WILEY
Publishers Since 1807

JOHN WILEY & SONS, LTD., THE ATRIUM, SOUTHERN GATE, CHICHESTER P019 8SQ, UK

*** PROOF OF YOUR ARTICLE ATTACHED, PLEASE READ CAREFULLY ***

After receipt of your corrections your article will be published initially within the online version of the journal.

PLEASE NOTE THAT THE PROMPT RETURN OF YOUR PROOF CORRECTIONS WILL ENSURE THAT THERE ARE NO UNNECESSARY DELAYS IN THE PUBLICATION OF YOUR ARTICLE

☐ **READ PROOFS CAREFULLY**

ONCE PUBLISHED ONLINE OR IN PRINT IT IS NOT POSSIBLE TO MAKE ANY FURTHER CORRECTIONS TO YOUR ARTICLE

- This will be your only chance to correct your proof
- Please note that the volume and page numbers shown on the proofs are for position only

☐ **ANSWER ALL QUERIES ON PROOFS** (Queries are attached as the last page of your proof.)

- List all corrections and send back via e-mail to the production contact as detailed in the covering e-mail, or mark all corrections directly on the proofs and send the scanned copy via e-mail. Please do not send corrections by fax or post

☐ **CHECK FIGURES AND TABLES CAREFULLY**

- Check sizes, numbering, and orientation of figures
- All images in the PDF are downsampled (reduced to lower resolution and file size) to facilitate Internet delivery. These images will appear at higher resolution and sharpness in the printed article
- Review figure legends to ensure that they are complete
- Check all tables. Review layout, titles, and footnotes

☐ **COMPLETE COPYRIGHT TRANSFER AGREEMENT (CTA) if you have not already signed one**

- Please send a scanned signed copy with your proofs by e-mail. **Your article cannot be published unless we have received the signed CTA**

☐ **OFFPRINTS**

- 25 complimentary offprints of your article will be dispatched on publication. Please ensure that the correspondence address on your proofs is correct for dispatch of the offprints. If your delivery address has changed, please inform the production contact for the journal – details in the covering e-mail. Please allow six weeks for delivery.

Additional reprint and journal issue purchases

- Should you wish to purchase a minimum of 100 copies of your article, please visit http://www3.interscience.wiley.com/aboutus/contact_reprint_sales.html
- To acquire the PDF file of your article or to purchase reprints in smaller quantities, please visit http://www3.interscience.wiley.com/aboutus/ppv-articleselect.html. Restrictions apply to the use of reprints and PDF files – if you have a specific query, please contact permreq@wiley.co.uk. Corresponding authors are invited to inform their co-authors of the reprint options available
- To purchase a copy of the issue in which your article appears, please contact cs-journals@wiley.co.uk upon publication, quoting the article and volume/issue details
- Please note that regardless of the form in which they are acquired, reprints should not be resold, nor further disseminated in electronic or print form, nor deployed in part or in whole in any marketing, promotional or educational contexts without authorization from Wiley. Permissions requests should be directed to mailto: permreq@wiley.co.uk

INTERNATIONAL JOURNAL OF GERIATRIC PSYCHIATRY
Int J Geriatr Psychiatry 2008; **22**: 1–7.
Published online in Wiley InterScience
(www.interscience.wiley.com) **DOI**: 10.1002/gps.1991

Subjective cognitive functioning as a predictor of all cause mortality in an Israeli national sample of community dwelling older adults

Liat Ayalon*

School of Social Work, Bar Ilan University, Israel

SUMMARY

Objective Cognitive functioning has been identified as a predictor of all cause mortality in several epidemiological studies. As a result, researchers have suggested the use of short cognitive screens as prognostic indicators in older adults. Little is known, however, about subjective complaints of cognitive functioning as predictors of all cause mortality.

Methods A 7-year follow-up of a national sample of 4,921 Israelis over the age of 60. Main predictors were subjective complaints of memory problems, confusion, and recognition problems. Outcome was time to death.

Results As expected, in the fully adjusted model, age, gender, subjective health, baseline health, and ADL and IADL impairments were significant predictors of all cause mortality. In addition, complaints about difficulties recognizing familiar people also were associated with a greater risk for mortality.

Conclusions Subjective complaints about recognition problems serve as a risk for all cause mortality above and beyond well-known risk factors. Health care professionals can use this information about subjective cognitive functioning in conjunction with other measures in order to identify older adults at risk for an earlier death. Copyright © 2008 John Wiley & Sons, Ltd.

KEY WORDS — death; epidemiology; insight; cognition; prognosis; subjective evaluation

INTRODUCTION

Several studies have identified cognitive functioning as an independent risk for functional decline (Blaum *et al*., 2002; Soderqvist *et al*., 2006), hospitalization (Chodosh *et al*., 2004), and all cause mortality (Berr *et al*., 1994; Ostbye *et al*., 1999; Smits *et al*., 1999; Lee *et al*., 2006) even once adjusted for sociodemographic, mental health, and physical health. Thus, researchers have concluded that cognitive impairments and/or decline in cognitive functioning could serve as risk factors for all cause mortality (Kelman *et al*., 1994; Bassuk *et al*., 2000; van Reekum, 2000; Ramos *et al*., 2001; Stump *et al*., 2001; McGuire *et al*., 2006). It was further suggested that health care providers could use information obtained through brief cognitive screens as a means to predict older adults' risk for all cause mortality (McGuire *et al*., 2006). However, research is still equivocal with regard to the specific cognitive functions that signify a risk for mortality (Swan *et al*., 1995; Bosworth *et al*., 1999; van Reekum, 2000; Nguyen *et al*., 2003; Pavlik *et al*., 2003; Shipley *et al*., 2006).

Similarly, subjective evaluation of cognitive functioning could potentially be used as a predictor of all cause mortality, given research that has shown that subjective evaluations of health, physical health, mental health, and quality of life are strong predictors of functional decline and morality even once objective indicators are controlled for (Lee, 2000; Fan *et al*., 2002; Myint *et al*., 2007). In a thorough review, Idler and Benyamini (1997) found that self-rated health was an independent predictor of mortality in 23 of 27 studies. They suggested that relative to objective

*Correspondence to: Dr L. Ayalon, School of Social Work, Bar Ilan University, Ramat Gan, Israel 52900.
E-mail: ayalonl@mail.biu.ac.il

Received 17 September 2007
Accepted 17 December 2007

indicators of health, self-rated health might more fully capture both diagnosed and undiagnosed diseases. Self-rated health was also viewed as a self-fulfilling prophecy or as a reflection of the presence or absence of internal and external resources needed to maintain health. Similar mechanisms might play a role in the relationship between subjective evaluation of cognitive functioning and mortality.

The research on subjective evaluation of cognitive functioning as a predictor of disability and mortality is limited. Several researchers have found that complaints of memory decline predict future cognitive decline (Crowe *et al*., 2006) and that cognitive complaints are associated with an underlying neurodegenerative decline even in the absence of objective cognitive impairments (Minett *et al*., 2005; Saykin *et al*., 2006). However, others found that memory complaints do not distinguish cases with different progression rates in disability or cognitive impairments (Purser *et al*., 2006) and that reports of cognitive problems do not predict difficulties in daily life (Newson *et al*., 2006). To date, only one study evaluated the role of subjective complaints of cognitive function as predictors of mortality. Conducting a secondary analysis of the US Study of Aging with 7,527 individuals over the age of 70, Lee (2000) found that in addition to self-assessed general and physical health, higher frequency of confusion was a risk for functional decline and 7-year mortality, whereas reports of memory problems were not.

Thus, whereas the roles of subjective health, mental health, and well being as risk factors for all cause mortality have been studied extensively (Idler and Kasl, 1991; Lee, 2000), much less is known about the subjective perception of one's cognitive functioning as a risk for mortality. Given the high rates of cognitive impairments in the elderly (Schonknecht[Q1] *et al*., 2005) and the ample research that has shown a strong relationship between cognitive impairments and mortality (Bosworth *et al*., 1999; Nguyen *et al*., 2003), it is important to evaluate the role of subjective complaints of cognitive functioning as predictors of all cause mortality. The evaluation of subjective cognitive functioning has not only theoretical implications, but also practical ones, as information about subjective cognitive status often is readily available to clinicians.

METHODS

Sample

Between the years 1997–1998, the Israeli Central Bureau of Statistics conducted a face-to-face national survey of Israelis born prior to 1938 using data from the 1995 census to guide the sampling procedure. A stratified sampling method was employed to obtain representation of older Jews who came to Israel prior to 1989, those who came to Israel after 1990, and Arabs. Sampling also obtained representations of those living alone, living with a partner, and living with younger people. Males and females were stratified based on age (60–64; 65–69; 70–74; 75–79; 80+). The final sample included 5,055 ommunity dwellers, yielding a response rate of 83.2%.

Measures

The survey was developed by experts in geriatricians, gerontology, health services, and epidemiology. All information was gathered in a face-to-face interview, conducted by trained interviewers during the years 1997 and 1998.

Outcome variable

Time of death. All Israelis have a unique ID that was used by Israel Central Bureau of Statistics to link the survey with Israel's National Death Record, which contains information about all deaths occurring in Israel. Year of death was available for the years 1997–2004.

Predictors

Subjective cognitive functioning. Subjective cognitive functioning was evaluated using three questions:

1. 'Do you have a hard time remembering things? For example, where you placed things or whether or not you took your medications?';
2. 'Do you get confused? For example, knowing where you are or what day it is?';
3. 'Do you have a hard time recognizing familiar people? For example, recognizing family members and friends?'.

Response options were: never; yes—very infrequently; yes—occasionally; yes—very frequently. The three questions were selected based on clinical and research experience of the survey developers.[1]

Covariates

Demographic information. Age (60–64; 65–69; 70–74; 75–79; 80+), gender, and level of education

DOI: 10.1002/gps

(primary, secondary, tertiary) were evaluated based on self-report.

Health. Health was evaluated by the question: 'have you ever been diagnosed with heart attack/myocardial infraction, stroke, diabetes, cancer, or Alzheimer's disease'. Similarly to Litwin and Shiovitz-Ezra (2007), I used reported diagnoses of each disease as a dichotomous variable.

Activities of daily living (ADL). These were evaluated usingy five questions 'can you, without any assistance, dress up; bath or shower; sit down or get off your chair; get in and out of bed; eat'. Response options were: 'yes with no difficulty'; 'yes with some difficulty'; 'cannot' (Katz *et al*., 1970). I categorized this variable to represent no impairment (0 ADL impairments), moderate impairment (1–2 ADL impairments), and severe impairment (>2 ADL impairments).

Instrumental activities of daily living (IADL). These were evaluated by the following five questions: 'do you need assistance or additional assistance in any of the following: preparing meals, cleaning the house, doing the laundry, grocery shopping, and running errands' (Lawton and Brody, 1969). I categorized this variable to represent no impairment (0 IADL impairments), moderate impairment (1–2 IADL impairments), and severe impairment (>2 IADL impairments).

Self-rated health. This was evaluated by the question 'how would you rate your health'. Response options were very good, good, not so good, and bad.

Mental health. This was evaluated, using the General Health Questionnaire-12 (Goldberg and Williams, 1988), which includes 12 'yes' or 'no' questions. I reverse scored responses to positive items so that a higher score would reflect worse mental health. I categorized this variable into: no mental health problems, 1–2 mild mental health problems, > moderate to severe mental health problems.

Statistical analysis

I conducted a Cox proportional hazards model, with time to death as the outcome variable and the three indicators of subjective cognitive functioning as predictors. I controlled for age, gender, level of education, baseline health, subjective health status, and mental health as potential covariates. Those who did not die within the study period (1997–2004) were censored at the end of this period (i.e. 2004). All analyses were adjusted using sampling weights. Because the focus of this study was on participants' subjective perception of cognitive functioning, I excluded all interviews conducted by proxies due to medical conditions of the interviewee (134; 2.6%).

RESULTS

Table 1 summarizes the demographic and clinical characteristics of the sample. Overall, 38.7% reported having no memory problems, 17.1% reported infrequent memory problems, 27.7% reported occasional memory problems, and 16.3% reported very frequent memory problems. With regard to confusion, 84.2% reported no problems, 4.6% reported infrequent confusion, 7.1% reported occasional confusion, and 3.9% reported very frequent confusion. A total of 94.0% reported no problems recognizing familiar people, 2.2% reported infrequent problems, 2.3% reported occasional problems, and another 1.9% reported very frequent problems.

There was no evidence for multicollinearity among predictors. There also was no interaction between gender or age and subjective evaluation of cognitive functioning. Of the 4,921 participants, 1,335 died at or before the end of study period. There was no significant difference in all cause mortality between those who reported having no memory problems (19.0% mortality), those who reported having infrequent memory problems [19.5% mortality, unadjusted[Q3] HR = 0.96, Confidence Intervals (CI): 0.77–1.18; adjusted for age, gender, and level of education HR = 0.90, CI: 0.73–1.10; fully adjusted HR = 0.89, CI: 0.72–1.10], those who reported having occasional memory problems (22.1% mortality, unadjusted HR = 1.03, CI: 0.86–1.24; adjusted for age, gender, and level of education HR = 0.94, CI: 0.79–1.13; fully adjusted HR = 0.84, CI: 0.70–1.01), and those who reported having frequent memory problems (32.7% mortality, unadjusted HR = 1.17, CI: 0.95–1.44; adjusted for age, gender, and level of education HR = 1.05, CI: 0.85–1.29; fully adjusted HR = 0.83, CI: 0.67–1.02).

With regard to confusion, relative to those who reported no confusion (19.2% mortality), those who reported infrequent (30.3% mortality, unadjusted HR = 1.37, CI: 1.04–1.81), occasional (34.8% mortality, unadjusted HR = 1.59, CI: 1.25–2.00), and very frequent confusion (54.6% mortality, unadjusted HR = 2.27, CI: 1.73–2.98) had a significantly greater mortality risk. Once adjusted for age, gender, and level of education, only those who

DOI: 10.1002/gps

Table 1. Subjective cognitive[Q2] functioning as a predictor of all cause mortality

	Number at baseline (4,921)	Overall incidence (1,335)	Unadjusted HR, 95% CI	Adjusted for age, gender, and level of education HR, 95% CI	Fully adjusted model HR, 95% CI
Memory problems					
Never (reference)	1949 (38.7)	452 (19.0)			
Yes—very infrequently	774 (17.1)	188 (19.5)	0.96 (0.77–1.18)	0.90 (0.73–1.10)	0.89 (0.72–1.10)
Yes—occasionally	1300 (27.7)	344 (22.1)	1.03 (0.86–1.24)	0.94 (0.79–1.13)	0.84 (0.70–1.01)
Yes—very frequently	887 (16.3)	347 (32.7)	1.17 (0.95–1.44)	1.05 (0.85–1.29)	0.83 (0.67–1.02)
Confusion					
Never (reference)	4046 (84.2)	952 (19.2)			
Yes—very infrequently	237 (4.6)	80 (30.3)	**1.37 (1.04–1.81)**	1.13 (0.86–1.48)	0.95 (0.72–1.26)
Yes—occasionally	363 (7.1)	147 (34.8)	**1.59 (1.25–2.00)**	**1.35 (1.07–1.70)**	1.08 (.86–1.36)
Yes—very frequently	263 (3.9)	152 (54.6)	**2.27 (1.73–2.98)**	**1.50 (1.15–1.97)**	1.14 (.87–1.51)
Recognition problems					
Never (reference)	4540 (94.0)	1134 (20.5)			
Yes—very infrequently	124 (2.2)	53 (38.4)	**1.48 (1.06–2.08)**	1.23 (0.90–1.66)	1.08 (0.80–0.147)
Yes—occasionally	142 (2.3)	76 (49.3)	**1.78 (1.32–2.39)**	**1.51 (1.13–2.01)**	1.22 (0.91–1.64)
Yes—very frequently	94 (1.9)	64 (64.7)	**2.53 (1.74–3.66)**	**2.24 (1.59–3.15)**	**1.59 (1.10–2.29)**
Age					
60–64 (reference)	876 (23.6)	83 (9.0)			
65–69	953 (23.6)	136 (12.2)		1.27 (0.94–1.73)	1.16 (0.85–1.58)
70–74	1052 (22.4)	235 (20.4)		**2.29 (1.73–3.03)**	**1.97 (1.49–2.61)**
75–79	1028 (15.3)	334 (31.2)		**3.51 (2.68–4.60)**	**2.77 (2.11–3.64)**
80+	1010 (14.7)	546 (53.0)		**6.58 (5.09–8.51)**	**4.77 (3.66–6.22)**
Gender					
Male (reference)	2507 (43.9)	790 (26.0)			
Female	2414 (56.0)	545 (19.2)		**0.65 (0.57–0.74)**	**0.55 (0.48–0.64)**
Education					
Primary (reference)					
Secondary				**0.83 (0.71–0.97)**	0.93 (0.79–1.09)
Tertiary				0.84 (0.69–1.03)	1.05 (0.85–1.26)
Mental health					
0 (reference)	1063 (23.7)	179 (13.4)			
1–2	863 (18.0)	193 (18.0)			1.15 (0.89–1.48)
>2	2995 (58.1)	963 (27.1)			1.11 (0.88–1.40)
Self rated health					
Very good (reference)	224 (5.0)	25 (8.0)			
Good	1577 (34.8)	309 (14.8)			1.28 (0.81–2.03)
Not so good	2278 (44.9)	613 (23.0)			1.38 (0.86–3.02)
Bad	832 (14.6)	385 (42.6)			**1.83 (1.11–3.02)**
Heart attack/MI					
No (reference)					
Yes					**1.20 (1.03–1.40)**
Stroke					
No (reference)					
Yes					1.15 (0.90–1.48)
Diabetes					
No (reference)					
Yes					**1.33 (1.14–1.56)**
Cancer					
No (reference)					
Yes					**1.63 (1.26–2.12)**
Alzheimer's Disease					
No (reference)					
Yes					1.12 (0.76–1.64)
ADL					
0 impairments (reference)	3646 (78.0)	725 (16.0)			
1–2 impairments	256 (5.0)	101 (35.5)			**1.35 (1.03–1.78)**
>2 impairments	1019 (16.8)	509 (46.7)			**1.54 (1.29–1.85)**
IADL					
0 impairments (reference)	2030 (45.5)	304 (11.8)			
1–2 impairments	1098 (21.6)	301 (22.4)			**1.49 (1.21–1.85)**
>2 impairments	1793 (32.7)	730 (36.6)			**1.69 (1.36–2.10)**

reported occasional (adjusted for age, gender, and level of education HR = 1.35, CI: 1.07–1.70) or frequent (adjusted for age, gender, and level of education HR = 1.50, CI: 1.15–1.97) confusion were at a greater mortality risk. However, in the fully adjusted model, a report of subjective confusion was no longer a predictor of all cause mortality (fully adjusted HR = 0.95, CI: 0.72–1.26; fully adjusted HR = 1.08, CI: 0.86–1.36; fully adjusted HR = 1.14, CI: 0.87–1.51, respectively).

Relative to those who reported no difficulties recognizing familiar people (20.5% mortality), those who reported having infrequent (38.4% mortality, unadjusted HR = 1.48, CI: 1.06–2.08), occasional (49.3% mortality, unadjusted HR = 1.78, CI: 1.32–2.39), or very frequent (64.7% mortality, unadjusted HR = 2.53, CI: 1.74–3.66) recognition problems had a significantly greater risk for death. Once adjusted for age, gender, and level of education, only those who reported occasional (adjusted for age, gender, and level of education HR = 1.51, CI: 1.13–2.01) and very frequent recognition problems (adjusted for age, gender, and level of education HR = 2.24, CI: 1.59–3.15) had a greater mortality risk. In the fully adjusted model, only those who reported having very frequent recognition problems (fully adjusted HR = 1.59, CI: 1.10–2.29) had a greater mortality risk. As expected, age, gender, baseline health, self rated health, and ADL and IADL impairments were significant predictors of mortality.

DISCUSSION

This is the first study to evaluate subjective complaints of cognitive functioning as predictors of all cause mortality by the use of three different subjective cognitive domains: memory, confusion, and recognition of familiar people. The findings show that reports of problems recognizing familiar people serve as a prognostic indicator of all cause mortality even once sociodemographic variables, baseline mental and physical health, disability, and subjective health status are taken into account.

The majority of research to date has focused on subjective complaints about memory problems as prognostic indicators with much less attention given to subjective complaints about confusion or recognition problems (Crowe *et al*., 2006; Saykin *et al*., 2006). The findings show that the majority of participants in this study reported at least infrequent memory problems, but only a very small fraction of the sample reported confusion and/or recognition problems. Thus, complaints about memory problems likely are an insensitive indicator of impairment in the elderly and may reflect general levels of low mood or low physical health (Lahr *et al*., 2007). In support of this claim, researchers showed that memory complaints are high both in individuals with no cognitive impairments (31%) and in those with cognitive impairments (47%). Furthermore, in those individuals with no impairments, cognitive complaints had no predictive value over time (Schofield *et al*., 1997).

A question remains as to why complaints about recognition problems predict overall mortality in the fully adjusted model, whereas complaints about confusion do not. One possibility is that problems recognizing familiar people reflect such a serious neurodegenerative condition that is distinguished from all other medical and functional conditions evaluated in this study. In contrast, confusion might be highly associated with health and subjective health status so that it has no unique contribution to all cause mortality. Confusion may also be a prodromal sign of depression (Berger *et al*., 1998) and, thus, may not have a unique effect on mortality once mental health status is adjusted for.

A limitation of the present study is that the study did not include an objective evaluation of cognitive functioning. In addition, the assessment of additional domains of subjective cognitive impairments is warranted. Another limitation of the present study is that ADL and IADL impairments were evaluated based on self-report; as a result, the relationship between ADL and IADL impairments and subjective cognitive functioning might have been stronger than it would have been had ADL and IADL impairments been evaluated based on health providers' evaluation. However, subjective evaluation of ADL and IADL impairments is the common practice in large epidemiological studies. In addition, the study was limited to community dwelling individuals and, thus, those of more impaired objective cognitive functioning likely were not included. Finally, the study evaluated all cause mortality and not cause specific mortality. However, this is often the case with older adults who usually have multiple causes of death.

Nevertheless, this is one of the first studies to ever evaluate subjective cognitive functioning as a predictor of all cause mortality, using a nationally based sample with 7-year follow-up data. The findings establish a good basis for further research in the area of subjective cognitive functioning as a predictor of all cause mortality. The data demonstrate that not all subjective cognitive functions have the same effect over mortality; it is only the most rare and potentially the most severe complaints (e.g.

DOI: 10.1002/gps

KEY POINTS

- Cognitive impairment is common in older adults
- Cognitive impairment is a risk for mortality
- Subjective complaints of problem recognizing familiar people also are a risk for mortality
- Clinicians can use this information to identify older adults at risk

difficulties recognizing familiar people) that predict mortality above and beyond baseline health and mental health. Asking individuals about difficulties recognizing familiar people may serve, in conjunction with other measures, as a screening tool. However, the sensitivity and specificity of this question has to be further evaluated.

NOTE

1. Single item measures of health, quality of life satisfaction etc. are routinely used in population surveys in which many issues are measured during a short interview (Wilkin *et al*., 1992).

CONFLICT OF INTEREST

None known.

ACKNOWLEDGEMENTS

This study was made possible through a grant from the Israeli Ministry of Health to the Israel Gerontological Data Center.

REFERENCES

Ayalon Q4 L, Covinsky K. 2007. Late life mortality in older Jews exposed to the Nazi regime. *J Am Geriatr Soc* **55**: 1380–1386.

Bassuk SS, Wypij D, Berkmann LF. 2000. Cognitive impairment and mortality in the community-dwelling elderly. *Am J Epidemiol* **151**: 676–688.

Berger AK, Small BJ, Forsell Y, *et al*. 1998. Preclinical symptoms of major depression in very old age: a prospective longitudinal study. *Am J Psychiatry* **155**: 1039–1043.

Berr C, Dartigues JF, Alperovitch A. 1994. Cognitive performance and three-year mortality in the PAQUID elderly study. *Rev Epidemiol Sante Publique* **42**: 277–284.

Blaum CS, Ofstedal MB, Liang J. 2002. Low cognitive performance, comorbid disease, and task-specific disability: findings from a nationally representative survey. *J Gerontol A Biol Sci Med Sci* **57**: M523–531.

Bosworth H, Schaie K, Willis S. 1999. Cognitive and sociodemographic risk factors for mortality in the Seattle Longitudinal Study. *J Gerontol B Psychol Sci* **54**: P273–282.

Chodosh J, Seeman TE, Keeler E, *et al*. 2004. Cognitive decline in high-functioning older persons is associated with an increased risk of hospitalization. *J Am Geriatr Soc* **52**: 1456–1462.

Crowe M, Andel R, Wadley V, *et al*. 2006. Subjective cognitive function and decline among older adults with psychometrically defined amnestic MCI. *Int J Geriatr Psychiatry* **21**: 1187–1192.

Fan VS, Curtis JR, Tu SP, *et al*. 2002. Using quality of life to predict hospitalization and mortality in patients with obstructive lung diseases. *Chest1* **22**: 429–436.

Goldberg DP, Williams P. 1988. *A User's Guide to the General Health Questionnaire*. NFER-Nelson: Windsor.

Idler EL, Benyamini Y. 1997. Self rated health and mortality: a review of 27 community studies. *J Health Social Behav* **38**: 21–37.

Idler EL, Kasl S. 1991. Health perceptions and survival: do global evaluations of health status really predict mortality? *J Gerontol* **46**: S55–65.

Katz S, Downs TD, Cash HR, Grotz RC. 1970. Progress in development of the index of ADL. *Gerontologist* **10**: 20–30.

Kelman HR, Thomas C, Kennedy GJ, Cheng J. 1994. Cognitive impairment and mortality in older community residents. *Am J Public Health* **84**: 1255–1260.

Lahr D, Beblo T, Hartje W. 2007. Cognitive performance and subjective complaints before and after remission of major depression. *Cognit Neuropsychiatry* **12**: 24–45.

Lawton MP, Brody EM. 1969. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist* **9**: 179–186.

Lee Y. 2000. The predictive value of self assessed general, physical, and mental health on functional decline and mortality in older adults. *J Epidemiol Commun Health* **54**: 123–129.

Lee HB, Kasper JD, Shore AD, *et al*. 2006. Level of cognitive impairment predicts mortality in high-risk community samples: the memory and medical care study. *J Neuropsychiatry Clin Neurosci* **18**: 543–546.

Litwin H, Shiovitz-Ezra S. 2007. Network type and mortality risk in late life. *Gerontologist* **6**: 735–743.

McGuire L, Ford E, Ajani U. 2006. The impact of cognitive functioning on mortality and the development of functional disability in older adults with diabetes: the second longitudinal study on aging. *BMC Geriatrics* **6**: 8.

Minett TS, Dean JL, Firbank M, *et al*. 2005. Subjective memory complaints, white-matter lesions, depressive symptoms, and cognition in elderly patients. *Am J Geriatr Psychiatry* **13**: 665–671.

Myint PK, Luben RN, Surtees PG, *et al*. 2007. Self-reported mental health related quality of life and mortality in men and women in the European Prospective Investigation into Cancer (EPIC-Norfolk): a prospective population study. *Psychosomat Med* **69**: 410–414.

Newson RS, Kemps EB. 2006. The nature of subjective cognitive complaints of older adults. *Int J Aging Hum Dev* **63**: 139–151.

Nguyen HT, Black SA, Ray LA, *et al*. 2003. Cognitive impairment and mortality in older Mexican Americans. *J Am Geriatr Soc* **51**: 178–183.

Pavlik VN, de Moraes SA, Szklo M, *et al*. 2003. Relation between cognitive function and mortality in middle-aged adults: The Atherosclerosis Risk in Communities Study. *Am J Epidemiol* **157**: 327–334.

Ostbye T, Steenhuis R, Wolfson C, *et al*. 1999. Predictors of five-year mortality in older Canadians: the Canadian Study of Health and Aging. *J Am Geriatr Soc* **47**: 1249–1254.

Purser JL, Fillenbaum GG, Wallace RB. 2006. Memory complaint is not necessary for diagnosis of mild cognitive impairment and

DOI: 10.1002/gps

does not predict 10-year trajectories of functional disability, word recall, or short portable mental status questionnaire limitations. *J Am Geriatr Soc* **54**: 335–338.

Ramos LR, Simoes EJ, Albert MS. 2001. Dependence in activities of daily living and cognitive impairment strongly predicted mortality in older urban residents in Brazil: a 2-year follow-up. *J Am Geriatr Soc* **49**: 1168–1175.

Saykin AJ, Wishart HA, Rabin LA, *et al*. 2006. Older adults with cognitive complaints show brain atrophy similar to that of amnesic MCI. *Neurology* **67**: 834–842.

Schofield PW, Marder K, Dooneief G, *et al*. 1997. Association of subjective memory complaints with subsequent cognitive decline in community-dwelling elderly individuals with baseline cognitive impairment. *Am J Psychiatry* **154**: 609–615.

Shipley BA, Der G, Taylor MD, *et al*. 2006. Cognition and all-cause mortality across the entire adult age range: Health and Lifestyle Survey. *Psychosom Med* **68**: 17–24.

Smits CHM, Deeg DJH, Kriegsman DMW, Schmand B. 1999. Cognitive functioning and health as determinants of mortality in an older population. *Am J Epidemiol* **150**: 978–986.

Soderqvist A, Miedel R, Ponzer S, Tidermark J. 2006. The influence of cognitive function on outcome after a hip fracture. *J Bone Joint Surg Am* **88**: 2115–2123.

Stump TE, Callahan CM, Hendrie HC. 2001. Cognitive impairment and mortality in older primary care patients. *J Am Geriatr Soc* **49**: 934–940.

Swan GE, Carmelli D, LaRue A. 1995. Performance on the Digit Symbol Substitution Test and 5-year mortality in the Western Collaborative Group Study. *Am J Epidemiol* **141**: 32–40.

van Reekum R. 2000. The association between cognitive function and mortality pertained to specific but not general measures of cognitive function when health factors were considered. *Evid Based Ment Health* **3**: 60.

Wilkin D, Hallam L, Doggett MA. 1992. *Measures of Need and Outcome for Primary Health Care*. Oxford Medical Publications: New York; 274–279.

Author Query Form (GPS/1991)

Special Instruction: Author please include responses to queries with your other corrections and return by e-mail.

Q1: Author: Schonknecht et al., 2005 – not in reference list, please supply full details.

Q2: Author: Meaning of bold entries in Table 1?

Q3: Author: Define HR.

Q4: Author: Ayalon and Covinsky, 2007 – not cited in text.