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

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Abstract

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 “memory” AND “Asia” AND “risk factors” AND “assessment tools”.

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.
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...
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.

### 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

<table>
<thead>
<tr>
<th>Study, Country</th>
<th>SMCQ tools</th>
<th>Types of tools</th>
<th>What do the tools assess?</th>
<th>Validity</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close et al. [23] South Korea</td>
<td>One item from the SMCQ</td>
<td>Close-ended questions</td>
<td>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”</td>
<td>Not stated</td>
<td>Korean</td>
</tr>
<tr>
<td>Chu et al. [24] Taiwan</td>
<td>GMS-a</td>
<td>Close-ended questions</td>
<td>The internal consistency of the scale was evaluated in this sample yielding a high Cronbach alpha score of 0.85</td>
<td>Not stated</td>
<td>Japanese</td>
</tr>
<tr>
<td>Iida et al. [25] Japan</td>
<td>EMC-Japanese version</td>
<td>Close-ended questions</td>
<td>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)</td>
<td>Not stated</td>
<td>Japanese</td>
</tr>
<tr>
<td>Kang et al. [26] South Korea</td>
<td>SMCQ</td>
<td>Close-ended questions</td>
<td>The SMCQ was developed by Korean physicians to evaluate 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]</td>
<td>A score of 8 (sensitivity 0.9305, specificity 0.7050) is the optimal cutoff score of SGS-K for screening both MDD and MnDD higher scores indicate stronger memory complaints (c = 0.73)</td>
<td>Korean</td>
</tr>
<tr>
<td>Kim et al. [1] South Korea</td>
<td>The 10th question of the SGDS-K was used to evaluate SMC</td>
<td>Close-ended questions</td>
<td>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”). 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 memory problem (e.g., forget turning off the stove and forgot looking in 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</td>
<td>Not stated</td>
<td>Vietnamese</td>
</tr>
<tr>
<td>Meyer et al. [27] Vietnam</td>
<td>Subjective memory complaints were assessed with two items</td>
<td>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”). 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 memory problem (e.g., forget turning off the stove and forgot looking in 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</td>
<td>Not stated</td>
<td>Not stated</td>
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</tr>
<tr>
<td>Nishizawa et al. [28] Japan</td>
<td>5 close-ended questions</td>
<td>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”). 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 memory problem (e.g., forget turning off the stove and forgot looking in 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</td>
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<td></td>
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<tr>
<td>Park et al. [29] South Korea</td>
<td>SMCQ</td>
<td>Close-ended questions</td>
<td>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]</td>
<td>The SMCQ has shown a sensitivity of 0.75 and specificity of 0.69</td>
<td>Korean</td>
</tr>
<tr>
<td>Ryu et al. [30] South Korea</td>
<td>PRMQ</td>
<td>Close-ended questions</td>
<td>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]</td>
<td>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 minutes time and then forget to do it?”) and prospective (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)</td>
<td>Korean</td>
</tr>
<tr>
<td>Seo et al. [31] South Korea</td>
<td>SMCQ</td>
<td>Close-ended questions</td>
<td>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]</td>
<td>The SMCQ has shown a sensitivity of 0.75 and specificity of 0.69</td>
<td>Korean</td>
</tr>
<tr>
<td>Song et al. [32] China</td>
<td>MIC</td>
<td>Close-ended questions</td>
<td>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</td>
<td>The MIC has good internal consistency (Cronbach’s α = 0.89) and is in good correlation with the score of the Mini-Mental State Examination when tested in the Chinese population</td>
<td>Chinese</td>
</tr>
<tr>
<td>Takechi et al. [33] Japan</td>
<td>2 items from KCL and 1 item from GDS</td>
<td>Close-ended questions</td>
<td>The concurrent validity of the KCL-CF for clinical diagnostic classification (Clinical Dementia Rating) reported that the sensitivity and specificity were 0.72 and 0.86, respectively</td>
<td>The concurrent validity of the KCL-CF for clinical diagnostic classification (Clinical Dementia Rating) reported that the sensitivity and specificity were 0.72 and 0.86, respectively</td>
<td>Japanese</td>
</tr>
<tr>
<td>Tanaka et al. [10] Japan</td>
<td>The single self-reported question included in the POMS- Brief</td>
<td>Close-ended questions</td>
<td>Reliability coefficients (Cronbach's alpha) were 0.779-0.926 for six mood scales measured by the Japanese edition, that is, “Depression-Dejection,” “Anger-Hostility,” “Fatigue,” “Tension-Anxiety” and “Confusion”</td>
<td>The single self-reported question was included in the Japanese version of the POMS-Brief [36]. Therefore, high scores indicated severe SMCs. SMCs were used as the quantitative variable in the analyses</td>
<td>Japanese</td>
</tr>
</tbody>
</table>

(Contd...)
**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-ended 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

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**Table 2: (Continued)**

<table>
<thead>
<tr>
<th>Study, Country</th>
<th>SMCs tools</th>
<th>Types of tools</th>
<th>What do the tools assess?</th>
<th>Validity</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomita et al. [14] Japan</td>
<td>1 question</td>
<td>Open-ended</td>
<td>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</td>
<td>Not stated</td>
<td>Japanese</td>
</tr>
<tr>
<td>Yap et al. [4] Malaysia</td>
<td>Memory item from WHO-SAGE</td>
<td>Close-ended questions</td>
<td>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?” &lt;2% of the participants responded as “severe” and “extreme.” In light of that, these responses were combined into the group that responded “moderate”</td>
<td>Not stated</td>
<td>Not stated</td>
</tr>
</tbody>
</table>

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

References


PMid:30288043

PMid:28267777

PMid:31340466

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PMid:28380342

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