VIEW AND REVIEW

Evaluating subjective cognitive decline: a systematic review of tools available for evaluating cognitive complaints in Portuguese

Avaliação de declínio cognitivo subjetivo: uma revisão sistemática de instrumentos disponíveis para avaliar queixa cognitiva em português

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ABSTRACT

Background: Subjective cognitive decline (SCD) is a perception that is not objectively measured in screening tests. Although many tools are available for evaluating SCD, no single gold standard is available for classifying individuals as presenting SCD, in the Portuguese-speaking population. The aim of this study was to systematically review the literature for tools used to evaluate SCD in the Portuguese-speaking population. **Methods:** Four databases (Web of Science, SciELO, LILACS and MEDLINE) were primarily utilized in this study (Phase 1). Subsequently, we conducted a manual search of the literature (Phase 2). We then retrieved tools for critical evaluation (Phase 3). Studies that matched the inclusion criteria were analyzed. We summarized the features of each tool in terms of the number of questions, scoring system, benefits and deficiencies, translation and validity. **Results:** A total of 30 studies utilizing four questionnaires and seven different single questions were found. The tools retrieved were the Memory Assessment Questionnaire (MAC-Q; 12/30 studies), single-question methods (7/30 studies), Subjective Memory Complaint Scale (SMC scale; 5/30 studies), Prospective and Retrospective Memory Questionnaire (PRMQ; 3/30 studies) and Memory Complaint Scale (MCS; 3/30 studies). Only two were formally translated and validated for the Portuguese speaking population (PRMQ and MCS). **Conclusions:** In summary, SCD is still underinvestigated in Portuguese-speaking countries. The MAC-Q was the most commonly used tool in Portuguese, despite its lack of formal translation and validation for the Portuguese-speaking population. Further studies are required in order to develop and validate a screening tool that includes questions for detecting SCD-plus features and affective symptoms, so as to improve its predictive value.

Keywords: Dementia; Cognitive Dysfunction; Cognitive Aging; Mental Status and Dementia Tests.

RESUMO

Introdução: Declínio cognitivo subjetivo (DCS) é uma percepção não objetivamente mensurada em testes de rastreio. Apesar de muitos instrumentos estarem disponíveis para avaliação de DCS, nenhum padrão-ouro único é capaz de classificar um indivíduo com DCS em população falante de português. Este estudo objetivou revisar sistematicamente a literatura para instrumentos usados, para avaliar DCS em falantes de português. **Métodos:** Quatro bases de dados (Web of Science, SciELO, LILACS e MEDLINE) foram inicialmente usadas neste estudo (Fase 1). Em seguida, conduzimos uma busca manual (Fase 2) e os instrumentos coletados foram criticamente avaliados (Fase 3). Estudos que correspondiam aos critérios de inclusão foram analisados. Nós resumimos as características de cada instrumento em termos de números de questões, sistema de pontuação, vantagens e desvantagens, tradução e validação. **Resultados:** O total de 30 estudos utilizou 4, questionários e 7 diferentes questões para avaliar DCS. Os instrumentos avaliados foram Memory Assessment Questionnaire (MAC-Q, 12/30 estudos), método de questão única (7/30 estudos), Subjective Memory Complaint Scale (SMC-scale, 5/30 estudos), Prospective and Retrospective Memory Questionnaire (PRMQ, 3/30 estudos) e Memory Complaint Scale (MCS, 3/30 estudos). Apenas dois instrumentos foram formalmente traduzidos e validados para falantes de português (PRMQ e MCS). **Conclusões:** Em suma, DCS é ainda sub-representado em países lusofônicos. O MAC-Q foi o instrumento mais utilizado em português, apesar de sua falta de tradução e validação formal para a população falante de português. Mais estudos são necessários para desenvolver e validar um instrumento de rastreio que inclua questões sobre DCS-plus e sintomas afetivos, para aumentar seu poder preditivo.

Palavras-chave: Demência; Disfunção Cognitiva; Envelhecimento Cognitivo; Testes de Estado Mental e Demência.

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INTRODUCTION

Subjective cognitive decline (SCD) is a manifestation of self-observed concern about one's thinking processes, most frequently memory. This complaint is helpful in accessing non-objective features of cognitive decline in clinical practice. Functionally, SCD is defined as a cognitive complaint without objective cognitive impairment, and it represents an early stage of Alzheimer's disease (AD)[1]. However, this subjective perception is greatly influenced by affective symptoms and mood states such as depression and anxiety in older adults[2].

SCD has been correlated with increased risk of cognitive decline, even though the majority of individuals presenting SCD do not exhibit progressive decline[3]. It has been estimated that SCD manifests approximately 15 years before the subsequent mild cognitive impairment (MCI) stage[4]. Thus, it represents a therapeutic window for improved clinical interventions among AD patients. However, evaluating SCD in clinical practice and research protocols may be challenging. Many tools for classifying individuals as SCD-positive have been described, ranging from a direct single question to complex questionnaires. Nonetheless, no single gold standard tool is available[3].

An international working group was created to standardize the terminology and criteria for SCD, namely the Subjective Cognitive Decline-Initiative (SCD-I)[1]. This group established that the research priority was to develop and validate an SCD scale[3]. A great variety of tools has been described in studies that evaluated SCD and, ultimately, this has hampered the interpretation of studies and decreased the consistency of trials. The working group also suggested a number of features that should be addressed when selecting a tool to evaluate SCD. The results from different studies that each used a single question to classify individuals as presenting SCD may not be interpreted together, given that different questions have different meanings. Consequently, different assessment procedures may have variable results[5], which are influenced by culture and education[6,7]. Therefore, a single question or brief assessment tool may not encompass the full meaning of a cognitive complaint[8].

Although structured questionnaires may be more accurate, they are time-consuming. This is an important variable in applying a questionnaire, considering that general practitioners' time is usually too limited to be able to perform a full assessment. Moreover, questionnaires with multiple questions have higher consistency but answering them is complicated for individuals with low levels of education, which is often the situation in countries like Brazil[9]. Measuring memory loss may be challenging in this context. Thus, more efficient and reliable tools need to be developed to evaluate SCD in both clinical and research settings[3].

One important recommendation from the SCD-I is that tools evaluating SCD should address the appropriate demographic context, undergo psychometric validation studies and have content that is appropriate for the target population[10].

Therefore, the present study was conducted to provide a systematic review of tools that have been used to evaluate SCD in Portuguese-speaking population. We critically reviewed and discussed the pros and cons of each questionnaire and put forward a suggestion for a high-accuracy screening tool for use within research settings.

METHODS

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[11] and was registered in the international prospective register of systematic reviews, under identification number 140092.

Eligibility criteria

Study selection

The data for this study were collected in three phases, as follows.

Phase 1 (search in literature databases)

We performed a search in MEDLINE, Web of Science, LILACS and SciELO for all data up to February 2020. Peer-reviewed journals and grey literature were investigated for original studies, in order to obtain an overview of the available literature.

The search strategy included "subjective cognitive decline" and all its possible synonyms found in the literature: ("self-reported" or "subjective") and ("memory" or "cognitive") and ("decline" or "impairment" or "complaint" or "concern") and "Portuguese". Boolean operators were used depending on the structure of each search engine. For a broader search of Lusophone people, there were no language restrictions. No meta-analysis was performed because of the qualitative nature of this investigation.

Two authors (ELC and VNL) independently assessed potentially eligible studies for their suitability for inclusion in the review. Any disagreements were resolved by discussion or by a third reviewer (WVB). During the screening of titles and abstracts, papers were defined as relevant if they mentioned aspects of SCD, such as "subjective memory decline," "self-reported memory complaints," "subjective cognitive impairment" or "memory complaints." The abstracts and titles were analyzed in accordance with the inclusion criteria, and all articles that met these criteria were included for full reading. From this, the articles that identified questionnaires used in samples from Portuguese-speaking populations were included in this review.

In order to recognize all questionnaires available for Portuguese speakers, the inclusion criteria were rigorously defined. Articles were required to show original data, include

a group of individuals presenting SCD or similar, and needed to clearly describe the inclusion criteria for participants in that study. The exclusion criteria comprised unclear definition of SCD and tools that were used to evaluate conditions other than neurodegeneration.

Phase 2 (manual search of the literature)

A manual investigation of the literature was performed to search for studies that might have been missed in the primary strategy. This phase was conducted to search for references within other studies and in Google Scholar. This produced a large number of findings (over three million), so we added the words "questionnaire and Portuguese" to improve study selection (Figure 1). Only the first 100 references were evaluated. According to previous evidence, Google Scholar is a useful tool and can help in retrieval of even the most obscure information, but its use is marred by inadequate citation information[12].

Phase 3 (critical review of tools)

Data extraction was conducted by two authors (ELC and VNL), from papers that met the inclusion criteria. A summary of the studies was created, which included the country in which the study was conducted, total sample size, the method to classify individuals as SCD and the main outcome of the study. The scoring for SCD-positive features was determined as described by Jessen et al.[3]: the tools were evaluated for subjective decline only in memory; the onset of SCD within the past five years; onset of SCD in individuals aged 60 years or over; associated concerns, persistence of SCD over time; seeking of medical help; and confirmation of cognitive decline by an observer. The instrument validation process was also evaluated through its factors and psychometric properties when described (Figure 1).

RESULTS

A total of 1,444 studies were retrieved (Figure 1). Phase 1 of this study led to the retrieval of 21 studies that matched the inclusion criteria, while phase 2 included 9 studies from the grey literature and Google Scholar. In phase 3, seven studies were found to have used a single-question method to classify individuals as belonging to an SCD group, while 24 used questionnaires. During this last phase, the tools were evaluated for authors, year of publication, translation process and validity. To facilitate the interpretation of the results, the tools were evaluated together, but their properties were analyzed separately.

Studies that included other conditions not related to neurodegenerative diseases, such as multiple sclerosis, stroke and epilepsy, were excluded from this review. Some studies
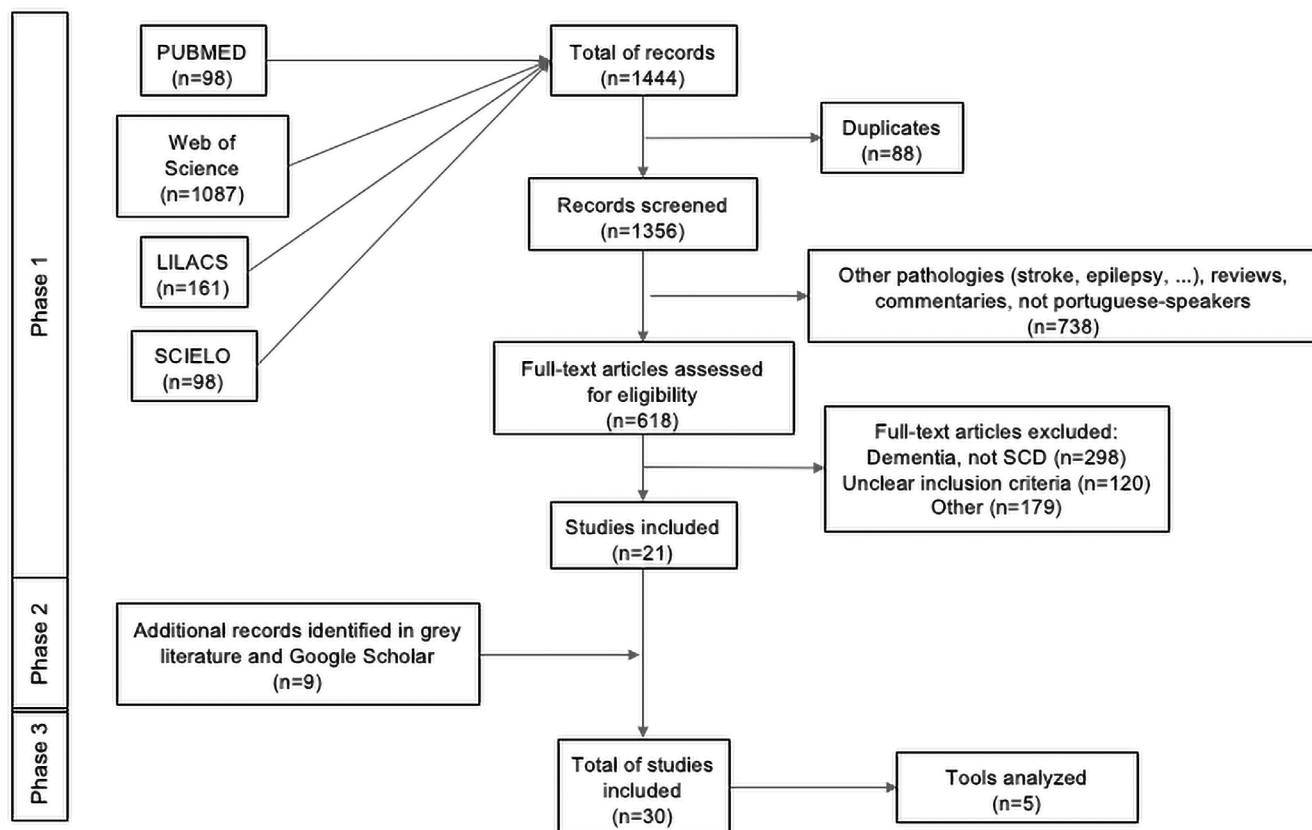

Figure 1. Flowchart of the study.

were excluded because they conducted evaluations on samples of older adults presenting with cognitive impairment, which was not the aim of this study. Eleven studies analyzed SCD using a group comparison (presence vs. absence of SCD), while the majority analyzed it using regression analysis (association between SCD and other variables).

The largest number of the studies was published in 2010 (5/30), while the first was published in 1998 (Brazil). There were 5 studies (16.7%) from Portugal and 25 studies from Brazil, among which the majority were from the São Paulo area (19/25) or from Porto Alegre (6/25 studies). The total number of participants recruited in all the studies was 7,035 (mean 234.5±274.23), with a mean age of 52.87 years (SD±7.79) and female predominance (4,355 individuals; 61.9%). Only one study analyzed biomarkers in individuals with SCD[13], while another study analyzed SCD and individuals who converted from nondemented to dementia[14].

General evaluation of instruments

We found that 30 studies used some tools (questionnaire or question) to evaluate SCD in the Portuguese speaking population (Table 1). The majority of studies (24, 80%) used a questionnaire to evaluate memory complaints. Seven authors (23.3%) classified individuals in the SCD group based on a

Table 1. Summary of articles included in both phase 1 and phase 2.

Study/year	Country	Phase retrieved	Instrument(s) used	Sample size	Study design	SCD group
Bernardes et al. 2017[20]	Brazil	1	MAC-Q	386	Cross-sectional	No
Andrade and Novelli, 2015[27]	Brazil	1	MAC-Q	90	Cross-sectional	No
Argimon et al., 2014[28]	Brazil	1	MAC-Q	121	Cross-sectional	No
Brum et al., 2013[29]	Brazil	1	MAC-Q	56	Cross-sectional	No
Santos et al., 2012[30]	Brazil	2	MAC-Q	204	Cross-sectional	Yes
Paulo and Yassuda, 2010[31]	Brazil	2	MAC-Q	67	Cross-sectional	No
Lima-Silva and Yassuda, 2009[24]	Brazil	1	MAC-Q and Forgetfulness frequency scale	57	Cross-sectional	No
Lindôso, 2008[32]	Brazil	2	MAC-Q	51	Cross-sectional	No
Caramelli and Beato, 2008[33]	Brazil	1	MAC-Q	60	Cross-sectional	Yes
Minett and et al., 2008[34]	Brazil	2	MAC-Q	114	Cross-sectional	Yes
Argimon and Stein, 2005[35]	Brazil	1	MAC-Q	66	Longitudinal	No
Mattos et al., 2003[21]	Brazil	1	MAC-Q and single question	71	Cross-sectional	Yes
Pereira and Albuquerque, 2018[38]	Portugal	2	PRMQ	1052	Cross-sectional	No
Piauilino et al., 2010[18]	Brazil	2	PRMQ	664	Cross-sectional	No
Benites and Gomes, 2007[19]	Brazil	2	PRMQ and MAC-Q	642	Cross-sectional	No
Sousa et al., 2017[41]	Portugal	1	SMC-scale	620	Cross-sectional	Yes
Sousa et al., 2015[36]	Portugal	1	SMC-scale	330	Cross-sectional	Yes
Silva et al., 2014[14]	Portugal	2	SMC-scale	133	Longitudinal	No
Ginó et al., 2010[42]	Portugal	2	SMC-scale	946	Cross-sectional	No
Kasai et al., 2010[37]	Brazil	1	SMC-scale	26	Longitudinal	No
Almeida et al., 2019[43]	Brazil	1	MCS	83	Cross-sectional	No
Dalpubel et al., 2019[44]	Brazil	1	MCS	100	Cross-sectional	No
Vale et al., 2012[40]	Brazil	1	MCS	161	Cross-sectional	No
Gil et al., 2015[22]	Brazil	1	Sunderland everyday memory questionnaire	79	Clinical trial	No
Rizzi et al., 2018[13]	Brazil	1	Single question	45	Cross-sectional	Yes
Bourscheid et al., 2016[46]	Brazil	1	Single question	152	Cross-sectional	Yes
Jacinto et al., 2014[23]	Brazil	1	Single question	248	Cross-sectional	Yes
Aguiar et al., 2010[47]	Brazil	1	Single question	28	Cross-sectional	No
Brucki and Nitrini, 2009[48]	Brazil	1	Single question	163	Cross-sectional	Yes
Almeida, 1998[49]	Brazil	1	Single question	220	Cross-sectional	Yes

MAC-Q: Memory Assessment Questionnaire; PRMQ: Prospective and Retrospective Memory Questionnaire; SMC-Scale: Subjective Memory Complaint Scale; MCS: Memory Complaint Scale.

single question "How is your memory?". There was high heterogeneity among the questionnaires used in the studies. A total of seven different evaluation tools (including questionnaires and single questions) were applied to classify individuals as belonging to an SCD group. The questionnaire most used was the Memory Complaint Questionnaire (MAC-Q; 12/30 studies), followed by use of a single-question method (7/30 studies), the Subjective Memory Complaint scale (SMC-scale; 5/30 studies), the Prospective and Retrospective Memory Questionnaire (PRMQ; 3/30 studies) and the Memory Complaint Scale (MCS; 3/30 studies). Other questionnaires were used only in a single paper each: Informant Questionnaire on Cognitive Decline in the Elderly (Short-IQCODE)[15], Forgetfulness frequency scale[16] and Sunderland Everyday Memory Questionnaire[17]. The latter two were referenced as retrieved from books, not articles (Table 1).

Several tools have been developed previously, such as MAC-Q, SMC-scale and Sunderland questionnaire. However, most of these have not been subjected to any associated in-depth psychometric analysis. A total of 18 studies analyzed here referred to other studies and used non-validated tools. Furthermore, only two instruments retrieved in this review had been analyzed for validity in their populations (PRMQ and MCS). Importantly, the PRMQ was subjected to both confirmatory[18] and exploratory factor analysis[19]. In each analysis, the number of questions was the same (16 items), but the latter found a higher Cronbach's alpha when the PRMQ was reduced to 10 questions.

Interestingly, application of the MAC-Q showed a decrease with time, and the last study that mentioned using this tool was carried out in 2017[20], while other tools have been increasingly used in Portuguese-speaking populations. The first usage of the MAC-Q appeared in 2003[21]. However, a small number of studies have utilized this tool for evaluating SCD based on cross-cultural adaptation and validation within the population studied. It remains the tool that has most commonly been used.

One study used both a questionnaire and a single question to classify individuals with memory complaints, and the results were compared[21]. Two questionnaires could not be found online (Forgetfulness frequency scale[16] and Sunderland everyday memory questionnaire[22]), despite an extensive search of the literature. Jacinto et al.[23] used a single question to classify individuals in the Subject Memory Complaints group (yes or no) and measured its correlation with the diagnosis established by cognitive neurologists using a short form of the IQ-CODE. This tool was used in their study by physicians to help in making diagnoses and not in classifying individuals as SCD-positive.

Evaluation of specific instruments

The instruments have been listed according to the frequency of their use in the studies included (Table 2). The adapted version of the questionnaire on forgetfulness described by Lima-Silva[24] was used specifically in one study

and could not be found in the search online. Similarly, the questionnaire used by Gil[22] could not be found and, thus, both tools were excluded from the critical review.

- Memory Complaint Questionnaire (MAC-Q[19,20,21,24,25,26,27,28,29,30,31,32,33,34,35]): This questionnaire uses a 5-item Likert scale from "much better now"=1 to "much worse now"=5, and the last question scores double. The scores can range from 7 to 35 points. The questions ask the subject to compare some aspects of his/her memory with a time when he/she was younger. A cutoff of 25 points or more indicates that the individual presents a memory complaint. The question about the telephone number (Q2) is relatively outdated due to the popularity of mobile phones. Despite being the questionnaire most used to evaluate SCD, it has not been translated and validated for use in Portuguese-speaking populations, unlike the PRMQ[38,39] and the MCS[40].

- Subjective Memory Complaint Scale (SMC-Scale[14,26,36,37,41,42]): This scale was independently translated and used by two groups[27,28] in five different studies. It comprised 10 questions scoring from "No"=0 to "Yes"=1 to 3, depending on each question. The cutoff point for SCD was defined as 3 points. Its short and direct questions were easy for older adults to understand. Two questions (Q6 and Q10) evaluated naming abilities and attention, respectively, which may negatively interfere with the purpose of the questionnaire, i.e. evaluation of memory. However, no formal translation and validation were found in phase 2 of the present study.

- Prospective and Retrospective Memory Questionnaire (PRMQ[18,29,38]): The PRMQ is a well-tested and validated tool for use among Portuguese speakers. It contains 16 questions on a Likert scale from "Never"=1 to "Almost always"=5. The cutoff point is 16 or more. It is the only questionnaire that evaluates both retrospective and prospective memory. Two-factor analyses, namely exploratory[19] and confirmatory[18], were performed to validate this instrument, which makes comparisons between studies difficult. However, because of the large high number of questions and the length of some questions, applying this questionnaire may be time-consuming.

- Memory Complaint Scale (MCS[30,40,43,44]): This scale comprises two sections with seven items each, scoring from 0 to 2 in each item. Its results are scaled as mild (3–6 points), moderate (7–10 points) or severe (11–14 points) memory complaint. It addresses both the patient and the companion, which increases its predictive value for dementia[31]. This tool was originally developed and validated for the Portuguese population, and it presented high internal consistency. However, except for P7, it relies excessively upon abstraction in questions. The validity analysis that was performed was limited to internal consistency, and there was no factorial analysis. Moreover, the validity analysis[30] had a small sample size (n=161) compared with

Table 2. Summary of tools used to evaluate subjective cognitive decline among Portuguese speakers.

Tool	MAC-Q	PRMQ	SMC-Scale	MCS	Single questions
Studies/ year	Benites and Gomes, 2007[19] Lima-Silva and Yassuda, 2009[24] Brum et al., 2013[29] Argimon et al., 2014[28] Bernardes et al., 2017[20] Andrade and Novelli, 2015[27] Paulo and Yassuda, 2010[31] Argimon and Stein, 2005[35] Caramelli and Beato, 2008[33] Minett and et al., 2008[34] Santos et al., 2012[30] Lindôso, 2008[32] Mattos et al., 2003[21]	Pereira and Albuquerque, 2018[38] Piauilino et al., 2010[18] Benites and Gomes, 2007[19]	Sousa et al., 2017[41] Sousa et al., 2015[36] Silva et al., 2014[14] Ginó et al., 2010[42] Kasai et al., 2010[37]	Almeida et al., 2019[43] Dalpubel et al., 2019[44] Vale et al., 2012[40]	Rizzi et al., 2018[13] Bourscheid et al., 2016[46] Jacinto et al., 2014[23] Aguiar et al., 2010[47] Brucki and Nitrini, 2009[48] Mattos et al., 2003[21] Almeida, 1998[49]
No. of items	6	16	10	7 (patient)+ 7 (companion)	1
Scoring system (min-max)	Self-reported Likert questions: score 1–5, last question scores twice (7–35). Cutoff point≥25	Self-reported Likert questions: score 1–5 (16–80). Cutoff point≥6	Applied questions score 0–3, some questions score less than others (0–21). Cutoff point> 3	Applied questions score 0–2 (0–14). Cutoff points for memory complaints: Mild (3–6), Moderate (7–10), Severe (11–14)	Applied question: Yes/No
Cognitive domains (No. of questions)	Episodic memory (5), attention (1), language (1)	Episodic memory (16), attention (5)	Episodic memory (5), attention (2), language (2), orientation (2), processing speed (1)	Episodic memory (6), attention (1), activity of daily living (1)	Episodic memory
Benefits	Brief, shortest questionnaire.	Prospective, retrospective and general memory assessments.	Easy to understand.	SCD-plus feature: Companion is also asked one question on the impact on activities of daily living	Fast classification
Deficits	Not formally translated or validated for Portuguese	Time-consuming	Not formally translated or validated for Portuguese	It overvalues abstraction. It lacks factor analysis for validation.	Vulnerable to education level, low reliability
Validation process	No	Translated and validated for Portuguese	No	Developed and validated (internal consistency only) in Portuguese	No

MAC-Q: Memory Assessment Questionnaire; PRMQ: Prospective and Retrospective Memory Questionnaire; SMC-Scale: Subjective Memory Complaint Scale; MCS: Memory Complaint Scale.

other studies of this type, and the subjects were selected from a memory clinic.

- Single-question methods[13,21,23,46,47,48,49]: To classify subjects as positive for SCD, questions like "How is your memory?", "Do you have memory problems?" or synonyms were used in seven studies. These studies presented different outcomes, including the cerebrospinal levels of amyloid, cognitive scores and affective symptoms. A few identical questions were put forward in different ways. In brief, concise questioning may be easier to apply in the clinical setting[21], but is vulnerable to the level of education[32]. Even small differences

in the single-question method may limit the interpretation of these studies.

DISCUSSION

The growing understanding of SCD is leading to an increasing number of studies on this subject[3]. The aim of this review was to discuss some of the recommendations proposed through the Subjective Cognitive Decline-Initiative (SCD-I), especially regarding tools to evaluate SCD in a target population[10]. Among all the recommendations, this study

addressed the evaluation of tools according to their appropriate demographic characterization, validation process and content. To our knowledge, this is the first study to systematically organize and compare the questionnaires on SCD that have been used for the Portuguese-speaking population.

Appropriate demographic characterization is a key feature of evaluation tools that address SCD[10]. Therefore, this review only included studies from Portuguese-speaking populations. However, only a small number of studies evaluating SCD in this population could be retrieved, precisely totaling 30 studies. We correlated the low number of studies on this population, in both Brazil and Portugal, with educational factors. There is only limited capacity for identifying SCD in both countries, since the majority of studies have focused on later stages of AD (Figure 1). In Brazil, another important factor was low awareness of cognitive decline, among family members, general practitioners and other healthcare professionals[33,34]. In Portugal, dementia is also underdiagnosed[35]. Thus, a greater number of studies addressing SCD will provide better identification of demographic and cultural aspects of the Portuguese-speaking population.

The majority of the tools reviewed in this study showed limited psychometric validation, even though this is an important factor recommended by the SCD-I[10]. Four questionnaires and seven different single questions were found in this review for classifying individuals as SCD positive (Table 2). Only two instruments had been validated for the Portuguese-speaking population (PRMQ and MCS), and both of these tools showed high internal consistency[19,36]. However, PRMQ evaluated not only *prospective* memory (as in all questionnaires) but also *retrospective* memory, which becomes diminished through mild cognitive impairment[37]. Moreover, the MCS was the only tool presenting a questionnaire for the patient's companion (i.e. an SCD-plus feature), and had better predictive value for further cognitive impairment than the other tools reviewed. The SMC-scale was used in five studies, but its validity and translation have not been described in the literature. The MAC-Q was the most used questionnaire and has been validated as a screening tool for Portuguese speakers. However, this was not described in the literature and it has not been formally translated into Portuguese. The first study mentioning this tool was from 2003[21]. Validation for a questionnaire is essential in order to be able to determine its psychometric properties[38]. Tools that have not been adequately translated and tested before usage are susceptible to fundamental flaws of construct and consistency[39], which ultimately restrict their accuracy for making measurements. Further studies need to carefully address non-validated or untranslated questionnaires, so as to be able to adequately classify individuals as SCD-positive.

A total of seven studies used a single-question method to classify individuals as SCD-positive. This method of classification has been described as potentially useful in clinical practice for a variety of screening scenarios[21,40]. The low level of literacy presented by Brazilian people causes bias because of poor understanding of complex questionnaires[32]. Simple, concise and direct questions are preferred for this elderly population, especially those with yes/no answers. However, previous studies suggested that a single-question method showed worse predictive values than brief questionnaires[41,42]. In a research setting, small differences in a sentence or a word may lead to different outcomes and might result in low reliability[43]. For example, "What do you think of your memory?" and "Do you have memory problems?" were used in two studies and presented different outcomes. Hence, interpretating these outcomes together may be inaccurate. Because these questions measure SCD slightly differently, it dilutes the rigor of science in grouping all the results. Thus, we suggest that classifying an individual as SCD using a single question needs to be carefully addressed in the research setting. Instead, a questionnaire using short questions with yes/no answers is preferable for older adults with low literacy.

Currently, there is no single gold standard tool to differentiate between SCD-positive and negative individuals[3]. The SCD-I has established that the research priority is to harmonize existing measures and develop a validated SCD scale[10]. A variety of tools is available for classifying individuals as SCD. Item-response theory and computerized adaptive test modeling were performed to identify reliable SCD questions among a variety of questions[8]. A set of nine questions were selected, including global memory functioning, temporal comparisons and everyday activities. Some of these questions were associated with amyloid positivity[44] and medial temporal atrophy[45]. It has been reported that functional cognitive decline is a major confounding factor of SCD[46], and that this includes affective symptoms and negative self-evaluation. Hence, it is recommended that novel tools should be designed to evaluate SCD that combine existing measures to improve the diagnostic accuracy of the instrument.

Ideally, an instrument with high reliability and predictive value for progressive cognitive decline should include items both positively and negatively associated with AD[10]. The features that define SCD-plus features were not described in the questionnaires retrieved, except the MCS. A screening tool that includes a brief evaluation of affective symptoms would also be useful for distinguishing individuals at higher risk of cognitive decline. For example, a two-question screen is a valuable tool for rapidly identifying symptoms of depression, and both questions can easily be included in a screening questionnaire[47]. Similarly, a brief tool for anxiety has been developed using only two questions[48]. Both short screenings of affective symptoms can improve the specificity of an SCD questionnaire for pathological cognitive decline, instead of functional decline[46]. Thus, an adequate questionnaire should include SCD-plus features and enable screening for affective symptoms, validated through confirmatory factor analysis in a short and concise manner. This instrument hypothetically

would present increased predictive value and specificity for progressive cognitive decline.

Despite our efforts to avoid bias, several key limitations of our review need to be considered. Because we focused on the Portuguese-speaking population, the conclusion of this study is valid only for this community. We tried to minimize publication bias using four major databases and a major search engine (Google Scholar). The latter resulted in inclusion of nine studies through using a manual search of the literature. Thus, we believe that a few other tools may have been used, though with a small impact on SCD. Some of the tools retrieved were not found online, which limited the utility of these tools.

In summary, this study retrieved four questionnaires and seven different single questions that have been used to evaluate SCD among Portuguese speakers. The MAC-Q was the most used tool, despite its lack of formal translation and validation for the Portuguese-speaking population. Further studies should be conducted to validate a screening tool for SCD that would include investigation of SCD-plus features and affective symptoms and would provide increased predictive value with regard to future cognitive decline.

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