

VU Research Portal

Evidence for an association of the big five personality factors with recurrence of depressive symptoms in later life

Steunenberg, B.; Braam, A.W.; Beekman, A.T.F.; Deeg, D.J.H.; Kerkhof, A.J.F.M.

published in

International Journal of Geriatric Psychiatry
2009

DOI (link to publisher)

[10.1002/gps.2291](https://doi.org/10.1002/gps.2291)

document version

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

citation for published version (APA)

Steunenberg, B., Braam, A. W., Beekman, A. T. F., Deeg, D. J. H., & Kerkhof, A. J. F. M. (2009). Evidence for an association of the big five personality factors with recurrence of depressive symptoms in later life. *International Journal of Geriatric Psychiatry*, 24(12), 1470-1477. <https://doi.org/10.1002/gps.2291>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

E-mail address:

vuresearchportal.ub@vu.nl

Evidence for an association of the big five personality factors with recurrence of depressive symptoms in later life

Bas Steunenberg^{1,2*}, Arjan W. Braam^{2,3}, Aartjan T. F. Beekman^{2,3},
Dorly J. H. Deeg^{2,3} and Ad J. F. M. Kerkhof^{1,2}

¹*Department of Clinical Psychology, VU University, Amsterdam, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands*

²*Institute for Research in Extramural Medicine (EMGO), VU University Medical Centre, The Netherlands*

³*Department of Psychiatry, VU University Medical Centre, Amsterdam, The Netherlands*

SUMMARY

Objectives Although it is well known that recurrence of late-life depression is very common, little is known about the characteristics of older people who are vulnerable for recurrence. In order to identify characteristics of those who are at risk, the present study aimed to investigate the strength of the associations of the big five personality factors with recurrence in later life. Secondly, we studied whether there are gender and age differences in the strength of these associations.

Methods Using data from the longitudinal aging study Amsterdam (LASA) a subsample with clinically relevant depressive symptoms at one or more of the first three LASA-cycles, but who had recovered at the fourth cycle, was approached to participate in a fifth cycle to determine recurrence ($n = 92$). Respondents completed self-report questionnaires on personality (NEO-FFI) and depression (CES-D). By means of logistic regression analyses the associations between the Big Five and recurrence of depression at fifth cycle was investigated.

Results 58 (63%) had a recurrence of depressive symptoms. A high level of neuroticism was significantly associated with recurrence. No gender differences or age-related differences in strength of the associations of personality with recurrence were found.

Conclusion In later life, neuroticism still is associated with the recurrence of depression. Efforts to prevent recurrence of late-life depression should focus on those with high levels of neuroticism and future research should aim at further unravelling the association between depression and personality in later life. Copyright © 2009 John Wiley & Sons, Ltd.

KEY WORDS — big five; recurrence; old age; depression

INTRODUCTION

The long-term prognosis for depression in later life has generally been considered mixed with only one quarter to one third of the patients robustly well at 1–3 years of follow-up (Murphy, 1983; Post *et al.*, 1992; Cole *et al.*, 1999; Beekman *et al.*, 2002; for a review see Mitchell and Subramaniam, 2005). Once recovered from depressive symptoms, older people have a high risk of recurrence, with rates ranging between 15

and 50% (Hinrichsen and Hernandez, 1993; Little *et al.*, 1996; Flint and Rifat, 1997; Kivela *et al.*, 2000; Beekman *et al.*, 2002). Recent studies revealed that older depressives have a higher risk of recurrence after recovery compared to younger adults (Mueller *et al.*, 2004; Mitchell and Subramaniam, 2005). These prognosis data demonstrate the need to identify characteristics of older persons who are at high risk for recurrence.

Recurrence of depression involves a complex and dynamic interaction of biological, physical and cognitive health, social and psychological factors, such as personality traits (Teasdale, 1988; Segal and Dobson, 1992). Little is known about the influence of personality on recurrence of late-life depression. The

*Correspondence to: Dr B. Steunenberg, Department of Clinical Psychology, VU University, Amsterdam, Van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands.
E-mail: b.steunenberg@psy.vu.nl

primary aim of this study was to investigate the association between the Big Five personality characteristics (Costa and McCrae, 1992) and recurrence of depressive symptoms in later life.

The Big Five model (Costa and McCrae, 1978, 1980, 1992) is currently the most generally used dimensional model of personality and includes the following factors: neuroticism (tendency to experience negative emotions and cope poorly), extraversion (quantity and intensity of interpersonal interactions and positive emotions), openness to experience (appreciation of experience for its own sake), agreeableness (orientation toward others, altruistic vs. antagonistic) and conscientiousness (organization, motivation, and persistence in achieving goals). In younger aged samples neuroticism scores of recovered patients predict subsequent episodes (Faravelli *et al.*, 1986; Duggan *et al.*, 1990; Surtees and Wainwright, 1996; Klein *et al.*, 2002; Ormel *et al.*, 2004a). For the other four traits the association with recurrence of depression has not been examined or in only few studies. Watson and Clark (1984, 1988) found a negative association between extraversion and depression. This was expected since there is evidence that extraversion represents an independent personality dimension of positive affectivity. Openness to experience was shown to be significantly positively associated with depression (Wolfenstein and Trull, 1997; Bienvenu *et al.*, 2001b). According to Anderson and McLean (1997) depressed individuals score low on conscientiousness and the level of conscientiousness significantly contributes to the prediction of the severity and recurrence of symptoms. These studies mainly describe the relationship between personality and recurrence of depression in younger aged samples. Little to nearly nothing is known about these associations in later life.

To our knowledge, this is the first study which investigates, in a population-based sample of older people, the strength of the association between the Big Five personality traits (Costa and McCrae, 1992) and recurrence of a clinically significant level of depressive symptoms. Due to late-life decline in physical health, cognitive functioning and loss of social resources, factors known to be associated with depression in later life, we expect that the influence of personality characteristics diminishes as the age becomes higher, while the influence on recurrence of physical health and social situational factors increases. A study in a younger aged sample supports a sex difference in the link between personality and depression (Goodwin and Gotlib, 2004). In particular, women have both higher levels of neuroticism and

higher rates of depression than men. We will investigate the strengths of the associations between the personality traits and recurrence for both genders separately and expect to find the same results as in the younger age samples.

METHODS

Sampling and procedures

Data for this study were collected in the longitudinal aging study Amsterdam (LASA), an ongoing interdisciplinary longitudinal study on predictors and consequences of changes in autonomy and well-being in the aging population (Deeg *et al.*, 1993). Sampling procedures and response were described in detail elsewhere (Beekman *et al.*, 1995; Penninx *et al.*, 1997). In short, a random sample of older (55–85 years) men and women was drawn from the population registers in 11 municipalities in three geographical regions of the Netherlands. The sample was stratified by age and sex according to expected 5-year mortality to ensure sufficient sample size for longitudinal analyses within age and sex strata. The LASA study started in 1992/1993, and includes a follow-up measurement cycle every 3 years. In the first cycle of LASA, 3107 respondents were included. Respondents were visited at home by trained interviewers. In order to spread the burden for the respondent, each cycle consisted of two interviews and a self-administered questionnaire, the latter including the personality variables. Loss of respondents by attrition or non-response was described in detail elsewhere (Beekman *et al.*, 2002; Deeg *et al.*, 2002).

The association of the Big Five personality traits (Costa and McCrae, 1992) with recurrence of depression was measured at a fifth measurement cycle in April 2005. Only those respondents who had a history of depression on one or more of the first three LASA cycles ($\text{CES-D} \geq 16$; Berkman *et al.*, 1986), but who had recovered at the fourth cycle ($\text{CES-D} < 16$; in 2001/2002) were approached to participate.

At the time of the fourth measurement cycle the cohort included 1474 (47% of baseline sample) respondents, of whom 306 (21%) with a history of depressive symptoms. Within this subsample 142 (46%) were recovered at the fourth measurement and were approached to participate. Finally, 92 (69%) of the subjects responded.

In multivariate analyses (logistic regression), the baseline characteristics (1992/1993) of our recovered sample were compared with the subjects with a history of depressive symptoms who could not be included in

this study ($n = 50$). A higher age (β , .010; SE, .04; $P = .01$) and impaired cognitive functioning (β , .25; SE, .14; $P = .07$) were found to be significant predictors for attrition. No difference between our study sample and those lost by attrition was found for level of depressive symptoms at baseline, gender, education and urbanization level, marital status, number of functional limitations or chronic diseases, level pain complaints, network size, loneliness and level of emotional and instrumental support received.

MEASUREMENTS

Depressive symptoms—As a screener for depression, the Dutch translation (Beekman *et al.*, 1994) of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used. Respondents were asked to indicate on this 20 item self-report scale how often during the past week they had experienced each symptom. Items were scored on a four-point scale, ranging from 0 (rarely or none of the time) to 3 (most of or all of the time). The total CES-D score ranges from 0 (no symptoms) to 60 (maximum number of symptoms). This scale has been widely used in older community samples and has good psychometric properties in three previously studied samples of older persons in the Netherlands (Beekman *et al.*, 1994). In our study a Cronbach's alpha of 0.84 was found. A score of ≥ 16 has generally been used as indicative for clinically relevant depressive symptoms (Berkman *et al.*, 1986). We used this clinically significant level of depressive symptoms as our definition for depression.

All included respondents had a history of depressive symptoms during one or more of the first three LASA measurements cycles and had recovered at the fourth cycle. Between this fourth cycle (2001/2) and the fifth cycle (April 2005) two course types could be distinguished: continued recovery and recovery with recurrence of depressive symptoms at fifth cycle. Recurrence was defined applying a definition of a clinically relevant change in depressive symptoms. A relevant change was defined as an increase of at least five points on the CES-D and thereby crossing the cut-off score of 16. The difference of five points is in line with the definition of a reliable change (Jacobsen and Truax, 1991) which takes into account the reliability of the CES-D, and with the principle of a medium effect size (Cohen, 1988). A similar definition of a relevant change was used in earlier studies (Kennedy *et al.*, 1991; Beekman *et al.*, 1995d; Geerlings *et al.*, 1999, 2000; Steunenberg *et al.*, 2006).

Personality measurement

Personality characteristics were assessed with the NEO five factor Inventory (NEO-FFI; Costa and McCrae, 1992; Dutch version, Hoekstra *et al.*, 1996). The NEO-FFI is a shortened version of the NEO PI-R (Costa and McCrae, 1992). The inventory comprises 60 self-descriptive statements in which participants rate the extent to which each statement describes them. Item-scores range on a scale from strongly disagree (0) to strongly agree (4). The scores for each of the five scales are recoded into nine categories with a normal distribution indicating the relative score of an individual compared with the general population. The five dimensions of personality measured by this instrument are Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A) and Conscientiousness (C). The reliability coefficients (Cronbach's alpha) we found in our study for the five scales were the following: neuroticism, 0.75; extraversion, 0.68; openness, 0.60; agreeableness, 0.60; and conscientiousness, 0.74.

Covariates selected for this study were gender, age, the number of functional limitations, education level, marital status and level of depressive symptoms at time of recovery (this last covariate was measured in the fourth LASA cycle). These variables have been shown to be related to both depression and personality in previous studies. The number of functional limitations was assessed by three items: 'Can you climb up and down a staircase of 15 steps without stopping?', 'Can you cut your own toenails?' and 'Can you use your own or public transportation?' Response categories were 'yes, without difficulty', 'yes, with difficulty', 'not able without help' and 'cannot' (van Sonsbeek, 1988; Kriegsman *et al.*, 1997). A 'yes, without difficulty' response was scored as 0 and all others as 1. The number of functional limitations is a sum score of these three items.

DATA-ANALYSES

In order to investigate the strength of the association of recurrence of depression for each of the five personality characteristics univariate logistic regression analyses were performed. We compared the respondents with a recurrence of depression with the continued recovery group. The regression models were corrected for the potential effects of the covariates gender, age, number of functional limitations, educational level, marital status and level of depressive symptoms at the time of recovery. The statistical significance was set at $P = .05$.

Secondly, by means of univariate One-way ANOVA analyses of variance for each personality trait possible gender- or age-effects with recurrence of depression were investigated. These effects were investigated by testing the main effect for each pair of predictors as well as their interaction, while controlling for covariates.

RESULTS

Demographic and clinical characteristics of the study sample are presented in Table 1. The mean age of the respondents was 76 (SD = 6.9) years, 66% was female, 48% were not or no longer married, 56% had a low level of education and 76% reported one or more functional limitations. Of the 92 subjects with a history of depression 58 (63%) had a recurrence of depressive symptoms at the time of this fifth cycle.

Table 1. Distribution of demographic characteristics of the study sample ($n = 92$)

Characteristics	<i>N</i> (%)
Age	
65–74	39 (44)
75–84	38 (43)
85–95	12 (13)
Sex	
Women	61 (66)
Men	31 (34)
Marital status	
Not or no longer married	48 (52)
Married	44 (48)
Educational level	
Low	52 (56)
Middle	32 (35)
High	8 (9)
Number of functional limitations	
No	22 (24)
One	20 (22)
Two or more	50 (53)
Clinical Level of Depressive Symptoms	
No	34 (37)
Yes (Recurrence)	58 (63)
Cognitive functioning	
Normal	85 (92)
Impaired	7 (8)
Personality characteristics	<i>M</i> (SD)
Neuroticism	5.7 (1.7)
Extraversion	4.6 (1.9)
Openness to Experience	4.9 (1.7)
Agreeableness	5.8 (1.8)
Conscientiousness	4.5 (1.9)

M = Mean; *SD* = standard deviation.

Results revealed that all covariates, except age of respondent, were related to recurrence (see Table 2). Female gender (odds ratio (OR) = 3.1; 95% confidence interval (CI) 1.2–7.8); one or more functional limitation (OR = 1.8; 95% CI 1.2–2.6) and a higher level of depressive symptoms at the time of recovery (OR = 1.2; 95% CI 1.0–1.3) were significantly associated with the recurrence of depressive symptoms.

In additional analyses we investigated the strength of the association between the level of depressive symptoms at the time of the recovery (fourth cycle) and the chance of recurrence at time of the fifth cycle. The correlation between both measurements was $r = .39$ ($p < .001$). At the time of the recovery the mean score of the respondents who experienced a recurrence was 9.4 (CES-D; SD = 3.8). At the time of the recurrence this mean score has risen to 23 (SD = 5.1). Nearly 20% of the older persons experiencing a recurrence had an increase of more than 20 points on the CES-D between both measurements. The non-recurrent sample had a mean score of 7.0 (SD = 4.1) at the fourth cycle and 9.7 (SD = 4.4) at the fifth cycle. These results show that in the case of recurrence there was a large and clinically significant increase of depressive symptoms.

To investigate whether personality traits are associated with the recurrence of depression in later life, subjects who experienced a recurrence were compared on the five personality traits to those who had a continued recovery (Table 2). A high level of neuroticism (OR = 2.1; 95% C. I. 1.3–3.3) was significantly associated with the chance of recurrence. With each point increase on the Neuroticism-scale (0–9) the chance on recurrence doubled. For the other four personality traits no significant association was found with the recurrence of depressive symptoms.

Secondly, we investigated whether the strength of the associations between the five personality traits and the chance of recurrence of depressive symptoms differed for men and women or whether the strength of these associations differed with increasing age. Results showed that none of the interaction terms were significant (results not shown), indicating that the strength of the significant association in later life between neuroticism and the chance of recurrence does not differ for men and women and across age groups.

DISCUSSION

This study focused on the association between the big five personality traits (Costa and McCrae, 1978, 1980, 1992) and the recurrence of depression in later life. Once again, our results demonstrate the high risk of

Table 2. Univariate analyses of the association of the big five personality traits with depressive symptoms in later life while controlling for covariates

Covariates	B (S.E.)	Wald-statistic	OR (95% C.I.)
Gender	1.1 (.47)	6.2	3.1 (1.3–7.8)*
Age	0.40 (.32)	1.6	1.5 (.8–2.8)
Number of Functional limitations	0.56 (.20)	8.0	1.7 (1.2–2.6)**
Level of depressive symptoms at time of recovery	0.15 (.06)	6.9	1.2 (1.0–1.3)**
Level of education	0.20 (.34)	0.33	1.2 (.6–2.4)
Marital status	0.10 (.21)	0.23	1.1 (.7–1.6)
Personality Trait ^a			
High neuroticism	0.73 (.23)	9.5	2.1 (1.3–3.3)**
Low Agreeableness	–0.03 (.14)	0.03	1.0 (.8–1.3)
Low openness to experience	0.13 (.17)	0.7	1.1 (.8–1.6)
Low extraversion	–0.03 (.16)	0.03	1.03 (.8–1.4)
Low conscientiousness	–0.12 (.14)	0.8	1.1 (.9–1.5)

B = regression coefficient, S.E. = standard error; OR = odds ratio; 95% C.I. = 95% confidence interval.

^aCovariates entered were age, gender, number of functional limitations, educational level, marital status and level of depressive symptoms at time of recovery, level of education and marital status at time of interview.

* = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$.

recurrence in later life. In our study a recurrence rate of 63% was found. This figure is comparable to other studies on the course of late-life depression (Kennedy *et al.*, 1991; Judd, 1997; Reynolds *et al.*, 1998; Beekman *et al.*, 2002). Older people scoring high on neuroticism had a significantly greater chance of recurrence compared to older people with a medium or low score on this personality trait. This finding is in line with other studies showing that neuroticism scores predict subsequent episodes (Faravelli *et al.*, 1986; Duggan *et al.*, 1990; Surtees and Wainwright, 1996). The core of the personality trait neuroticism is conceptualized to be a sensitive to negative stimuli (Tellegen, 1985), thereby causing high trait scorers to experience a broad range of negative moods, including fear/anxiety, sadness/depression, guilt, hostility and self-dissatisfaction (Watson and Clark, 1984). A wide range of non-mood variables are related to this affective core, including negative cognitions (Clark *et al.*, 1990), somatic complaints (Watson and Pennebaker, 1989) and negativistic appraisal of self and others (Gara *et al.*, 1993). These characteristics form a highly pervasive dimension of subjective experience, and they are strongly related with the onset and course of depression.

For the other four personality traits, extraversion, openness to experience, agreeableness and conscientiousness, no significant relationship with recurrence of late life depression was found. Unfortunately no comparable study investigating the role of these four

personality characteristics is known to us. In studies with younger aged adults negative associations for extraversion and conscientiousness have been found (Watson and Clark, 1984, 1988) and openness to experience was found to be protective to recurrence (Wolfenstein and Trull, 1997; Bienvenu *et al.*, 2001b). Future studies should address these associations and, perhaps, more important, attempt to unravel the mechanisms through which neuroticism or other personality traits are related to recurrence of depression.

We also investigated whether the associations between the personality traits and the recurrence of depression differed for men and women or whether the strength of the associations differed with age. Not much is known about late life gender differences in the personality traits and their association with the course of depression. Our hypothesis that, among women, the influence of personality traits on recurrence of depression was stronger than in men was not supported by our findings. Studies in younger aged samples also did not support a sex difference in the link between personality and recurrence of depression (Katz and McGuffin, 1987; Fanous *et al.*, 2002). We did find a higher risk of recurrence for women, but no moderating role for gender in the association between neuroticism and risk of recurrence. Our results favour a model of main effects adding to each other rather than an interactive model. Those high in neuroticism tend to experience more distress across time, regardless of their gender. Furthermore, our results

revealed that there were no differences in the strength of the associations between the different age groups. These results support the notion that aging in itself does not affect the strength of the associations between personality and recurrence of depression. However, our study sample was rather small and our results may be the effect of a lack of power. Future research should aim at a larger sample size, especially more male and oldest old persons.

Some limitations of the present study have to be acknowledged. A first limitation concerns the loss of subjects. Loss to follow-up is an inevitable consequence of a longitudinal design among older persons covering a relatively long period of time. Moreover, in order to study the influence of personality on recurrence respondents were selected by having a clinically significant level of depressive symptoms at one or more of the first three LASA-measurements cycles, but were not depressed at the fourth cycle, which further diminished the study-sample. However, analyses of loss-to-follow up revealed that the sample has certainly not become a sample of 'healthy elderly'. The health risk factors functional limitations, chronic diseases and cognitive functioning were well represented in our study sample and we corrected for the influence of number of functional limitations on the investigated associations. After that, we still found a significant association between neuroticism and the recurrence of depression, which implies that the bias was probably limited. Therefore, although loss of subjects did occur, we think this did not greatly influence the results.

A second limitation is that depression was measured using a symptom rating scale, and the results pertain to clinically relevant depressive symptoms but not to depressive disorders as defined in the DSM classification (APA, 1994). DSM diagnoses were not available for all respondents with a clinically significant level of depressive symptoms (Geerlings *et al.*, 1999). It has been shown that depressive syndromes not fulfilling rigorous diagnostic criteria are highly prevalent in older adults, while their consequences are similar to those of major depressive illness (Wells *et al.*, 1997; Beekman *et al.*, 1997, 2002). We have taken care to limit the effect of small or random fluctuations around the threshold for clinically relevant depressive symptoms by applying a definition of a clinically relevant change.

Thirdly, despite the longitudinal nature of the LASA-study, this study is a cross-sectional study, in that personality was assessed at the same time as the recurrence of depression. However, we do have data about the 9-year course of depressive symptoms and

we do know all the included respondents had a history of depression during the first three measurement of LASA and were recovered at the fourth measurement. An enduring criticism of neuroticism as a potential risk factor or moderator of depressive symptoms is that because of neuroticism and depressive symptoms overlap, part of the effect of neuroticism may be an artefact of symptom overlap. There is still much debate about the degree to which fluctuating mood states can contaminate data on personality traits (Abrams *et al.*, 2004). Given the cross sectional nature of our study we cannot make causal inferences about the associations found. We minimized the potential contamination of personality measures by coexisting depressive symptoms by means of adding the level of depressive symptoms at time of recovery as a confounder to the model. In additional analyses, we investigated whether the result of the analyses was different when not correcting for the level of depressive symptoms at time of recovery. As the difference was negligible, our results are unlikely to be largely the product of contamination.

In conclusion, our results lend support to the association of neuroticism with recurrence of late-life depression. The strength does not seem to differ between both genders and age groups. This study is to our best knowledge, the first investigating this association in a community based sample of older adults, so we hope our results will be confirmed in future, longitudinal studies aimed at explaining the etiologic mechanisms.

ACKNOWLEDGEMENTS

LASA is primarily funded by the Ministry of Welfare, Health and Sports of The Netherlands.

REFERENCES

- Abrams KJ, *et al.* 2004. Trait and state aspects of harm avoidance and its implication for treatment in major depressive disorder, dysthymic disorder, and depressive personality disorder. *Psychiatr Clin Neurosci* **58**(3): 240–248.
- APA. 1994. *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition: DSM-IV. American Psychiatric Association: Washington DC.
- Anderson KW, McLean PD. 1997. Conscientiousness in depression: tendencies, predictive utility, and longitudinal stability. *Cognit Ther Res* **21**(2): 223–238.
- Beekman ATF, Limbeek, van J, Deeg DJH, Wouters L, van Tilburg W. 1994. Screening for depression in the elderly in the community: using the Center for Epidemiologic Studies Depression Scale (CES-D) in The Netherlands. *Tijdschr Gerontol Geriatr* **25**: 95–103.

- Beekman ATF, Deeg DJH, van Tilburg T, Smit JH, Hooijer Ch, van Tilburg W. 1995. Major and minor depression in later life: a study of prevalence and risk factors. *Journal of Affective Disorders* **36**: 65–75.
- Beekman ATF, Deeg DJH, Smit JH, van Tilburg W. 1995d. Predicting the course of depression in the elderly: results from a community-based study in the Netherlands. *Journal of Affective Disorders* **34**: 41–49.
- Beekman ATF, Deeg DJH, van Limbeek J, Braam AW, de Vries MZ, van Tilburg W. 1997. Criterion validity of the Center for Epidemiologic Studies Depression scale (CES-D): results from a community-based sample of older subjects in The Netherlands. *Psychol Med* **27**: 231–235.
- Beekman ATF, Geerlings SW, Deeg DJH, et al. 2002. The natural history of late-life depression: a 6-year prospective study in the community. *Archives General Psychiatry* **59**: 605–611.
- Berkman LF, Berkman CS, Kasl SV, et al. 1986. Depressive symptoms in relation to physical health and functioning in the elderly. *Am J Epidemiol* **124**: 372–388.
- Bienvenu OJ, Brown C, Samuels JF, et al. 2001b. Phobic, panic and major depressive disorders and the Five-factor model of personality. *J Nerv. Ment. Dis.* **189**: 154–161.
- Clark DA, Beck AT, Stewart B. 1990. Cognitive specificity and positive-negative affectivity: complementary or contradictory view on anxiety and depression? *J Abnorm Psychol* **99**: 148–155.
- Cohen J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence A. Erlbaum Associates: Hillsdale, NJ.
- Cole MG, Bellavance F, Mansour A. 1999. Prognosis of depression in elderly community and primary care populations: a systematic review and meta-analysis. *Am J Psychiatry* **156**: 1182–1189.
- Costa PT, McCrae RR. 1978. Objective personality assessment. In *The Clinical Psychology of Aging* (pp. 119–143), Storandt M, Siegler IC, Elias MF (eds). Plenum Press: New York.
- Costa PT, McCrae RR. 1980. Influence of extraversion and neuroticism on subjective well-being: happy and unhappy people. *Journal of Personality and Social Psychology* **38**: 668–678.
- Costa PT, McCrae RR. 1992. *Revised professional manual NEO Personality Inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI)*. Psychological Assessment Resources: Odessa.
- Deeg DJH, Knipscheer CPM, van Tilburg W. 1993. *Autonomy and well-being in the aging population: concepts and design of the Longitudinal Aging Study Amsterdam*. NIG-trend-studies No. 7. Netherlands Institute Gerontology, Bunnik, The Netherlands.
- Deeg DJH, van Tilburg TG, Smit JH, de Leeuw ED. 2002. Attrition in the longitudinal aging study Amsterdam: the effect of differential inclusion in side studies. *J Clin Epidemiol* **55**: 319–328.
- Duggan CF, Lee AS, Murray RM. 1990. Does personality predict long-term outcome in depression? *Br J Psychiatry* **157**: 19–24.
- Fanous A, Gardner CO, Prescott CA, Canero R, Kendler KS. 2002. Neuroticism, major depression and gender: a population-based twin study. *Psychol Med* **32**: 719–728.
- Faravelli C, Ambonetti A, Pallanti S, Pazzagli A. 1986. Depressive relapses and incomplete recovery from index episode. *Am J Psychiatry* **7**: 888–891.
- Flint AJ, Rifat SL. 1997. The effect of treatment on the two-year course of late-life depression. *Br J Psychiatry* **170**: 268–272.
- Gara MA, Woolfolk RL, Cohen BD, Goldston RB, Allen LA, Novalany J. 1993. Perception of self and other in major depression. *J Abnorm Psychol* **102**: 93–100.
- Geerlings SW, Beekman ATF, Deeg DJH, Smit JH, van Tilburg W. 1999. The center for epidemiologic studies depression scale (CES-D) in a mixed-mode repeated measurements design: sex and age effects in older adults. *Int J Meth of Psychiatr Res* **8**: 102–109.
- Geerlings SW, Beekman ATF, Deeg DJH, Tilburg W van. 2000. Physical health and the onset and persistence of depression in older adults: an eight-wave prospective community based study. *Psychol Med* **30**: 369–380.
- Goodwin RD, Gotlib IH. 2004. Gender differences in depression: the role of personality factors. *Psychiatr Res* **126**: 135–142.
- Hinrichsen GA, Hernandez NA. 1993. Factors associated with recovery from and relapse into major depressive disorder in the elderly. *American Journal of Psychiatry* **150**: 1820–1825.
- Hoekstra HA, Ormel H, De Fruyt F. 1996. *NEO Persoonlijkheidsvragenlijsten: NEO-PI-R, & NEO-FFI*. Swets, & Zeitlinger: Lisse.
- Jacobsen N.S, Truax P., 1991. Clinical significance: a statistical approach to defining meaningful change in psychotherapy research. *J Consult Clin Psychol* **59**: 12–19.
- Judd LL. 1997. The clinical course of unipolar major depressive disorders. *Arch Gen Psychiatry* **54**: 989–991.
- Katz R, McGuffin P. 1987. Neuroticism in familial depression. *Psychol Med* **17**: 155–161.
- Kennedy GJ, Kelman HR, Thomas C. 1991. Persistence and remission of depressive symptoms in late life. *Am J Psychiatry* **148**: 174–178.
- Kivela S-L, Viramo P, Pakkala K. 2000. Factors predicting the relapse of depression in old age. *Int J Geriatr Psychiatry* **15**: 112–119.
- Klein DN, Durbin CE, Shankman SA, Santiago NJ. 2002. Depression and personality. In: *Handbook of Depression*, Gotlib IH, Hammen CL (eds). Guilford Press: New York, NY; pp. 115–120.
- Kriegsman DMW, van Eijk JT, Penninx BW. 1997. Does family support buffer the impact of specific chronic diseases on mobility in community-dwelling elderly? *Disabil Rehabil* **19**: 71–83.
- Little JT, Reynolds CE, Perel JM, et al. 1996. How common is treatment-resistant geriatric depression? *AJGP* **153**: 1418–1422.
- Mitchell AJ, Subramaniam H. 2005. Prognosis of depression in old age compared to middle age: a systematic review of comparative studies. *Am J Psychiatry* **162**(9): 1588–1601.
- Murphy E. 1983. The prognosis of depression in old age. *Br J Psychiatry* **142**: 111–119.
- Mueller TI, Kohn R, Leventhal N, et al. 2004. The course of depression in elderly patients. *Am J Geriatr Psychiatry* **12**: 22–29.
- Ormel J, Rosmalen J, Farmer A. 2004a. Neuroticism: a non-informative marker of vulnerability to psychopathology. *Soc. Psychiatry Psychiatr. Epidemiol* **39**: 906–912.
- Penninx BWJH, van Tilburg TG, Kriegsman DMW, Deeg DJH, Boeke AJP, van Eijk JTM. 1997. Effects of social support and personal coping resources on mortality in older age: the longitudinal aging study Amsterdam. *Am J Epidemiol* **146**: 510–519.
- Post RM. 1992. Transduction of psychosocial stress into the neurobiology of recurrent affective disorder. *Am J Psychiatry* **149**(8): 999–1010.
- Radloff LS. 1977. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* **1**: 385–401.
- Reynolds CF, Dew MA, Frank E, et al. 1998. Effects of age at onset of first lifetime episode of recurrent major depression on treatment response and illness course in elderly patients. *Am J Psychiatry* **155**: 795–799.
- Segal ZV, Dobson KS. 1992. Cognitive models of depression: report from a consensus development conference. *Psychological Inquiry* **3**: 219–224.
- Sonsbeek van JLA. 1988. Methodological and substantial aspects of the OECD indicator of chronic functional limitations. *Maandbericht Gezondheid (CBS)* **88**: 4–17.
- Steunenber B, Beekman ATF, Deeg DJH, Kerkhof AJFM. 2006. Personality and the onset of depression in late life. *Journal of Affective Disorders, Jun*; **92**(2–3): 243–251.

- Surtees PG, Wainwright NW. 1996. Fragile states of mind: neuroticism, vulnerability and long-term outcome of depression. *Br J Psychiatry* **169**: 338–347.
- Teasdale JD. 1988. Cognitive vulnerability to persistent depression. *Cognition and Emotion* **2**: 247–274.
- Tellegen A. 1985. Structures of mood and personality and their relevance to assessing anxiety, with a emphasis on self-report. In *Anxiety and the Anxiety Disorders*, Tuma AH, Maser JD (eds). Erlbaum: Hillsdale, NJ; (pp. 681–706).
- Watson D, Clark LA. 1984. Negative affectivity: the disposition to experience aversive emotional states. *Psychol Bull* **96**: 465–490.
- Watson D, Clark LA. 1988. Positive and negative affect and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology* **97**: 346–353.
- Watson D, Pennebaker J. 1989. Health complaints, stress, and distress: exploring the central role of negative affectivity. *Psychol Rev* **96**: 234–254.
- Wells KB, Stewart AL, Hays RD, *et al.* 1997. The functioning and well-being of depressed patients: results from the medical outcomes study. *J Am Med Assoc* **262**: pp. 914–919.
- Wolfenstein M, Trull TJ. 1997. Depression and openness to experience. *J Pers Assess* **69**(3): 614–632.