

Screening for Depression in Well Older Adults: Evaluation of a Short Form of the CES-D

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We derived and tested a short form of the Center for Epidemiologic Studies Depression Scale (CES-D) for reliability and validity among a sample of well older adults in a large Health Maintenance Organization. The 10-item screening questionnaire, the CESD-10, showed good predictive accuracy when compared to the full-length 20-item version of the CES-D ($\kappa = .97, P < .001$). Cutoff scores for depressive symptoms were ≥ 16 for the full-length questionnaire and ≥ 10 for the 10-

item version. We discuss other potential cutoff values. The CESD-10 showed an expected positive correlation with poorer health status scores ($r = .37$) and a strong negative correlation with positive affect ($r = -.63$). Retest correlations for the CESD-10 were comparable to those in other studies ($r = .71$). We administered the CESD-10 again after 12 months, and scores were stable with strong correlation of $r = .59$. [Am J Prev Med 1994;10:77-84]

Screening for symptoms of depressed mood is an integral part of a comprehensive assessment of health status in older adults. Although the overall prevalence of depression among persons 65 years of age and older is not greater than those of other age groups,¹⁻¹⁰ depression is often correlated with a decline in physical health that occurs frequently in older age groups.^{5,6} For depression screening to be incorporated into survey research instruments and included as part of routine care of older adults in clinical settings, screening instruments must be (1) clinically meaningful for case finding; (2) reliable, valid, and sensitive to changes in the target population over time; (3) acceptable to the target population; and (4) brief enough to be administered in clinical settings or to be included in surveys.

The 20-item Center for Epidemiologic Studies Depression Scale (CES-D), originally developed for National Institute of Mental Health studies,^{1,11,12} has been judged among the best screening instruments for symptoms of depressed mood in older adults.^{5,6,9} It has high levels of reliability and validity to detect both clinical (by the criteria of *Diagnostic and Statistical Man-*

ual of Mental Disorders, third edition, revised [DSM-III]) and nonclinical symptoms of depressed mood for a wide range of study populations,^{1,10,11} including older adults.^{1-3,5-8,12-18}

Both survey researchers and clinicians often object to the length of the form, 20 items, for general use in survey instruments and in clinical settings. Shrout and Yager¹⁹ demonstrated that, in a population of adults ranging in age from 17 to 60 (mean age 38), the items in the CES-D could be reduced to five with a low impact on the reliability and validity of the instrument. Little is known, however, about the performance characteristics of any shortened form of the CES-D within a population of well adults older than 65. The purpose of this study was to assess the feasibility of using a shortened form of the CES-D to evaluate a relatively well population of older adults.

METHODS

Setting. This study was conducted at Group Health Cooperative (GHC) of Puget Sound during 1988 as part of a large senior health promotion demonstration project funded by the Centers for Disease Control and administered by the Center for Health Promotion in Older Adults at the University of Washington and the Center for Health Studies at GHC. GHC is a large prepaid health maintenance organization, which serves 350,000 enrollees in several counties surrounding Seattle, Washington. We describe this population in more detail elsewhere.²⁰ GHC has both Medicaid and Medicare enrollees. Persons 65 and older represent 11.4% of the GHC enrollment, or about 36,500

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persons. The GHC older adult population is similar in racial, ethnic, and gender distributions to the population of King County, Washington (the county that includes Seattle and the majority of GHC enrollees), except for a slightly higher median income (\$14,733) and education level (41% have more than a high school education).

Subjects and procedures. We selected a random sample of 4,250 GHC enrollees who were 65 years of age or older and who were assigned to one of three GHC clinics within 20 miles of the central hospital facility in Seattle as potential participants in the demonstration project. Because study interventions were designed for relatively well older adults, we asked the doctors of potential participants to identify any significant disability and other major physical or psychosocial problems prior to study recruitment. Eligible enrollees ($n = 3,943$) were mailed a 54-page baseline questionnaire including a 10-item version of the CES-D scale (CESD-10). A total of 1,542 enrollees (39%) returned the baseline questionnaire, and 1,206 of the questionnaires were complete enough to score the CESD-10 (78%). The CESD-10 response was decreased largely because of a questionnaire printing error in an early wave of mailed surveys. Table 1 lists the subject response rates in more detail.

One to four weeks after the baseline questionnaires were completed, a retest questionnaire was mailed to 102 randomly selected individuals, and 99 questionnaires were returned. The retest questionnaire included the original 20-item CES-D^{9,11} and questions that assessed self-reported health status (excellent, very good, good, fair, poor) and physical pain and stress experienced over the prior year on 11-point scales. Eighty-eight individuals completed sufficient numbers of CES-D items on both baseline and retest questionnaires to be included in the retest analyses.

A follow-up questionnaire that included the CESD-10 was mailed to all study participants 12 months after the baseline assessment. There was a 98% response rate for the 12-month follow-up, and 80% of respondents completed sufficient numbers of items to permit the CESD-10 to be scored. The CESD-10 was, therefore, available for three different time periods: at baseline, during a retest of 88 subjects less than one month later, and at one year.

CES-D. The original CES-D consists of 20 descriptive statements of depressed mood (see Appendix). The 10 items noted with asterisks in the Appendix were selected to compose the short form, CESD-10, by a research group at Stanford University. These items were selected through examination of the correlation of individual items to the total score. Items without

high correlations to the total score or items deemed redundant by high correlation to each other were eliminated to form the 10-item version. After item selection, the 20-item CES-D was administered to 50 patients with rheumatoid arthritis. The derived 10-item score from that administration was then compared to the 20-item score with satisfactory correlation results (James Fries, personal communication).

Subjects respond to the CES-D by rating each item in terms of the frequency that each mood or symptom occurred "during the past week" on a four-point scale, ranging from zero ("none of the time") to three ("most of the time"). A score is assigned by totaling all item scores (after reversing the positive mood items). The possible range of scores is 0–60 for the 20-item CES-D and 0–30 for the 10-item scale, with higher scores representing greater degrees of depressed mood. Berkman⁸ has found that the integrity of the original CES-D can be maintained with up to three missing responses by substituting the mean for the missing values and then totaling the score. We used a more conservative approach for the CESD-10, allowing only one missing response (nine of 10 items complete), and we substituted the mean for the one missing item.

Other instruments. The Positive Affect Scale is a 10-item scale that depicts positive aspects of life, such as "I wake up feeling rested and refreshed." It was developed for use in the Rand Health Insurance Study.^{21–24} Subjects mark each item on a seven-point scale ranging from zero (never) to six (almost always), and the total scores range from 0 to 60, with higher scores representing greater positive feelings.

The Pain Scale²⁵ allows a subject to quantify the amount of physical pain experienced in daily life by placing a mark on an 11-point scale, ranging from 0 (no pain) to 10 (a great deal of pain). The Stress Scale is scaled and scored in the same way as the Pain Scale and was derived from a stress "ladder," a visual aid for self-assessment of life stress.²⁶

Analysis

We conducted primary analyses using SPSS/PC.²⁷ Test/retest and comparisons of the original and 10-item CES-D were made using κ 's²⁸ or Pearson's correlation coefficients with two-tailed probabilities for statistical significance. Other selected items from the retest and the original baseline questionnaire were compared with the CESD-10 for validation purposes. Regression analysis was run using the 10-item total score as the dependent variable to assess the relative importance of the different items in predicting the total score. Principal component factor analysis was used to determine whether the CESD-10 contained the same positive and negative affect factors found during the original development of the CES-D.^{1,29} We computed 95% confidence intervals (CIs) by estimation, using programs written by Rothman and Boice.³⁰

RESULTS

The mean age of the 1,206 persons who completed all of the CESD-10 items in the baseline questionnaire was 72.1 (95% CI = 71.7, 72.4) compared to 75.5 (95% CI = 74.8, 76.2) for those who left some or all of the items blank. Persons who completed the instrument were more likely to be married—62.1% (95% CI = 59.3%, 64.8%) versus 42.2% (95% CI = 37.1%, 47.6%)—and male—41.5% (95% CI = 38.7%,

Table 1. Summary of response rate

	<i>n</i>	%
Doctor refusals	307	7
Questionnaires sent	3,943	100
Ineligible	123	3
Refusals	529	13
Nonresponse	1,749	44
Response	1,542	39
CESD-10 complete	1,206	30

Results provided from a randomized sample of 4,250 people.

44.3%) versus 28.9% (95% CI = 24.3%, 33.9%) than persons who did not complete the entire CESD-10. Among the persons who did not complete CESD-10, 35.4% (95% CI = 30.5%, 40.7%) rated their health as fair or poor versus only 13.9% (95% CI = 12.1%, 16.0%) among those who completed the questionnaire. No other demographic or medical characteristics differed strongly between respondents and nonrespondents.

The characteristics of the two study groups (baseline and retest) appear in Table 2. The age distribution of the 1,542 individuals in the analysis group ranged from 65 to 98 years of age with a mean of 72.8 years. Sixty-one percent had completed at least a high school education, with 54% attaining education beyond high school. Reported annual incomes ranged from under \$5,000 per household to over \$50,000, with the majority falling in the \$15,000 to \$24,000 range. The population was primarily Caucasian (83%) and married (58%), with 29% widowed, 8% divorced, 3% never married, and 1% separated. In the preceding 12 months, 82% of the total group reported no major illness, and chronic conditions of the subjects ranged from high blood pressure to stroke. The retest sample was drawn from this group and did not differ significantly in demographic variables.

Since the 20-item CES-D has demonstrated reliability and validity in a wide range of populations, it served as the primary criterion in assessing the CESD-10. A score of 16 or higher on the original CES-D was used to classify persons as having "depressive symptoms." The cutoff score of 16 has been validated with DSM-III criteria for clinical depression^{1,8,13,14,31} and has been used with other populations.^{3,4,15,16,18,32,33} Since the CESD-10 does not have an established cutoff score, two cutoff scores (eight and 10) were analyzed for a derived 10-item CESD from the retest administration of the 20-item CES-D. Table 3 presents these results. Using a cutoff of eight or greater resulted in 10 false positive scores compared to the 20-item CES-D, and a cutoff of 10 or greater resulted in one false negative for the retest sample. A comparison of the baseline CESD-10 with a cutoff of 10 or greater to the retest 20-item CES-D resulted in only one misclassification with a κ of .97.

Table 3. Agreement between the CESD-10 with cutoff scores of ≥ 8 and ≥ 10 positive responses and the 20-item CES-D with a cutoff score of ≥ 16 positive responses for 88 older adults

	20-item CES-D, cutoff ≥ 16	
	+	-
CESD-10, cutoff $\geq 8^a$		
+	26	10
-	0	52
CESD-10, cutoff $\geq 10^b$		
+	25	0
-	1	62

^a $\kappa = .75$.

^b $\kappa = .97$.

Since the CESD-10 was embedded in the full CES-D and subjects were being tested simultaneously by both versions, we infer that the shortened CESD-10 cannot be scored automatically at the arithmetic equivalent of a score of eight or greater.

The percentage of persons with depressed mood scores in the demonstration project appears in Table 4 for the two CESD-10 cutoff scores. Symptoms of depressed mood occurred more frequently among women of all ages and less frequently for both men and women 75 years of age or older. Using the cutoff score of eight or greater for the baseline CESD-10 resulted in an estimate of overall prevalence of 19.3%, which is similar to the 19.8% prevalence obtained for retest participants using the standard 20-item CES-D. Using a cutoff of 10 or more in the baseline administration of the CESD-10, however, yielded a prevalence estimate of only 11.7%.

We evaluated the reliability of the CES-D by comparing baseline and retest responses with the 10 items common to both instruments. Test-retest item correlations ranged from $r = .21$ to $r = .84$, with an overall score correlation of $r = .71$. The total score correlation is comparable to test-retest correlations

Table 2. Comparison of all study subjects and retest subjects

Variable	All subjects ($n = 1,542$)	Retest subjects ($n = 99$)
Mean age (years)	72.8 (72.5, 73.1) ^a	72.4 (71.4, 73.4)
Percentage women	61.2 (58.8, 63.6)	68.0 (58.0, 76.1)
Mean years of schooling past high school	3.7 (3.6, 3.8)	3.4 (3.1, 3.7)
Percentage married	58.5 (56.0, 60.9)	57.1 (46.7, 65.9)
Mean daily pain score (range 0-100)	23.1 (22.0, 24.3)	22.6 (18.4, 26.8)
Mean stress score (range 0-100)	37.9 (36.5, 39.3)	36.0 (30.5, 41.5)
Mean CESD-10 score (range 0-30)	4.7 (4.5, 5.0)	5.7 (4.9, 6.5)
Self-reported health status		
Percentage excellent	10.4 (158) ^b (8.9, 12.0)	10.4 (10) (5.8, 18.1)
Percentage very good	30.5 (465) (28.3, 32.9)	34.4 (33) (25.6, 44.3)
Percentage good	42.7 (651) (40.3, 45.2)	39.6 (38) (30.4, 49.6)
Percentage fair	14.8 (226) (13.1, 16.7)	14.6 (14) (8.9, 23.0)
Percentage poor	1.5 (23) (1.0, 2.3)	1.0 (1) (0.02, 5.7)
Missing answers	19	5

The retest was completed 22 days, on average, after the baseline questionnaire.

^aNumbers in parentheses indicate the 95% CI.

^b%(n), 95% CI.

Table 4. Estimated prevalence of depressive symptoms among 1,206 older adults measured by a 10-item version of the CES-D scale

	% with scores of		Mean CESD-10 score (n)	95% CI
	≥8 (n)	≥10 (n)		
Men				
65-74 years	15.8 (57)	9.4 (34)	4.4 (360)	4.0, 4.8
≥75 years	16.3 (23)	7.8 (11)	4.8 (141)	4.2, 5.4
Women				
65-74 years	19.6 (95)	12.3 (60)	5.0 (484)	4.6, 5.4
≥75 years	26.2 (58)	16.3 (36)	5.8 (221)	5.2, 6.4
Total	19.3 (233)	11.7 (141)	4.7 (1,206)	4.5, 5.0

of the developmental studies of the 20-item CES-D, which ranged from .45 to .70, with higher correlations for shorter time intervals between the test and retest.¹ Our study had a 22-day average interval between the baseline CES-D and retest.

A second method for evaluating reliability is to examine the extent to which classification of depressive symptoms changed between two administrations of the CESD-10 over a short time. Using a cutoff score of eight or greater as indicative of symptoms of depressive mood, we found two disagreements between administrations (below eight at baseline and above eight on the retest). Setting the cutoff score equal to 10, we found one disagreement, scoring 10 at baseline and below 10 on the retest.

The relationships between the CESD-10 total score, positive affect, self-reported health, and self-reported Pain and Stress Scales for the baseline sample ($n = 1,542$) appear in the top half of Table 5. Correlations in the lower portion of the table are from the retest administration of these same variables. The right-left diagonal shows test-retest reliability correlations for 99 subjects who participated in both the test and retest (88 subjects had complete baseline and retest CES-D scales).

Correlations between the CESD-10 and other psychosocial and health measures varied in a predicted fashion. As self-reported health status decreased (higher scores) and daily pain increased, depressive symptoms also increased. Self-assessed stress was more strongly associated with depressive symptoms ($r = .43$). Conversely, as positive affect scores decreased, depression scores increased ($r = -.63$).

Correlations of the 10 individual items to total scores ranged from $r = .45$ to $r = .71$ for the 20-item CES-D in the retest sample ($n = 99$) and from $r = .46$ to $r = .68$ for the baseline CESD-10 administration of 1,206 older adults. Regression analysis (Table 6) showed that five items accounted for 89% of the variance in overall CESD-10 score. A single item, "I felt depressed," loaded first and accounted for 45% of the variance. This item also loaded first in the factor analysis. Factor analysis yielded two sets of variables, "positive affect" (items H and L in Table 6 and the Appendix) and "negative affect" (items A, C, F, G, J, K, N, T in Table 6 and the Appendix) similar to factors in the original version by Radloff.¹ Ten items, however, are not sufficient to retain all four of the original 20-item CES-D factors (depressed affect, positive affect, somatic, and interpersonal).

We tested the stability of the CESD-10 by comparing the baseline and 12-month follow-up scores. The correlation was $r = .59$ ($P < .01$) for 1,006 persons for whom a complete baseline and follow-up instrument were available.

DISCUSSION

This study was limited by a low response rate to the baseline questionnaire and by incomplete CES-D instruments. Other investigators surveyed a random sample of 250 nonrespondents and addressed the problem of response bias. These analyses are

Table 5. Correlations among health, pain, depression, stress, and positive affect in 1,542 older adults and a retest sample of 99

Retest sample (n = 99)	Baseline (N = 1,542)				
	Health	Pain	Stress	CES-D	Positive affect
Health	.78 (test/retest)	.19	.08	.37	-.29
Pain	.61	.73 (test/retest)	.10	.30	-.03 ($P = .094$)
Stress	.26 ($P = .009$)	.35	.81 (test/retest)	.43	-.05 ($P = .064$)
20-item CES-D P	.36	.36	.43	.71 (test/retest)	-.63

Pearson correlation coefficients. Two-tailed probability (P) less than .005 for all cells, except where noted. Correlations above the test/retest diagonal are for the total sample; below the diagonal are for the retest sample.

Table 6. Regression analysis results for 1,206 older adults

Items	R ²	P value	Order of entry
(A) I was bothered . . . .	.99	.000	9
(E) I had trouble . . . .	.93	.000	6
(F) I felt depressed ^a	.45	.000	1
(G) I felt everything . . . .	.97	.000	8
(H) I felt hopeful ^a	.81	.000	4
(J) I felt fearful	1.00	—	10
(K) My sleep was ^a	.88	.000	5
(L) I was happy ^a	.63	.000	2
(N) I felt lonely . . . .	.95	.000	7
(T) I could not get ^a	.75	.000	3

^aThese five items account for 89% of the variance in CESD-10 total score.

reported in more detail elsewhere.³⁴ Of the 250 subjects, 25 subjects were found to be too ill to be interviewed, six had died, 12 could not be interviewed because of language or hearing problems, and 22 refused to be interviewed. A total of 175 (70%) were interviewed about the reasons for not responding. The most common reason for nonresponse was a decision not to participate in the health promotion trial for which the instrument was a baseline screening tool. In general, nonrespondents were more often of lower socioeconomic status and reported more smoking and lower self-reported health, but they showed little difference in terms of chronic diseases or reported disability days during the preceding year. Since some of the characteristics that differed are more often associated with depressive symptoms, the effect of this response bias may have lowered the overall prevalence of depressive symptoms in this study. The results do represent older adults willing to participate in health promotion activities but may not be generalizable to other, frailer populations.

The overall response rate of this study is similar to those from other recent surveys among older adults.³⁵ In a very similar postal survey invitation for a health promotion study conducted by Leigh and Fries, 39% of 4,000 retirees of the Bank of America completed a baseline and 12-month follow-up.³⁶ This "healthy participant effect" limits any inferences about the CESD-10 to less healthy older adults but does not restrict its use in research surveys that are universally affected by the same bias.

Our study does not compare the CESD-10 with clinical diagnoses of depression. Although the results are consistent with reports of the longer instrument, which has been validated against clinical diagnoses,^{3,4,6-8,13-16,31,32} this shorter instrument will benefit from comparisons with clinical criteria of depression (DSM-III, Schedule for Affective Disorders and Schizophrenia [SADS], Research Diagnostic Criteria [RDC], Diagnostic Interview Survey [DIS]) and should be tested in other populations of older adults.

In a review of the epidemiology of depression among older adults,⁵ Blazer cautioned that community surveys may overestimate the prevalence of depression, since they are more likely to find dysthymia (long-term cases) and periodic or cyclothymic disorders. Depression in later years may be a reaction to specific events, such as the death of a spouse,^{15,17,37} and in such cases the episode is finite. Furthermore, the increase in assessed

mood depression may be due to an increase in somatic symptoms in later life, causing an inappropriate loading toward depression. Our results confirm that poor health and physical pain are correlated with depressed mood.

Several studies have compared results from the CES-D to the SADS and RDC^{3,4,16} and recommend that the CES-D be used for screening only, the purpose for which it was developed, rather than as a diagnostic test, because of low sensitivity (.59 to .64) at the usual cutoff score of 16. In a recent study of older African Americans, Brown et al. reported that only 11% of persons scoring 16 or more points on the 20-item CES-D met the criteria for clinical depression with the DIS.¹⁸ However, by detecting the presence of depressive symptoms rather than just making a strict clinical diagnosis of depression, the CES-D is considered a valid screening tool.

Table 7 summarizes research among older adults with the CES-D for the prevalence of depressive symptoms. Population prevalences of depression vary according to different demographic groupings and CES-D cutoff values from a low of 11% among men^{7,8} to nearly 26% among African Americans.¹³ In the results of a longitudinal study from National Health and Nutrition Examination Survey data on 960 adults who survived at least 10 years, prevalence of depression was lower (2.3% to 10.8%) for two score cutoff values.³¹

New prevalence estimates from our study using the CESD-10, with cutoff scores of eight and 10, yielded prevalences of 19.3% and 11.7% (Table 4), respectively. These results are remarkably consistent with results from using the 20-item CES-D with other populations of older adults. These findings do suggest that a cutoff score should be selected to be compatible with the purpose of screening. With half the original items of the CES-D, there appears to be a problem with "false positives," at least among relatively well older adults. Reducing the number of items still further may yield a satisfactory statistical result (e.g., five items explain 89% of the score variance), but this may not be compatible with good "diagnostic" properties.

The CESD-10 scores were fairly stable over one year, consistent with the report of Hankin and Locke on a wide age range of patients in a prepaid group practice.³³ In addition, the CESD-10 showed good validity against other measures of emotional and physical discomfort, suggesting that it measures more universal distress and symptoms of depression and not only strict clinical depression, as discussed in other research

Table 7. Prevalence of depressive symptoms among older adults

Author	Age groups	CES-D cutoff	% of women	% of men	% of Total
Berkman ⁸	≥65	≥16	19.2	11.3	16.5
Brown ¹⁸					
African Americans	≥65	≥16		25.3	
Comstock ¹³					
African Americans				25.6	
Caucasians				12.3–18.1	
Costa ³²	≥55	≥16	7.7–10.8	2.3–5.6	
	≥20		3.6–7.4	2.3–5.6	
Eaton ³¹	65–74	≥16		14.8	
Frerichs ¹⁴	≥65			16.7	
Himmelfarb ⁶	≥50	≥20		14.0	
Kennedy ¹⁵	≥65	≥16	19.9	11.1	16.9
Murrell ⁷	55–59	≥20	19.0	13.2	
	60–64		15.0	11.1	
	65–74		14.5	12.9	
	≥75		26.0	17.5	
Andresen ^a	65–74	≥8	19.6	15.8	
	≥75	≥8	26.2	16.3	
	65–74	≥10	12.3	9.4	
	≥75	≥10	16.3	7.8	

^aCESD-10 scores; a cutpoint of ≥8 is equivalent to a cutoff of ≥16, and ≥10 to ≥20.

using the CES-D.^{37,38} The results of the factor analysis indicate that both positive and negative affect retain their discriminant functions.³⁹

Shrout and Yager¹⁹ explored shortening the CES-D to some subset of items, concluding that neither sensitivity nor specificity of the score was compromised when as few as five items were used. The instrument was administered only once, and it is unclear if five items retain stable results over time. However, five items of the CES-D were incorporated into a brief combination screening instrument for depression with good predictive ability.⁴⁰ Other investigators have experimented with shorter CES-D versions (10, 11, 13, and 14 items) and variable scoring schemes with older adults.^{41,42} Our study also supports the use of a shorter version for screening purposes among older adults in health promotion settings.

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APPENDIX

Center for Epidemiologic Studies Depression (CES-D) Scale

- (A) I was bothered by things that usually don't bother me.^a
- (B) I did not feel like eating; my appetite was poor.
- (C) I felt I could not shake off the blues even with help from my family or friends.
- (D) I felt that I was just as good as other people.
- (E) I had trouble keeping my mind on what I was doing.^a
- (F) I felt depressed.^a
- (G) I felt that everything I did was an effort.^a
- (H) I felt hopeful about the future.^a
- (I) I thought my life had been a failure.
- (J) I felt fearful.^a
- (K) My sleep was restless.^a
- (L) I was happy.^a
- (M) I talked less than usual.
- (N) I felt lonely.^a
- (O) People were unfriendly.
- (P) I enjoyed life.
- (Q) I had crying spells.
- (R) I felt sad.
- (S) I felt that people dislike me.
- (T) I could not get "going."^a

^aIndicates items on the CESD-10.

REFERENCES

1. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Measurement* 1977;1:385–401.

2. Weissman MM, Myers JK. Rates and risks of depressive symptoms in a United States urban community. *Acta Psychiatr Scand* 1978;57:219-31.
3. Myers JK, Weissman MM. Use of a self-report symptom scale to detect depression in a community sample. *Am J Psychiatry* 1980;137:1081-4.
4. Boyd JH, Weissman MM, Thompson WD, Myers JK. Screening for depression in a community sample: understanding the discrepancies between depression symptom and diagnostic scales. *Arch Gen Psychiatry* 1982;39:1195-1200.
5. Blazer D. The epidemiology of depression in late life. In: Breslau L, Haug M, Eds. *Depression and aging: causes, care, and consequences*. Berlin: Springer-Verlag; 1983:30-50.
6. Himmelfarb S, Murrell SA. Reliability and validity of five mental health scales in older persons. *J Gerontol* 1983;38:333-9.
7. Murrell SA, Himmelfarb S, Wright K. Prevalence of depression and its correlates in older adults. *Am J Epidemiol* 1983;117:173-85.
8. Berkman LF, Berkman CS, Kasl S, et al. Depressive symptoms in relation to physical health and functioning in the elderly. *Am J Epidemiol* 1986;124:372-88.
9. Radloff LS, Teri L. Uses of the Center for Epidemiological Studies Depression Scale with older adults. In: Brink TL, ed. *Clinical gerontology: a guide to assessment and intervention*. New York: Haworth Press; 1986:119-35.
10. Shinar D, Gross CR, Price TR, et al. Screening for depression in stroke patients: the reliability and validity of the Center for Epidemiologic Studies Depression Scale. *Stroke* 1986;17:241-5.
11. Radloff LS, Locke BS. The community mental health assessment survey and the CES-D Scale. In: Weissman MM, Myers JK, Ross CE, eds. *Community surveys of psychiatric disorders*. New Brunswick: Rutgers University Press; 1986:177-89.
12. Weissman MM, Sholomskas D, Pottenger M, Prusoff BA, Locke BZ. Assessing depressive symptoms in five psychiatric populations: a validation study. *Am J Epidemiol* 1977;106:203-14.
13. Comstock GW, Helsing KJ. Symptoms of depression in two communities. *Psychol Med* 1976;6:551-63.
14. Frerichs RR, Aneshensel CS, Clark VA. Prevalence of depression in Los Angeles County. *Am J Epidemiol* 1981;113:691-9.
15. Kennedy GJ, Kelman HR, Thomas C, Wisniewski W, Metz H, Bijur PE. Hierarchy of characteristics associated with depressive symptoms in an urban elderly sample. *Am J Psychiatry* 1989;146:220-5.
16. Roberts RE, Vernon SW. The Center for Epidemiologic Studies Depression Scale: its use in a common sample. *Am J Psychiatry* 1983;140:41-6.
17. Oxman TE, Berkman LF, Kasl S, Freeman DH, Barrett J. Social support and depressive symptoms in the elderly. *Am J Epidemiol* 1992;135:356-68.
18. Brown DR, Milburn NG, Gary LE. Symptoms of depression among older African Americans: an analysis of gender differences. *Gerontologist* 1992;32:789-95.
19. Shrout D, Yager TJ. Reliability and validity of screening scales: effect of reducing scale length. *J Clin Epidemiol* 1989;42:69-78.
20. Durham M. *GHC senior survey*. Seattle: Center for Health Studies, Group Health Cooperative; 1987.
21. Stewart AL, Ware JE, Brook RH, Davies-Avery A. Conceptualization and measurement of health for adults in the Health Insurance Study: Vol. II, Physical Health in terms of functioning. Santa Monica: Rand Corporation; 1978 (R-1987/2-HEW).
22. Ware JE, Johnston SA, Davies-Avery A, Brook RH. Conceptualization and measurement of health for adults in the Health Insurance Study: Vol. III. Mental health. Santa Monica: Rand Corporation; 1979 (R-1987/3-HEW).
23. Ware JE, Brook RH, Davies-Avery A, et al. Conceptualization and measurement of health for adults in the Health Insurance Study: Vol. I, Model of health and methodology. Santa Monica: Rand Corporation; 1980 (R-1987/1-HEW).
24. Ware JE. How to score the Health Insurance Experiment Mental Health Index and subscales (memorandum). Santa Monica: Rand Corporation; January 5, 1983.
25. Scott J, Huskisson EC. Graphic representation of pain. *Pain* 1976;2:175-84.
26. Bailey GA, Koepsell TD, Belcher DW. Reliability of two measures of life stress among outpatients at a Veterans hospital. *Am J Public Health* 1984;74:723-4.
27. SPSSPC+ V2.0. Chicago: SPSS Inc.; 1988.
28. Fleiss JL. *Statistical methods for rates and proportions*. 2nd ed. New York: Wiley & Sons; 1981:212-36.
29. Noris M, J/SPSS Inc., SPSS/PC+ Advanced Statistics V2.0, Chicago: SPSS Inc.; 1988.
30. Rothman KJ, Boice JD. *Epidemiologic analysis with a programmable calculator*. Chestnut Hill, Massachusetts: Epidemiology Resources Inc.; 1982.
31. Eaton WW, Kessler LG. Rates of symptoms of depression in a national sample. *Am J Epidemiol* 1981;114:528-38.
32. Costa PT, McCrae RR, Locke BZ. Personality factors. In: Coroni-Huntley JC, Huntley RR, Feldman JJ, eds. *Health status and well-being of the elderly*. New York: Oxford University Press; 1990:210-20.
33. Hankin JR, Locke BZ. The persistence of depressive symptomatology among prepaid group practice enrollees: an exploratory study. *Am J Public Health* 1982;72:1000-7.
34. Wagner EH, Grothaus LC, Hecht JA, La Croix AZ. Factors associated with participation in a senior health promotion program. *Gerontologist* 1991;31:598-602.
35. Carter WB, Elward K, Malmgren J, Martin ML, Larson E. Participation of older adults in health programs and research: a critical review of the literature. *Gerontologist* 1991;31:584-92.
36. Leigh JP, Fries JF. Health habits, health care use and costs in a sample of retirees. *Inquiry* 1992;29:44-54.
37. Harlow SD, Goldberg EL, Comstock GW. A longitudinal study of risk factors for depressive symptomatology in elderly widowed and married women. *Am J Epidemiol* 1991;134:526-38.
38. Breslau N. Depression symptoms, major depression, and generalized anxiety: a comparison of self-reports on CES-D and results from diagnostic interviews. *Psychiatry Res* 1985;15:219-29.
39. Orme JG, Reis J, Herz E. Factorial and discriminant validity of the Center for Epidemiologic Studies Depression (CES-D) Scale. *J Clin Psychol* 1986;42:28-33.
40. Burnam MA, Wells KB, Leake B, Landsverk J. Development of a brief screening instrument for detecting depressive disorders. *Med Care* 1988;26:775-89.

41. Kessler RC, Foster L, Webster PS, House JS. The relationship between age and depressive symptoms in two national surveys. *Psychol Aging* 1992;7:119-26.

42. Kohout FJ, Berkman LF, Evans DA, Coroni-Huntley J. Two shorter forms of the CES-D Depression Symptoms Index. *J Aging Health* 1993;5:179-93.