peripheral hearing impairment	RR=1.44 (1.27, 1.64)	Significant association between hearing loss and MCI

First Author	Publication Year	Number of Studies Included	Sample Size	Quality Assessment Tool	Factor	Effect Size [95% Confidence Interval (95%CI)]	Main Conclusion
Lao Y ¹¹	2021	6	4244	The Newcastle-Ottawa Scale tool	Alcohol consumption	RR=1.038 (1.002, 1.075)	Each additional weekly drink increases MCI risk by 3.8%
Cao GY ¹²	2019	9	23402	The Newcastle-Ottawa Scale tool	High saturated fat intake	RR=1.40 (1.002, 1.075)	Higher saturated fat intake is associated with an increased risk of MCI
Ma QP ¹³	2016	26	52503	The Newcastle-Ottawa Scale tool	Tea consumption	OR=0.64 (0.52, 0.76)	Daily tea consumption is linked to a reduced risk of cognitive decline
Hu MY ¹⁴	2020	13	33066	The Quality of Prognosis Studies in Systematic Reviews tool	Depression	RR=1.49 (1.13, 1.86)	Depression increases the risk of progressing to MCI by approximately 1.5 times
Zhu XX ¹⁵	2018	6	19940	The Newcastle-Ottawa Scale tool	Sleep apnea	OR=2.44 (1.71, 3.49)	Baseline sleep apnea significantly increases the risk of cognitive decline
Zhang YF ¹⁶	2023	49		The Newcastle-Ottawa Scale tool	Male gender	RR=0.778 (0.696, 0.870)	Protective factors against MCI include male gender, higher educational attainment, and regular exercise. Conversely, risk factors for MCI include advanced age, a family history of dementia, smoking, alcohol consumption, living alone, insomnia, overweight/obesity, hypertension, hyperlipidemia, diabetes, cardiovascular disease, and cerebrovascular disease
					Education duration > 6 years	RR=0.428 (0.374, 0.490)	
					Regular exercise	RR=0.496 (0.421, 0.585)	
					Age ≥ 70 years	RR=2.431 (2.086, 2.833)	
					Family history of dementia	RR=3.228 (2.140, 4.867)	
					Smoking	RR=1.214 (1.098, 1.342)	
					Alcohol consumption	RR=1.165 (1.047, 1.297)	
					Living alone	RR=2.816 (2.123, 3.736)	
					Insomnia	RR=1.402 (1.093, 1.799)	
					Overweight/obesity	RR=1.431 (1.207, 1.696)	
					Hypertension	RR=1.731 (1.589, 1.886)	
					Hyperlipidemia	RR=1.722 (1.541, 1.924)	
					Diabetes	RR=1.495 (1.341, 1.666)	
					Cardiovascular disease	RR=1.671 (1.446, 1.932)	
					Cerebrovascular disease	RR=2.309 (2.040, 2.613)	
Pei JY ¹⁷	2021	31	95254	JBIC critical appraisal tool	Advanced age	OR=2.01 (1.75, 2.31)	The occurrence of MCI in elderly Chinese individuals is influenced by multiple factors
					Female gender	OR=1.46 (1.36, 1.58)	
					Low educational level	OR=1.81 (1.57, 2.09)	

First Author	Publication Year	Number of Studies Included	Sample Size	Quality Assessment Tool	Factor	Effect Size [95% Confidence Interval (95%CI)]	Main Conclusion
Yuan LL ¹⁸	2019	36	114941	The Newcastle-Ottawa Scale tool	Being single	OR=1.90 (1.51, 2.39)	Risk factors for MCI in community-dwelling elderly individuals include hypertension, diabetes, stroke, coronary heart disease, depression, alcohol consumption, smoking, being unmarried or divorced, female gender and advanced age. Conversely, protective factors against MCI in community-dwelling elderly individuals include tea consumption, physical exercise, engaging in learning or reading, active social participation, high family income, and high educational level
					Living alone	OR=1.84 (1.49, 2.28)	
					Low income	OR=1.60 (1.49, 1.71)	
					Physical labor	OR=1.95 (1.58, 2.40)	
					No tea consumption	OR=6.76 (1.79, 25.52)	
					Alcohol consumption	OR=2.21 (1.91, 2.54)	
					Smoking	OR=1.78 (1.48, 2.13)	
					Not reading	OR=2.21 (1.34, 3.31)	
					Lack of physical exercise	OR=2.18 (1.68, 2.84)	
					Lack of social activities	OR=3.73 (1.70, 8.18)	
					Lack of hobbies	OR=2.84 (1.74, 4.64)	
					Depression	OR=1.93 (1.51, 2.47)	
					Cerebrovascular disease	OR=2.24 (1.44, 3.48)	
					Diabetes	OR=2.60 (1.68, 4.01)	
					Hypertension	OR=2.21 (1.77, 2.75)	
					Hyperlipidemia	OR=1.72 (1.33, 2.22)	
					Hypertension	OR=2.21 (1.77, 2.75)	
					Diabetes	OR=1.61 (1.23, 2.12)	
					Stroke	OR=2.00 (1.70, 2.36)	
					Coronary heart disease	OR=1.35 (1.11, 1.63)	
					Depression	OR=1.65 (1.29, 2.11)	
					Alcohol consumption	OR=1.56 (1.22, 1.99)	
					Smoking	OR=1.59 (1.14, 2.20)	
					Tea consumption	OR=0.81 (0.71, 0.92)	
					Physical exercise	OR=0.60 (0.47, 0.78)	
					Engaging in learning or reading	OR=0.60 (0.44, 0.81)	
					Active social participation	OR=0.67 (0.52, 0.86)	
					Being unmarried or divorced	OR=1.46 (1.30, 1.65)	
					High family	OR=0.59 (0.46, 0.77)	

First Author	Publication Year	Number of Studies Included	Sample Size	Quality Assessment Tool	Factor	Effect Size [95% Confidence Interval (95%CI)]	Main Conclusion
Shang QQ ¹⁹	2022	11	12238	The Newcastle-Ottawa Scale tool and AHRQ quality indicators	income		Frequent consumption of eggs, fish and shellfish, fruits, and regular tea drinking are potential protective factors against MCI in the elderly
					Female gender	OR=1.42 (1.07, 1.89)	
					Advanced age	OR=1.27 (1.20, 1.34)	
					Low educational level	OR=0.69 (0.59, 0.80)	
					Frequent consumption of eggs	OR=0.71 (0.53, 0.95)	
					Frequent consumption of fish and shellfish	OR=0.65 (0.54, 0.78)	
					Frequent consumption of fruits	OR=0.61 (0.47, 0.79)	
					Regular tea drinking	OR=0.54 (0.34, 0.87)	
Pike KE ²⁰	2022	46	NA	The QUADAS-2 tool	Subjective cognitive decline	OR=1.83 (1.56, 2.16)	Subjective cognitive decline is associated with an increased risk of MCI

Note: JBI: Joanna Briggs Institute, NA: not available, AHRQ: The Agency for Healthcare Research and Quality, QUADAS: the Quality Assessment of Diagnostic Accuracy Studies, OR: odds ratio, RR: relative risk, CI: confidence interval.

4. Discussion

This re-evaluation of systematic reviews on factors associated with MCI in community-dwelling elderly individuals indicated that the methodological quality of these reviews was generally suboptimal, with several criteria failing to meet evaluation standards. A synthesis of related factors demonstrated that the incidence of MCI was intricately linked to physiological health, psychological health, dietary nutrition, and lifestyle behaviors.

4.1. Physiological Factors

Six studies [10, 15-18, 20] assessed the physiological factors associated with MCI. Cognitive functions, including memory, learning, decision-making, and attention, tend to decline with age, necessitating the monitoring of cognitive changes in elderly populations. Gender analysis reveals that being male serves as a protective factor, whereas being female constitutes a risk factor. Studies suggest that MCI prevalence is generally higher in women [21], potentially due to lower educational levels and hormonal changes during menopause [17].

Chronic diseases such as hypertension, diabetes, and hyperlipidemia are significant risk factors for MCI. These conditions can adversely affect cognitive function through mechanisms such as chronic inflammation, oxidative stress, and accelerated neurodegeneration [22]. Furthermore, the management and treatment of chronic diseases may impact cognitive function, with factors such as medication side effects, chronic pain, and sleep disorders [15] playing contributory roles. There is a notable association between age-related hearing impairment and MCI, potentially explained by cognitive decline due to impaired communication abilities. Subjective cognitive decline, characterized by individuals perceiving memory deterioration despite normal objective memory tests, is also an early indicator of Alzheimer's disease. The results of this study also revealed that subjective cognitive decline was a risk factor for MCI. Therefore, memory impairment may become an early indicator for MCI.

4.2. Psychological Factors

Three studies [14, 17, 18] evaluated the relationship between depression and MCI. Depression is a prevalent mental health issue among MCI patients, and there may be a bidirectional relationship between depression and cognitive dis-

orders. Approximately 40% of MCI patients experience depression [2]. One study evaluating the relationship between dementia status and the risk of depression in individuals aged 60 and above found that the incidence of depression was significantly higher in dementia patients compared with that in non-dementia individuals [23]. Therefore, screening for psychological health issues in the elderly is crucial for identifying high-risk populations for MCI.

4.3. Dietary Nutrition-related Factors

Seven studies [11-13, 16-19] evaluated dietary nutrition-related factors associated with the risk of MCI. Tea consumption emerges as a significant protective factor due to its high content of phytochemicals, such as tea polyphenols and catechins, which possess antioxidant and anti-inflammatory properties beneficial for cognitive function. Eggs provide essential proteins that supply the amino acids, such as tryptophan, necessary for neural activities. Fish and shellfish are rich in polyunsaturated fatty acids that reduce pro-inflammatory cytokines, lowering the risk of progression from MCI to severe cognitive impairment [24]. One study analyzed the relationship between the intake of fruits and vegetables and the risk of developing MCI, concluding that higher consumption was associated with a reduced prevalence of MCI in the elderly [25]. Fruits, rich in vitamins and trace elements such as vitamin B9, play a vital role in cognitive function by influencing the secretion of serotonin in the brain. This finding underscores the critical link between the quality of dietary nutrition and the incidence of MCI among the elderly.

4.4. Lifestyle Behavior-related Factors

Three studies [16-18] assessed the relationship between lifestyle behaviors and the risk of MCI. Physical exercise, learning or reading, and social participation are protective factors against MCI in community-dwelling elderly individuals. Moderate exercise enhances cardiopulmonary function and improves the brain's oxygen and nutrient supply, benefiting cognitive functions. Engaging in learning and reading stimulates neural networks, improving memory and cognitive processes, thereby mitigating brain aging. Social participation reduces feelings of loneliness, preventing psychological disorders and cognitive decline.

5. Conclusion

In conclusion, this study re-evaluated the systematic reviews on factors associated with mild cognitive impairment (MCI) in community-dwelling elderly individuals. The results indicate a significant correlation between the occurrence of MCI and factors such as physiological health, psychological health, dietary nutrition, and lifestyle behaviors. It is critical to pay attention to high-risk groups, particularly the elderly and

females, as well as individuals experiencing subjective cognitive decline, and to conduct screenings for psychological health issues and assessments of dietary quality, as these factors may serve as early indicators for MCI in community-dwelling elderly individuals. However, the methodological quality of the included studies is generally low, which compromises the reliability of the findings. Future research should focus on improving study design and reporting objective information to enhance methodological rigor. This effort will provide a more robust and accurate basis for the early detection of MCI among community-dwelling elderly populations.

Abbreviations

AHRQ	The Agency for Healthcare Research and Quality
AMSTAR	A Measurement Tool to Assess Systematic Review
CI	Confidence Interval
CNKI	China National Knowledge Infrastructure
JB	Joanna Briggs Institute
MCI	Mild Cognitive Impairment
NA	Not Available
OR	Odds Ratio
QUADAS	The Quality Assessment of Diagnostic Accuracy Studies
RR	Relative Risk

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Conflicts of Interest

The authors declare no conflicts of interest.

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