What are subjective cognitive difficulties and do they matter?

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Key points:

- Different assessment measures of subjective cognitive difficulties are not interchangeable
- A multifaceted approach that includes more than subjective memory appraisal is needed to adequately investigate subjective cognitive difficulties
- Subjective cognitive difficulties may be more related to mood and subjective feelings of age than cognition

Abstract

Background: Subjective cognitive difficulties (SCD) have been associated with a higher risk of developing dementia. However, there is large variation in the way SCD are assessed and in their associations with cognitive functioning.

Objective: To compare the agreement of different SCD measures in identifying people with SCD and to investigate whether SCD are more strongly associated with cognitive functioning, mood, subjective-age or background variables.

Methods: This cross-sectional study included 206 community-dwelling people aged ≥65. SCD were assessed with individual domain specific questions and a multiple-item scaled measure. Performance on tests of memory, attention, and executive function, and ratings of mood, subjective-age and demographic information were recorded.

Results: There was some classification overlap between the five measures of SCD, however of the 64 people identified as having SCD, only one person appeared in all five measures of SCD and 34 people were classified by one measure only. There were limited associations between SCD and objective cognition, with more consistent associations with mood and subjective-age.

Conclusions: The conflicting evidence regarding whether SCD are related to objective cognition and future risk of dementia may be due to different measures of SCD being employed. Careful consideration and standardisation is recommended regarding the cognitive domains and the reference groups for comparison, the response structure and the

classification criteria. Longitudinal studies of SCD that include these considerations are needed to clarify the conceptual utility of SCD.

Introduction

Identification of factors associated with developing dementia is of clinical and research interest as it creates opportunity for early interventions [1, 2]. Self-reported cognitive difficulties are considered potential early indicators of dementia, as people may notice subtle changes in functioning before objective difficulties become apparent during neuropsychological assessment [3]. However, the evidence is mixed and the mechanisms are not well understood with some studies showing a greater likelihood of progression to dementia for people reporting subjective cognitive difficulties [4, 5], while other studies have not [2, 6].

Synthesis of research is hindered by inconsistent terminology and assessment [7] potentially accounting for some discrepancies reported previously. 'Subjective memory complaints' refers specifically to memory problems, whereas 'subjective complaints' may include other non-memory difficulties; 'subjective cognitive impairment' may not be accurate if only subtle difficulties are described, and whilst 'subjective cognitive decline' is gaining traction as the accepted term [3] and acknowledges non-memory cognitive domains, it implies longitudinal measurement that may not be available. As the present study is cross-sectional 'subjective cognitive difficulties' (SCD) is used to provide an inclusive concept reflecting assessment at a single time point [8].

Assessment methods range from single yes/no questions, to multiple-item scaled measures addressing various cognitive domains [9].There appears to be little association between subjective evaluation and objective cognitive performance [10-12], and SCD fluctuates over time [13]. Subjective appraisals may be related to mood, personality and sleep quality rather than objective cognitive performance [14-18], factors which potentially represent early pathological changes associated with development of Alzheimer's disease before cognitive changes can be reliably assessed. Impaired awareness of cognitive difficulties may be a more accurate indicator of developing dementia [19], suggesting the information that SCD provides is more nuanced than simply an appraisal of cognitive abilities, and could be better utilised to detect unseen changes.

Inconsistencies in implementation and conceptualisation of SCD have implications for diagnosing mild cognitive impairment (MCI), as many diagnostic systems consider exclusively individuals' perceptions of their memory functioning [20]. Overlooking other cognitive domains may lead to conservative MCI prevalence rates and individuals remaining undiagnosed. Given the importance of early diagnosis of dementia and identifying those at risk, investigating SCD is important to clarify inconsistencies and determine how the concept should best be measured and/or conceived.

This study explores potential disparities in SCD identification using five measures and aims to answer the following questions:

1. To what extent do different measures of SCD correspond?

2. Does the association with objective cognitive performance vary depending on SCD measure?

3. Can other factors explain the relationship between SCD and objective cognitive performance?

Method

Participants

Participants were aged ≥65 and had no self-reported neurological disorder or cognitive impairment. Two-hundred and nine community-dwelling older people were recruited from community centres in the UK and Ireland. Three participants were excluded as their depression scores indicated they had moderate/severe depression and the focus of this study was on a non-clinical population as the relationship between clinical levels of depression and SCD is already known [9, 21]. Ethical approval was granted by the Bangor University School of Psychology Ethics and Research Committee.

Measures

Subjective cognitive difficulties (SCD): Five measures of SCD were used.

Three questions were asked sequentially to assess participant's perceptions of their day-to-day memory (SCD-Memory), executive (SCD-Executive), and attention (SCD-Attention)

abilities in comparison to other people their own age (Appendix 1). Participants rating their abilities as fair, poor, or very poor were considered to have SCD.

A single yes/no question from the 15-item Geriatric Depression Scale (GDS-15;[22]) asked if participants feel they have more problems with memory than most (SCD-GDS).

Finally, a self-completed version of the 16-item Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE; [23]) asked participants about changes in cognitive ability over the previous 10 years, with response options ranging from much improved to much worse. The recommended cut-off score of 3.38 [24] was used to dichotomise participants into those with and without SCD, this cut-off score has previously been shown to have sensitivity of 0.77 and specificity of 0.86 [23] for dementia.

Mood: Depressive symptoms were assessed with the remaining 14 items from the GDS-15, subsequently referred to as GDS-14. Anxiety was assessed with the Geriatric Anxiety Inventory (GAI; [25]). Depressive thoughts were assessed with the Depressive Cognitions Scale (DCS; [26]).

Subjective age was assessed with a single question (Appendix 1). Responses were grouped into ‘younger’, ‘the same age’, or ‘older’ in the analyses.

To ensure subjective responses were not influenced by cognitive test performance all questionnaires were completed before cognitive testing.

Cognition: Memory was assessed with the word list-learning subtest from Wechsler Memory Scale, 3rd Edition (WMS-III; [27]). The total score for the four immediate memory trials (WMS-Immediate) and total score for the same words after a delay of 25 minutes (WMS-Delay) were used. Executive function was assessed with the Trail Making Test Part 4

(TMT-4) and Letter Fluency from the Delis-Kaplan Executive Function System (D-KEFS; [28]). Attention was assessed with the D-KEFS Trail Making Test Part 2 (TMT-2). Global cognition was assessed with the Addenbrooke's Cognitive Examination III (ACE-III; [29]).

Data analysis

For each SCD measure participants were dichotomised into either with or without SCD, as outlined above. For each SCD measure, the groups were compared with t-tests or chi square to evaluate differences in mood, cognition, subjective age, and demographic variables. Individual logistic regressions were conducted for each SCD measure to evaluate predictive value of the variables in identifying people with SCD. For each regression, only variables shown to be significantly associated with individual SCD measures before correction for multiple comparisons were included, with cognition variables entered in the first block, mood variables entered in the second block and demographic and subjective age variables entered in the third block. As subjective age was a categorical variable, the 'younger' group was used as the reference category. Where there were no significant associations between the SCD measure and cognition, mood variables were entered in the first block. This allowed the assessment of whether mood mediates any associations between SCD and cognition, and whether any demographic variables or subjective age mediates the associations between SCD and mood. Holm-Bonferroni correction for multiple comparisons was applied to all analyses.

Results

There were 69 males and 137 females (mean age = 72.76; *SD* = 6.49), with an average ACE-III score of 90.61 (*SD* = 6.66), see Table 1 for details of the main measures.

(((Table 1 near here)))

SCD classification

The percentage of participants with SCD varied from 5.3% to 22.3%, dependent upon the measure employed (Table 2). All SCD measures demonstrated significant interdependence (Table 2A). There were 142 participants without SCD and 64 participants classed as having SCD when all measures were considered. However, only one was classed as having SCD by all five measures, seven participants by four measures, nine by three measures, and 13 by two measures. There were 34 participants classed as having SCD in a single measure. Twenty participants had SCD identified by both SCD-Memory and GDS-SCD; six participants had SCD according to SCD-Memory, SCD-Executive and SCD-Attention and three had SCD according to the IQCODE in combination with the three individual items. Table 2B shows the differences between those with and without SCD by each SCD measure on cognition, mood, demographics, and subjective age.

(((Table 2 near here)))

Group comparisons

Three cognition variables were associated with SCD but none remained statistically significant after correcting for multiple comparisons (Table 2B). Participants with SCD had significantly higher depressive symptoms than those without SCD for all SCD measures except SCD-Attention, higher anxiety for SCD-Memory, higher depressive cognitions for SCD-Attention, and there were significant differences for subjective age for SCD-Memory

and SCD-Attention with fewer people with the same or younger subjective age in the SCD groups after correcting for multiple comparisons.

Logistic regression

All models were statistically significant, indicating that predictors reliably distinguished between those with and without SCD (Table 3). However, the predictive success of the models varied in correctly determining which participants had SCD, from 78% for model one of SCD-Memory to 95% for model three of SCD-Attention. Cognition measures were a significant predictor for two of the five SCD measures after corrections for multiple comparisons.

(((Table 3 near here)))

SCD-Memory

In the first model WMS-Immediate was a significant predictor with decreased odds of .95 of having SCD-Memory for every additional WMS-Immediate point scored. The odds ratio increased very slightly for WMS-Immediate once scores for mood were included in the model and WMS-Immediate was no longer significant. In the final model, only subjective age was a significant predictor, with those who rated themselves as feeling the same age 3.17 times more likely to have SCD than those who rated themselves as feeling younger.

SCD-Executive

In the first model, total time for TMT-2 significantly predicted SCD-Executive, with an increased odds ratio of 1.03 for every additional second participants took to complete TMT-2. In model two, GDS-14 was the only significant predictor of SCD-Executive. The relationship between GDS-14 and SCD-Executive was attenuated and became non-significant once subjective age was included in the model.

SCD-Attention, SCD-GDS, and IQCODE

For SCD-Attention there were no significant predictors after correcting for multiple comparisons. There were no significant predictors for SCD-GDS or IQCODE.

Discussion

This study compared classification rates in community-dwelling older people using five SCD measures, explored the extent that SCD measures are interrelated, and investigated how SCD measures relate to objective cognitive functioning, mood, subjective ageing and background variables. Different SCD measures displayed significant interdependence, although there was limited overlap in identifying those with SCD. Less than a third of people classified as having SCD with any of the five SCD measures were identified by three or more measures and only one person by all five measures. Different SCD measures capture different features of SCD, yet are often used interchangeably in both research and clinical practice. This is likely to be inappropriate as it could lead to subtle changes in some individuals being missed, and the chance to capitalise on intervention at an early stage is

jeopardised. We found limited evidence that SCD was related to objective measures of memory, executive function or attention [10-12]. Only three single-domain SCD measures showed sensitivity to objective cognitive functioning, although none of the associations were statistically significant after correcting for multiple comparisons. There was however a stronger relationship with measures of mood [14-18] and subjective age. SCD may be more strongly related to subjective feelings of well-being rather than cognition even in a sample who did not meet criteria for moderate or severe depression. This may be indicative of early pathological changes associated with the development of dementia occurring before objective cognitive impairments can be reliably assessed and consequently an holistic approach to interpreting the meaning of SCD is required.

The only individually significant predictor in the final models for the SCD measures was subjective age, and only for SCD-Memory. This finding, and the individual associations between subjective age and SCD-Memory, SCD-Executive and SCD-Attention is not surprising as the questions ask for comparison to people of the same age. It is likely that there is an interaction between how well a person feels they are doing for their age and expectations of how someone should be when they are at a particular age [30].

Observed differences in SCD rates may reflect frequency of difficulties in cognitive domains, with memory difficulties more common or easier to recognise and acknowledge than more abstract difficulties in attention. However, this variability may also result from other factors differing between measures: the reference group for comparison, response structure, SCD classification criteria, or a combination of these. Nevertheless, SCD-Memory, SCD-Attention,

and SCD-Executive use the same question, response structure and classification criteria, yet are endorsed to different extents. SCD-Memory classified the most people as having SCD whereas the single-item attention question SCD-Attention classified the least, suggesting it is reasonable that comparisons should be made between each measure of cognitive functioning and its respective SCD measure [8]. However, the IQCODE combines questions about various cognitive domains but did not demonstrate improved associations with objective measures of cognition. SCD-GDS is less frequently endorsed than SCD-Memory, despite reference to the same cognitive domain, possibly due to different response structure and comparison groups. For SCD-GDS, respondents compared their memory to 'most' people and for SCD-Memory to 'people their own age'. Previous research suggests that the 'most people' comparison increases endorsement particularly when respondents include younger people [7]. Participants could consider small declines as part of normal ageing and thus perceive that they have more memory problems than 'most'. However, in contrast to previous research [7] we found including the own age comparison increased endorsement compared to the most people comparison, which may be due to response structure or classification criteria. The different response structure for these questions, a dichotomous yes/no as opposed to a scaled response from very poor to excellent may account for a lower endorsement, as people may find it easier to say that their memory is very poor, poor, or fair as opposed to a blunt 'yes' for memory problems. Concordant with previous research [7], we interpreted the response 'fair' as SCD, but this may have inflated the number in applicable SCD groups. Understanding the true meaning of 'fair' needs further investigation to validate SCD classifications. The psychometric properties of SCD measures should therefore be considered thoroughly in relation to the outcome sought, and results interpreted in view of the question format.

Limitations

This study is a cross-sectional design and has a relatively small sample size. Larger studies considering several time points are required to establish relationships between various measures of SCD, objective cognitive functioning, mood, and cognitive change. The ambiguous category 'fair' in scaled responses was taken as an indication of SCD, but more research is needed to establish whether it improves specificity [7]. Cognitive decline from prior functioning may have already taken place for some participants, whereas others may have maintained their functioning as they have aged. However, as this was a cross-sectional study it was not possible to consider such individual differences. Conceptually, SCD should occur before the development of objective cognitive problems and consequently relationships between subjective and objective measure of functioning should be small. However, our findings reflect that evidence regarding the presence of SCD and objective cognitive functioning is equivocal and thus longitudinal research is needed to understand how SCD may contribute to further decline [2, 4, 6, 8, 10, 16].

Conclusions

Our comparisons demonstrate that SCD assessment strategy leads to different SCD rates, which may potentially explain observed discrepancies in the predictive validity of SCD for dementia. The measurement approach and the question structure should be carefully considered when designing studies and synthesising existing evidence. Whilst each measure identified SCD, none accounted for subjective appraisal of cognition completely. Therefore,

future investigations should employ a multi-faceted approach to ensure different domains of cognition are accounted for rather than focusing solely on memory [9]. SCD may be a predictor for future cognitive decline, and accurate identification of individuals could enhance sensitive prediction. However, accurate identification requires considering different cognitive domains, mood, subjective age and a consistent approach to measuring SCD across studies.

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References

1. Cheng YW, Chen TF, Chiu MJ. From mild cognitive impairment to subjective cognitive decline: conceptual and methodological evolution. Neuropsychiatr Dis Treat 2017;13:491-8.

2. Jorm AF, Christensen H, Korten AE, Henderson AS, Jacomb PA, Mackinnon A. Do cognitive complaints either predict future cognitive decline or reflect past cognitive decline? A longitudinal study of an elderly community sample. Psychol Med 1997;27:91-8.

3. Jessen F, Amariglio RE, van Boxtel M, et al. A conceptual framework for research on subjective cognitive decline in preclinical Alzheimer's disease. Alzheimers Dement 2014;10:844-52.

4. Reisberg B, Shulman MB, Torossian C, Leng L, Zhu W. Outcome over seven years of healthy adults with and without subjective cognitive impairment. Alzheimers Dement 2010;6:11-24.

5. Amieva H, Le Goff M, Millet X, et al. Prodromal Alzheimer's disease: successive emergence of the clinical symptoms. Ann Neurol 2008;64:492-8.

6. Flicker C, Ferris SH, Reisberg B. A longitudinal study of cognitive function in elderly persons with subjective memory complaints. J Am Geriatr Soc 1993;41:1029-32.

7. Tandetnik C, Farrell MT, Cary MS, et al. Ascertaining subjective cognitive decline: a comparison of approaches and evidence for using an age-anchored reference group. J Alzheimers Dis 2015;48:S43–S55.

8. Burmester B, Leathem J, Merrick P. Subjective cognitive complaints and objective cognitive function in aging: a systematic review and meta-analysis of recent cross-sectional findings. Neuropsychol Rev 2016;26:376-93.

9. Rabin LA, Smart CM, Crane PK, et al. Subjective cognitive decline in older adults: an overview of self-report measures used across 19 international research studies. J Alzheimers Dis 2015;48:S63–S86.

10. Lenehan ME, Klekociuk SZ, Summers MJ. Absence of a relationship between subjective memory complaint and objective memory impairment in mild cognitive impairment (MCI): is it time

to abandon subjective memory complaint as an MCI diagnostic criterion? Int Psychogeriatr 2012;24:1505-14.

11. Lachman ME. Development in midlife. Annu Rev Psychol 2004;55:305-31.

12. Minett TS, Da Silva RV, Ortiz KZ, Bertolucci PH. Subjective memory complaints in an elderly sample: a cross-sectional study. Int J Geriatr Psychiatry 2008;23:49-54.

13. Yates JA, Clare L, Woods B. Subjective memory complaints, mood and MCI: a follow-up study. Aging Ment Health 2017;21:313-21.

14. Yates JA, Clare L, Woods RT, Matthews FE, Cognitive Function Ageing Study Wales. Subjective memory complaints are involved in the relationship between mood and mild cognitive impairment. J Alzheimers Dis 2015;48:S115-23.

15. Balash Y, Mordechovich M, Shabtai H, Giladi N, Gurevich T, Korczyn AD. Subjective memory complaints in elders: depression, anxiety, or cognitive decline? Acta Neurol Scand 2013;127:344–50

16. Zlatar ZZ, Moore RC, Palmer BW, Thompson WK, Jeste DV. Cognitive complaints correlate with depression rather than concurrent objective cognitive impairment in the successful aging evaluation baseline sample. J Geriatr Psychiatry Neurol 2014;27:181-7.

17. Merema MR, Speelman CP, Foster JK, Kaczmarek EA. Neuroticism (not depressive symptoms) predicts memory complaints in some community-dwelling older adults. Am J Geriatr Psychiatry 2013;21:729-36.

18. Tardy M, Gonthier R, Barthelemy J-C, Roche F, Crawford-Achour E. Subjective sleep and cognitive complaints in 65 year old subjects: a significant association. The PROOF cohort. J Nutr Health Aging 2015;19:424-30.

19. Cacciamani F, Tandetnik C, Gagliardi G, et al. Low cognitive awareness, but not complaint, is a good marker of preclinical Alzheimer's disease. J Alzheimers Dis 2017;59:753-62.

20. Matthews FE, Stephan BC, McKeith IG, et al. Two-year progression from mild cognitive impairment to dementia: to what extent do different definitions agree? J Am Geriatr Soc 2008;56:1424-33.

21. Garcia-Ptacek S, Eriksdotter M, Jelic V, Porta-Etessam J, Kåreholt I, Manzano Palomo S. Subjective cognitive impairment: towards early identification of Alzheimer disease. Neurología (English Edition) 2016;31:562-71.

22. Yesavage JA, Sheikh JI. Geriatric Depression Scale (GDS) recent evidence and development of a shorter version. Clin Gerontol 1986;5:165-73.

23. Jorm AF. A short form of the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): development and cross-validation. Psychol Med 1994;24:145-53.

24. Jorm AF. The Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE): a review. Int Psychogeriatr 2004;16:275-93.

25. Pachana NA, Byrne GJ, Siddle H, Koloski N, Harley E, Arnold E. Development and validation of the Geriatric Anxiety Inventory. Int Psychogeriatr 2007;19:103-14.

26. Zauszniewski JA. Development and testing of a measure of depressive cognitions in older adults. J Nurs Meas 1995;3:31-41.

27. Wechsler D. Wechsler Memory Scale. 3rd ed. San Antonio, TX: The Psychological Corporation; 1997.

28. Delis DC, Kaplan E, Kramer JH. Delis-Kaplan Executive Function System (D-KEFS). San Antonio, TX: The Psychological Corporation; 2001.

29. Hsieh S, Schubert S, Hoon C, Mioshi E, Hodges JR. Validation of the Addenbrooke's Cognitive Examination III in frontotemporal dementia and Alzheimer's disease. Dement Geriatr Cogn Disord 2013;36:242-50.

30. Kleinspehn-Ammerlahn A, Kotter-Grühn D, Smith J. Self-perceptions of aging: do subjective age and satisfaction with aging change during old age? J Gerontol B Psychol Sci Soc Sci 2008;63B:377-85.

Table 1: Means, standard deviations and ranges for all measures

	Mean	SD	Range
Verbal Fluency	42.71	13.56	11-77
Trail Making Test-2[a]	44.67	18.37	17-126
Trail Making Test-4[a]	117.14	54.12	43-240
Wechsler Memory Scale-Immediate	29.09	6.85	9-47
Wechsler Memory Scale-Delay	5.71	3.15	0-12
Geriatric Depression Scale-15	1.53	1.80	0-8
Geriatric Depression Scale-14	1.41	1.70	0-8
Geriatric Anxiety Inventory	2.43	3.50	0-18
Depressive Cognitions Scale[b]	5.62	4.77	0-23
Subjective age [N (%)]	Younger	140 (68.00%)	
	Same	40 (19.4%)	
	Older	26 (12.6%)	

Note: [a] n=204, [b] n=205

Table 2: Comparisons of two groups of participants with SCD and without SCD, as identified by each SCD measure, with regard to cognition, mood, demographics, and subjective age

	SCD-Memory	SCD-Executive	SCD-Attention	SCD-GDS	IQCODE
N with SCD	46 (22.3%)	15 (7.3%)	11 (5.3%)	25 (12.1%)	23 (11.2%)
Part A (X^2)					
SCD-Memory		**38.61*** **	**17.02*** **	**54.56*** **	**17.45*** **
SCD-Executive			**38.45*** **	**34.76*** **	**13.56*** **
SCD-Attention				**6.40***	**7.44****
SCD-GDS					**17.69*** **
Part B					
Verbal Fluency (t)	0.27	0.96	1.67	0.34	0.07
Trail Making Test-2 (t)	-1.18	-2.42*	-2.57*	-0.54	-0.78
Trail Making Test-4 (t)	-0.54	-1.55	-1.83	0.07	-0.41
Wechsler Memory Scale-Immediate (t)	2.45*	1.58	1.17	1.63	0.00
Wechsler Memory Scale-Delay (t)	1.69	0.70	1.06	1.41	0.23
Geriatric Depression Scale-14 (t)	**-3.25****	**-4.08****	-2.69**	**-3.46****	**-4.00*** **
Geriatric Anxiety Inventory (t)	**-2.47****	-1.39	-2.15	-2.35*	-2.57*
Depressive Cognitions Scale (t)	-1.46	-3.41**	**-3.48****	-2.55*	-2.76**
Gender (X^2)	0.84	0.00	1.22	2.69	0.37
Age (t)	0.13	-0.73	-0.51	1.02	-0.42
Education (t)	1.46	1.12	1.61	1.71	0.29
Subjective age (X^2)	**11.80****	6.00*	**18.53*** **	5.22	3.25

*p < .05 **p < .01 ***p < .001

Note: Associations between SCD measures and other variables were established for each measure separately, by comparing participants with SCD and participants without SCD (as defined by each SCD measure). Part A presents group comparisons for SCD measures using chi-square tests (X^2), and Part B presents group comparisons for other variables using chi-square tests (X^2) or t tests (t). Bold indicates significant at the 5% level after Holm-Bonferroni correction. SCD, Subjective cognitive difficulties; GDS, Geriatric Depression Scale; IQCODE, Informant Questionnaire on Cognitive Decline in the Elderly.

Table 3: Logistic regressions for each SCD measure

	SCD-Memory	SCD-Executive	SCD-Attention	SCD-GDS	IQCODE
Model 1	X^2 = 5.26, p = 0.022	X^2 = 5.59, p = .018	X^2 = 5.25, p = .022	X^2 = 9.44, p = .024	X^2 = 11.70, p = .008
Trail Making Test-2		**1.03 (1.01-1.05)***	1.03 (1.01-1.06)*		
Wechsler Memory Scale-Immediate	**.95 (.90-.99)***				
Model 2	X^2 = 13.00, p = .011	X^2 = 18.76, p < .001	X^2 = 13.58, p = .004		
Trail Making Test-2		1.02 (1.00-1.05)	1.03 (1.00-1.06)*		
Wechsler Memory Scale-Immediate	.96 (.91-1.01)				
Geriatric Depression Scale-14	1.17 (.92-1.48)	**1.46 (1.06-2.02)***	1.03 (.68-1.56)	1.21 (.92-1.59)	1.28 (.97-1.67)
Geriatric Anxiety Inventory	1.08 (.98-1.19)			1.06 (.94-1.19)	1.06 (.94-1.20)
Depressive Cognitions Scale	1.01 (.93-1.09)	1.07 (.95-1.20)	1.16 (1.01-1.34)*	1.05 (.95-1.15)	1.05 (.95-1.16)
Model 3	X^2 = 20.39, p = .002	X^2 = 20.19, p = .001	X^2 = 20.92, p = .001		
Trail Making Test-2		1.02 (.99-.1.05)	1.03 (.99-1.06)		
Wechsler Memory Scale-Immediate	.96 (.91-1.01)				
Geriatric Depression Scale-14	1.10 (.85-1.41)	1.39 (.98-1.95)	.93 (.58-1.48)		
Geriatric Anxiety Inventory	1.08 (.97-1.19)				
Depressive Cognitions Scale	1.02 (.94-1.10)	1.07 (.95-1.21)	1.17 (1.01-1.34)*		
Subjective age Younger	*Comparison Group*				
Subjective age Same	**3.17 (1.40-7.18)****	2.37 (.57-9.46)	.66 (.07-6.71)		
Subjective age Older	1.47 (.50--4.33)	1.84 (.36-9.46)	6.84 (1.43-32.79)*		

*p < .05 **p < .01

Note: Bold indicates significant at the 5% level after Holm-Bonferroni correction. SCD, Subjective cognitive difficulties; GDS, Geriatric Depression Scale; IQCODE, Informant Questionnaire on Cognitive Decline in the Elderly.

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Supplementary Data. Appendix 1

SCD-Memory:

Compared to other people your age how would you describe your day-to-day memory?

Very poor / Poor / Fair / Good / Very good / Excellent

SCD-Executive:

Compared to other people your age how would you describe your day-to-day ability to organise activities and to plan ahead?

Very poor / Poor / Fair / Good / Very good / Excellent

SCD-Attention:

Compared to other people your age how would you describe your day-to-day ability to concentrate on tasks (such as chores, reading or work)?

Very poor / Poor / Fair / Good / Very good / Excellent

Subjective age:

How old do you feel at the moment?

a lot younger than my age	a little younger	not much younger	about the same	not much older	a little older	a lot older than my age