

Symptoms of Depression in the Oldest Old: A Longitudinal Study

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This study examined depressive symptoms in a population-based, longitudinal sample of people aged 80 and older to determine initial prevalence of depressive symptoms and changes over time. Depressive symptomatology was assessed with the Center for Epidemiologic Studies–Depression scale (CES–D). The sample was drawn from the OCTO–Twin study, which examined 702 Swedish twins over age 80 in which both members of the pair were still surviving. For the present study, one member of each twin pair was randomly selected, resulting in a sample of 351. A comprehensive biobehavioral assessment was conducted at three time points over 4 years. Depressive symptoms were initially relatively low and decreased significantly between Wave 1 and Wave 2. At Wave 3, depressive symptoms increased slightly but not significantly. Participants who received a dementia diagnosis at some point in the study did not differ significantly on initial CES–D scores when compared to those participants who never received such a diagnosis. Lack of well-being, as opposed to negative affect, was the biggest contributor to the overall depression score at each of the three waves of measurement. Predictors of negative affect for this sample included activities of daily living, subjective health, and performance on the cognitive test, block design. None of these predictors were significant for lack of well-being.

DEPRESSIVE symptoms in very old people—age 80 and over—were explored in this study. Depression is a major health and common mental health problem among the elderly population, yet few studies of depression focus on the very old, despite the fact that the oldest old make up the fastest growing age group in the United States and many European countries (Treas, 1995).

The relationship between aging and depression is ambiguous. When studies focus on clinically diagnosed depression, using *DSM-III-R* or *DSM-IV* criteria (American Psychiatric Association, 1987, 1994), prevalence rates are usually lower for major depressive disorder in older populations (Girling et al., 1995). By contrast, when depressive symptoms are assessed as opposed to diagnoses, some studies report a curvilinear relationship with age. Newman (1989) found that symptom scales yield a negative linear and a positive curvilinear trend, with higher depression scores in young adulthood, lower in middle age, and higher scores in the oldest age cohorts. Kessler, Foster, Webster, and House (1992) replicated the curvilinear age curves with two large national surveys in the United States using an abbreviated form of the Center for Epidemiologic Studies–Depression (CES–D) scale (Radloff, 1977).

Gatz, Johansson, Pedersen, Berg, and Reynolds (1993) found both linear and curvilinear relations of depressive symptoms and age using the CES–D in a Swedish sample aged 29 to 95. There was some elevation of symptoms among adults in their 30s, lower scores in the 40s, and then a gradual increase decade by decade, until there was a marked elevation in very old age. Gatz and colleagues (1993), however, found that age differences were less pronounced when examining the percentage of individuals scoring above the clinical cutoff score of 16 on the CES–D.

In other words, the proportion of people meeting the CES–D cutoff criterion does not rise as rapidly with age as the overall symptom score.

The association between depressive symptoms and age in older adults has been explored in a number of studies. Mirowsky and Ross (1992) examined the influence of decreased survival among the most disadvantaged individuals, increased physical dysfunction, erosion of personal control, and changes in social status over the life cycle (i.e., gains and losses of marital partners, employment, and income) as possibly accounting for age differences in symptoms of depression. Similarly, Blazer, Burchett, Service, and George (1991) controlled for biological factors and stressful life events, including chronic illness, physical disability, reduced income, and loss of close relatives. Both studies reported that the covariates could largely explain cross-sectional age differences in depressive symptoms. In addition, Mirowsky and Ross (1992) inferred an underlying benefit of increased maturity to explain why average levels of depression were not more responsive to accelerating declines and losses.

Factors identified in the etiology of depression are not necessarily inherent to the aging process (Roberts, Kaplan, Shema, & Strawbridge, 1997). In other words, chronological age per se is not the critical variable for depressive symptoms in later life. When the aging pattern was defined primarily by negative changes in health and psychological functioning, these changes were associated with depression. Risk factors such as poor physical health, disability, and social isolation account for higher depression scores among older persons. In turn, high depressive symptoms may be associated with an increased risk of subsequent onset of disability in activities of daily living (Bruce, Seeman, Merrill, &

Blazer, 1994). This implies that healthy, normally functioning, older adults may be at no greater risk of depression than younger adults. It also suggests that intervention strategies that modify the risk factors could lower rates of depression (Roberts et al., 1997).

Along with examining the rates of depression in later life, an important question is whether or not there are qualitative differences in the experience of depressive symptoms in very old age. In their study of Swedish young and old adults, Gatz and coworkers (1993) found that four items of the CES-D indicating lack of well-being were endorsed to a similar degree by every age group except the oldest. These four items include the statements: *I felt that I was just as good as other people*; *I felt hopeful about the future*; *I was happy*; and, *I enjoyed life (during the past week)*. The oldest age group endorsed fewer statements of happiness or well-being. Gatz and colleagues (1993) hypothesized that this pattern of response might indicate that depression represents a different kind of experience for older adults. Lack of well-being may become a more salient feature of depression for older adults rather than negative symptoms such as sadness and tearfulness.

A particular issue when studying the oldest old is high rates of attrition, which could affect estimates of rates of depression. Blazer and Koenig (1996) cite various studies indicating that there are higher rates of mortality for depressed elderly people (men in particular) with concurrent physical health problems. This relationship is found in clinical samples after important covariates have been controlled. Thus, people surviving into late life may be less likely to be depressed than other age groups, when morbidity and mortality are controlled. There may be other sources of selective attrition from longitudinal samples, besides mortality, that are related to depression. People having higher depressive symptoms may be more likely to refuse to continue in longitudinal samples. Another possible influence on changes in depressive symptoms over time is comorbidity with dementia. In a review of several longitudinal studies, Nussbaum (1997) found evidence that depression in some older adults might represent an early marker for development of progressive dementia. As dementia progresses, however, reports of depressive symptoms decrease.

This study examined rates of depressive symptoms across three waves in a study of the very old (aged 80 and above), both initially and over time. Sociodemographic characteristics, activities of daily living (ADLs), subjective health, loneliness, and cognition were examined as potential correlates of depressive symptomatology. We also investigated sample attrition and comorbidity of dementia and depression for their possible relation to depressive symptoms. It was hypothesized that lack of well-being as opposed to negative affect would be a more salient feature of the depressive symptomatology expressed by these older people.

METHODS

The sample consisted of participants in the OCTO-Twin study, a longitudinal study of intact pairs of same-sex twins, aged 80 and older, living in Sweden. This population-based sample was drawn from the Swedish Twin Registry, which records all twins born in the country. A total of 549 pairs of

like-sex twins with birth years of 1913 and earlier were identified. Of the initial 549 intact twin pairs, 351 (702 individuals) were investigated. For the current study, a subsample was drawn from the OCTO-Twin study with one individual randomly selected from each pair yielding a sample of 351 individuals.

Information on depressive symptoms was available for 275 (78%) of the 351 people interviewed at baseline (Table 1). Failure to complete this part of the interview was mainly due to the frailty of respondents. A comparison of people who completed the CES-D at baseline and those who did not shows that the two groups differed on measures of age, ability to perform ADL tasks, and having a diagnosis of dementia. Participants completing the CES-D were younger, had better ADL performance, and were less likely to have a diagnosis of dementia (Table 2).

The study comprised a baseline measurement (Wave 1) and two follow-ups two years apart (Wave 2 and Wave 3). Of the 275 people with Wave 1 depression data, 218 (79%) completed the CES-D at Wave 2, 27 (10%) were deceased, 17 (6%) failed to complete the CES-D, and 13 (5%) refused to continue to participate in the study. At Wave 3, 164 (75%) of the sample from Wave 2 completed the CES-D, 35 (16%) were deceased, 15 (7%) were unable to complete the CES-D, and 4 (2%) refused to continue to participate in the study. Failure to complete the CES-D at Waves 2 and 3 was mainly due to frailty of the participants. Sources of attrition in the longitudinal sample are summarized in Table 1.

Demographic characteristics of the sample at baseline ($N = 275$) are shown in Table 3. The average age of the participants was 83.18 years ($SD = 2.91$). Nearly two thirds (65.8%) of the participants were women. Eighty-nine participants (32.4%) were married at baseline, 37 (13.5%) were unmarried, 141 (51.3%) were widowed, and 8 (2.9%) were divorced. Educational achievement was on average 7.12 years ($SD = 2.14$), which is typical of older cohorts in Sweden. Most of the participants lived independently (90.2%, $n = 248$) and alone (58.5%, $n = 161$).

Procedures and Measures

Participants were interviewed in their place of residence. Comprehensive batteries of structured assessments were administered to obtain information on the following: background information, health, memory and cognitive ability, functional capacity, contacts and friends, ADL capacity, personality, personal control and psychological well-being, and disability. In addition, an independent diagnosis of dementia using *DSM-III-R* criteria was made on each participant.

Table 1. Sample With Data on Depressive Symptoms and Sources of Attrition Across Three Waves

	Wave 1	Wave 2	Wave 3
Total interviewed	351	—	—
Completed CES-D ^a	275	218	164
Missing data for CES-D	76	17	15
Deceased	0	27	35
Refusals	0	13	4

^aCenter for Epidemiologic Studies–Depression scale.

Table 2. Comparison of Participants Completing Wave 1 CES-D With Those Who Did Not

Variable	Participants With CES-D (n = 275)	Participants Without CES-D (n = 76)	Test of Difference
Participant Age at Interview			
M	83.18	84.99	$t(100.4) = -3.94^{**}$
SD	2.91	3.69	
Participant Gender			
Female	181 (65.8%)	53 (69.7%)	$\chi^2(1) = .41$
Male	94 (34.2%)	23 (30.3%)	
Marital Status			
Currently married	89 (32.4%)	17 (22.4%)	$\chi^2(1) = 1.08$
Not married	186 (67.6%)	49 (64.5%)	
Education			
M	7.12	6.93	$t(328) = .62$
SD	2.14	2.19	
Activities of Daily Living ^a			
M	34.56	23.40	$t(45.9) = 5.71^{***}$
SD	6.80	12.54	
Diagnosis of Dementia			
None or uncertain	265 (96.4%)	43 (56.5%)	$\chi^2(1) = 87.67^{***}$
Probable	10 (3.6%)	33 (43.4%)	

^aHigher scores on activities of daily living indicate higher functioning.

** $p < .01$; *** $p < .001$.

Measures were selected from these assessments to examine their potential relationship to depression.

Depressive symptoms.—Depressive symptoms were measured using the 20-item CES-D scale (Radloff, 1977). Developed from samples in the United States, the CES-D has been found to have similar psychometric properties when used in translation into Swedish (Gatz et al., 1993). The CES-D is not intended for use in making clinical diagnoses, but rather as a way to identify groups that are at risk for depression and to study the relationship between depressive symptoms and other variables.

Participants are asked about the frequency with which they experienced the 20 items during the past week. The items are rated on a 4-point scale, ranging from “rarely or none of the time” to “most or all of the time.” Four positive items are reverse scored, so that higher scores (lack of well-being) indicate more depressive symptomatology.

Three scores are reported: (a) the total score of depressive symptoms, a sum of all 20 items; (b) the sums of the 16 negative items and 4 positive items, reflecting depressed mood and lack of well-being, respectively; and (c) the proportion of the sample that scores 16 and above, indicating a possible case of depression in a community population of older adults (Lewinsohn, Seeley, Roberts, & Allen, 1997).

There was high internal consistency of the CES-D in the present sample, as measured by Cronbach's alpha for all three waves (range 0.87–0.90). Construct validity is good in both clinical and community samples (Avlund, Kreiner, & Schultz-Larsen, 1996; Heikkinen, 1982).

Sociodemographic characteristics.—The following sociodemographic characteristics were selected for their pos-

Table 3. Demographic Characteristics of the Participants

Variable	Sample at Baseline (N = 275)
Participant Age at Interview	
M	83.18
SD	2.91
Participant Gender	
Female	181 (65.8%)
Male	94 (34.2%)
Marital Status	
Married	89 (32.4%)
Unmarried	37 (13.5%)
Widowed	141 (51.3%)
Divorced	8 (02.9%)
Children and Grandchildren	
Yes	218 (79.6%)
No	56 (20.4%)
Education	
M	7.12
SD	2.14
Work/Professional Background ^a	
Social group 1	37 (13.6%)
Social group 2	99 (36.3%)
Social group 3	137 (50.2%)
Living Arrangement	
Lives alone	161 (58.5%)
Lives with others	108 (39.3%)
Lives in institution	6 (02.2%)
Housing	
Independent	248 (90.2%)
Service apartment	18 (06.5%)
Institutional	9 (03.3%)

^aSocial group codes are in accordance with the Swedish Election Statistics, Socialforskningsinstitutet. Group 1 is the highest level.

sible relationship to depression: age, gender, marital status, education, and living arrangement. Marital status was treated as a dichotomous variable in the analyses; (1) currently married at Wave 1, and (2) not married, which included widowed and divorced.

Dementia diagnosis.—Dementia may have a relation to depression scores. People with early, mild dementia may have elevated depression symptoms, whereas in later stages depressive symptoms are generally lower (Nussbaum, 1997). For that reason, we considered whether participants met criteria for a diagnosis of dementia. A panel of three clinicians made independent diagnoses using DSM-III-R criteria. Diagnosis was based on review of results of a battery of neuropsychological tests, a neuropsychological interview with an informant, and medical records. Disagreements were addressed through a consensus conference. Diagnosis of dementia was made independently of information from the CES-D.

Activities of daily living.—ADLs were evaluated along two dimensions, personal activities of daily living (PADLs) and instrumental activities of daily living (IADLs). These two dimensions are aspects of disability (i.e., difficulty doing activities to meet daily environmental demands) as opposed to functional limitations (Verbrugge & Jette, 1994).

- (a) *Personal activities of daily living.* Participants rated their ability to perform the following six self-care tasks: getting up from and going to bed; taking a bath or shower; keeping clean and tidy, combing, shaving, etc.; dressing and undressing; going to the toilet; and eating. Ratings were on a 4-point scale ranging from being able to perform the task independently to not being able to do the task at all.
- (b) *Instrumental activities of daily living.* Participants rated their performance on seven IADLs: housework, including cleaning and laundry; making the bed; cooking; shopping for food, etc.; going to places that can't be reached by foot; handling economy, postal and bank business; and using the telephone. Ratings were on a 4-point scale ranging from being able to perform the task independently to not being able to do the task at all.

These two scales are highly correlated and were summed to create a single ADL score. Cronbach's alpha for the three waves ranged from 0.92 to 0.95. Higher scores indicate better functioning.

Subjective health.—Self-rated health was assessed with four questions: How do you appraise your general health condition? How do you rate your health compared to what it was two years ago? How do you rate your health compared to others your own age? and, Do you think that your health condition is preventing you from doing the things you would like to do? The ratings of the items were on a 3-point scale: good, about average, and poor. Cronbach's alpha for the three waves ranged from 0.60 to 0.67.

Loneliness.—A 5-item loneliness scale was used. Participants were asked the following questions: (1) if they were troubled by feelings of loneliness; (2) whether they had friends with whom they could talk; (3) whether they feel a part of a set of friends; (4) whether they lack company; and (5) whether they feel abandoned. Response options consisted of a 4-point scale that ranged from nearly always/to a high degree to hardly ever (never)/not at all.

Cognition.—Cognitive functioning was assessed using the Information subtest (verbal) and the Block Design subtest (timed performance) of the Wechsler Adult Intelligence Scale—Revised (WAIS-R). We selected these two cognitive measures to better differentiate people who are at the high end of functioning.

Analyses

The findings on depressive symptoms are analyzed in 5 steps:

- Data are presented on the prevalence of depressive symptoms at the initial time of assessment and changes over time, including incidence of new cases and recovery.
- We considered whether depressive symptoms at Wave 1 were related to subsequent attrition at Waves 2 and 3, including deaths, refusals, and becoming too disabled to complete the interview.
- Comorbidity with dementia was examined at baseline and over time.

- Depressive symptoms were divided into the negative affective and lack of well-being components, and their relative contribution to the total scores was considered at baseline and over time.
- Multiple regression analyses were conducted to determine factors associated with depressive symptomatology at baseline and over time.

RESULTS

Prevalence of Depressive Symptoms

The prevalence of depressive symptoms at Wave 1 for those participants who provided CES-D information ($N = 275$) showed a mean score of 8.80 ($SD = 7.00$). The proportion of people that scored above the cutoff of 16 was 18.9% ($n = 52$).

In order to examine changes over time, we next divided the sample according to whether they had Wave 1, 2, or 3 of data on the CES-D. Table 4 shows the prevalence of depressive symptoms at Wave 1 for those participants with CES-D scores at all three waves ($n = 164$). These participants showed a mean score of 7.46 ($SD = 7.03$) at Wave 1, 5.81 ($SD = 7.65$) at Wave 2, and 5.75 ($SD = 8.10$) at Wave 3. Depression symptoms decreased significantly from Wave 1 to Wave 2 (paired $t(163) = 3.04, p < .01$), but remained the same from Wave 2 to Wave 3 (paired $t(163) = .098, p = .922$). The group with two waves of data also showed a decrease from a mean of 10.00 ($SD = 11.05$) at Wave 1 to a mean of 8.01 ($SD = 10.08$) at Wave 2. This difference was not significant (paired $t(53) = 1.68, p = .100$). These results were replicated when the analyses were conducted using data from the other twin of the twin pair.

Using the cutoff of 16 for clinical depression on the CES-D, those scoring >16 were examined to identify those who moved from below to above ("incident"), those who moved from above to below ("recovered"), and those who were above the cutoff at both times. Table 5 shows that the majority, 82.9%, stayed below the cutoff from Wave 1 to Wave 2, and the majority stayed below the cutoff from Wave 2 to Wave 3 (80.5%). The proportion of incident cases was 4.9%

Table 4. CES-D^a Scores and Percent Above Cutoff as a Function of Number of Waves of Data

Participants	Wave 1 CES-D	Wave 2 CES-D	Wave 3 CES-D
Participants With Three Waves of Data ($n = 164$)			
<i>M</i>	7.46	5.81	5.75
<i>SD</i>	7.03	7.65	8.10
Cutoff ≥ 16	20 (12.2%)	17 (10.4%)	22 (13.4%)
Cutoff < 16	144 (87.8%)	147 (89.6%)	142 (86.6%)
Participants With Two Waves of Data ($n = 54$)			
<i>M</i>	10.00	8.01	
<i>SD</i>	11.05	10.08	
Cutoff ≥ 16	13 (24.1%)	9 (16.7%)	
Cutoff < 16	41 (75.9%)	45 (83.3%)	
Participants With One Wave of Data ($n = 57$)			
<i>M</i>	11.53		
<i>SD</i>	10.53		
Cutoff ≥ 16	19 (33.3%)		
Cutoff < 16	38 (66.7%)		

^aCenter for Epidemiologic Studies—Depression scale.

Table 5. Incident and Recovered Cases of Depression and Dementia Between the Three Waves of Measurement

Measurement, Diagnosis, and Participants	Wave 1 to Wave 2	Wave 2 to Wave 3
CES-D^a		
Participants with 3 waves of data (<i>n</i> = 164)		
Below 16 both times ^b	136 (82.9%)	132 (80.5%)
Below 16 then above	8 (4.9%)	15 (9.1%)
Above 16 then below	11 (6.7%)	10 (6.1%)
Above 16 both times	9 (5.5%)	7 (4.2%)
Dementia^c		
Participants with 3 waves of data (<i>n</i> = 164)		
No dementia both times	161 (98.2%)	152 (92.7%)
No dementia, then dementia	2 (1.2%)	9 (5.5%)
Dementia both times	1 (.6%)	3 (1.8%)

^aCenter for Epidemiologic Studies–Depression scale.^bThe cutoff of 16 indicates the possibility of clinical depression.^cDementia diagnosis made using DSM-III-R criteria.

between Wave 1 and Wave 2; 6.7% recovered, and 5.5% qualified as clinically depressed at both waves. The smallest increment of change for the incident cases between Wave 1 and Wave 2 was 4 points, and the mean change was –10.46. For the recovered cases, the smallest increment of change was again 4 points, and the mean change was 15.18. The proportion of incident cases was 9.1% between Wave 2 and Wave 3; 6.1% recovered, and 4.2% qualified as clinically depressed at both waves. The smallest increment of change for the incident cases between Wave 2 and Wave 3 was 4 points, and the mean change was –13.82. For the recovered cases, the smallest increment of change was 6 points, and the mean change was 14.40.

Depressive Symptoms and Attrition

We next examined if initial depression scores were related to participation in or attrition from subsequent waves. An examination of the findings in Table 4 shows that people with three waves of data had initially lower depression scores when compared to those with two or one wave. Participants were classified into four groups: (1) those who completed the CES-D at all three waves (*n* = 164); (2) those who participated in all three waves of the study, but did not complete the CES-D questionnaire at Wave 2 and/or Wave 3; (3) those who died; and (4) those who refused to be interviewed at Wave 2 or 3. Mean scores on the CES-D at baseline for these four groups are shown in Table 6. In a few cases, a participant could not complete the CES-D at Wave 2, and died before Wave 3. That person was placed in the deceased category. A one-way analysis of variance (ANOVA) was conducted to evaluate sources of attrition over time and Wave 1 CES-D scores. The ANOVA was significant, $F(3,271) = 3.60, p = .014$. The strength of the relationship was small, accounting for 4% of the variance. Follow-up tests were conducted to evaluate pairwise differences comparing the sample with three waves of data to the three groups who failed to complete three waves. There was a significant difference between the means of those people who completed the CES-D at all three waves and those participants who had died by Wave 3.

Table 6. Categorization of Participants Based on Attrition and Wave 1 CES-D Scores

Group	CES-D ^a Scores (<i>N</i> = 275)
Participants Who Completed the CES-D at All 3 Waves (<i>n</i> = 164)	
<i>M</i>	7.46
<i>SD</i>	7.03
Participants Who Completed All 3 Waves of Study, No CES-D at Wave 2 and/or Wave 3 (<i>n</i> = 26)	
<i>M</i>	11.91
<i>SD</i>	11.71
Participants Who Died (<i>n</i> = 67)	
<i>M</i>	10.84
<i>SD</i>	11.43
Participants Who Refused Interviews at Wave 2 or 3 (<i>n</i> = 18)	
<i>M</i>	8.96
<i>SD</i>	6.02

^aCenter for Epidemiologic Studies–Depression scale.

Comorbidity With Dementia

Another possible influence on changes in depression symptoms over time is comorbidity with dementia. This possibility was examined in two ways. First, among the entire sample of 275 at baseline (with CES-D scores), 10 people initially had a diagnosis of dementia and another 30 received a diagnosis of dementia at either Wave 2 or 3. The mean initial CES-D score of these participants (*n* = 40) was 8.79 (*SD* = 10.45) compared to a mean initial CES-D score of 8.80 (*SD* = 8.60) for those who did not (*n* = 235). Those participants who at some time in the study received diagnoses of dementia did not have significantly different initial CES-D scores than those who did not (independent samples $t[273] = .01, p = .99$). Second, we looked at the issue of comorbidity of dementia and depression among participants with three waves of data. In this longitudinal panel, 12 participants had a dementia diagnosis at some point in the study. They had an initial score on the CES-D of 4.50 (*SD* = 4.03), compared to 7.69 (*SD* = 7.17) for the rest of the sample (*n* = 152). Initial CES-D scores for the 12 participants with dementia did not differ significantly (independent samples $t[162] = 1.52, p = .13$) from the rest of the longitudinal sample. The low rates of dementia are due to the inability of most people in the sample to complete the depression measure.

Role of Negative Affect and Lack of Well-Being

We next examined the scores for the negative symptoms and the items reflecting a lack of well-being on the CES-D. Because there were more negative than lack of well-being items, the mean strength of response per symptom was calculated by dividing the total scores for negative and lack of well-being items by the number of items. Scores were coded on both subscales so that higher scores would always indicate more depression. The results are shown in Table 7 for participants with three waves of data. There was a greater lack of well-being at Wave 1 compared to the negative symptoms (mean item responses of 0.74 and 0.26, respectively, paired $t[163] = -9.35, p < .001$). These results indicate that a lack of well-being, as opposed to negative affect,

Table 7. CES-D Positive and Negative Items for Three Waves of Measurement

Participants	Wave 1 CES-D ^a	Wave 2 CES-D	Wave 3 CES-D
Participants with 3 waves of data (<i>n</i> = 164)			
Lack of well-being			
<i>M</i>	0.74	0.46	0.46
<i>SD</i>	0.73	0.65	0.68
Negative			
<i>M</i>	0.26	0.23	0.22
<i>SD</i>	0.32	0.32	0.35
Participants with 2 waves of data (<i>n</i> = 54)			
Lack of well-being			
<i>M</i>	0.75	0.58	
<i>SD</i>	0.69	0.71	
Negative			
<i>M</i>	0.39	0.33	
<i>SD</i>	0.48	0.47	
Participants with 1 wave of data (<i>n</i> = 57)			
Lack of well-being			
<i>M</i>	0.85		
<i>SD</i>	0.76		
Negative			
<i>M</i>	0.44		
<i>SD</i>	0.47		

^aCenter for Epidemiologic Studies–Depression scale.

was a relatively bigger contributor to the overall depression score. Lack of well-being was also higher at Wave 2 (mean item response = 0.46 for lack of well-being and 0.23 for negative items, paired t [163] = -5.98 , $p < .001$), and the same pattern was found for Wave 3 (mean item response = 0.46 for lack of well-being and 0.22 for negative items, paired t [163] = -5.87 , $p < .001$).

Looking at change over time, lack of well-being decreased significantly from Wave 1 to Wave 2 (means = 0.74 and 0.46, paired t [163] = 4.68 , $p < .001$). Thus, participants were reporting more positive affect at Wave 2. Negative symptoms also decreased slightly, but not significantly. There was a nonsignificant increase of lack of well-being from Wave 2 to Wave 3. Higher scores on lack of well-being items were also found for participants not completing the three waves of interviews.

Predictors of Negative Items and Lack of Well-Being Items of the CES-D

Multiple regression was used to examine factors associated with depressive symptoms. Because the two factors that make up the CES-D for this sample (negative symptoms and lack of well-being) were endorsed differently by participants, we decided to conduct separate regressions for these two scales. Variables were entered into the regressions in two blocks. Sociodemographic characteristics were entered first, as they are often considered strong predictors of depression (Heikkinen, Berg, & Avlund, 1995). The predictor variables were age, gender, marital status, and education. The second block of variables reflected current functioning, including ADLs, subjective health, cognition, and loneliness.

The bivariate correlations of the negative items criterion variable and predictors can be seen in Table 8. The results

Table 8. Bivariate Correlations of Negative Items of the CES-D^a at Wave 1 and Predictor Variables (*n* = 227)

Variable	Negative Items of CES-D	Age	Gender	Marital Status	Education	ADLs ^b
Age	.07					
Gender	.02	.05				
Marital status	.04	.11	.37***			
Education	-.02	-.13*	-.07	-.03		
ADLs	-.14*	-.15*	.00	.01	.06	
Subjective health ^c	.36***	.15*	.08	.07	-.05	-.51***
Loneliness	.15*	.12*	.01	.05	.01	-.10
Information	-.04	-.14*	-.19**	-.01	.41***	.18**
Block design	-.25**	-.12*	.01	.02	.20***	.36***

^aCenter for Epidemiologic Studies–Depression scale.

^bADLs = activities of daily living; higher score indicates better functioning.

^cSubjective health, lower score indicates higher perceived health.

* $p < .05$; ** $p < .01$; *** $p < .001$.

of the multiple regression analysis are shown in Table 9. The set of sociodemographic characteristics alone were not significant predictors (F [4,222] = $.37$, $p = .83$) of depression and accounted for less than 1% of the variance. When all of the predictors were entered, the result was significant (F [9,217] = 5.89 , $p < .001$) and accounted for 19% of the variance. Activities of daily living, subjective health, and block design were significantly related to negative affect. Subjective health was reverse scored so that a lower score indicated higher perceived health. Thus, the positive coefficient indicates that better subjective health is related to lower negative affect. Higher scores on the block design were related to lower negative affect. When the criterion variable was lack of well-being items, none of the predictor variables were significant.

Table 9. Multiple Regression Analysis With Two Sets of Predictors and Negative Items of CES-D^a as Criterion Variable (*n* = 227)

Variable	<i>b</i>	<i>SE b</i>	Beta	<i>t</i>	<i>R</i> ²	Adjusted <i>R</i> ²	ΔR^2
Model 1					0.01	-0.01	0.01
Age	0.01	0.01	0.07	1.01			
Gender	0.01	0.06	0.01	0.11			
Marital status	0.03	0.06	0.03	0.42			
Education	0.00	0.01	-0.01	-0.12			
Model 2					0.20	0.16	0.19***
Age	0.00	0.01	0.01	0.12			
Gender	0.01	0.06	0.00	0.05			
Marital status	0.01	0.06	0.02	0.24			
Education	0.00	0.01	0.01	0.21			
ADLs ^b	0.01	0.01	0.15	2.02*			
Subjective health	0.08	0.02	0.38	5.27***			
Loneliness	0.03	0.02	0.09	1.50			
Information	0.00	0.00	0.08	1.07			
Block design	-0.01	0.00	-0.28	-3.80**			

^aCenter for Epidemiologic Studies–Depression scale.

^bADLs = activities of daily living.

* $p < .05$; ** $p < .01$; *** $p < .001$.

DISCUSSION

The results of this study confirm other studies that suggest low rates of depressive symptoms in older adults. Several other studies have assessed the prevalence rates of depressive symptoms with older Scandinavian samples and likewise found evidence of depressive symptoms, but concluded that they did not constitute a serious problem for most of the participants (Heikkinen et al., 1995; Kiljunen et al., 1997). The rates of depressive symptoms in this sample of oldest old were relatively low at baseline and decreased somewhat from Wave 1 to Wave 2. Most participants stayed below the clinical cutoff of 16 for the CES-D from Wave 1 to Wave 2 (82.9%), and the majority stayed below the cutoff from Wave 2 to Wave 3 (80.5%). The proportion of the participants scoring above the cut-off did not differ from one wave to the next. These results do not replicate findings from other studies of Swedish twins, where depressive symptoms increase in very late life (Gatz et al., 1993), but are consistent with other Scandinavian findings on the oldest old, suggesting relatively low rates of depressive symptoms (Kiljunen et al., 1997).

The Wave 1 baseline mean score on the CES-D across all subjects was 8.80, and 7.46 for participants with three waves of CES-D data. These means are similar to the Berkman and coworkers (1986) study in which the mean scores on the CES-D ranged from 4.86 for people aged 65 and older without any physical disabilities to 13.51 for those with major functional disabilities. Those participants aged 75 years and older had a mean score of 9.01.

Our findings also suggest that the low rates of depressive symptoms may, in part, reflect selective attrition. At baseline, people with greater disabilities and/or dementia did not complete the CES-D. Attrition at subsequent waves was largely due to mortality, with people who died before the third wave having higher initial scores on the CES-D. Participants who received a probable dementia diagnosis at some point in the study did not differ significantly on initial CES-D scores when compared to those participants who never received such a diagnosis. This result was found not only for those participants who completed the CES-D at all three waves, but also for those who had at least completed the CES-D at baseline. Thus, the findings on attrition raise the possibility that depressive symptoms were underestimated to some extent by the exclusion of some people with severe disability at Wave 1 and higher mortality of those with initially more depressive symptoms.

Gatz and colleagues (1993) emphasize the importance of recognizing that the presence of symptoms of depression may represent a different kind of experience for older adults. Lack of well-being as proposed by those researchers was in fact more salient for this sample of the oldest old. Interestingly, the results in the current study indicate that a significant decrease in depressive symptoms over time was due primarily to a decrease in symptomatology, indicating a lack of well-being. One possible explanation for the role of lack of well-being in contributing to depressive symptomatology is that this pattern of findings is consistent with what is seen in two-factor theories of well-being, where both positive affect and negative affect drop in intensity (Stallings, Dunham, Gatz, Baker, & Bengtson, 1997). Stallings and colleagues found that, consistent with a two-factor theory of

well-being, desirable life events predicted change in positive affect and undesirable events predicted change in negative affect. Results from their study suggest that the expectation of life events might be more important than whether they are desirable or undesirable.

Another explanation for the decrease in lack of well-being involves the possibility that being a participant in the study introduced a positive effect. In other words, there might have been a reactive component in terms of participation. The participants were interviewed in depth by nurses, and these experiences may have provided the participants with some degree of social involvement and a sense that their psychological and physical well-being were being monitored. While the cause of the decrease in lack of well-being cannot be pinpointed, it is clear that depression was not increasing throughout the three waves.

A finding of the study indicated that when negative affect and lack of well-being were used as criterion variables, only the model for negative affect was significant. Variables were entered in two blocks. Sociodemographic characteristics (age, gender, marital status, and education) alone were not significant predictors of negative affect. Three additional predictors, namely ADLs, subjective health, and block design, were significantly related to negative affect. This finding indicates that negative symptoms were more related to ADL deficits, suggesting that in a more disabled sample, depressive scores might be higher. These are predictors that typically have been found in studies of depressive symptoms (Zarit, Femia, Gatz, & Johansson, 1999). There has been less effort to examine negative affect and lack of well-being separately. The findings raise the possibility that lack of well-being has a different set of predictors, at least in very late life.

The results of a study by Lewinsohn and colleagues (1997) found that functional impairment, physical disease, and the tendency to answer items in a socially desirable way were correlated with the CES-D and with age. In the present study the participants were relatively healthy and high functioning. Therefore, some of the expected relationships, such as low functioning on ADLs and depression, were not found for those participants who completed the CES-D on at least one occasion of measurement. A comparison of people who completed the CES-D at baseline and those who did not shows that the two groups differed on measures of severity and age. Participants completing the CES-D were younger, had better ADL performance, and were less likely to have a diagnosis of dementia. In fact, the best predictors of negative affect for this sample included subjective health and performance on the block design.

One potential limitation of this study is the generalizability of findings from a sample of twins. Among samples of older twins, two particular problems might limit generalizability of findings. Twin studies, including OCTO-Twin, typically require that both twins be alive and willing to participate. These requirements could bias the sample toward better functioning individuals. The question of the representativeness of twin samples was investigated by Simmons and coworkers (1997). They compared a population-based sample in Sweden of non-twins in their 80s to a random selection of one member of each twin pair from the current

sample across the domains of vitality, well-being, physical and cognitive functioning, and health utilization to evaluate possible selection bias. Relatively small differences were revealed after controlling for age, education, and gender.

The authors concluded that, although a selection bias may exist in twin samples, the extent of bias appears to be small. A selection effect is observable in participation rates, however. If twins are treated as individuals, the rates of refusal between twin and singleton samples are similar; however, because both twins must agree to participate, the result is a lower overall participation rate at Wave 1 (64% compared to 86%). Given the availability of comprehensive and longitudinal data on a sample aged 80 and older, we believed that the potential limitations of using twin data were outweighed by the benefits.

Kiljunen and colleagues (1997) offer alternative explanations for the low prevalence of depressive symptoms and depression in very old people. They suggest that those who survive into very old age may have physical and psychiatric advantages as well as coping abilities that have allowed them to handle their life circumstances. Therefore, depression may become less prevalent. It can also be assumed that the most depressed individuals may have died before they reached the age of 85 years, and individuals with optimistic mood are still alive. This perspective meshes well with the description of people in their late 80s and early 90s as having an "aura of survivorship," as characterized by Johnson and Barer (1996).

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