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Assessing Subjective Cognitive Decline in older adults attending primary health care centers: what question should be asked?

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Abstract

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Objective: 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.

Design/setting: 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 Mini-Mental State Examination (MMSE), the Free and Cued Selective Reminding Test (FCSRT), the Pfeffer functional scale, and the Geriatric Depression Scale (GDS). An Item-Response-Theory (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 Pffefer 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 may be perceived by the patient him/herself and/or by informants, but which may not always be documented by standard neuropsychological tests (Rabin et al., 2017). In the literature, numerous terms are used to refer to those changes such as "subjective cognitive impairment", "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 tests 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 quite well admitted that individuals with SCD have a significantly higher risk of progression to dementia (Reisberg et al., 2010); they would be 4,5 times more likely to develop dementia than those without SCD (Slot et al., 2019).

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 (MAC-Q)

(Crook et al., 1992), the Subjective Cognitive Functioning (SCF) (Aalten et al., 2014), the Subjective Memory Decline Scale (SMDS) (Jorm et al., 2001), to short scales such as the AgeCode Study Memory Question AgeCode,(Jessen et al., 2011), the Australian Imaging Biomarkers and Lifestyle flagship study of ageing (AIB Screen) (Ellis et al., 2009), the Subjective Cognitive Decline Self- Identification Item (SCD-SID) (Smart et al., 2014) or longer questionnaires like the Activities of Daily Living Rating Scale Self Version (ADL) (Saykin, 1992), or the Behavioral Rating Inventory of Executive Function Adult Version (BRIEF) (Roth, et al., 2005). In 2015, the SCD Initiative working group reviewed 34 types of instruments that evaluate the SCD categorized according to their characteristics (e.g. the mode of presentation of items, the type of responses, the number of items, when did cognitive trouble appear…). Moreover, the thematic elements of cognitive complaints explored differ according to the instruments. Some studies suggest that the phenomenology of cognitive complaints differ between healthy older adults and those with mild cognitive impairment. In addition, some types of cognitive complaints, such as having trouble following a group conversation or finding one's way in familiar environments have been reported as being more associated than others with further risk of cognitive decline. As a consequence of the variety of the instruments, the prevalence of cognitive complaints substantially varies across the studies, ranging from 25 to 50% (Jonker et al., 2000).

Indeed, the way a clinician gets a patient to appreciate his/her own cognitive difficulties will directly influence the patient's appraisal of the problem. 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 conducted in older adults aged 70 and over) (Turvey et al., 2000) while questions requiring comparing current cognitive functioning with previous one yield a higher prevalence (46% in(Slot et al., 2018).

Given the lack of consensus on a reliable and easy-to-administer clinical instrument, the opportunity for a clinician, in particular those non-specialized 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. (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 according to the theme considered: Memory changes, Memory of names of people, General memory problems, Remembering where one put common objects/findings familiar objects, Words finding, Remembering appointments, Remembering recent events, Remembering recent conversation, Memory for intentions and Remembering phone numbers.

The present study is founded on 11 of those questions reported by Rabin et al. based on their high recurrence in most instruments. More specifically, this study was designed to assess the relevance of each of these questions in order to determine whether one (or several ones) can be used as a simple screening tool that could be easily integrated in a clinical assessment including when it is performed by non-specialist / primary care practitioners. Based on a sample of 189 Chilean older adults selected in Primary Health Care centers in Santiago

de Chile, we used the item response theory (IRT) approach to evaluate the psychometric qualities of the 11 questions and checked the association with factors potentially associated with SCD, i.e., functional and cognitive performances and depressive symptoms.

Methods

Study sample

Participants were recruited from three Primary Care Centers, located in different areas of Santiago, Chile (La Reina, Providencia, Macul). Individuals who had had the EMFAM assessment (the EMFAM assessment consists of a global cognitive and physical assessment mandatory done in all the Primary Care Centers on population aged 65 or more) within the preceding 6 months were contacted and invited to participate. In addition, people attending these centers were given a brochure presenting the study and were offered the opportunity to participate. Persons who agreed to participate were asked to leave their contact details to be contacted later by the researcher to complete the assessment.

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, have received a medical assessment within the previous 6 month. The exclusion criteria were: illiteracy and a clinical diagnosis of dementia. The diagnosis of major cognitive impairment based on the following criteria: Mini- Mental State Examination (MMSE) score < 21(Folstein et al., 1975) and Pfeffer questionnaire >=5 (Pfeffer et al., 1982).

Two hundred participants were recruited, of which 11 were excluded as the neuropsychological testing showed cognitive impairment. So the final sample was of 189 older adults who were are evaluated with tests of global cognitive efficiencies, memory and mood. Ethical approval for this study was obtained from the Ethical and Scientific Committee of the East Metropolitan Health Service and Ethic Committee in Santiago, Chile. All participants provided informed consent in accordance with the Declaration of Helsinki.

Questions assessing SCD

The 11 questions selected to evaluate the SCD 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. Do you remember accurately the names of close friends and relatives?

4. Do you believe your memory has become worse?

5. Do you use to forget where things are?

6. Do you have difficulty finding the right words?

7. Do you remember accurately 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. De 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?

For each item, the score is binary (0 for no and 1 for yes).

Sociodemographics and clinical variables

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

In addition to the 11 questions assessing SCD, the following tests and scales were administered to assess functional and cognitive performances and depressive symptoms:

- The Mini Mental State Examination MMSE (Folstein et al., 1975) evaluates global cognitive efficiency and measures 5 cognitive domains: temporal and spatial orientation, memory, language, attention, and visuospatial skills. The score ranges from 0 to 30.

- The Free and Cued Selective Reminding Test (FCSRT) (Grober & Buschke, 1987) consists in learning 16 words from 16 different semantic categories. In this study we used the picture version ((Delgado et al., 2016). In the encoding phase, the participant is presented with four cards, each displaying four pictures. After giving a semantic category key, the participant is asked to name the element corresponding to each category. After each card presentation, the participant has to recall the four items. In the second phase, the participant has perform three successive recall trials separated by an interference task. Each trial includes a free and cued recall for missing words. The last phase consists of a free and cued recall delayed recall. The variables considered were the score of free recall, the score of cued recall, and the total score of recall (free and cued).

- The Geriatric Depression Scale (GDS) (Yesavage et al., 1982) is a self-reported questionnaire assessing depressive symptoms in the elderly. Initially developed with 30 questions, an abridged version composed of 15 questions was later developed (Yesavage & Sheikh, 1986).

Statistical analysis

The psychometric relevance of the 11 questions assessing SCD was investigated with the Item Response Theory (IRT) methodology, a psychometric technique particularly useful for the construction and evaluation of psychological measurements (Thomas, 2011). IRT allows allows identifying the elements of a test/scale/questionnaire that contributes most to the initial 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 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.

First, to apply the IRT model, the 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 R-Package (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), Tucker-Lewis Index (TLI>0.90) and Root Mean Square Error of Approximation (RMSEA<0.10) (Browne & Cudeck, 1992)(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;) (Reise & Revicki, 2014).

- 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.

Results

Sample description

The study sample consisted in 189 participants. As may be seen in Table 1 displaying the participants characteristics, the sample includes almost as much men and women, individuals had a mean age of 74.1 and 11 years of education (SD=4.4). The mean MMSE score was 27.5 (SD=2.8).

Frequency of responses to the 11 questions addressing SCD

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% of the participants answered "no" to questions 8 and 9. On the other hand question 5, 50% of the subjects answer « yes ». In addition, in questions 4 and 6, 57% of participants answered « yes ».

IRT results

An EFA showed that question 4 had a saturation equal to 1 on the first factor and five questions had a saturation close to 0. Consequently, a first 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 relevant questions, the best fit to a unidimensional model was obtained with questions 1 and 4, question 1 having a higher saturation on factor 1. Moreover, questions 1 and 4 have a very high residual correlation suggesting that these 2 questions are redundant.

Taken together, these results led us to select only one question, i.e. question 4 "*Do you believe your memory has become worse?*".

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). However, there was no association between the response to question 4 with cognitive scores measured with MMSE and FCSRT, nor with the Pffefer functional scale score.

Discussion

The first noticeable result is that the frequency of affirmative responses to the 11 selected items 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% of participants answered "yes" to the question "Do you find that you begin to do something and forget what you were doing or remember what you entered a room to do?". These results highlight that the question contents, although related to memory loss in both cases, directly influence the answer provided by the individual on what is assumed to reflect the same phenomenon.

Moreover, the IRT analysis performed 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 significantly correlated with depressive symptomology. This finding is consistent with prior studies, which have reported that depression is frequent among older adults with SCD. Furthermore, this association converges with other research that suggests that memory complaints may be a reliable indicator of depression risk (John et al., 2017).

No association was found with cognitive performances which is consistent with prior reports showing that older adults with SCD do not necessarily present a cognitive impairment documented by standard neuropsychological tests (Balash et al., 2013; Zlatar et al., 2018; Liew, 2019; Howard et al 2020) 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 remind that a major difference between measurements of SCD (subjective) and cognitive performances (objective) is that the former evaluates individual's slowly progressive decline, while the latter assess his/her cognitive level at a given moment

Obviously, the main limitations 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 (n=189) is also a limitation as it may result in a limited statistical power.

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 asses the predictive of this SCD question. Also, future studies should evaluate the applicability of the present results in different settings and populations.

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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.

Questions	Response categories *N*		Response categories percentage	
	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.

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.