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RESEARCH ARTICLE

Assessing subjective cognitive decline in older adults attending primary health care centers: what question should be asked?

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ABSTRACT

Introduction: Subjective Cognitive Decline (SCD) refers to a self-perceived experience of decreased cognitive function without objective signs of cognitive impairment in neuropsychological tests or daily living activities. Despite the abundance of instruments addressing SCD, there is no consensus on the methods to be used. Our study is founded on 11 questions selected due to their recurrence in most instruments. The objective was to determine which one of these questions could be used as a simple screening tool.

Methods: 189 participants aged 65 and over selected from Primary Care centers in Santiago de Chile responded to these 11 questions and were evaluated with the MiniMental State Examination (MMSE), the Free and Cued Selective Reminding Test (FCSRT), the Pfeffer functional scale, and the Geriatric Depression Scale (GDS). An Item ResponseTheory (IRT) method was performed to assess the contribution of each of the 11 questions to the SCD latent trait and its discrimination ability.

Results: Based on the results of the exploratory factor analysis showing very high/low saturation of several questions on the factors, and the high residual correlation between some questions, the IRT methods led to select one question ("Do you feel like your memory has become worse?") which revealed to be the most contributive and discriminant. Participants who answered yes had a higher GDS score. There was no association with MMSE, FCSRT, and Pfeffer scores.

Conclusion: The question "Do you feel like your memory has become worse?" may be a good proxy of SCD and could be included in routine medical checkups.

Introduction

Neurocognitive disorders are generally preceded by a prodromal phase characterized by subtle cognitive changes that are perceived by the patient him/herself and/or by informants, but which are not always documented by standard neuropsychological tests(Jessen et al., 2020). In the literature, numerous terms are used to refer to those changes, such as "subjective memory impairment," "subjective cognitive complaints," "self-reported memory complaint," "cognitive memory complaint." An international working group proposed the term "Subjective Cognitive Decline (SCD)": *Subjective* referring to self-perception of cognitive performance (independently of cognitive test scores); *Cognitive* referring to any cognitive function that could be affected and not exclusively memory; *Decline* being preferred to impairment to reflect the worsening of cognitive functioning with time (Jessen et al., 2014). It is now well admitted that individuals with SCD have a significantly higher risk of dementia (Reisberg et al., 2010); they would be 4,5 times more likely to develop dementia than those without SCD(Slot et al). Importantly, SCD constitutes a heterogeneous concept and has been variably associated with global cognitive status,

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memory impairment or depressive symptoms (Liew, 2019; Mendonça et al., 2016).

Whereas cognitive complaints are an obvious and compulsory dimension to explore in older adults suspected to have neurocognitive disorders, surprisingly there is no consensus on the method to assess it. Rather, there is a wide range of instruments consisting in a limited number of binary questions, such as the Memory Complaint Questionnaire (Crook et al., 1992), the Subjective Cognitive Functioning (Aalten et al., 2014), the Subjective Memory Decline Scale (Jorm et al., 2001), short scales, such as the Age Code Study Memory Question (Frank et al., 2007), the Australian Imaging Biomarkers and Lifestyle flagship study of aging (Ellis et al., 2009), the Subjective Cognitive Decline Self Identification Item (Smart et al., 2014) or longer questionnaires like the Metamemory in Adulthood Questionnaire (Dixon et al., 1988), or the Behavioral Rating Inventory of Executive Function Adult Version (Roth et al., 2005). In 2015, the SCD Initiative working group reviewed 34 types of instruments that evaluate SCD categorized according to their characteristics (mode of presentation of items, type of responses, number of items, considering previous functioning or not). Consequently, the prevalence of cognitive complaints substantially varies across the studies, ranging from 25% to 50% (Cees et al., 2000).

Indeed, the way one gets a patient to appreciate his/her own cognitive difficulties directly influences the patient's responses. For instance, interviewing a patient with a general question, such as "How would you rate your memory – excellent, good, fair, or poor?" results in a low frequency of complainers (6% in Turvey et al. 's study; Turvey et al., 2000) while questions requiring comparing current cognitive functioning with previous one yield a prevalence up to 46% (Slot et al., 2018).

Given the lack of consensus, the opportunity for cliniciansin particular, those nonspecialized in cognitive disorders, to recourse to a simple but valuable question to screen potential patients who would deserve more thorough assessment of both SCD, and psychometric performances would be useful. However, if reaching a consensus regarding the clinical scales assessing SCD is hardly possible, identifying a unique question is still more challenging. Rabin et al. (Rabin et al., 2015) in their review report the questions most frequently used in the questionnaires reviewed by the SCD Initiative group. Those questions were grouped into 10 categories: Memory changes, Memory of names of people, General memory problems, remembering where one put common objects/finding familiar objects, Words finding,

remembering appointments, remembering recent events, remembering recent conversation, memory for intentions and remembering phone numbers.

This study is founded on 11 of those questions reported by Rabin et al. based on their recurrence in most instruments. More specifically, this study was designed to assess the relevance of each of these questions to determine whether one (or several) can be used as a simple screening tool that could be easily included in a clinical assessment including when it is performed by nonspecialist/primary care practitioners. Based on a sample of 189 non-demented older adults selected in primary care centers (PCC) in Santiago de Chile, we used the item response theory (IRT) approach to evaluate the psychometric qualities of the 11 questions. Finally, once the IRT performed, we evaluated the association of the question(s) retained with global cognitive status, memory impairment, functional abilities, and depressive symptoms.

Methods

Study sample and procedure

Participants were recruited from three PCC located in three areas of Santiago, Chile (La Reina, Providencia, Macul). PCC provide ambulatory care of general medicine and are the first point of contact with the public health system. PCC provided to the study investigator with the contact details of the people who had undertaken during the 6 previous months an annual preventive medicine examination (EMPAM for its acronym in Spanish), an exam proposed to all older adults aged 65 and over in Chile. All the participants included in the list were invited to participate regardless of their scores. Assessments took place at participant's home or at the clinical center as preferred by the participants.

Inclusion criteria were: Spanish-speaking participants, older than 65 years, living at home, with a proper capacity to provide consent for research according to clinical judgment, received a medical assessment within the previous 6 months. The exclusion criteria were: illiteracy, defined as the inability to read and write a short and simple text regardless of the years of formal education, and a diagnosis of major cognitive impairment based on: Mini Mental State Examination (MMSE; Folstein et al., 1975) score <21 and Pfeffer Functional Activities Questionnaire (PFAQ) score ≥5 (Pfeffer et al., 1982; Quiroga et al., 2004).

Two hundred participants were recruited, of whom 11 were excluded as the neuropsychological testing showed cognitive impairment. The final sample was of 189 participants.

This study protocol was reviewed and approved by the Ethical and Scientific Committee of the East Metropolitan Health Service and Ethics Committee in Santiago, Chile, approval number: 1,140,423. Written informed consent was obtained from participants prior to the study in accordance with the Declaration of Helsinki.

Collected information

For each participant, age, sex, and number of years of education were recorded.

The 11 SCD questions with binary score were:

(1) How is your memory compared to the way it was 10 years ago?
(2) Do you remember things less well than you did a year ago?
(3) How is your ability to remember names of close friends and relatives?
(4) Do you feel like your memory has become worse?
(5) Do you use to forget where things are?
(6) Do you have difficulty finding the right words?
(7) How is your ability to remember important appointments?
(8) Do you have trouble remembering things that have recently happened?
(9) Do you ever forget what you were told yesterday or the day before?
(10) Do you ever start doing something and forget what you were doing?
(11) Do you ever go to a room to look for something and forget what you came for?

Questions 1, 3, and 7 have three possible answers, while the other items had two possible answers. Specifically in the item 1, the possible answers were: better, same or worse. We considered that the answer reflecting a potential difficulty was "worse", while the other two answers reflected no difficulty. Therefore, were coded as follows: 1 (worse) and 0 (same or better).

Items 3 and 7 have also three possible answers: good, very good or bad. The first two answers do not reflect difficulties and were coded 0, while the answer "bad" was coded 1 as it reflected a perceived difficulty.

In addition, the following tests and scales were administered:

To exclude the participants with dementia, we administered the MMSE, a brief cognitive test that evaluates global cognitive deterioration (Folstein et al., 1975) and the PFAQ, a tool assessing independence in performing activities of daily living (Pfeffer et al., 1982). Quiroga et al. (2004) validated this questionnaire with 11 items.

Each has 4 possible answers: 0 = able to do it; 1 = performs with difficulty; 2 = needs help; 3 = not able (score from 0 to 33). The combination of MMSE score < 21 and Pfeffer score ≥5 has shown excellent sensitivity (94,4%) and specificity (83.3%) to detect dementia surpassing each instrument separately. Cutoff scores of 21 points in the Chilean validation of MMSE and of 5 points in the PFAQ present the best balance between sensitivity and specificity in older adults with either high or low education (Quiroga et al., 2004).

To evaluate the association of SCD questions with global cognitive status we used the MMSE.

To evaluate the association of SCD questions with memory impairment, we used the pictorial version of the Free and Cued Selective Reminding Test (FCSRT), a validated test assessing episodic memory in a rather low educated population (Delgado et al., 2016). FCSRT was administered according to standard procedures and provide four main scores, free recall, cued recall, and the total score (the sum of the free and cued recall).

To evaluate the association of SCD questions with depressive symptoms, we used the abridged Geriatric Depression Scale (GDS; Yesavage et al., 1982), a self-reported questionnaire assessing depressive symptoms in the elderly (Yesavage & Sheikh, 1986).

To evaluate the association of SCD questions with functional abilities, we used the Pfeffer questionnaire.

Statistical analysis

Frequencies and percentages are reported for categorical data, means and standard deviations, for continuous data.

The psychometric relevance of the 11 questions assessing SCD was investigated with the Item Response Theory (IRT) methodology, a psychometric technique useful for the construction and evaluation of psychological measurements (Thomas, 2011). IRT allows identifying the elements of a test/scale/questionnaire that contributes most to the underlying theoretical construct (in our study, SCD). IRT refers to this underlying construct as a latent trait. Evaluating each question according to this process makes it possible to only retain the items that provide the best measure of the latent trait, resulting in a shorter and more precise instrument. More specifically, this methodology consists in linking the level of a measured construct (in our study SCD) to an item response category (the two-response categories for each question, according to which the participant agrees or not with the different statements).

Our study was based on the properties of the different questions assessing SCD, namely their difficulty as well as their discrimination ability. The difficulty of the item is defined as the point in the ability scale at which

person has a 50% chance of responding positively to the item. The discriminatory power of a question is defined as the degree to which the question distinguishes persons with higher ability from those with lower ability. We therefore conducted these analyses in order to study the properties of each question separately and determine which one(s) best define(s) SCD.

To evaluate the 11 questions assessing SCD, the IRT assumptions of unidimensionality, local independence and monotonicity were verified. Unidimensionality (i.e., all questions are assumed to load on a single factor) was evaluated with confirmatory factor analysis (CFA) using polychoric correlations. The analysis was performed using the RPackage (version 3.6.0) Lavaan (version 0.5–22), and CFA model goodness-of-fit was assessed by examining multiple indices and recommended criteria: Comparative Fit Index (CFI > 0.90), TuckerLewis Index (TLI > 0.90), and Root Mean Square Error of Approximation (RMSEA < 0.10; Kenny et al., 2015; Thomas, 2011). In the case of CFA model poor fit, an exploratory factor analysis (EFA) was performed. Unidimensionality assumption is reached when the first factor accounts for at least 20% of the variability and when the ratio of the variance explained by the first to the second factor is greater than 4 (Reeve et al., 2007). Local independence assumes that after controlling for the dominant factor, there is no significant correlation among item responses (Reeve et al., 2007). To identify local dependence (LD), the residual correlation matrix achieved by the single-factor CFA was examined. Possible LD was considered for residual correlation greater than 0.2.

Monotonicity assumes that the probability to endorse a higher item response category should increase as the underlying level of the construct increases.

This step of IRT assumptions evaluation led us to retain only one question, the following steps of the method were not performed.

Finally, once the IRT performed, we assessed the associations between the SCD question(s) retained with other potentially relevant dimensions, i.e., global cognitive status, memory impairment, disability and depressive symptoms with univariate linear regressions. Before conducting these regression analyses, the assumptions of homoscedasticity and normal distribution of the residuals were verified.

Results

Sample description

The study sample consisted of 189 participants. As may be seen in Table 1 displaying the participants' characteristics, the sample included almost as many men as

Table 1. Sample characteristics, n = 189.

Variables	
Age, Mean (SD), [range]	74,1 (5,8), [65–96]
Women, n (%)	98 (52, 6%)
Number of years of education, Mean (SD), [range]	11,1 (4,4), [0–20]
Mini Mental Status Examination score (/30), Mean (SD), [range]	27.5 (2,8), [14–30]
Free and cued selective reminding test (total score /48), Mean (SD), [range]	47,1 (2,3), [32–48]
Pfeffer score, Mean (SD), [range]	0,5 (1,8), [0–15]

SD, standard deviation.

Table 2. Frequency of responses to the 11 questions related to subjective cognitive decline.

	Response categories *N*		Response categories percentage	
Questions	0	1	0	1
(1) How is your memory compared to the way it was 10 years ago?	71	94	43,8%	56,2%
(2) Do you remember things less well than you did a year ago?	104	60	63,6%	36,4%
(3) How is your ability to remember the names of close friends and relatives?	148	17	89,5%	10,5%
(4) Do you feel like your memory has become worse?	69	94	42,6%	57,4%
(5) Do you use to forget where things are?	82	83	50,0%	50,0%
(6) Do you have difficulty finding the right words?	71	94	42,6%	57,4%
(7) How is your ability to remember important appointments?	151	14	91,4%	8,6%
(8) Do you have trouble remembering things that have recently happened?	136	29	82,1%	17,9%
(9) Do you ever forget what you were told yesterday or the day before?	136	29	82,1%	17,9%
(10) De you ever start doing something and forget what you were doing?	110	55	66,7%	33,3%
(11) Do you ever go to a room to look for something and forget what you came for?	25	140	14,8%	85,2%

Item 1 had three possible responses: better, same or worse. We considered that the answer reflecting a potential difficulty was "worse" while the other two reflected no difficulty. Therefore, were coded as follows: 1 (worse) and 0 (same/better).

Items 3 and 7 have also three possible answers: good, very good or bad. The first two answers do not reflect difficulties and were coded 0 while the answer "bad" was coded 1 as it reflected a perceived difficulty.

women, with a mean age of 74.1 (SD = 5.8) and 11 years of education (SD = 4.4). The mean MMSE score was 27.5 (SD = 2.8).

Frequency of responses to the 11 SCD questions

Table 2 shows the frequencies of responses to the questions. As may be seen, the frequencies of responses were very disparate. For example, 10% of participants answered "yes" to question 3, while 85% answered "yes" to question 11% and 82% answered "no" to questions 8 and 9. On questions 4, 5, 6, around 50% answered "yes".

IRT results

First a CFA was carried out with the 11 items. The results on the 11-item scale indicated a poor fit to a unidimensional model. Therefore, EFAs were performed and showed that question 4 had a saturation equal to 1 on the first factor, while five questions had a saturation close to 0. Consequently, a CFA was carried out on the 5 remaining questions. The CFA revealed a good fit to a unidimensional latent trait model with good indices (RMSEA = 0.10; CFI = 0.99; TLI = 0.98) but with a ratio F1: F2 = 2.0 < 4. After EFA analyses allowing selecting the relevant questions, the best fit to a unidimensional model was obtained with questions 1 and 4. Nonetheless, questions 1 and 4 have a very high residual correlation (0.8) suggesting that these 2 questions are redundant. Question 4 has a better saturation on factor 1 than question 1 (0.9 vs 0.8). Taken together, these results led us to select only one question, i.e., question 4 *"Do you feel like your memory has become worse?."*

Table 3. Relation between answer to question 4, depressive symptoms, cognitive, and functional abilities. Univariate regressions.

	Estimate	STD	p-value
Memory (free and cued selective reminding)			
Total score (free and cued)	0.052	0.327	0.873
Free recall score	−1.298	0.945	0.172
Cued recall score	1.350	0.820	0.102
Global cognition (Mini Mental Status Examination)	−1.273	2.776	0.647
Depression (Geriatric Depression Scale)	1.768	0.392	<.001
Functional abilities (Pfeffer)	0.430	0.305	0.161

STD, standard deviation.

Association between question 4, depressive symptoms, cognitive and functional abilities

The association between the answer to question "4" and other mental health scores was assessed using univariate regressions (Table 3). Participants who perceived their memory as worse than before had a significantly higher depression score (1.8 points higher on average on the GDS). After excluding the two GDS items potentially related to cognition (memory and concentration problems), the association between GDS score and the response to question 4 remained unchanged. However, there was no association between the response to question 4 with cognitive scores measured with MMSE and FCSRT, nor with the Pfeffer functional questionnaire score.

Discussion

The first noticeable result is that the frequency of affirmative responses to the 11 selected questions varied substantially. For example, to the question "How is your ability to remember the names of close friends and relatives?" only 10% of participants responded "poor." In contrast, 85% answered "yes" to the question "Do you ever go to a room to look for something and forget what you came for?." These results highlight that the question content, although related to memory loss in both cases, directly influences the answer provided by the individual on what is assumed to reflect the same phenomenon.

Moreover, the IRT analysis showed that among the 11 questions identified as the most common by Rabin et al., the question *"Do you feel like your memory has become worse?"* was the most informative for detecting SCD in our sample of older adults. A positive response to this question was correlated with depressive symptomatology. This finding is consistent with prior studies, which reported that depression is frequent among older adults with SCD and that memory complaints are a reliable indicator of depression risk (John et al., 2017). A systematic review showed a high frequency of SCD in individuals with depression (Hill et al., 2016). Consistently, in our study, we observed a significant relationship between a high score on the GDS and a positive response to question 4 of SCD. Therefore, more research is needed to better understand this relationship as having both depression and SCD has been found to increase the risk of developing future dementia (Liew, 2019).

No association was found with cognitive and functional abilities, which is consistent with prior reports

showing that older adults with SCD do not necessarily present a cognitive impairment in standard neuropsychological tests (Balash et al., 2013; Howard, 2020; Zlatar et al., 2018) and that functional abilities in daily living activities is well preserved in the majority of individuals with SCD (Roehr et al., 2019). Indeed, it is important to remember that a major difference between measuring SCD and cognitive performances is that the former relies on the individual's slowly progressive decline, while the latter assesses his/her level of performance at a given moment.

Obviously, the main limitation of this study is the cross-sectional design. The lack of longitudinal follow-up does not allow assessing the predictive value of an affirmative response to the SCD question. The sample size is also a limitation as it may result in a limited statistical power. Another limitation of our study is that most of the questions proposed by Rabin that are based on a literature review up to 2014 do not measure a "decline" but rather a current "complaint." Yet, more recent recommendations (Molinuevo et al., 2017) propose to include the time frame when assessing cognitive complaints, the report of informants, a longitudinal assessment of SCD, to consider demographic factors, to consider SCD plus assessment, etc. Finally, another limitation is that we do not have demographic information of all the eligible population so we cannot exclude a potential selection bias in our sample.

Despite these limitations, the main contribution of this study is the finding that one simple question ("Do you feel like your memory has become worse?") may be a good proxy of SCD and could be easily included in a routine medical checkup. Furthermore, this item is associated with depressive mood confirming the close relationship between SCD and depression reported in many previous studies. An affirmative answer to this question may guide clinicians to seek for a more comprehensive evaluation and a clinical follow-up of the patient. To go further, future studies involving a longitudinal design should assess the predictive value of this question. Also, future studies should evaluate the applicability of the present results in different settings and populations.

Disclosure statement

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