



Risk Factors and the Assessment Tools for Subjective Memory Complaints in Asia

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Abstract

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BACKGROUND: As the aged population is growing worldwide, the topic of subjective memory complaints (SMCs) has become a major interest in the current research on cognitive aging and dementia in Asia. SMC's relation to dementia is of critical relevance as SMCs were suggested as the first subtle indication of cognitive deterioration before the appearance of preclinical dementia and before actual objective cognitive impairment.

AIM: The main questions of this review were to first identify the common risk factors of SMCs in Asia. Second, the assessment tools commonly used in Asia to screen SMCs.

METHODS: This systematic review used four databases; Medline, Scopus, PubMed, and Web of Science. The literature searches were conducted from 2010 to 2021. The search terms strategy for all databases was "SMCs" AND "mild cognitive impairment (MCI)" OR "cognitive impairment" OR "MCI." A total of 861 papers were found and extracted using preferred reporting items for systematic review and meta-analyses guidelines. After screening based on inclusion and exclusion criteria, 15 studies were identified for the purpose of the current review.

RESULTS: Of the 15 studies, 14 were cross-sectional and one was longitudinal. The main risk factors of SMCs in Asia were depression and objective cognitive performance. Other risk factors were problems with adaptive daily functioning, self-rated health and pain, sleep, material hardship, childhood socioeconomic status, social and leisure activities, and gender. The majority of tools used to screen SMCs included a close-ended method with questionnaires in their respective country's first language. To date, there are no SMCs tools that analyze the cultural impact on the SMCs manifestation in Asia.

CONCLUSION: SMCs may be linked to changes in mood and cognition performance. Future studies may consider adopting a longitudinal design and explore quantitative studies as they might also help understand how individuals from various backgrounds manifest their memory difficulties. Besides, further research may consider using both open-ended questions and validated questionnaires to measure SMCs.

Introduction

The topic of subjective memory complaints (SMCs) has become a major interest in current research on cognitive aging and dementia [1], [2]. To date, no drug can stop the progression of dementia thus experts focus on identifying modifiable risk factors to prevent dementia [3]. SMCs can be defined as self-reported memory difficulties that may or may not entail objective cognitive impairment which is measured through neuropsychological assessments [4]. In addition, the term SMC is coined as the subjective awareness of memory loss which may or may not be memory deficits [5], [6]. Meanwhile, objective cognitive impairment is defined as a poor performance in one or more cognitive measures that suggest deficits in one or more cognitive domains which may include executive functions, attention, language, memory, and visuospatial skills [7].

In the older adult population, SMCs are widespread and could be as high as 50% [4]. The risk of

dementia is higher in people with SMCs than in people without objective impairment [8]. SMCs are suggested as the first subtle indication of cognitive deterioration before the appearance of preclinical dementia and also before actual objective cognitive impairment [4], [9]. In addition, SMCs have been associated with a low quality of life, poor daily living activity, impaired higher level functional capacities, mild cognitive impairment (MCI), and dementia [10]. To date, there is no gold standard test to use in establishing SMCs. Some measures used in assessing SMCs include the SMCs Questionnaire (SMCQ) [11], everyday memory checklist (EMC) [12], and Prospective and Retrospective Memory Questionnaire [13]. Some studies assessed SMCs by asking a few specific questions. In a study by Tomita and colleagues [14], they asked the following question: Have you been distressed by your forgetfulness? "to assess participants" likelihood of SMCs.

Over the past few years, studies have begun to explore the contribution of culture to long-term memory [15], [16], [17]. Individuals from Western

cultures tend to concentrate more on what is object-based, categorically linked, or self-important, whereas individuals from Eastern cultures tend to concentrate more on contextual information, similarities, and information relevant to the community. These diverse ways of perceiving the world suggest that culture acts as a mirror that focuses and channels the environment into memory processing [18]. Thus, cultural background may influence a person's uniqueness in reporting memory difficulties.

A few studies explored the association between SMCs and objective cognitive function. A study by Mendes and colleagues [19] reported that there is no association between SMCs and objective performance and SMCs were predicted only by depression. The study also reported that SMCs are a product of depression and are weakly related to objective dysfunction [20]. Recent studies found that SMCs are more associated with mood and depressive symptoms than objective cognitive function [21]. In one longitudinal study, it has been reported that about three-quarters of older adults with SMCs died without developing impaired cognition [22]. Besides objective cognitive function and depression, demographic variables such as age, gender, education, marital status, alcohol, and smoking simultaneously affect both objective cognitive performance and SMCs [1]. Thus, the objective of the present systematic review is to synthesize the risk factors of SMCs in Asia. The secondary aim is to identify common tools used to measure SMCs in Asia.

Methods

The present systematic review focuses on identifying papers that describe the risk factors of SMCs. Restrictive study inclusion criteria were applied, and data extraction from each study was performed to enable detailed comparison of study methods and quality.

Data source

The preferred reporting items for systematic review and meta-analyses (PRISMA) framework forms the foundation for the methodology of this systematic review. Searches were conducted using four databases (i.e., Medline, Scopus, PubMed, and Web of Science). Researchers used the same initial search terms strategy for all databases: "SMCs" AND "MCI" OR "cognitive impairment" OR "MCI."

Selection method

Searches were refined by identifying the studies published in the years 2010–2021 with full-text articles.

Searches were restricted to the area of psychology as an additional search criterion. Selected articles were also limited to the countries in Asia to explore the risk factors.

Inclusion and exclusion criteria

The following inclusion criteria were used to identify the eligible studies: (1) English language, (2) studies about MCI and dementia related, and (3) countries in the Asia region. The exclusion criterion involves (1) countries outside the Asia region, (2) use of non-English language, (3) validation of measurement tools, (4) study is not related to MCI, (5) animal or laboratory study, and (6) protocol, commentary, letter to editor, and review papers.

Data extraction and analysis

Data were extracted into a table to facilitate qualitative comparison and critique of key study parameters. Only 15 articles were included in this review after excluding similar articles from different databases. The article selection process is shown in Figure 1.

Results

General characteristics

The systematic literature search identified 857 articles after duplicate study excluded from the study. A total of 35 studies met the criteria for data extraction. Of those articles, 15 studies met the inclusion and exclusion criteria. Out of 15, 14 were cross-sectional studies and one was a longitudinal study. Six studies were reported from South Korea, five from Japan, and one each from Taiwan, Vietnam, China, and Malaysia. Table 1 depicts the following features of related studies: Study reference, title, age, methodology, sample size, setting, and SMCs risk factors. Table 2 depicts the tools used to measure SMCs in their study.

Risk factors of SMCs

Two main risk factors associated with SMCs in Asia were depression and objective cognitive performance. Nine studies [1], [10], [14], [24], [26], [27], [30], [31], [32] found the association between SMCs and depressive symptoms. For example, Meyer and colleagues [27] found depressive symptoms associated with SMCs in Vietnamese adults in Vietnam. This cross-cultural study shows that depressive symptoms were common among American Vietnamese in the United States [39]. Meanwhile, six studies [1], [14], [23], [27], [29], [31] reported an association between SMCs and cognitive impairment

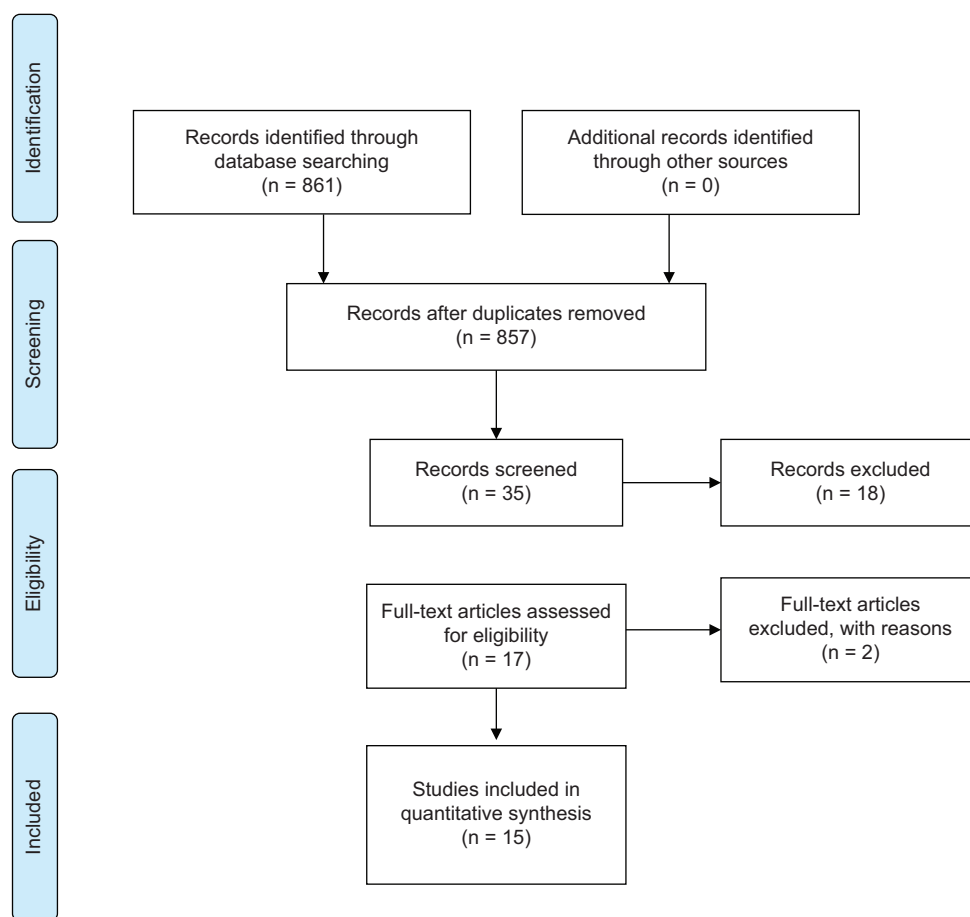


Figure 1: Preferred reporting items for systematic reviews and meta-analyses flow diagram for smcs in asia

detected through objective cognitive measures. Other risk factors associated with SMCs were lower or poor ability in adaptive daily functioning [25], [30], low childhood socioeconomic status [28], being female [14], poor self-rated health [4], [27], material hardship [27], and poor sleep [26].

Tools used in assessing SMCs

Out of 15 studies, 14 utilized close-ended questions and only one study utilized open-ended questions [14]. Among 14 studies that used close-ended questions, four studies [23], [26], [29], [31] used the SMCQ to assess SMCs. Other close-ended tools used were the Everyday Memory Complaints questionnaire [25], one item from the Geriatric Depression Scale and Kihon Checklist [33], geriatric mental schedule [24], memory item from the WHO Study on global AGEing and adult health [4], Prospective Retrospective Memory Questionnaire [30], 10th question of the Geriatric Depression Scale-Short Form [1], 5 closed-ended questions with 4 frequency scale [28], and two questions with 4-Likert scales ranging from very good to very poor [27].

In terms of the language used, out of the 15 studies, there were three studies (close-ended questions) [4], [24], [28] that did not report the language of the questionnaires used to assess SMCs. However,

the remaining 12 studies utilized their mother tongue in assessing SMCs. In terms of the validity of study tools, three studies [4], [14], [28] did not provide information on the validity of tools. The remaining 12 studies utilized tools with a sensitivity ranging from 0.72 to 0.93, as shown in Table 2.

Discussion

The present review aimed to first identify the common risk factors of SMCs in reported Asia. Second, the assessment tools commonly used in Asia to screen SMCs. The key findings from the current review were: (i) Depression and objective cognitive impairment are the two main risk factors associated with SMCs in Asia and (ii) close-ended method using questionnaires, for example, SMCQ to assess SMCs is most common in Asia.

The current result is consistent with a review on SMCs that was completed in 2015 by Brigola and colleagues [40]. Their systematic review was to determine whether SMCs are associated with cognitive loss or depression and can predict dementia. Of the total articles retrieved, 15 were cross-sectional studies and five were longitudinal

Table 1: Depiction of sample size, study setting, tools used to measure subjective memory complaints, and outcomes

Study, Country	Title	Age	Methodology	Sample size	Setting	Outcomes
Choe <i>et al.</i> [23] South Korea	Subjective memory complaint as a useful tool for the early detection of AD	60 years or older (mean age: 70.6 years old)	Cross-sectional design	293 (175 Cognitive Normal, 52 MCI, 66 probable AD)	2 public health centers, 1 senior citizens' welfare center, 1 dementia clinic	Cognitive impairment
Chu <i>et al.</i> [24] Taiwan	The association between subjective memory complaint and objective cognitive function in older people with previous major depression	60 years or older (mean age: 66.7 years old)	Cross-sectional design	159 (113 MDD, 46 healthy control)	Hospitals and community based	Depression
Ikeda <i>et al.</i> [25] Japan	Instrumental Activities of Daily Living: The Processes Involved in and Performance of These Activities by Japanese Community-Dwelling Older Adults with Subjective Memory Complaints	60 years and older (mean age: 74.7 years old)	Cross-sectional design	270 (137 SMC+, 133 SMC-)	Community based	Adaptive daily functioning
Kang <i>et al.</i> [26] South Korea	Subjective memory complaints in an older adult population with poor sleep quality	60 years or older (mean age: 68.2 years old)	Longitudinal design	352 (192 good sleepers+160 poor sleepers)	Population based	Sleep Depressive symptoms
Kim <i>et al.</i> [1] South Korea	Relationship between subjective memory complaint and executive function in a community sample of South Korean older adult	65 years and over	Cross-sectional design	1442 non-cognitive impaired older adults (1088 normal control group, 354 SMC group)	Community based	Depression Lower objective cognitive performance
Meyer <i>et al.</i> [27] Vietnam	Prevalence and correlates of subjective memory complaints in Vietnamese adults	55 years and older (mean age: 70 years old)	Cross-sectional design	A stratified sample of 600 with approximately equal men and women and urban and rural areas	Population based	Depression Cognitive impairment Self-rated health and pain Material hardship Childhood SES
Nishizawa <i>et al.</i> [28] Japan	Association between childhood SES and subjective memory complaints among older adults: Results from the Japan Gerontological Evaluation Study 2010	65 years or older	Cross-sectional design	98,229 (randomly selected 1/2 of community-dwelling Japanese aged 65 years and older)	Community based	Mild cognitive impairment
Park <i>et al.</i> [29] South Korea	Interactions between subjective memory complaint and objective cognitive deficit on memory performances	55 years and older (mean age: 69.3 years old)	Cross-sectional design	219 (181 normal control, 38 MCI)	Hospital and dementia clinic	Depressive symptoms Independent adaptive daily living
Ryu <i>et al.</i> [30] South Korea	Subjective memory complaints, depressive symptoms and instrumental activities of daily living in mild cognitive impairment	Mean age 65.7 +/- 8.01 years	Cross-sectional design	66 (33 high SMC and 33 low SMC)	Hospital based (memory disorders clinic)	Objective memory performance Depressive symptoms
Seo <i>et al.</i> [31] South Korea	Association of subjective memory complaint and depressive symptoms with objective cognitive functions in prodromal AD including pre-mild cognitive impairment	60 years old and older (mean age: 73.2 years old)	Cross-sectional design	672 (299 cognitively normal older adults, 106 pre-MCI, 267 aMCI)	Community based	Depressive symptoms
Song <i>et al.</i> [32] China	Role of depressive symptoms in subjective memory complaint in older adults with mild cognitive impairment	60 years and older (mean age: 75.6 years old)	Cross-sectional design	154	Community based	Social and leisure activities
Takechi <i>et al.</i> [33] Japan	Relationship between subjective memory complaints and social and leisure activities in community-dwelling older people: Toyoake Integrated Care Study	70 years and older	Cross-sectional design	6685	Community based	Depressive symptoms
Tanaka <i>et al.</i> [10] Japan	Association between subjective memory complaints and depressive symptoms after adjustment for genetic and family environmental factors in a Japanese twin study	20 years and older (mean age for males: 59.9 years old; mean age for females: 47.2 years old)	Cross-sectional design	556 twins	Community based	Gender Cognitive status Depression Self-rated health
Tomita <i>et al.</i> [14] Japan	Sex-specific effects of subjective memory complaints concerning cognitive impairment or depressive symptoms	60 years and older (mean age: 68.7 years old)	Cross-sectional design	394	Community based	
Yap <i>et al.</i> [4] Malaysia	Effects of SMCs and Social Capital on SRH in a Semirural Malaysian Population	56 years old and older	Cross-sectional design	6421 (8496 participants were part of SEACO were approached to complete a cross-sectional health survey)	Community based	

SMCs: Subjective memory complaints, SRH: Self-rated health, MCI: Mild cognitive impairment, AD: Alzheimer's disease, MCI: Mild cognitive impairment, SES: Socioeconomic status

studies [40]. Most of the cross-sectional studies associated SMC with depression, objective cognitive impairment, and anxiety. Although less frequently, they also found that SMCs were also associated with reduced quality of life, impairment in activities of daily living, the emergence of neuropsychiatric symptoms, lower hippocampal volume, amygdala volume reduction, increased activation of the left temporal, bilateral thalamus, caudate and posterior cingulate, and with the occurrence of ApoE ϵ 4. In the current review, it was found that most of the studies reported that depression and objective cognitive performance are linked to SMCs. Furthermore, the current review found that SMCs are also linked to adaptive daily functioning, self-rated health, gender, social and leisure activities, childhood Socioeconomic status, material hardship, and sleep. However, the current review contradicts the findings of Brigola *et al.* [40]

who found that no study in Asia had reported anxiety associated with SMCs.

Cross-sectional versus longitudinal study

The current review found only one longitudinal study in Asia which has explored SMCs risk factors among Asians [26]. Another 14 studies included in this review used a cross-sectional research design. Brigola *et al.* [40] reported that the emergence of dementia in people with SMCs was evidenced in longitudinal studies. Therefore, to understand SMCs and their linkage with dementia in Asia, future studies should consider the recruitment of representative samples with control groups and longitudinal study designs. It was notable from the current review that follow-up studies among SMCs in Asia are very rare.

Table 2: The tools used to measure subjective memory complaints in each study

Study, Country	SMCs tools	Types of tools	What do the tools assess?	Validity	Language
Choe et al. [23] South Korea	One item from the SMCQ	Close-ended questions	SMC was assessed with one question: "Do you think that your memory is poorer than that of other people of a similar age?" from SMCQ. The SMCQ was developed by Korean physicians to evaluate subjective memory complaints, also mentioned as subjective memory loss or subjective memory impairment [11]. SMCQ responses were restricted to either "Yes" or "No"	The SMCQ has shown a sensitivity of 0.75 and specificity of 0 [1]	Korean
Chu et al. [24] Taiwan	GMS-a	Close-ended questions	GMS-a is a semi-structured clinical interview for the assessment of diagnosis and mental state in the older adult. The GMS [34] includes an evaluation of the presence and severity of self-reported memory difficulties, recent forgetfulness of names, misplacing objects and effort to remember things. SMC was defined based on a score of 4 on this GMS sub-scale (which has a maximum score of 8), a cutoff point applied in previous research using an identical scale	The internal consistency of the scale was evaluated in this sample yielding a high Cronbach alpha score of 0.85	Not stated
Ikeda et al. [25] Japan	EMC-Japanese version	Close-ended questions	EMC [12] assess everyday memory problems and examined their reliability and validity in assessing brain-damaged patients with memory deficits. EMC introduces 13 items and scenarios that may arise in real life due to memory impairment and evaluates them on a scale of 0 (not at all) to 3 (always). The sum of these 13 scores is then used to rank the level of memory impairment—the higher the score, the more significant the memory impairment. The average score of healthy older adults (between 60 and 69 years old) is 11.6±5.4	The test-retest reliability of the EMC evaluated in 149 randomly selected patients was acceptably high with an intraclass correlation coefficient (0.950 for caregiver evaluated scores and 0.759 for self-evaluated scores)	Japanese
Kang et al. [26] South Korea	SMCQ	Close-ended questions	The SMCQ was developed by Korean physicians to evaluate SMCs also mentioned as subjective memory loss or subjective memory impairment. The SMCQ has a total of 14 items: 4 items for global judgment of memory function (global memory) and 10 items for specific judgment of memories of particular events (everyday memory). Each question is answered with either a "yes" or "no," and higher SMCQ scores are indicative of more severe subjective memory complaints [11]	The SMCQ has shown a sensitivity of 0.75 and a specificity of 0.69 [1]	Korean
Kim et al. [1] South Korea	The 10 th question of the SGDS-K was used to evaluate SMC	Close-ended questions	The 10 th question of the SGDS-K was "do you feel you have more problems with memory than other older adults?" SMC was defined as the older adult who answered "Yes" in item 10 of SGDS-K among the subjects who have a normal cognitive function (> 1.5 SDs from the MMSE-KC norms) [35], [36]	A score of 8 (sensitivity 0.9365, specificity 0.7603) is the optimal cutoff score of SGDS-K for screening MDD and a score of 6 (sensitivity 0.7898, specificity 0.6586) is the optimal cutoff score for screening both MDD and MnDD	Korean
Meyer et al. [27] Vietnam	Subjective memory complaints were assessed with two items	Close-ended questions	Questions to assess SMC: "Do you think (on the whole) that your memory is good or poor? (4-point scale of "very good" to "very poor")" and "Do you think that you have some problems with memory that interfere with your daily life? (4-point scale of "no, not at all" to "a great deal")	Higher scores indicate stronger memory complaints ($\alpha = 0.73$)	Vietnamese
Nishizawa et al. [28] Japan	5 close-ended questions	Close-ended questions	We assess the SMC by asking frequency (i.e. never, seldom, sometimes, and often) to forget about (1) the person's name, (2) the place where you put something, (3) what you plan to do, (4) today's date, and (5) presence of any other memory problem (e.g. forgot turning off the stove and forgot locking the door). Those who reported "often" in at least one of the four aspects or reported any other memory problem were classified as having SMC	Not stated	Not stated
Park et al. [29] South Korea	SMCQ	Close-ended questions	The SMCQ was developed by Korean physicians to evaluate subjective memory complaints, also mentioned as subjective memory loss or subjective memory impairment. The SMCQ has a total of 14 items: 4 items for global judgment of memory function (global memory) and 10 items for specific judgment of memories of particular events (everyday memory). Each question is answered with either a "yes" or "no," and higher SMCQ scores are indicative of more severe subjective memory complaints [11]	The SMCQ has shown a sensitivity of 0.75 and specificity of 0.69 [1]	Korean
Ryu et al. [30] South Korea	PRMQ	Close-ended questions	The PRMQ[13] contains 16 items that describe everyday memory failure of both prospective (eight items) (e.g. "Do you decide to do something in a few minute's time and then forget to do it?") and retrospective (eight items) memory (e.g. "Do you forget something that you were told a few minutes before?"). For each item, participants were requested to rate the frequency of failure on a 5-point Likert-type scale that ranged from 5 (very often) to 1 (never). The ratings result in a score from 16 to 80, with higher scores representing more memory complaints, which can be divided into separate 8-item PM and RM sub-scores (range = 8–40)	The reliability (internal consistency) of the PRMQ total score and the prospective and retrospective sub-scores are acceptable (Cronbach's α was 0.89, 0.84, and 0.80, respectively) [13]	Korean
Seo et al. [31] South Korea	SMCQ	Close-ended questions	The SMCQ was developed by Korean physicians to evaluate subjective memory complaints, also mentioned as subjective memory loss or subjective memory impairment. The SMCQ has a total of 14 items: 4 items for global judgment of memory function (global memory) and 10 items for specific judgment of memories of particular events (everyday memory). Each question is answered with either a "yes" or "no," and higher SMCQ scores are indicative of more severe subjective memory complaints [11]	The SMCQ has shown a sensitivity of 0.75 and specificity of 0.69 ¹	Korean
Song et al. [32] China	MIC	Close-ended questions	The MIC[37] was developed and validated to measure the awareness of memory limitations in the Chinese population with AD. The questionnaire consisted of 27 questions that explore SMC in everyday life. The total score ranges from 0 to 108, with higher scores representing greater awareness of memory limitations	The MIC has good internal consistency (Cronbach's $\alpha = 0.89$) and is in good correlation with the score of the Mini-Mental State Examination when tested in the Chinese population	Chinese
Takechi et al. [33] Japan	2 items from KCL and 1 item from GDS	Close-ended questions	To assess SMC, three questions were used asking about the feeling of a memory problem, memory loss pointed out by others, and difficulty in recalling today's date. The actual question sentences are as follows. First, "Do you feel you have more problems with memory than most?" (SMC-1) was from the GDS widely used in the past studies. Two other question items were selected from the KCL widely used for health examinations in Japan. "Do your family or your friends point out your memory loss?" (SMC-2) and (iii) "Do you find yourself not knowing today's date? The KCL also includes "KCL-CF," which consists of three yes/no questions about subjective memory complaints	The concurrent validity of the KCL-CF for clinical diagnostic classification (Clinical Dementia Rating) reported that the sensitivity and specificity were 0.72 and 0.66, respectively	Japanese
Tanaka et al. [10] Japan	The single self-reported question included in the POMS- Brief	Close-ended questions	The SMCs were assessed through a single self-reported question referring to previous review articles: "Please tell us how you would have answered the following question during the past week: Do you consider yourself as being forgetful?" The responses were graded with a graduated response ranging from 0 (not at all) to 4 (extremely) points. The single self-reported question was included in the Japanese version of the POMS-Brief [38]. Therefore, high scores indicated severe SMCs. SMCs were used as the quantitative variable in the analyses	Reliability coefficients (Cronbach's alpha) were 0.779–0.926 for six mood scales measured by the Japanese edition, that is, "Depression-Dejection," "Vigor," "Anger-Hostility," "Fatigue," "Tension-Anxiety" and "Confusion"	Japanese

(Contd...)

Table 2: (Continued)

Study, Country	SMCs tools	Types of tools	What do the tools assess?	Validity	Language
Tomita <i>et al.</i> [14] Japan	1 question	Open-ended question	Participants were asked the following question: Have you been distressed by your forgetfulness? SMCs were judged for each participant based on their answer to this question	Not stated	Japanese
Yap <i>et al.</i> [4] Malaysia	Memory item from WHO-SAGE	Close-ended questions	SMC was measured using the memory item from the WHO-SAGE and adult health on a 5-point Likert scale (none, mild, moderate, severe, and extreme). The item was "Overall in the last 30 days, how much difficulty did you have with concentrating or remembering things?" <2% of the participants responded as "severe" and "extreme." In light of that, these responses were combined into the group that responded "moderate"	Not stated	Not stated

SMCQ: Subjective memory complaints questionnaire, EMC: Everyday Memory Checklist, GMS: Geriatric Mental State Schedule, SMCs: Subjective memory complaints, SGDS-K: Geriatric Depression Scale-Short Form, MIC: Memory Inventory for the Chinese, PRMQ: Prospective and Retrospective Memory Questionnaire, AD: Alzheimer's disease, KCL: Kihon Checklist, GDS: Geriatric Depression Scale, KCL-CF: KCL-Cognitive Function, POMS: Profile of Mood States, SAGE: Study on Global AGEing

Methods in assessing SMC

In the present systematic review, 14 studies used close-ended questions (SMCQ, EMC, etc.) while only one study used open-ended questions (e.g., asking single self-reported questions, etc.). There are mixed findings on the extent of the utility of both methods. Conventionally, SMCs have been assessed by either questionnaires, which ask whether a person has experienced given examples of SMCs or open-ended questions which elicit spontaneous reports of SMCs [41].

As little is known about how these methods of assessment might influence reporting of SMCs. Thus, Burmester *et al.* [41] conducted a systematic review to explore methods of assessment that might influence reporting of SMCs. Four hundred and twenty-one adults aged 40 years and above were surveyed about SMCs using the spontaneous report and questionnaire methods. They found that spontaneously reported SMCs were fewer in number and rated more distressing overall than SMCs endorsed on a questionnaire. However, a comparison of individual SMCs revealed that distress ratings tended to be higher when assessed in a questionnaire than spontaneously reported, which may be due to the context of a questionnaire causing inflated ratings. Implications for clinical assessment of SMCs are that open-ended questioning might be preferable to the initial use of prescriptive questionnaires, to elicit SMCs that are most distressing.

To date, there is a big gap in understanding what are the best tools to elicit SMCs. The choice of clinical assessment of SMCs has a big impact on SMC studies. Further research may consider exploring utilizing both types of assessments (open-ended and close-ended questionnaires) when trying to establish SMCs in their study.

Studies in Asia

The current review focuses on studies on SMCs in Asia to explore whether there will be uniqueness in reporting memory difficulties. Based on studies conducted by Gutchess and Indeck [18], they reported that individuals from Western cultures tend to concentrate more on what is object based, categorically linked, or self-important, whereas individuals from

Eastern cultures tend to concentrate more on contextual information.

However, in this review, there is no study explore on how cultural and individual backgrounds might impact reporting memory impairment. Future research should explore to what extent cultural background impact one's SMCs. Future researchers may also want to analyze in detail the reported SMCs. Taking studies that utilized the SMCQ, for example, exploring the difficulties to recognize people and remembering where they placed objects. Based on our understanding of how culture impact memory, it is predicted that Asian and Westerners may report their SMCs differently as there is a possibility of different manifestations of SMCs in different cultures.

To deepen our understanding of the subject, future studies should consider adopting a longitudinal design and explore quantitative studies as they might also help understand how individuals from various backgrounds manifest their memory difficulties. Besides, further research may consider using both open-end questions and validated questionnaires to measure SMCs. A culturally sensitive tool such as using mother tongue language as tools is vital in SMCs assessment.

Conclusion

SMCs are considered an important symptom as they have been associated with a low quality of life, low daily living activity, impaired higher level functional capacities, mild cognitive impairment, and dementia. This is better evidenced if an intensive search is undertaken for the patient and when knowledge about a companion who knows the patient well is included in the search. In the literature, the importance and treatment of SMCs are often discussed, and the hypothesis that SMCs may be a preliminary stage of dementia has already led to specific preventive trials being developed. While there is no cure for dementia at present, early detection of at-risk participants will allow them to participate in the lifestyle and behavioral interventions that have been shown to improve cognition and minimize conversion to neurodegenerative disorders. Thus, identifying risk

factors associated with SMCs and reliable tools to screen SMCs among the Asian population are the way forward.

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