Reverberations of Family Illness: A Longitudinal Assessment of Informal Caregiving and Mental Health Status in the Nurses' Health Study

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In 1990, more than 31 million people in the United States were aged 65 years or older. The US elderly population is expected to exceed 75 million by 2040, at which point 1 in 5 Americans will be aged 65 years or older.[1] The aging of the population, and the accompanying prevalence of chronic disease and disability, is already exerting a profound effect on familial roles and responsibilities. Caregiving for disabled or ill family members is estimated to occur in more than 22 million US households.[2] Relatives and friends are the sole source of assistance for 70% of the Americans who require long-term care.[3] It is expected that more than 60% of all women will provide this type of informal care to a disabled or an ill family member at some point during their lives.[4,5]

In 1980, Zarit and colleagues[6] identified caregiving as a source of burden or role strain, and several studies followed to show that caregivers experience elevated rates of depressive symptoms.[7–13] Researchers have linked informal care provision to adverse health effects such as sleep disturbance,[14] increased blood pressure,[15] increased insulin levels,[16] altered endocrine function,[17] impaired vaccine response,[18] and poorer adherence to therapeutic regimens.[19] Schulz and Beach[20] published results from a longitudinal study in which caregivers who reported role strain also experienced a 63% elevation in mortality risk. The current study, conducted in a large community-based cohort, complements the existing literature by offering longitudinal data on caregiving and mental health.

The primary purpose of this study was to examine, with data from 1992 and 1996, the relation between care for a disabled or ill spouse and onset of depressive or anxious symptoms. Secondarily, we investigated the association between care for a disabled or an ill parent and onset of depressive or anxious symptoms. The study was conducted in a cohort of women who were free from high levels of depressive or anxious symptoms at baseline in 1992.

Objectives. This study examined the association between caregiving for disabled or ill family members, estimated to occur in more than 22 million US households, and change in mental health.

Methods. We assessed 4-year change in mental health among 37 742 Nurses' Health Study participants with the Medical Outcomes Study Short-Form 36.

Results. Women who provided 36 or more weekly hours of care to a disabled spouse were almost 6 times more likely than noncaregivers to experience depressive or anxious symptoms (multivariate odds ratio [OR]=5.6; 95% confidence interval [CI]=3.8, 8.3). Caring for a disabled or ill parent (≥36 weekly hours) was associated with a less dramatic elevation in depressive or anxious symptoms (multivariate OR=2.0; 95% CI=0.9, 4.3).

Conclusions. In this population, caregiving was associated with increased risk of depressive or anxious symptoms. (*Am J Public Health.* 2002;92:1305–1311)

METHODS

Sample

This study, a longitudinal analysis of caregiving responsibilities and mental health, was based on data from respondents to the 1992 and 1996 Nurses' Health Study questionnaires. Participants enrolled in the Nurses' Health Study cohort were aged 30 to 55 years when the cohort was assembled in 1976 and 50 to 75 years in 1996. The initial cohort included married women who were registered nurses living in 1 of 11 states at the time of enrollment. A detailed description of the population is available elsewhere.[21]

The original Nurses' Health Study population included 121 700 nurses. After losses to death, follow-up, and nonresponse, 104 064 participants returned the 1992 survey on health and disease status. Of those women, 75 453 completed an additional section on social variables, which was included in the first mailing to the cohort but not in subsequent attempts to obtain updated information from study participants. These respondents were similar to the larger sample with respect to prevalence of major chronic disease and health behaviors such as cigarette smoking.

Questions about social roles were asked again in the 1996 survey. Participants were included in the current analysis only if they provided complete information on health and disease status and social variables, including caregiving responsibilities, in both 1992 and 1996. To obtain a conservative estimate of the effect of caregiving on mental health, we limited the set for analysis to a relatively healthy or robust group. Women who had been diagnosed with cancer, heart disease, or stroke between 1976 and 1996 or who had high levels of depressive or anxious symptoms in 1992 were excluded from the analysis.

For our longitudinal analysis of spousal caregiving as a predictor of depressive or anxious symptoms, we further limited the sample to women who were married in both 1992 and 1996 (n=37 742). These women were eligible to be spousal caregivers at both survey periods. To assess the association between parent care and depressive or anxious

symptoms, we examined the subset of participants, either married or unmarried, who had at least 1 living parent through the 1996 follow-up (n=17 755).

Caregiving Exposure Measure

On the Nurses' Health Study questionnaire, participants self-reported the number of hours per week they typically spent providing care. The question was framed as follows: "Outside of your employment, do you provide regular care for any of the following?" The survey queried participants about care for a disabled or ill spouse, a disabled or ill parent, and a disabled or ill other person (unspecified), child, or grandchild. Because "care" was not defined specifically in the survey question, types of informal care assistance (i.e., with bathing, dressing, transportation, household chores, paperwork) were not assessed.

Unless otherwise noted, *caregiving* and *informal care* refer to care for a disabled or ill spouse, which is the central focus of this article. Care for a disabled or ill parent, referred to as *parent care,* is described as a point of comparison.

Assessment of Stress and Reward Associated With Caregiving

Care-related stress and reward were assessed globally with 2 questions: (1) "How stressful would you say it is to provide care to the individuals mentioned above?" and (2) "How rewarding would you say it is to provide care to the individuals mentioned above?" For both questions, the multiple-choice answers included the following: not applicable; not at all; just a little bit; moderately; extremely; and don't know. Participants who answered "not applicable" and "don't know" were eliminated from analyses that investigated stress and reward as independent predictors of mental health status. Otherwise, "not applicable" and "don't know" responses were treated as missing values when perceptions of care-related stress and reward were analyzed as covariates.

Mental Health Outcome

In both 1992 and 1996, we measured participants' mental health status with the 5-item Mental Health Inventory, 1 of the 8 health-related quality-of-life scales included in the Medical Outcomes Study 36-Item Short Form

Health Survey. Crude scores on the 5-item Mental Health Inventory range from 5 to 30 points and are transformed to a 0- to 100-point scale.[22] Transformed scores can be treated as a continuous variable, in which case higher scores (or positive change scores) indicate better (or improved) overall mental health status. The scale also can be dichotomized, with participants who score less than 52 likely to satisfy the clinical diagnostic criteria for depression and related disorders. Because the 5-item Mental Health Inventory is not a clinical diagnostic tool, women in the low-scoring range (<52) are classified as having depressive or anxious symptoms rather than depression per se.

This 5-item scale has been validated as a global measure of well-being or mental health status.[22,23] The 5-item Mental Health Inventory has performed well in criterion-based tests of validity, with low-scoring subjects more frequently requiring inpatient and outpatient psychiatric care and showing suicidal ideation.[22] Furthermore, the sensitivity and specificity of the 5-item Mental Health Inventory for detecting clinical depression are high.[24] Berwick and colleagues,[24] using receiver-operating-characteristic curve analysis, found the Mental Health Inventory to be a viable screening tool for the identification of clinical depression, with a high area under the curve (0.892).

Statistical Analysis

To assess change in women's spousal caregiving responsibilities as a determinant of mental health status, we created indicator variables to represent 4 exposure categories. These categories, which refer specifically to spousal care, were (1) no caregiving in 1992 and no caregiving in 1996 (noncaregivers), (2) no caregiving in 1992 but caregiving in 1996 (new caregivers), (3) caregiving in 1992 but not in 1996 (former caregivers), and (4) caregiving in both 1992 and 1996 (continuing caregivers). For each of these groups, we first described the age-adjusted distributions of key variables and then described shifts in women's overall mental health status over time, as indicated by 5-item Mental Health Inventory change score (change score=score in 1996−score in 1992). Negative 5-item Mental Health Inventory change scores indicated de-

cline in mental health status over the follow-up period, and positive 5-item Mental Health Inventory change scores indicated mental health improvement. Women whose 5-item Mental Health Inventory scores dropped below 52 in 1996 were classified as new patients with depressive or anxious symptoms.

After evaluating the crude distributions of 5-item Mental Health Inventory change scores in each caregiving exposure category, we used linear and logistic regression to compare new, former, continuing, and noncaregivers' mental health status while adjusting for potential confounders. In linear models, we treated the 5-item Mental Health Inventory change score as a continuous outcome measure, and in logistic models, we dichotomized the outcome at 52 to estimate the odds ratio (OR) for developing depressive or anxious symptoms among new, former, and continuing caregivers, compared with noncaregivers. In the subset of women who at baseline did not have depressive or anxious symptoms and reported no spousal care responsibilities, we used linear and logistic regression to further describe the association between new caregiving responsibilities and mental health changes or onset of depressive or anxious symptoms.

Our final models controlled for factors that are known or suspected to be correlated with caregiving or depressive or anxious symptoms, or both. These factors include age, other 1996 caregiving responsibilities (disabled or ill parent; disabled or ill other person, child, or grandchild, whose health status was not specified), employment in 1996, cigarette smoking (1992 and 1996), chronic illness (rheumatoid arthritis or diabetes), level of social ties in 1992 (measured by the Berkman–Syme Social Network Index[25]), and level of education. Our final models also controlled for baseline mental health status. This analytic approach addresses the question, "During follow-up, is a new caregiver (for example) expected to experience the same change in mental health (or likelihood of developing depressive or anxious symptoms) as a noncaregiver, given that they both started with the same initial mental health status?"

Because perceptions of stress and reward were considered elements in the causal pathway between spousal care and depressive or anxious symptoms, these factors were not in-

TABLE 1—Characteristics of Married Women in the Nurses' Health Study I Population: Variation According to Care for a Disabled or an Ill Spouse, 1992–1996[a]

	Spousal Care: 1992 No, 1996 No (Noncaregivers)	Spousal Care: 1992 Yes, 1996 No (Former Caregivers)	Spousal Care: 1992 Yes, 1996 Yes (Continuing Caregivers)	Spousal Care: 1992 No, 1996 Yes (New Caregivers)
n, before exclusion based on 1992 depressive or anxious symptoms	36 279	726	1000	1693
Excluded because of depressive or anxious symptoms in 1992, % (not adjusted)	4.7	12.3	8.2	4.7
No. included in analysis	34 573	638	918	1613
Age, %				
50–54	19.8	15.5	8.9	8.5
55–59	23.5	17.7	13.6	13.6
60–64	23.1	24.5	20.7	19.2
65–69	18.4	19.9	23.2	23.1
70–75	15.2	22.4	33.6	35.6
Mean MHI-5 score, 1992	79.5	75.2	76.0	78.4
Mean MHI-5 score, 1996	81.3	78.9	77.5	77.0
Mean change in MHI-5 score, 1992–1996 (change relative to that in noncaregivers)	+1.8 (0)	+3.7 (+1.9)	+1.6 (−0.2)	−1.4 (−3.2)
Depressive or anxious symptoms, 1996, %	2.2	4.4	5.0	4.7
Working outside home, 1996, %	50.6	56.1	51.0	51.8
Current smoker, 1996, %	9.8	13.5	14.1	14.1

Note. MHI-5 = 5-item Mental Health Inventory.
[a]Age-adjusted.

cluded in the final multivariate model. However, we also tested the independent associations between care-related stress and reward and depressive or anxious symptoms in a subset composed of all women who provided spousal care in 1996. In that group, we used logistic regression to estimate the relative odds of depressive and anxious symptom onset in 1996 for women at each level of stress and reward. We controlled for all 1996 caregiving responsibilities, baseline mental health status and baseline level of social ties, cigarette smoking in 1992 and 1996, baseline level of education, baseline chronic conditions, and employment in 1996.

To assess the mental health effects of care for disabled or ill parents, we repeated the analyses described above in a sample of women (either married or unmarried) who reported that they had at least 1 living parent in 1996. When relevant for comparison, results from these analyses are described in the text.

RESULTS

Table 1 summarizes the age-adjusted distributions of covariates. The table shows the numbers of women in each caregiving exposure category, both before and after exclusions based on detection of depressive or anxious symptoms in 1992. Women who stopped caregiving between 1992 and 1996 were more likely than their peers to have experienced depressive or anxious symptoms in 1992. After exclusion of women with depressive or anxious symptoms at baseline and adjustment for age, women who reported spousal care responsibilities at any time during the study were approximately 2 times more likely than noncaregivers to experience symptoms in 1996. Accordingly, women who did not provide care to a disabled or ill spouse during the study period had higher mean 5-item Mental Health Inventory scores in 1996 (81.3), or better mental health status, than did women with new (77.0), continuing (77.5), or former (78.9) spousal care responsibilities. Statistical significance of these differences was later explored in multivariate models.

Change in Mental Health, 1992 to 1996

To describe shifts in mental health over the 4-year study period, we first described unadjusted distributions of 5-item Mental Health Inventory scores in 4 groups of married women: noncaregivers, new caregivers, former caregivers, and continuing caregivers. As expected, new caregivers were more likely than women in any other group to show declines in mental health status between 1992 and 1996. Almost half (44%) of the new caregivers had negative 5-item Mental Health Inventory change scores, or a decline in mental health, compared with 31% of the noncaregivers, 34% of the continuing caregivers, and 27% of the former caregivers. Substantial declines of 20 points or more were more commonly endured by new caregivers (9%) than by noncaregivers (4%), continuing caregivers (5%), and former caregivers (5%).

Conversely, only 39% of the new caregivers enjoyed mental health improvements (higher 5-item Mental Health Inventory scores) over time, compared with 50% of the noncaregivers, 48% of the continuing caregivers, and 58% of the former caregivers. Substantial improvements of 20 or more points were infrequently experienced by new caregivers (1%) but were more commonly observed among noncaregivers (3%), continuing caregivers (4%), and former caregivers (7%). Noncaregivers and continuing caregivers had similar shifts in mental health status between 1992 and 1996.

TABLE 2—Mean Change in Mental Health Scores (5-Item Mental Health Inventory [MHI-5]) and Odds Ratios (ORs) for Association Between Change in Spousal Caregiving Status Between 1992 and 1996 and Depressive or Anxious Symptoms in 1996: Analysis Among Women Who Did Not Have Depressive or Anxious Symptoms in 1992

	n	Mean Change in MHI-5 Score, 1992–1996, Without Adjusting for Baseline Mental Health[a]	Mean Change in MHI-5 Score, 1992–1996, After Adjusting for Baseline Mental Health[b]	OR for Depressive and Anxious Symptoms in 1996, Without Adjusting for Baseline Mental Health Status (95% CI)[c]	OR for Depressive and Anxious Symptoms in 1996, After Adjusting for Baseline Mental Health Status (95% CI)[d]
Nonspousal caregivers	34 573	+1.9	+2.5	Reference	Reference
Former spousal caregivers	638	+3.5*	+2.5	1.8 (1.1, 2.8)	1.3 (0.8, 2.1)
Continuing spousal caregivers	918	+1.0**	+0.3***	1.9 (1.2, 3.0)	1.5 (1.0, 2.4)
New spousal caregivers	1613	−1.3***	−1.1***	2.2 (1.7, 2.9)	2.1 (1.6, 2.8)

Note. CI = confidence interval.

[a]Model controls for age, employment status in 1996, level of education (registered nurse, bachelor's degree, master's degree or higher), cigarette smoking in 1992 and 1996 (never, former, current smoker), baseline level of social ties (measured with the Berkman–Syme Social Network Index), self-report of chronic illness (rheumatoid arthritis, diabetes), time commitment to spousal caregiving in 1992, and other caregiving responsibilities in 1996. Model is solved for adjusted mean change in MHI-5 scores among women with either 0 or 4.5 hours of spousal care and high levels of social ties in 1992; who were not employed outside the home in 1996, younger than 55, nonsmokers, and registered nurses; and who had no other care responsibilities in 1996.

[b]Model controls for the same variables mentioned in footnote a as well as baseline MHI-5 score (assumed to be 78).

[c]Model controls for age, employment status in 1996, cigarette smoking in 1992 and 1996 (never, former, current smoker), baseline level of social ties (measured with the Berkman–Syme Social Network Index), hours of spousal caregiving in 1992, level of education, self-report of chronic illness (rheumatoid arthritis, diabetes), and any other caregiving responsibilities in 1996 (disabled parent or other unspecified ill person; care for child or grandchild, health unspecified).

[d]Model controls for variables mentioned in footnote c as well as baseline MHI-5 score.

*$P<.01$; **$P<.1$; ***$P<.001$.

Multivariate findings, summarized in Table 2, were consistent with observations from the unadjusted data described above. In multivariate linear models that did not control for baseline mental health status, we found that women with no caregiving responsibilities (the reference group) improved by an average of +1.9 points over the course of this study. Instead of experiencing this age-related improvement in mental health, women with new caregiving responsibilities experienced a decline (adjusted mean 5-item Mental Health Inventory change score=−1.3). After controlling for baseline mental health status, the average change among noncaregivers and former caregivers was +2.5 points and that among continuing caregivers was +0.3 point; by contrast, new caregivers lost an average of 1.1 points between 1992 and 1996.

In logistic models that did not control for baseline mental health status, women who provided care to a disabled spouse at any point during the follow-up period (new, continuing, and former caregivers) appeared to experience an approximately 2-fold elevation in depressive or anxious symptoms, relative to noncaregivers (Table 2). However, the groups that provided spousal care in 1992 (former and continuing caregivers) had lower baseline 5-item Mental Health Inventory scores than did those without baseline spousal care responsibilities (new caregivers and noncaregivers). After adjustment for baseline mental health differences, only new caregivers experienced a statistically significant elevation in depressive or anxious symptoms at follow-up (multivariate OR=2.1; 95% confidence interval [CI]=1.6, 2.8). Former caregivers did show an overall improvement in mental health status between 1992 and 1996, as assessed in linear models treating the 5-item Mental Health Inventory score as a continuous variable. Nonetheless, former caregivers were somewhat more likely than noncaregivers to experience high levels of depressive or anxious symptoms at follow-up, as illustrated in the logistic models.

In our further analysis of new spousal caregivers' mental health status (Table 3), we observed a clear trend of increasing odds of depressive or anxious symptoms with higher weekly spousal care time commitment (β= 0.34; P for trend=<.001). Women who reported providing 36 or more weekly hours of care for a disabled or ill spouse were almost 6 times more likely than noncaregivers to experience depressive or anxious symptoms at follow-up (multivariate OR=5.6; 95% CI=

3.8, 8.3). On average, these providers of high amounts of spousal care experienced a decline of 5.1 points on the 5-item Mental Health Inventory. As a comparison, other researchers noted an average 3-point loss among people recently fired or laid off from their jobs.[26] When we controlled for respondents' perceptions of care-related stress and reward, the association between greater amounts of time devoted to spousal care and odds of experiencing depressive or anxious symptoms was attenuated but still strong (OR=3.8; 95% CI=2.5, 5.8).

We also observed a relation between greater time commitment to care for a disabled or ill parent and higher relative odds of experiencing depressive or anxious symptoms, but the association was not as strong as that for spousal care (β=0.17; P for trend=<.01; data not shown). Women who provided 36 or more hours per week of care to a disabled or ill parent were 2 times more likely than noncaregivers to have depressive or anxious symptoms (OR=2.0; 95% CI=0.9, 4.3). This association between high time commitment to parent care and depressive or anxious symptoms was reduced to nonsignificance when we controlled for perceived stress and reward (OR=1.2; 95% CI=0.5, 2.7; P for trend=>.5).

TABLE 3—Odds Ratios (ORs) for Association Between Time Commitment to Spousal Caregiving and Depressive or Anxious Symptoms: Analysis Among Women Who Reported No Depressive and Anxious Symptoms and No Spousal Caregiving in 1992

	Zero Weekly Hours of Caregiving in 1996	1–8 Weekly Hours of Caregiving in 1996	9–35 Weekly Hours of Caregiving in 1996	≥ 36 Weekly Hours of Caregiving in 1996	P for Trend
n	34 573	828	404	381	
Age-adjusted OR	Reference	1.3 (0.9, 2.1)	1.8 (1.0, 3.1)	5.4 (3.7, 7.9)	<.001
Multivariate OR[a]	Reference	1.2 (0.7, 1.9)	1.5 (0.8, 2.9)	5.6 (3.8, 8.3)	<.001
Multivariate OR, controlling for stress and reward[b]	Reference	1.1 (0.7, 1.8)	1.3 (0.7, 2.4)	3.8 (2.5, 5.8)	<.001
Adjusted mean change in 5-item Mental Health Inventory score[c]	+2.5	+0.9*	–1.3*	–5.1*	<.001

[a]Controlling for age, cigarette smoking (1992 and 1996), level of social ties in 1992, other caregiving responsibilities in 1996, employment status in 1996, self-reported chronic illness (rheumatoid arthritis, diabetes), level of education, and baseline 5-item Mental Health Inventory score.
[b]Controlling for variables mentioned in footnote a as well as perceived stress and reward associated with caregiving.
[c]Controlling for age, cigarette smoking (1992 and 1996), level of social ties in 1992, other caregiving responsibilities in 1996, employment status in 1996, and baseline 5-item Mental Health Inventory score. Model is solved for women who were younger than 55, had never smoked, were not currently employed, had high levels of social ties in 1992, had no other care responsibilities in 1996, reported no chronic conditions, were registered nurses, and were assumed to have a baseline 5-item Mental Health Inventory score of 78.
*P<.001

In the subset of all women who provided spousal care in 1996, we used logistic regression to assess the independent associations between care-related stress and reward and depressive or anxious symptoms (data not shown in tables). We controlled for spousal care time commitment, other care responsibilities (1996), age, employment status (1996), level of social ties (1992), level of education, chronic conditions (rheumatoid arthritis and diabetes) (ever), and cigarette smoking (1992 and 1996) and found that level of care-related stress was strongly associated with depressive or anxious symptoms (P for trend=<.001). Compared with women who reported that caregiving was not at all stressful (16.8%), those who reported that caregiving was extremely stressful (14.1%) were approximately 4 times more likely to have depressive or anxious symptoms (OR=3.8; 95% CI=2.8, 5.0). In contrast, women who reported high levels of care-related reward experienced a decreased risk of depressive or anxious symptoms. Compared with women who reported that caregiving was not at all rewarding (3.4%), those who reported that caregiving was extremely rewarding (42.9%) were 50% less likely to experience depressive or anxious symptoms (OR=0.5; 95% CI=0.4, 0.7).

We also observed in a cross-sectional analysis of the 1992 Nurses' Health Study data that depressive or anxious symptoms were particularly common among women with high time commitment to spousal caregiving

(≥ 36 hours/week) and few social ties. Compared with socially integrated women without caregiving responsibilities, socially isolated spousal caregivers were approximately 12 times more likely to have depressive or anxious symptoms (OR=11.8; 95% CI=4.8, 28.9). In a separate analysis, we compared the caregiving–mental health association among women with a range of levels of employment (employed part-time in nursing, full-time in nursing, part-time in another profession, full-time in another profession, or not employed). The association between caregiving time commitment and depressive or anxious symptoms was similar across all employment strata; this was true for both spousal care and parent care (data not shown).

DISCUSSION

In this 4-year study of middle-aged and older women, we observed mental health improvement among those women who did not provide informal care, as is expected with advancing age.[22] However, instead of experiencing age-related improvement, women who initiated spousal care during the study period had a decline in well-being, on average. The decline was especially pronounced among women who reported high time involvement in new spousal care responsibilities. Furthermore, the relation between time commitment and risk of depressive or anxious symptoms may not be linear. We observed a marked in-

crease in risk among women who provided 36 or more hours per week of spousal care, indicating that there may be a threshold of time involvement beyond which likelihood of mental health impairment rapidly escalates.

We also observed that depressive or anxious symptoms were more common among new caregivers than among noncaregivers and that higher weekly caregiving time commitment was associated with higher risk of depressive or anxious symptoms. This was true for provision of either spousal or parent care, although the elevation in depressive or anxious symptoms was more pronounced among spousal caregivers. Controlling for perceptions of care-related stress and reward accounted for some of the association between spousal-care time commitment and depressive or anxious symptoms and for virtually all of the association between parent-care time commitment and depressive or anxious symptoms. As a point of comparison, we assessed the association between care for a child or grandchild (well or ill, not specified) and depressive or anxious symptoms, and we observed no association between hours of care for a child and risk of depressive or anxious symptoms. Time commitment to care for a grandchild was associated with a small but statistically significant decrease in risk of depressive or anxious symptoms (data not shown).

This study was based on data from 2 points in time, which allowed us to exclude women with high levels of depressive or anxious

symptoms at baseline and to control for baseline mental health status. However, our follow-up survey was essentially a cross-sectional examination of previously healthy women, because the caregiving exposure measure and the second assessment of depressive or anxious symptoms were conducted simultaneously in 1996. Although women with depressive or anxious symptoms in 1996 represented incident cases during the study period, we could not determine the temporal association between newly reported care responsibilities and newly identified depressive or anxious symptoms. Furthermore, people with psychological distress may systematically overreport their caregiving time commitment, thereby inflating the association between caregiving hours and depressive or anxious symptoms. Future studies should evaluate the validity of time-use assessment by psychologically distressed survey respondents.

In addition to the potential bias in sampling described above, random misclassification of caregiving responsibilities may have influenced our findings. Both the caregiving exposure and the mental health outcome were assessed with brief instruments, introducing the potential for measurement error and attenuation of the association between exposure and outcome. Furthermore, because the statement "provision of care to a disabled or ill spouse" was open to interpretation by respondents, some participants with husbands who were only slightly impaired may have reported that they provided low levels of spousal care (1–8 hours), whereas other similarly involved women chose to mark "0 hours" of spousal care. This type of misclassification would dilute the observed association between low levels of caregiving and depressive or anxious symptoms. In contrast, we are more confident that women who reported higher levels of caregiving (21–36 or more hours/week) truly differed from the reference population (0 hours/week) with respect to provision of care. Therefore, after taking into account the potential for systematic and random misclassification described above, the true association between spousal care provision and depressive or anxious symptoms is likely to fall somewhere along the continuum between the weakest (OR=1.2) and the strongest (OR=5.6) point estimates noted in Table 3.

Exclusion of unhealthy women (i.e., those with high levels of depressive or anxious symptoms at baseline) also may have introduced systematic bias. By excluding women with serious illness or impaired mental health, we may have eliminated from the analysis those women who would be most vulnerable to the stresses of caregiving. Similarly, nurses, who are trained professional caregivers, may be particularly resilient in the face of care demands (although we observed no difference in the effect of caregiving on mental health among women currently working in nursing vs other professions). Therefore, we may have underestimated the true association between care provision and mental health decline. These factors may limit the generalizability of our findings.

The 5-item Mental Health Inventory scale has been found to be a valid measure of mental health and well-being and is efficient for use in a large survey population. However, this brief measure is not appropriate for diagnosis of clinical depression or related disorders. Identification of clinically depressed women would require a clinical diagnostic instrument such as the Diagnostic Interview Schedule, the use of which is a labor- and resource-intensive process that is impractical in a large sample like the Nurses' Health Study population.

Clinical and Social Significance of Findings

Data from the Medical Outcomes Study[22] indicate that lower scores on the 5-item Mental Health Inventory are monotonically related to increased likelihood of experiencing 7 indicators of mental health disturbance, including life dissatisfaction, depressive symptoms, diagnosis of clinical depression, suicidal ideation, and use of outpatient, specialist, or inpatient mental health care. Important differences in life satisfaction and health service resource use were observed across the entire range (0–100) of 5-item Mental Health Inventory scores, even when participants with the highest scores (100) were compared with those with scores near the population mean (80). This difference in scores corresponds to more than a 3-fold increase in the likelihood of being diagnosed with depression, a 4-fold increase in suicidal ideation, and a 3-fold increase in outpatient mental health care use.

Therefore, any shift of the 5-item Mental Health Inventory distribution toward lower scores, as we observed among new caregivers and those with high time commitments to care, would be expected to result in an increase in the population burden of impaired mental health and in health service use.

Informal Care Time Commitment as a Predictor of Depressive or Anxious Symptoms

Historically, a basic tenet of caregiving research has been that care-related tasks are a fundamental source of burden, strain, or depressive or anxious symptoms in caregivers. Our findings contribute evidence that tasks alone do not determine caregivers' health. In this study, equal spousal and parent care time commitments exerted unequal effects on risk of depressive or anxious symptoms, although care for a disabled spouse and care for a disabled parent should involve similar tasks. Therefore, our study suggests that task burden is likely to be only 1 of many component causes of caregivers' psychological distress. Future prospective, population-based investigations should explore additional characteristics of caregiving relationships (e.g., obligation, intimacy, conflict, reciprocity, financial dependence) as underlying determinants of caregivers' mental and physical health. Furthermore, information was not available in the Nurses' Health Study regarding living arrangements of care providers and recipients, duration of care, family income, and access to paid sources of support, all of which may contribute to observed differences in caregivers' mental health.

Within each caregiving category (spousal care, parent care), the association between higher caregiving time commitment and higher risk of depressive or anxious symptoms also warrants further investigation. Higher time involvement may represent several unmeasured variables that influence caregivers' health and well-being. For instance, greater weekly hours of care may be a marker not only for performance of a greater number of tasks, but also for poorer health status of the care recipient or for more frequent communication or intimate contact between caregiver and care recipient. Such factors may drive the trend of increasing risk of depressive or anxious symptoms with

higher time involvement in spousal and parent care. To inform successful long-term care interventions, future research should explore factors that underlie caregivers' mental health impairment or successful coping. For example, grief surrounding a loved one's illness or impending death may be the fundamental cause of distress among highly involved caregivers. In this case, interventions that reduce caregivers' tasks (e.g., respite care) may ignore central concerns about coping with loss and thereby fail to prevent or alleviate caregivers' psychological distress.

CONCLUSIONS

Decrements in mental health powerfully relate to physical illness, with depressive or anxious symptoms influencing physical, social, and role impairment to the same degree as 8 common chronic conditions investigated in the Medical Outcomes Study. In other studies, depressive symptoms also have been associated with increased risk of incident ischemic heart disease, poorer outcomes among people with existing cardiovascular disease, and elevated risk of all-cause mortality in medical inpatients.[27,28]

The adverse health effects associated with caregiving are likely to disproportionately affect women, because 70% of informal care is provided by women and most US women will provide informal care at some point during their lives.[5] Therefore, if our findings are replicated and can be generalized to all women in this society, it could be predicted that a large proportion of the US population is exposed to the risks described in this article. We must establish structures to support not only the elderly and infirm but also their caregivers. ◼

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Contributors
C.C. Cannuscio wrote the proposal, conducted the analyses, and prepared the manuscript. C. Jones and L. Berkman edited the manuscript and provided guidance and review of the proposal and the analysis. I. Kawachi and G.A. Colditz obtained funding and collected the data. E. Rimm helped with the above and helped C.C. Cannuscio in the analysis and interpretation of the results.

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References
1. Abrams WB, Beers MH, Berkow R, Fletcher AJ, eds. *The Merck Manual of Geriatrics.* Whitehouse Station, NJ: Merck Research Laboratories; 1995.

2. National Alliance for Caregiving and the American Association of Retired Persons. *Family Caregiving in the US: Findings From a National Survey. Final Report.* Bethesda, Md: National Alliance for Caregiving; 1997.

3. Harrington C, Cassel C, Estes CL, Wollhandler S, Himmelstein DU. A national long term care program for the United States: a caring vision. The Working Group on Long-Term Care Program Design, Physicians for a National Health Program. *JAMA.* 1991;266: 3023–3029.

4. Moen P, Robison J, Fields V. Women's work and caregiving roles: a life course approach. *J Gerontol.* 1994;49:S176–S186.

5. Abel EK. "Man, woman, and chore boy": transformations in the antagonistic demands of work and care on women in the nineteenth and twentieth centuries. *Milbank Q.* 1995;73:187–211.

6. Zarit SH, Reever KE, Bach-Peterson J. Relatives of the impaired elderly: correlates of feelings of burden. *Gerontologist.* 1980;20:649–655.

7. Tennstedt S, Cafferata GL, Sullivan L. Depression among caregivers of impaired elders. *J Aging Health.* 1992;4:58–76.

8. Knight BG, Lutzky SM, Macofsky-Urban F. A meta-analytic review of interventions for caregiver distress: recommendations for future research. *Gerontologist.* 1993;33:240–248.

9. Rosenthal CJ, Sulman J, Marshall VW. Depressive symptoms in family caregivers of long-stay patients. *Gerontologist.* 1993;33:249–257.

10. Baumgarten M, Hanley J, Infante-Rivard C, Battista RN, Becker R, Gauthier S. Health of family members caring for elderly persons with dementia: a longitudinal study. *Ann Intern Med.* 1994;120:126–132.

11. Toseland RW, Blanchard CG, McCallion P. A problem-solving intervention for caregivers of cancer patients. *Soc Sci Med.* 1995;40:517–528.

12. Lieberman MA, Fisher L. The impact of chronic illness on the health and well-being of family members. *Gerontologist.* 1995;35:94–102.

13. Yates ME, Tennstedt S, Chang BH. Contributors to and medicators of psychological well-being for informal caregivers. *J Gerontol B Psychol Sci Soc Sci.* 1999;51: P12–P22.

14. Wilcox S, King AC. Sleep complaints in older women who are family caregivers. *J Gerontol B Psychol Sci Soc Sci.* 1999;54:P189–P198.

15. King AC, Oka RK, Young DR. Ambulatory blood pressure and heart rate responses to the stress of work and caregiving in older women. *J Gerontol.* 1994;49: M239–M245.

16. Vitaliano PP, Scanlan JM, Krenz C, Schwartz RS, Marcovina SM. Psychological distress, caregiving, and metabolic variables. *J Gerontol B Psychol Sci Soc Sci.* 1996;51:P290–P299.

17. Kiecolt-Glaser JK. Stress, personal relationships, and immune function: health implications. *Brain Behav Immun.* 1999;13:61–72.

18. Kiecolt-Glaser JK, Glaser R, Gravenstein S, Malarky WB, Sheridan J. Chronic stress alters the immune response to influenza virus vaccine in older adults. *Proc Natl Acad Sci U S A.* 1996;93: 3043–3047.

19. Burton LC, Newsom JT, Schulz R, Hirsch C, German PS. Preventive health behaviors among spousal caregivers. *Prev Med.* 1997;26:162–169.

20. Schulz R, Beach SR. Caregiving as a risk factor for mortality: the Caregiver Health Effects Study. *JAMA.* 1999;282:2215–2219.

21. Colditz GA, Manson JE, Hankinson SE. The Nurses' Health Study: a 20-year contribution to the understanding of health among women. *J Womens Health.* 1997;6:49–62.

22. Ware JE, Snow KK, Kosinski M, Gandek B. *SF-36 Health Survey: Manual Interpretation and Guide.* Boston, Mass: Nimrod Press; 1993.

23. McHorney CA, Ware JE, Raczek AE. The MOS 36-Item Short-Form Health Survey (SF-36), II: psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care.* 1993;31: 247–263.

24. Berwick DM, Murphy JM, Goldman PA, Ware JE, Barsky AJ, Weinstein MC. Performance of a five-item mental health screening test. *Med Care.* 1991;29: 169–176.

25. Berkman LF. Physical health and the social environment: a social epidemiological perspective. In: Eisenberg L, Kleinman A, eds. *The Relevance of Social Science for Medicine.* Dordrecht, Holland: D. Reidel Publishing Co; 1980:51–75.

26. Ware JE, Brook RH, Rogers WH, et al. Comparison of health outcomes at a health maintenance organization with those of fee-for-service care. *Lancet.* 1986; 1(8488):1017–1022.

27. Hemingway H, Marmot M. Evidence-based cardiology: psychosocial factors in the aetiology and prognosis of coronary heart disease: systematic review of prospective cohort studies. *BMJ.* 1999;318:1460–1467.

28. Kiecolt-Glaser JK, Glaser R. Chronic stress and mortality among older adults. *JAMA.* 1999;282: 2259–2260.