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Cognitive complaints correlate with depression rather than concurrent objective cognitive impairment in the SAGE baseline sample

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Abstract

Objective—Whether subjective cognitive complaints are suggestive of depression or concurrent cognitive impairment in older adults without dementia remains unclear. The current study examined this question in a large (N=1,000), randomly-selected community-based sample of adults ages 51-99 without a formal diagnosis of dementia (Successful AGing Evaluation study-SAGE).

Methods—The modified Telephone Interview for Cognitive Status (TICS-m) measured objective cognitive function, the Cognitive Failures Questionnaire (CFQ) measured subjective cognitive complaints, and the Patient Health Questionnaire (PHQ-9) measured depression. Spearman rho correlations and linear regression models were conducted to examine the relationship among variables in the baseline SAGE sample.

Results—There was a weak association between TICS-m and CFQ scores ($\rho = -.12$); however a moderate to large association was observed for CFQ and PHQ-9 ($\rho = .44$). Scores on the CFQ were not associated with TICS-m scores ($\beta = -.03, p = .42$) after controlling for PHQ-9 and variables of interest, such as age, gender, ethnicity, and physical functioning, while PHQ-9 was significantly associated with CFQ scores ($\beta = .46, p < .001$) after controlling for variables of interest.

Conclusions—Subjective cognitive complaints are more likely related to symptoms of depression rather than concurrent cognitive impairment in a large cross-section of community-dwelling adults without a formal diagnosis of dementia.

Keywords

Subjective cognitive complaints; cognitive function; depression; aging; Modified Telephone Interview for Cognitive Status (TICS-m); Cognitive Failures Questionnaire (CFQ)

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5. CONFLICT OF INTEREST

The authors report no actual or potential conflicts of interest.

1. INTRODUCTION

Subjective cognitive complaints are important for the diagnosis of mild cognitive impairment (MCI)¹ and have been associated with future risk of cognitive decline.²⁻¹¹ However, the relationship between subjective cognitive complaints and objective cognitive performance in large community-based adult cohorts remains controversial in the literature, especially when attempting to ascertain the role of subjective cognitive complaints on concurrent versus future cognitive performance.⁹ Furthermore, the role of depression in this relationship deserves further scrutiny given that subjective cognitive complaints sometimes have a stronger association with depressive symptoms than they do with objective cognitive performance,^{7,9,11-19} making it difficult for health care professionals to assert a diagnosis of MCI and possibly implement early dementia prevention strategies. Previous studies remain mixed however, with some reporting no association between cognitive complaints and cognitive function¹⁸⁻²¹ and others reporting significant associations even after controlling for depression.^{4,5,22,23} More specifically, many cross-sectional and short-term follow-up studies (<6 months) report no association between subjective cognitive complaints and current cognitive functioning,^{14-17,21,24} whereas an association has generally been found in longitudinal studies with longer follow-up periods (2-8 years; after controlling for depression).^{3,5-8,10} Unfortunately, many published studies^{13,22,23,25} have used unvalidated measures of subjective cognitive complaints, relying sometimes on a single question (usually about perceived forgetfulness) as their main variable of interest.⁹

Given the importance of subjective complaints in the diagnosis of MCI and prediction of future cognitive decline (For reviews, see ^{9,22}), further evidence from large, randomly-selected, community-based samples, using validated measures, is needed to replicate previous findings and clarify whether current cognitive complaints are related to cognitive function or symptoms of depression, while accounting for other variables of interest (demographic characteristics and physical function). The current study attempted to replicate and extend previous findings by further characterizing the relationship between objective cognition (modified Telephone Interview for Cognitive Status; TICS-m), subjective cognitive complaints (Cognitive Failures Questionnaire; CFQ), and symptoms of depression (Patient Health Questionnaire; PHQ-9) in a large multicohort, longitudinal study of randomly selected community-dwelling adults (N=1,000, ages 51-99), using validated measures. We also explored the role that other variables of interest (i.e., demographic characteristics, physical and mental functioning) may play in this relationship. The Successful AGing Evaluation (SAGE) study is a population-based study that over-sampled individuals above the age of 80 in San Diego County.²⁶ Previous studies from SAGE reported a relationship among higher self-ratings of successful aging, less depression, and better objective and subjective cognitive function.²⁶

Moreover, given the likelihood that a percentage of participants in the SAGE sample may show signs of cognitive impairment (even if not formally diagnosed with dementia by their clinician), we investigated how many individuals would meet criteria for dementia, based on their education-adjusted TICS-m scores, which we refer to as “significant cognitive impairment” (SCI). We hypothesized that a modest association would remain between objective cognitive performance and cognitive complaints after controlling for depression

and other variables of interest (i.e., age, gender, ethnicity and physical functioning), whereas a stronger relationship would exist between cognitive complaints and symptoms of depression after controlling for cognitive performance and other variables of interest.

2. METHODS

2.1. Participants

The Successful AGing Evaluation (SAGE) study used a structured multicohort design to recruit 1,300 community-dwelling residents of San Diego County, CA with an oversampling of people over the age of 80. Inclusion criteria for SAGE were 1) age between 50 and 99 years, 2) a (landline) telephone in the home (for random digit dialing), 3) physical and mental ability to participate in a telephone interview and to complete a paper-and-pencil mail survey, 4) informed consent for study participation, and 5) English fluency. Participants were excluded if they resided in a nursing home or needed daily skilled nursing care, reported a prior formal diagnosis of dementia made by a clinician, and/or had a terminal illness or need for hospice care. Two hundred and seventy nine potential participants were thusly excluded (unfortunately, the proportion of these who were excluded specifically on the basis of dementia was not recorded). Participants were not specifically screened for cerebrovascular disease or other neurological conditions that may potentially affect cognitive function, apart from dementia. The study was approved by the University of California, San Diego, Human Research Protections Program. More details about the SAGE study and baseline sample have been reported elsewhere.²⁶ Briefly, the SAGE baseline sample consisted of 1006 participants, ages 50 through 99, however 6 of them were excluded from the current analyses due to missing education data, which didn't allow us to adjust their TICS-m scores. The current study included baseline data from 1000 adults (ages 51-99) without a prior formal diagnosis of dementia by their clinician.

2.2. Measures

Sociodemographic information (age, gender, education, race/ethnic background, and marital status) was collected via self-report as part of the SAGE survey. During a structured telephone interview, trained study staff administered the 12-item modified version of the Telephone Interview for Cognitive Status; TICS-m,²⁷ which assesses for deficits in orientation, attention, memory, and language. The TICS-m has been validated in several studies and is a reliable screening instrument for cognitive impairment.²⁷⁻³⁰ Total TICS-m scores (range 0-50; higher scores indicate better cognitive performance) were adjusted for education as described by Knopman and colleagues (2010) and served as our objective measure of cognitive function. A cutoff score of 27²⁹⁻³¹ on the TICS-m was used to separate the SAGE sample into individuals with “no cognitive impairment” (NCI) and those with “significant cognitive impairment” (SCI) in order to compare our rates of SCI to the rates of dementia published by other national, population-based studies.^{30,32} This cutoff score was selected since it has been shown to reliably discriminate normal cognitive functioning from dementia in several studies.²⁹⁻³¹

To measure subjective cognitive function, we used the 25-item version of the Cognitive Failures Questionnaire; CFQ³³⁻³⁵ (range 0-100). The CFQ assesses subjective cognitive

complaints and asks questions such as: “Do you find you forget why you went from one part of the house to the other?” “Do you find you can't quite remember something although it's “on the tip of your tongue”?” Questions are rated on a 5-point Likert-type scale ranging from “never” to “very often”, with higher scores indicating greater subjective cognitive complaints.

Depression was assessed with the 9-item Patient Health Questionnaire (PHQ-9).³⁶ The PHQ-9 contains nine items based on the DSM-IV criteria for depression and its validity and reliability in measuring depression has been well-established.³⁶ Scores range from 0-27 points, with higher scores indicating more symptoms of depression. In the current study we report on the PHQ-9 severity score. Due to the significant relationship between age, cognitive function, and physical function previously reported in the SAGE sample,²⁶ the Medical Outcomes Study 36-Item Short-Form Healthy Survey (SF-36), which measures current mental and physical health functioning,³⁷ was included as a covariate of interest. One thousand individuals completed the TICS-m, 946 completed the PHQ-9, 859 completed the CFQ, and 943 completed the SF-36.

2.3. Analyses

All analyses were conducted on IBM SPSS version 21. Cross-tabulations were created to report the number of individuals within the SAGE sample who scored above and below a cutoff 27 on the TICS-m and were separated into “no cognitive impairment” (NCI) and “significant cognitive impairment” (SCI) groups.²⁹⁻³¹ Independent samples T-tests were carried out to compare the NCI and SCI groups on variables of interest (Table 1). To identify covariates of interest, Spearman's rho correlations were computed between age, CFQ (subjective cognitive complaints), TICS-m (objective cognitive function), PHQ-9 (depression), and other variables of interest such as: gender, marital status (“married/ married-like relationship” & “not married”), ethnicity (“Caucasian” & “not Caucasian”), education (“high school or less”, “some college”, “baccalaureate or more”), and SF-36 Physical and Mental Health Composite scores. We employed a significance value of $p < .001$ to control for multiple comparisons and results were interpreted using Cohen's effect size conventions for bivariate correlations (small=.1, medium=.3, large=.5).³⁸ To examine the relationship between objective cognitive function, subjective cognitive complaints, and depression, controlling for covariates of interest, two linear multiple regression models were conducted with 1) CFQ predicting TICS-m, while controlling for PHQ-9 and variables of interest and 2) PHQ-9 predicting CFQ, while controlling for TICS-m and variables of interest.

3. RESULTS

3.1. Sample characteristics and rates of “significant cognitive impairment” in the SAGE sample

Sociodemographic characteristics are provided in Table 1. Overall, a majority of the sample did not have clinically significant cognitive impairment or symptoms of depression. The percentage of individuals who meet criteria for SCI (TICS-m 27) in the SAGE sample (N=1,000) by age band is as follows: 0.8% (50-59 years), 4.9% (60-69 years), 14% (70-79

years), 19.1 % (80-89 years), and 41.2% (90+ years). When the sample is broken down by gender, percentage of SCI for women is as follows: 1.7% (50-59 years), 6.7% (60-69 years), 7.3% (70-79 years), 15.3% (80-89 years), and 38.8% (90+ years). For men, percentage of SCI is: 0% (50-59 years), 3.4% (60-69 years), 20.6% (70-79 years), 23.1% (80-89 years), and 43.3% (90+ years). Overall, women tended to have higher scores on the TICS-m than men. See Table 1 for average scores on the variables of interest by cognitive performance category. As can be seen in Table 1, there were no significant differences between the NCI and SCI groups on reports of cognitive failures or depressive symptoms, therefore, we decided to examine the correlations between the variables of interest using the whole sample.

3.2. Correlations between all variables of interest

See Table 2 for correlation results. Older age was correlated with lower TICS-m scores (worse cognitive performance) and higher CFQ scores (more cognitive complaints). There was a small negative association between CFQ and TICS-m scores; however a medium to large effect was seen between the CFQ and the PHQ-9. Small effects were seen between TICS-m scores and SF-36 physical composite (higher cognition and higher physical functioning), gender (women performing better than men), and ethnicity (non-Caucasians performing worse than Caucasians). Higher CFQ was significantly associated with lower scores on the physical and mental composites of the SF-36. Medium associations were seen between higher PHQ-9 scores and lower physical and mental composites on the SF-36. See Figure 1 for a depiction of the relationship between TICS-m, CFQ, and PHQ-9 across age in the SAGE baseline sample.

To explore if the relationship between TICS-m, CFQ, and PHQ-9 differed across age groups, correlations between these variables at each age band were conducted (50-59, 60-69, 70-79, 80-89, and 99+). There was not a significant association between TICS-m and CFQ scores at any decade ($r=.009$, $-.16$, $-.04$, $-.09$, and $-.02$ respectively, all $p>.05$), while the association between CFQ and PHQ-9 remained significant for each decade with medium and large effects ($r=.51$, $.55$, $.44$, $.52$, and $.31$ respectively, all $p<.001$).

3.3. Multiple linear regression models

Variables correlated with the TICS-m in the step above were entered as covariates in the regression models ($N=799$). When CFQ was entered as a predictor of TICS-m scores while controlling for age, gender, ethnicity, SF-36 physical composite, and depression, the overall model was significant, explaining 26% of the variance on TICS-m scores, $F(6,792)=45.5$, $p<.001$, $R^2=.26$, adjusted $R^2=.25$. Only age, gender, and ethnicity were significant predictors of TICS-m in the model, while SF-36 physical composite, PHQ-9, and CFQ scores were not significantly associated with TICS-m scores after controlling for demographic variables, physical function, and depression.

On the other hand, when PHQ-9 was entered as a predictor CFQ scores, PHQ-9 significantly predicted CFQ scores even after controlling for age, gender, ethnicity, SF-36 physical functioning, and TICS-m scores $F(6,792)=45.9$, $p<.001$, $R^2=.26$, adjusted $R^2=.25$. See Table 3 for regression coefficients. When examining this relationship separately for the NCI and

SCI groups, PHQ-9 scores were predictive of CFQ scores on both the NCI ($\beta=.46, p<.001$) and SCI ($\beta=.43, p<.001$) groups after controlling for age, gender, ethnicity, and SF-36 physical composite score. Thus subjective cognitive complaints were significantly related with depression and not with objective cognitive function in the current sample of older adults, regardless of cognitive status.

4. DISCUSSION

The current study aimed to further characterize the relationship amongst objective cognitive function, subjective cognitive complaints, and symptoms of depression, using validated measures, in a large community-based sample of older adults enrolled in a study of successful aging (SAGE). Results from baseline analyses indicated that subjective cognitive complaints were not associated with objective cognitive function once controlling for age, gender, ethnicity, physical functioning, and depressive symptomatology. There was, however, a medium association between subjective cognitive complaints and symptoms of depression, as has been consistently reported in the literature,^{9,12,22} regardless of cognitive status. Furthermore, symptoms of depression were associated with cognitive complaints even after controlling for demographic variables, physical functioning, and objective cognitive function. Thus, our current findings are supportive of previous research suggesting that cognitive complaints are significantly related to depression rather than concurrent objective cognitive functioning.⁹ It is important to note that SAGE participants reported very low levels of depression across the age spectrum on the PHQ-9. Thus, the association between depressive symptomatology and subjective cognitive complaints is present even at minimal levels of self-reported symptoms of depression in an older adult sample without a formal diagnosis of dementia. Research has suggested that in middle-aged and younger older adults, subjective cognitive complaints may be related to depression, since true cognitive impairment is unlikely, while these complaints are associated with actual cognitive impairment in older adults.^{22,25} However, in the current sample, there was no significant association between cognitive function and subjective cognitive complaints in any of the examined age groups, whereas the relationship between cognitive complaints and symptoms of depression remained significant for each decade with medium and large effects. Thus it is unlikely that our current findings are confounded by including a wider age range.

The current findings are important since subjective cognitive complaints are critical in the diagnosis of MCI, a group at high risk for conversion to dementia. Our results suggest that, when patients present to the clinic with subjective cognitive complaints, the role of depressive symptomatology should be taken into account, since subjective complaints may not relate to *current* cognitive functioning. However, the role of subjective cognitive complaints has been linked to the prediction of *future* cognitive decline and/or early degenerative process, as well as to brain correlates of cognitive impairment, such as amyloid burden³⁹, white matter lesions⁴⁰, and cerebral microbleeds²⁰. Hence, even though cognitive complaints were not related to concurrent cognitive functioning in this sample, it is crucial to pursue the role of subjective complaints as a possible harbinger of future decline in large, randomly-assigned, community-based samples, accounting for depression, age, gender, and ethnicity effects. Future data from the SAGE study will allow us to investigate longitudinal cognitive changes and their association with cognitive complaints and depression.

When dividing our sample into those with no cognitive impairment and significant cognitive impairment based on TICS-m scores, our rates of significant cognitive impairment were close to the prevalence rates of dementia reported by the Aging, Demographics, and Memory Study (ADAMS).^{32,41} This further validates the utility of the TICS-m as a screening tool for large population-based studies of aging, where screening for cognitive impairment in person would prove very challenging. Of note, participants were excluded from the SAGE sample if they had been formally diagnosed with dementia by their clinician. Even still, our rates of significant cognitive impairment were similar to those observed in other studies that have performed in person neuropsychological testing to derive a diagnosis of dementia,³² suggesting that even individuals without cognitive complaints performed poorly on the cognitive telephone interview. This further emphasizes that objective cognitive impairment might be more important than subjective cognitive complaints when trying to ascertain current cognitive status.

It is worth noting that the current study has several limitations: we used a telephone interview to measure objective cognitive function rather than an in-person evaluation, which may have contributed to the weak association between cognitive functioning and cognitive complaints. Furthermore, we did not cross-validate performance on the TICS-m with other objective cognitive measures. However, given our large sample size, it proves impractical to conduct in-person cognitive assessments. The TICS-m has been widely used as a cognitive screening tool and it is reliable at predicting actual cognitive performance.^{27,28,30} The SAGE sample is comprised of predominantly Caucasian individuals (81%) with higher levels of education than the San Diego County population (bachelor's degree or higher; 44.2% versus 34.1%).²⁶ Hence our results can only be generalized to individuals with similar demographic characteristics. It would have been preferable that depression be assessed by a mental health professional, however the PHQ-9 has been validated and it is based on the DSM-IV diagnostic criteria for depression,³⁶ making it a useful tool for large community-based cohort studies such as SAGE. The largest limitation of the current study is its cross-sectional nature, which does not allow us to infer causation or study cognitive changes over time. Since SAGE is an ongoing longitudinal study, we plan on addressing these issues once more than two data points are gathered. Several strengths of the current study should also be noted: SAGE is a large randomly-selected, multicohort population-based study that oversampled for individuals over the age of 80. Similarly, we used a validated measure of cognitive complaints (CFQ) rather than relying on unvalidated questions about perceived forgetfulness. Future studies should also investigate the relationship among subjective complaints, cognitive performance, depression, and the possible moderating role of physical activity/exercise and cognitive stimulation in healthy older adults and adults at genetic risk for Alzheimer's disease (e.g., APOE 4 allele carriers).

In conclusion, the results of the current study were consistent with the cross-sectional literature⁹ and found that subjective cognitive complaints were not associated with concurrent objective cognitive function after controlling for age, gender, ethnicity, physical functioning, and depressive symptomatology. Symptoms of depression however, were significantly associated with subjective cognitive complaints after controlling for covariates. Clinicians should take into account depressive state when patients present with subjective cognitive complaints.

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REFERENCES

1. Albert MS, DeKosky ST, Dickson D, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimers Dement*. 2011; 7(3):270–279. [PubMed: 21514249]
2. Coley N, Ousset PJ, Andrieu S, Matheix Fortunet H, Vellas B. Memory complaints to the general practitioner: data from the GuidAge study. *J Nutr Health Aging*. 2008; 12(1):66S–72S. [PubMed: 18165849]
3. Haley AP, Hoth KF, Gunstad J, et al. Subjective cognitive complaints relate to white matter hyperintensities and future cognitive decline in patients with cardiovascular disease. *Am J Geriatr Psychiatry*. 2009; 17(11):976–985. [PubMed: 20104055]
4. Amariglio RE, Townsend MK, Grodstein F, Sperling RA, Rentz DM. Specific Subjective Memory Complaints in Older Persons May Indicate Poor Cognitive Function. *Journal of the American Geriatrics Society*. 2011; 59(9):1612–1617. [PubMed: 21919893]
5. Dufouil C, Fuhrer R, Alperovitch A. Subjective cognitive complaints and cognitive decline: consequence or predictor? The epidemiology of vascular aging study. *J Am Geriatr Soc*. 2005; 53(4):616–621. [PubMed: 15817007]
6. Glodzik-Sobanska L, Reisberg B, De Santi S, et al. Subjective memory complaints: presence, severity and future outcome in normal older subjects. *Dement Geriatr Cogn Disord*. 2007; 24(3):177–184. [PubMed: 17641528]
7. Jorm AF, Christensen H, Korten AE, Jacomb PA, Henderson AS. Memory complaints as a precursor of memory impairment in older people: a longitudinal analysis over 7-8 years. *Psychol Med*. 2001; 31(3):441–449. [PubMed: 11305852]
8. Kim JM, Stewart R, Kim SW, Yang SJ, Shin IS, Yoon JS. A prospective study of changes in subjective memory complaints and onset of dementia in South Korea. *Am J Geriatr Psychiatry*. 2006; 14(11):949–956. [PubMed: 17068317]
9. Reid LM, MacLulich AMJ. Subjective Memory Complaints and Cognitive Impairment in Older People. *Dementia and Geriatric Cognitive Disorders*. 2006; 22(5-6):471–485. [PubMed: 17047326]
10. Tobiansky R, Blizard R, Livingston G, Mann A. The Gospel Oak Study stage IV: the clinical relevance of subjective memory impairment in older people. *Psychol Med*. 1995; 25(4):779–786. [PubMed: 7480455]
11. Wagle AC, Berrios GE, Ho L. The cognitive failures questionnaire in psychiatry. *Compr Psychiatry*. 1999; 40(6):478–484. [PubMed: 10579381]
12. Hohman TJ, Beason-Held LL, Resnick SM. Cognitive complaints, depressive symptoms, and cognitive impairment: are they related? *J Am Geriatr Soc*. 2011; 59(10):1908–1912. [PubMed: 22091504]
13. Gagnon M, Dartigues JF, Mazaux J, et al. Self-Reported Memory Complaints and Memory Performance in Elderly French Community Residents: Results of the PAQUID Research Program. *Neuroepidemiology*. 1994; 13(4):145–154. [PubMed: 8090256]
14. Gunstad J, Cohen RA, Paul RH, Tate DF, Hoth KF, Poppas A. Understanding reported cognitive dysfunction in older adults with cardiovascular disease. *Neuropsychiatr Dis Treat*. 2006; 2(2):213–218. [PubMed: 19412466]
15. Humphreys CT, Moser DJ, Hynes SM, Reese RL, Haynes WG. Predictors of subjective cognitive difficulties in older adults with atherosclerotic vascular disease. *Am J Geriatr Psychiatry*. 2007; 15(4):328–334. [PubMed: 17384315]

16. Lautenschlager NT, Flicker L, Vasikaran S, Leedman P, Almeida OP. Subjective memory complaints with and without objective memory impairment: relationship with risk factors for dementia. *Am J Geriatr Psychiatry*. 2005; 13(8):731–734. [PubMed: 16085790]
17. 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(1):49–54. [PubMed: 17520662]
18. Rabbitt P, Abson V. 'Lost and Found': Some logical and methodological limitations of self-report questionnaires as tools to study cognitive ageing. *British Journal of Psychology*. 1990; 81(1):1–16. [PubMed: 2322763]
19. van der Werf-Elderling MJ, Burger H, Jabben N, Holthausen EA, Aleman A, Nolen WA. Is the lack of association between cognitive complaints and objective cognitive functioning in patients with bipolar disorder moderated by depressive symptoms? *J Affect Disord*. 2011; 130(1-2):306–311. [PubMed: 21353309]
20. van Norden AG, van Uden IW, de Laat KF, et al. Cerebral microbleeds are related to subjective cognitive failures: the RUN DMC study. *Neurobiol Aging*. 2013; 34(9):2225–2230. [PubMed: 23623602]
21. Jungwirth S, Fischer P, Weissgram S, Kirchmeyr W, Bauer P, Tragl KH. Subjective memory complaints and objective memory impairment in the Vienna-Transdanube aging community. *J Am Geriatr Soc*. 2004; 52(2):263–268. [PubMed: 14728638]
22. Jonker C, Geerlings MI, Schmand B. Are memory complaints predictive for dementia? A review of clinical and population-based studies. *Int J Geriatr Psychiatry*. 2000; 15(11):983–991. [PubMed: 11113976]
23. Miranda B, Madureira S, Verdelho A, et al. Self-perceived memory impairment and cognitive performance in an elderly independent population with age-related white matter changes. *J Neurol Neurosurg Psychiatry*. 2008; 79(8):869–873. [PubMed: 18077477]
24. Khatri P, Babyak M, Clancy C, et al. Perception of cognitive function in older adults following coronary artery bypass surgery. *Health Psychol*. 1999; 18(3):301–306. [PubMed: 10357512]
25. Bassett SS, Folstein MF. Memory Complaint, Memory Performance, and Psychiatric Diagnosis: A Community Study. *Journal of Geriatric Psychiatry and Neurology*. Apr 1; 1993 6(2):105–111. 1993. [PubMed: 8512626]
26. Jeste DV, Savla GN, Thompson WK, et al. Association between older age and more successful aging: critical role of resilience and depression. *Am. J. Psychiatry*. Feb 1; 2013 170(2):188–196. [PubMed: 23223917]
27. De Jager C, Budge M, Clarke R. Utility of TICS-m for the assessment of cognitive function in older adults. *Int J Geriatr Psychiatry*. 2003; 18:318–324. [PubMed: 12673608]
28. Cook SE, Marsiske M, McCoy KJM. The Use of the Modified Telephone Interview for Cognitive Status (TICS-M) in the Detection of Amnesic Mild Cognitive Impairment. *Journal of Geriatric Psychiatry and Neurology*. 2009; 22(2):103–109. [PubMed: 19417219]
29. Gallo J, Breitner J. Alzheimer's disease in the NAS-NRC Registry of aging twin veterans, IV. Performance characteristics of a two-stage telephone screening procedure for Alzheimer's dementia. *Psychol Med*. 1995; 25:1211–1219. [PubMed: 8637951]
30. Knopman DS, Roberts RO, Geda YE, et al. Validation of the Telephone Interview for Cognitive Status-modified in Subjects with Normal Cognition, Mild Cognitive Impairment, or Dementia. *Neuroepidemiology*. 2010; 34(1):34–42. [PubMed: 19893327]
31. Welsh K, Breitner J, Magruder-Habib K. Detection of dementia in the elderly using telephone screening of cognitive status. *Neuropsychiatry Neuropsychol Behav Neurol*. 1993; 6:103–110.
32. Brookmeyer R, Evans DA, Hebert L, et al. National estimates of the prevalence of Alzheimer's disease in the United States. *Alzheimer's & Dementia*. 2011; 7(1):61–73.
33. Broadbent DE, Cooper PF, FitzGerald P, Parkes KR. The Cognitive Failures Questionnaire (CFQ) and its correlates. *British Journal of Clinical Psychology*. 1982; 21(1):1–16. [PubMed: 7126941]
34. Wallace CJ, Kass SJ, Stanny CJ. The cognitive failures questionnaire revisited: dimensions and correlates. *The Journal of General Psychology*. 2002; 129(3):238–256. [PubMed: 12224809]
35. Rast P, Zimprich D, Van Boxtel M, Jolles J. Factor Structure and Measurement Invariance of the Cognitive Failures Questionnaire Across the Adult Life Span. *Assessment*. Jun 1; 2009 16(2):145–158. 2009. [PubMed: 19066391]

36. Kroenke K, Spitzer R, Williams J. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med.* 2001; 16:606–613. [PubMed: 11556941]
37. Ware JJ, Sherbourne C. The MOS 36-Item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care.* 1992; 30(6):473–483. [PubMed: 1593914]
38. Cohen J. A power primer. *Psychol Bull.* 1992; 112(1):155–159. [PubMed: 19565683]
39. Amariglio RE, Becker JA, Carmasin J, et al. Subjective cognitive complaints and amyloid burden in cognitively normal older individuals. *Neuropsychologia.* 2012; 50(12):2880–2886. [PubMed: 22940426]
40. de Groot JC, de Leeuw FE, Oudkerk M, Hofman A, Jolles J, Breteler MM. Cerebral white matter lesions and subjective cognitive dysfunction: the Rotterdam Scan Study. *Neurology.* 2001; 56(11):1539–1545. [PubMed: 11402112]
41. Plassman BL, Langa KM, Fisher GG, et al. Prevalence of Dementia in the United States: The Aging, Demographics, and Memory Study. *Neuroepidemiology.* 2007; 29(1-2):125–132. [PubMed: 17975326]

Figure 1.

Scatter plot depicts the standardized scores for the modified version of the Telephone Interview for Cognitive Status (TICS-m), the Cognitive Failures Questionnaire (CFQ), and the 9-item Patient Health Questionnaire severity scores (PHQ-9) against age on the x-axis. A loess smoothed regression line was fitted to each measure. Darker shapes represent a larger number of observations.

Table 1

Sample characteristics by cognitive performance group

All SAGE (N=1,000)						NCI (N=825)						SCI (N=175)					
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Gender	Women	486	48.6	415	50.3	71	40.6	--	--	--	--	--	--	--	--	--	--
	Men	514	51.4	410	49.7	104	59.4	--	--	--	--	--	--	--	--	--	--
Ethnicity	Caucasian	806	80.6	677	82.1	129	73.7	--	--	--	--	--	--	--	--	--	--
	Non-Caucasian	190	19	147	17.8	43	24.6	--	--	--	--	--	--	--	--	--	--
Marital Status	Married	513	51.3	437	53	76	43.4	--	--	--	--	--	--	--	--	--	--
	Not-Married	482	48.2	385	46.7	97	55.4	--	--	--	--	--	--	--	--	--	--
Education	High School	181	18.1	148	17.9	33	18.9	--	--	--	--	--	--	--	--	--	--
	Some College	377	37.7	312	37.8	65	37.1	--	--	--	--	--	--	--	--	--	--
	Baccalaureate	442	44.2	365	44.2	77	44	--	--	--	--	--	--	--	--	--	--

Range of Scores		M	SD	M	SD	M	SD	M	SD	t	df	p
Age		77.3	12.2	75.5	12.1	85.4	8.3	-10.2	998	0.00		
TICS-m		32.1	5.1	33.7	3.8	24.3	2.7	--	--	--		
CFQ		29.4	11.7	29.2	11.6	30.6	12.2	-1.3	857	0.19		
PHQ-9		2.6	3.4	2.5	3.3	3.0	3.8	-1.6	944	0.11		
SF-36 PC		43.4	11.0	44.2	10.9	39.7	10.9	4.7	941	0.00		
SF-36 MC		55.2	8.1	55.2	8.1	55.1	8.0	0.1	941	0.92		

1 Statistics (bottom half of the table) indicate the mean difference between the NCI and SCI groups. NCI=No cognitive impairment; SCI= Significant cognitive impairment; N=number of cases; %= percent of total sample; M=mean; SD=standard deviation; df=degrees of freedom; TICS-m=Modified Telephone Interview for Cognitive status; CFQ=Cognitive Failures Questionnaire; PHQ-9= 9-Item Patient Health Questionnaire severity score; SF-36 PC & MC=Medical Outcomes Study 36-Item Short-Form Healthy Survey, Physical (PC) and Mental (MC) Composite Scores.

Table 2

Correlations between variables of interest

	CFQ	PHQ-9	TICS-m	SF-36 PC	SF-36 MC	Gender	Marital Status	Education	Ethnicity
Age	.12 *	0.05	-.45 *	-.38 *	.12 *	0.01	-.26 *	-.12 *	-.18 *
CFQ		.44 *	-.12 *	-.26 *	-.37 *	-0.04	-0.07	-0.1	0.08
PHQ-9			-0.05	-.37 *	-.48 *	-0.08	-0.1	-0.04	-0.05
TICS-m				.24 *	-0.01	-.14 *	0.06	0.01	-.13 *
SF-36 PC					-0.09	0.07	.23 *	.17 *	0.03
SF-36 MC						0.07	0.01	0.04	0.04
Gender							.43 *	.21 *	0.01
Marital Status								.21 *	0.07
Education									-0.05

² Spearman's rho correlations between variables of interest.

CFQ=Cognitive Failures Questionnaire; PHQ-9=9-Item Patient Health Questionnaire severity score; TICS-m=Modified Telephone Interview for Cognitive Status; SF-36 PC & MC=Medical Outcomes Study 36-Item Short-Form Healthy Survey, Physical (PC) and Mental (MC) Composite Scores. Gender was coded as: 0= female, 1=male; Marital Status: 0=not married (includes widowed), 1= married or in a married-like relationship; Education: 0=high school or less, 1=some college, 2= Baccalaureate or higher; Ethnicity 1=Caucasian, 2=Non-Caucasian.

* denotes statistically significant correlations at $p < .001$.

Table 3

Multiple linear regression coefficients (N=799)

CFQ predicting TICS-m scores					
	B	SE	Beta	t	p
Constant	48.66	1.66		29.28	0.00
Age **	-0.18	0.01	-0.43	-12.72	0.00
Gender **	-1.69	0.31	-0.17	-5.43	0.00
Ethnicity **	-2.29	0.41	-0.18	-5.65	0.00
SF-36 PC	0.03	0.02	0.06	1.77	0.08
PHQ-9	-0.04	0.06	-0.03	-0.71	0.48
CFQ	-0.01	0.02	-0.03	-0.82	0.42

PHQ-9 predicting CFQ scores					
	B	SE	Beta	t	p
Constant	18.11	5.53		3.28	0.00
Age **	0.11	0.04	0.12	3.22	0.00
Gender	-0.77	0.74	-0.03	-1.05	0.29
Ethnicity **	3.50	0.95	0.12	3.68	0.00
SF-36 PC	-0.07	0.04	-0.06	-1.80	0.07
TICS-m	-0.07	0.08	-0.03	-0.82	0.42
PHQ-9 **	1.67	0.12	0.46	13.98	0.00

³Linear regression coefficients controlling for variables of interest. B=Unstandardized coefficients; SE=Standard error; Beta=Standardized coefficients; TICS-m=Modified Telephone Interview for Cognitive Status; CFQ=Cognitive Failures Questionnaire; PHQ-9=9-Item Patient Health Questionnaire severity score; SF-36 PC=Medical Outcomes Study 36-Item Short-Form Healthy Survey Physical Composite score.

** Denotes statistically significant coefficients.