

The Stress Process Among Dementia Spouse Caregivers

*Are Caregivers at Risk for
Negative Health Behavior Change?*

MARY P. GALLANT

University at Albany, State University of New York

CATHLEEN M CONNELL

University of Michigan

This study examines the relationship between the demands of providing care to a spouse with dementia and caregiver health behaviors, specifically exercise, sleep patterns, weight maintenance, smoking, and alcohol consumption. Structural equation modeling was used to test a model predicting health behavior change from personal and environmental characteristics, perceived stress, social support, and depressive symptoms in a sample of 233 spouse caregivers of dementia patients and to examine gender differences in these relationships. Results support the hypothesis that caregiving negatively influences health behaviors. Among both women and men, health behavior change is directly influenced by depressive symptoms and objective burden. In addition, depressive symptoms mediate the effects of self-efficacy and objective burden on health behavior change. These results support the notion that health behavior change may represent one mechanism by which caregiving stress leads to adverse health outcomes.

Alzheimer's disease and related dementias constitute a significant public health concern, afflicting more than 4 million older Americans (Advisory Panel on Alzheimer's Disease 1993). Because most people with dementia are cared for at home until the final, most debilitating

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stages of the disease, family caregivers shoulder a significant portion of the care burden. Dementia caregiving is associated with a variety of adverse mental and physical health outcomes, including depression, anxiety, poor self-rated health, and decreased cardiovascular and immune functioning (Schulz et al. 1995). Generally, spouse caregivers, who represent about 50% of all primary family caregivers, are the most susceptible to these adverse effects (Schulz et al. 1995; Stone, Cafferata, and Sangl 1987). Despite the recognition that the stress of caregiving makes caregivers vulnerable to these detrimental health outcomes, relatively little is known about the mechanisms by which these outcomes occur, and the development of models that hypothesize mediating factors in the caregiver stress-illness relationship has been highlighted as a direction for future research (Schulz et al. 1995).

Health declines may be partly due to the deterioration of health-related behaviors, as caregiving may interfere with the practice of positive health behaviors and promote negative ones. For example, the demands of their role may prohibit spouse caregivers from leaving the house to exercise, getting adequate sleep, or having the time to prepare nutritious meals. Smoking, drinking, or overeating may be used to cope with the emotional distress of caregiving (Connell 1994; Nowack 1989). Social network changes may further contribute to health behavior decline. Decreased opportunities for social interaction may affect dietary behavior (McIntosh, Shifflett, and Picou 1989), and the regulatory support that spouses exert over health behaviors may be lost when the marital relationship changes (Rook, Thuras, and Lewis 1990). Finally, depressed caregivers may pay less attention to their own self-care (Pruchno et al. 1990).

A few studies have provided preliminary evidence of caregiving's impact on health behaviors. For example, in a small study of spouse caregivers, a majority reported using eating and sleeping as coping strategies, a third reported eating less nutritiously, a third of exercisers reported being less active, and half of smokers reported smoking more

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since caregiving began (Connell 1994). Other studies have demonstrated that getting adequate sleep and maintaining regular exercise are significantly more difficult for caregivers than for noncaregivers (Burton et al. 1997; Fuller-Jonap and Haley 1995). To date, however, the role of health behaviors in the caregiver stress process has not been examined.

The purpose of the present study is to examine the effect of the caregiver stress process on health-related behaviors (namely, exercise, sleep patterns, dietary behavior, smoking, and alcohol consumption). Specifically, we test a causal model that predicts change in caregiver health behavior since caregiving began from personal and environmental factors, social support, perceived burden, and depressive symptoms, and we investigate gender differences in this model. This study is an expansion of previous analyses of these data that provide a descriptive profile of the caregiver at risk for negative health behavior change (Gallant and Connell 1997).

The present study contributes to both the caregiving literature and to the stress and coping literature by providing a detailed understanding of one mechanism—health behaviors—by which caregiving stress may lead to adverse outcomes. An understanding of how health behaviors are affected by the caregiving role will inform interventions that help caregivers maintain and enhance their own self-care and ultimately enable them to continue in their role, a concern especially salient for spouse caregivers (Doty 1986). From a broader perspective, because caregivers play an invaluable role in the informal health care system, an investment in maintaining optimal caregiver health behaviors, and thus overall health and well-being, has beneficial societal consequences as well. Only by identifying specific targets for intervention in the caregiving process can this investment be made.

THEORETICAL FOUNDATION

The caregiving stress process can be conceptualized according to the stress and coping paradigm of Lazarus and Folkman (1984). The utility of this paradigm in predicting adaptational caregiving outcomes, such as depression, life satisfaction, and self-rated health, is supported by previous research (see, e.g., Haley et al. 1987; Lawton et al. 1991; Miller, McFall, and Montgomery 1991).

In this paradigm, stress is a dynamic process, a “particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus and Folkman 1984:19). The appraisal of a situation as stressful affects behavioral, physiological, and psychological responses, which in turn influence health outcomes. One such behavioral response may involve health behaviors; that is, psychosocial stress may affect the performance of health-related behaviors. This could be due to structural factors in the stressful situation, such as the lack of time to exercise or sleep, or the lack of resources to purchase or prepare nutritious foods. Or this response could be due to coping efforts that involve the use of alcohol, tobacco, drugs, or food (Lazarus and Folkman 1984; Nowack 1989; Steptoe 1991).

One’s appraisal of a particular situation as irrelevant, beneficial, or threatening is based on both environmental factors (such as objective characteristics of the situation) and personal factors (such as demographic characteristics and beliefs) (Lazarus and Folkman 1984). Personal control beliefs are thought to be particularly important. Greater perceived control is associated with the use of more problem-focused and fewer emotion-focused coping strategies, lower levels of perceived stress, greater feelings of well-being (Strickland 1978), and better psychological and physical health outcomes, especially among older adults (Rodin, Timko, and Harris 1985). Two widely used conceptualizations of personal control are health locus of control, the extent to which one feels in control of health outcomes (Wallston et al. 1976), and self-efficacy, the belief in one’s ability to successfully perform a behavior to achieve a desired outcome (Bandura 1986). One’s perception of available resources, especially social support, also influences the stress process. The presence of supportive others attenuates the overall relationship between stress and negative outcomes (Lin and Ensel 1989) and has an independent effect on positive outcomes (George 1989).

*EMPIRICAL SUPPORT FOR THE ROLE
OF HEALTH BEHAVIORS IN THE STRESS PROCESS*

Empirical evidence links stress to a variety of health behaviors. Greater levels of stress have been associated with increased smoking (Cohen et al. 1991), increased alcohol consumption (Glass et al. 1995),

increased calorie and fat intake (McCann, Warnick, and Knopp 1990), and a composite index of five health behaviors (smoking, exercising, alcohol use, weight maintenance, and sleep) (Gottlieb and Green 1984). In addition, evidence links perceived stress to psychological distress, particularly depression (George 1989), and depression to smoking and drinking (Cohen et al. 1991), suggesting that psychological distress may mediate an indirect relationship between stress and health behaviors.

Empirical evidence ties health behaviors to social support and personal control beliefs as well. Social support and social network characteristics have positive direct effects on health behavior practices (Gottlieb and Green 1984; McIntosh et al. 1989), perhaps because supportive others, either directly or indirectly via the existence of social norms, serve a regulatory function (Rook et al. 1990).¹ Internal health locus of control has been positively associated with the adoption of self-care practices and exercise (Oberle 1991) and negatively associated with cigarette smoking and alcohol use (Wallhagen et al. 1994). Greater self-efficacy is positively related to maintenance of health-promoting behaviors (McAvay, Seeman, and Rodin 1996), and among older adults, higher self-efficacy is related to lower health risk for exercise, fat intake, weight control, alcohol intake, and smoking behavior (Grembowski et al. 1993).

A MODEL OF CAREGIVER STRESS AND HEALTH BEHAVIOR

The present study is based on a conceptual model of caregiver health behavior that is adapted from Lazarus and Folkman's (1984) general framework. This model is illustrated in Figure 1, and the hypothesized relationships predicted by this model are described in the following text.

Self-reported change in health behavior patterns since caregiving began was chosen as the outcome of the present model. Change was assessed in an attempt to account for the individual variability in previous patterns of health behavior.

Environmental factors refer to objective aspects of the caregiving role and include patient status factors, such as degree and type of impairment, and situational factors, such as the number of hours on duty in a day. Termed *objective burden* in the caregiving literature, these factors generally exhibit weak relationships with caregiver out-

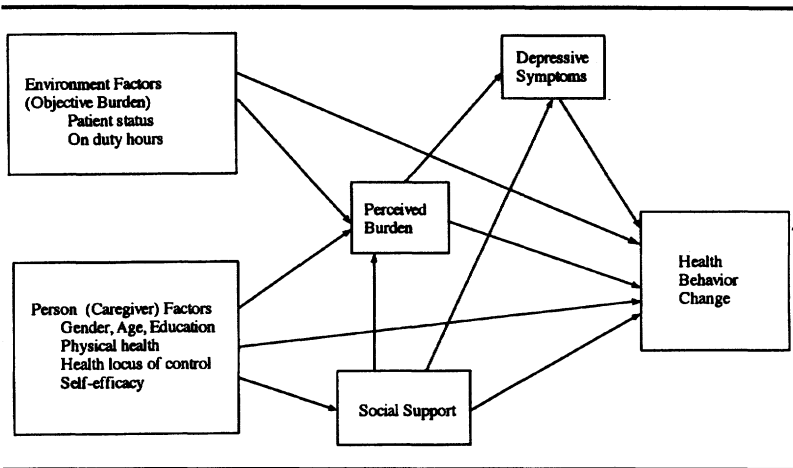


Figure 1: Conceptual Model of Caregiver Stress and Health Behavior Change

comes (Montgomery 1989). For example, Pruchno et al. (1990) found that the amount of help a caregiver provided had little relationship to subsequent burden, depression, or physical health. Similarly, George and Gwyther (1986) found that caregiver functioning was more dependent on caregiver characteristics than on the characteristics of a patient's illness. However, the extent of patient behavior problems has been linked to changes in physical and emotional health over time (Baumgarten et al. 1994). These divergent findings emphasize that patient and situational characteristics are not the only determinants of caregiver outcomes, but rather, there is great variability among caregivers in how they adapt to providing care for family members with similar impairments. This supports the notion that environmental characteristics affect outcomes largely through their impact on appraised stress, which is also affected by personal characteristics of the caregiver. It was hypothesized that environmental characteristics of the caregiving situation (i.e., objective burden) will weakly influence caregiver health behaviors directly and indirectly through their effects on perceived burden.

Demographic and background control variables, including age, socioeconomic status, relationship to patient, and caregiver health status, are salient to any model of caregiver stress and coping (Biegel, Sales, and Schulz 1991). Older caregivers, females, spouses, and

caregivers of lower socioeconomic status are particularly susceptible to the stress of caregiving (Biegel et al. 1991), and caregiver's current health status would be expected to influence the performance of health behaviors. It was hypothesized that personal characteristics will influence health behavior both directly and indirectly through perceived burden and social support.

Beliefs about personal control are also included in the model. Given previous research (Oberle 1991; Wallhagen et al. 1994), it is expected that caregivers with an internal health locus of control would be more likely to maintain positive self-care practices. Although self-efficacy has not been previously investigated in caregiver research, it has been mentioned as a potentially important psychosocial predictor of caregiver outcomes (Miller et al. 1991). Two types of self-efficacy may influence the appraisal process. A caregiver's belief in his or her ability to meet the needs of the care recipient would be expected to lessen the degree to which the objective situation is appraised as stressful. Similarly, self-efficacy in maintaining one's own health may enhance the caregiver's self-care behaviors. It was hypothesized that these two personal control beliefs will influence health behavior directly and indirectly through perceived burden and social support.

Social support may be an important resource for caregivers. The relationship between social support and perceived stress (Lin and Ensel 1989), and support's independent effects on psychological distress (Schulz and Williamson 1991) and health behaviors (Gottlieb and Green 1984), argue for modeling social support as a predictor of perceived burden, depression, and subsequent health behaviors. Thus, it is hypothesized that social support would have a direct effect on health behavior and an indirect effect via burden and depression.

Perceived caregiver burden, the "felt impositions . . . that require subjective judgement" (Montgomery 1989:203), is consistent with Lazarus and Folkman's (1984) conceptualization of appraised stress. This construct has largely been investigated as a dependent variable in the caregiving literature (Montgomery 1989), with the focus on identifying predictors of burden to intervene to prevent its development. However, if perceived burden occupies a central role in the caregiving stress process, this focus on burden as a dependent variable is one sided. Indeed, theoretical discussions of burden have emphasized that burden should be viewed as "a mediating force between

elders' impairment and impact on caregivers" (Poulshock and Deimling 1984:230). Practically speaking, because there is a limited amount that can be done to ameliorate the factors that contribute to perceived burden (i.e., patient's behavioral problems, cognitive decline), an alternative intervention strategy would enhance the ways that caregivers cope with the feelings of burden. This requires an understanding of burden as a predictor of various outcomes, including behavioral responses. In the proposed conceptual model, perceived burden is conceptualized as a mediator between personal and environmental characteristics and health behavior outcomes. It is hypothesized that increased levels of burden will be related to greater negative health behavior change.

An indirect relationship between burden and health behaviors via depressive symptoms is also hypothesized (Cohen et al. 1991). There has been some debate as to whether measures of subjective burden and of psychological well-being (i.e., depression) reflect the same underlying construct (George and Gwyther 1986) or whether subjective burden is just one of many role-specific contributors to the more global construct of well-being (Montgomery 1989). Although this issue is largely a conceptual one, specifying both subjective burden and depressive symptoms in a model of the caregiver stress process will allow for an empirical examination of the relationship between burden and depression.

A common assumption in the caregiving literature is that the caregiving role and its outcomes differ by gender. In fact, some evidence suggests that both the consequences of caregiving and the demands of the caregiving role are different for men and women. For example, as compared to male caregivers, female caregivers consistently report higher levels of stress and burden (Miller and Cafasso 1992; Stoller 1992), report greater social losses and isolation (Stoller 1992), are more likely to report their health as poor and to report higher levels of chronic conditions such as hypertension and arthritis (Pruchno and Resch 1989), and demonstrate higher levels of emotional distress, even when the higher prevalence of emotional distress among women than among men in the general population is taken into account (Pruchno and Resch 1989). In addition, females spend slightly more hours providing care, perform a greater number of caregiving tasks than do men, and are slightly more likely to carry out personal

care activities (i.e. bathing, feeding), which are among the most burdensome of caregiving tasks (Miller and Cafasso 1992), whereas men are more likely to use outside services such as home nursing or housekeeping (Allen 1994; Pruchno and Resch 1989). Furthermore, women attribute greater emotional significance to their role, have difficulty setting limits to their caregiving role, and tend to focus on the changes in their relationship to the care recipient, whereas men focus on the tasks they need to do to fulfill their role (Miller 1987).

However, much of the findings documenting gender effects are confounded by relationship effects, as samples have typically included both spouse and adult child caregivers. Because there is little evidence of how gender differences affect the caregiving role among caregivers of the same relationship (Miller and Cafasso 1992; Miller and Kaufman 1996), it is especially important to examine gender differences in the stress process for spouse caregivers. It may be that gender has main effects on perceived stress or health behavior outcomes. Alternatively, if the caregiving role is different for men and women, gender may moderate the relationships between personal and environmental resources, social support, perceived burden, depression, and caregiver health behavior. Therefore, both main and interactive effects of gender are investigated in the proposed model. It was expected that the strength of the model relationships would vary according to the gender of the caregiver.

Method

PARTICIPANTS

A mailed survey of spouse caregivers of dementia patients evaluated at the Michigan Alzheimer's Disease Research Center (MADRC) at the University of Michigan Medical Center provided the data for this study. The MADRC provides primary, secondary, and tertiary care to individuals with a variety of dementing illnesses. Potential study participants were identified from the MADRC patient database and included all co-dwelling spouses of noninstitutionalized patients with a diagnosis of dementia who had previously indicated an interest in

participating in research. Completed questionnaires were received from 233 of 355 eligible caregivers, yielding a 66% response rate.

The final sample consisted of 109 males (47%) and 124 females (53%). Mean age was 70 for males ($SD = 9.9$) and 66 for females ($SD = 9.8$) ($p < .05$), with about half of the caregivers between 65 and 74 years of age. The majority of the respondents were White (91%), retired (84%), and had been married more than 30 years (86%). Most (90%) of the sample had at least a high school diploma, and one third had a college degree. Care recipients' diagnoses included Alzheimer's disease (54%), Huntington's disease (8%), Parkinson's disease with dementia (7%), mixed cognitive disorder (5%), multi-infarct dementia (3%), progressive supranuclear palsy (3%), and unspecified cognitive disorder (21%). The mean age of the care recipients was 69 ($SD = 9.9$). About half of the caregivers had been providing care to their spouses for less than five years (56%) and half for five years or more (44%).

MEASURES

Descriptions of the variables used in the model, their possible ranges, means, and standard deviations, and alpha reliability coefficients for scale scores are presented in Table 1. Additional information about selected measures is provided next.

Number of caregiver chronic conditions. The presence of diabetes, high blood pressure, heart trouble, and arthritis was assessed and summed to indicate the caregiver's overall health. These four illnesses were included because of their high prevalence among older adults.

Objective burden. Three indicators of objective burden were used. A modified version of the Basic Activities of Daily Living (ADL) subscale of the Caregiving Hassles Scale (Kinney and Stephens 1989) was used to indicate the intensity of care provided in response to the patient's physical impairment. (Sample items are provided in Table 1.) On-duty hours were assessed by asking, "During the past month, how many hours a day have you felt 'on duty' in taking care of your spouse?" The third indicator of objective burden was the Time Dependence Burden subscale of the Caregiver Burden Inventory (CBI) (Novak and Guest 1989). This five-item subscale measures burden due to restrictions on caregiver time.

Self-efficacy. Because self-efficacy is behavior and situation specific, there are no standard self-efficacy measures. Thus, self-

TABLE 1
Study Variables and Their Means,
Standard Deviations, and Reliability Coefficients

| <i>Construct</i> | <i>Variable (possible scale range or values)</i> | <i>Mean</i> | <i>SD</i> | <i>Alpha</i> |
|------------------------------|--|-------------|-----------|--------------|
| Gender | Gender (male = 1; female = 0) | | | |
| Age | Age, calculated from birthdate (continuous variable) | 67.7 | 10.1 | |
| Education | Highest degree obtained (< high school diploma = 1; high school diploma/GED = 2; associate degree = 3; bachelor's degree = 4; graduate degree = 5) | 2.8 | 1.4 | |
| Number of chronic conditions | Current diabetes, high blood pressure, heart trouble, arthritis; coded dichotomously (no = 0; yes = 1) and summed (0-4) | 1.2 | 1.0 | |
| Objective burden | Number of Basic Activities of Daily Living subscale tasks ^a ; coded dichotomously (no = 0; yes = 1) and summed (0-8) | 2.5 | 2.7 | .80 |
| | "On-duty" hours per day (0-24) | 14.1 | 9.2 | |
| | Time Dependence Burden subscale of Caregiver Burden Inventory (5-25) ^b | 17.6 | 5.1 | .88 |
| Self-efficacy | Self-efficacy for self-care (<i>not confident at all</i> = 0; <i>very confident</i> = 5) | 4.3 | 0.9 | |
| | Self-efficacy for spouse care (<i>not confident at all</i> = 0; <i>very confident</i> = 5) | 4.0 | 1.0 | |
| Locus of control | Internal Control subscale of Multidimensional Health Locus of Control Scale (6-30) ^c | 19.9 | 4.2 | .82 |
| Social support | Abbreviated version of Interpersonal Support Evaluation List, an assessment of perceived social support (5-20) ^d | 15.7 | 3.4 | .84 |
| Perceived burden | Social Burden subscale of Caregiver Burden Inventory (3-15) ^e | 6.1 | 3.0 | .81 |
| | Emotional Burden subscale of Caregiver Burden Inventory (5-25) ^e | 10.5 | 4.7 | .88 |
| Depressive symptoms | Center for Epidemiologic Studies Depression Scale (CES-D) depressed mood (0-6) ^f | 2.3 | 1.7 | .80 |
| | CES-D positive affect (0-4) ^f | 2.4 | 1.3 | .75 |
| | CES-D somatic symptoms (0-8) ^f | 2.5 | 1.9 | .75 |
| | CES-D interpersonal (0-4) ^f | 0.3 | 0.8 | .70 |
| Health behavior change | Health behavior change index (0-5) | 1.4 | 1.0 | |

a. Respondents were asked to check which of the eight tasks applied to them; sample items include "I assist my spouse with walking" and "I help my spouse eat."

b. Sample items include "My care receiver needs my help to perform many daily tasks" and "I have to watch my spouse constantly." Item response choices range from *strongly disagree* (1) to *strongly agree* (5).

c. Sample items include "If I get sick, my own behavior determines how soon I will get well again" and "If I take care of myself, I can avoid illness." Item response choices range from

(note continues)

TABLE 1 Continued

strongly disagree (1) to *strongly agree* (5). A five-point, rather than a six-point, Likert-type scale was used to give respondents a neutral choice.

d. Sample items include "If I were sick, I could easily find someone to help me with my daily chores" (tangible), "There is at least one person I know whose advice I really trust" (appraisal), and "When I feel lonely, there are several people I can talk to" (belonging). Item response choices range from *definitely false* (1) to *definitely true* (4). Higher scores indicate higher levels of perceived social support.

e. Sample items include "I don't get along with other family members as well as I used to" (social), and "I feel ashamed of my care receiver" (emotional). Item response choices range from *strongly disagree* (1) to *strongly agree* (5).

f. Response choices include *hardly ever or never* (0), *some of the time* (1), and *much or most of the time* (2).

efficacy for self-care and self-efficacy for caregiving were each measured with single items developed for this study. Respondents were asked, "How confident do you feel in being able to take care of yourself?" and "How confident do you feel in being able to take care of your spouse?" These items were grouped with other questions concerning physical health and health behaviors and are similar to those used in studies examining self-efficacy beliefs regarding cigarette smoking, weight maintenance, and exercise behavior (Strecher et al. 1986).

Health locus of control. The six-item Internal Control subscale of the Multidimensional Health Locus of Control Scale (IHLC; Wallston, Wallston, and DeVellis 1978) was used to measure health locus of control.

Social support. The perceived availability of social support was assessed with five items from the Interpersonal Support Evaluation List (ISEL; Cohen et al. 1985). These items assess appraisal support and a sense of belonging, each with two items, and tangible support, with one item. These items have been shown to predict depression in previous caregiver research (Schulz et al. 1992).

Perceived burden. Two subscales of the Caregiver Burden Inventory (CBI; Novak and Guest 1989) were used to indicate perceived burden: Social Burden, representing role conflict, and Emotional Burden, or negative feelings toward the care receiver. The Social Burden subscale was altered from its original published version by the elimination of two items that did not load on this factor during exploratory factor analysis. (The retained items were "I don't get along with other family members as well as I used to," "My caregiving

efforts aren't appreciated by others in my family," and "I feel resentful of other relatives who could but do not help.")

Depressive symptoms. Depressive symptoms were measured with the Iowa Form of the Center for Epidemiologic Studies Depression Scale (CES-D; Kohout et al. 1993; Radloff 1977). This 11-item version of the CES-D taps the same underlying dimensions as the original 20-item scale and asks how often respondents experienced each depressive symptom during the past week. Four individual subscales—depressed mood, positive affect, somatic symptoms, and interpersonal problems—were used as separate indicators of the construct.

Health behavior change. A health behavior change index was constructed from five items that asked whether each of five health behaviors (sleep, exercise, alcohol consumption, smoking, and weight maintenance) had increased, stayed the same, or decreased since the caregiver first noticed problems with his or her spouse's memory or behavior. For example, to assess change in physical activity, respondents were asked, "How has your physical activity changed since you first noticed problems with your spouse's memory or behavior?" Response choices included, "I am more physically active now," "I am as physically active now as I used to be," and "I am less physically active now." For weight, respondents who indicated change were asked to specify the amount of weight gained or lost.

Each of these change items was coded dichotomously, with 0 indicating no change or a change in the positive direction and 1 indicating an undesirable change in the behavior. These dichotomies were constructed as follows: sleeping the same amount versus sleeping less or more; exercising the same amount or more versus exercising less; drinking the same amount of alcohol or less versus drinking more; smoking the same amount or less versus smoking more; and maintaining one's weight versus losing or gaining weight. Weight gain was defined as an increase in body mass index of 5 kg/m² or more (calculated from present weight and height), or about a 20% increase for most people, whereas weight loss was defined as a loss of body weight of 5% or more. The weight gain cutoff (20%) was thought to be high enough to account for the fact that a small weight gain in later life may be beneficial for subsequent longevity and that currently accepted weight standards may be too low for older adults (Williamson et al. 1990). A 5% weight loss is associated with an increased risk

of disability, morbidity, and mortality among middle-aged and older adults (Pamuk et al. 1993). The dichotomized codes for these items were summed to create a health behavior change index. Higher scores indicate higher levels of negative health behavior change. The resulting index ranged from 0 to 5, with a mean of 1.4 ($SD = 1.0$). It had a skewness value of 0.2 and a kurtosis value of -0.6 .

DATA ANALYSIS

A causal model, based on the conceptual model of Figure 1, was developed and estimated with LISREL 7.17 (Jöreskog and Sörbom 1989) using maximum likelihood procedures to analyze covariance matrices.² Model development began with confirmatory factor analysis to construct a measurement model for the entire sample. To reduce the number of parameters estimated, summary scale scores (for health locus of control, social support, burden subscales, and depression subscales) were used as single indicators. This strategy is appropriate when exploratory factor analysis indicates that individual factor item loadings for the scale are uniformly high (Liang et al. 1990). Then, in a series of preliminary modeling analyses, the most parsimonious and best-fitting structural model was developed. This involved estimating a hypothesized preliminary model, based on the conceptual model illustrated in Figure 1, and comparing this model with several nested competing models. The model was modified based on both substantive and statistical considerations to arrive at a final structural model.³

This model was then estimated simultaneously for males and females to examine gender differences (Jöreskog and Sörbom 1989). Two-group estimation involves first testing the null hypothesis that the covariance matrices for males and females are equivalent. Rejection of this hypothesis requires further model estimations to detect gender differences.

Measurement model equivalence is examined with a series of model estimations in which aspects of the measurement model are successively constrained across groups. Equality constraints are placed on (1) the factor pattern, (2) the factor loadings, (3) both factor loadings and error variances, and (4) the entire measurement model (factor loadings, error variances, and factor variances and covariances). At each step, the fit of the model is compared to the fit of the

previous, less-constrained model. Adequate fit leads to the acceptance of the null hypothesis of invariance across groups.

The equivalence of the structural model is similarly assessed. The full model is estimated first with the structural relationships (beta and gamma linkages) constrained across groups, and then with the entire structural model constrained across groups.

Several criteria were used for converging evidence of model fit, including both absolute goodness-of-fit indexes—chi-square (χ^2), goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI) and comparative fit indexes—change in chi-square ($\Delta\chi^2$), relative noncentral index (RNI) (McDonald and Marsh 1990), and relative normed fit index (RNFI) (Mulaik et al. 1989). Change in chi-square was used to compare each successively more constrained model with the previous model; a significant value indicates that the additional constraints resulted in a significantly poorer model fit. For the GFI, AGFI, RNI, and RNFI, values between 0.9 and 1.0 indicate a good fit. The RNI compares the fit of a model to that of a null model. The RNFI controls for the fit of the measurement model while comparing the fit of the structural model to the fit of a null model. Unlike χ^2 , GFI, and AGFI, the RNI and RNFI are not dependent on the sample size and thus were relied on more heavily.

Missing data was minimal. Only five cases had missing data for more than three variables. These five cases were eliminated, and mean substitution was used to impute values for the remaining missing data. Thus, the final sample size was 228. Of these 228, 79% had complete data. No cases had missing data for the primary dependent variable. The percentage of missing data for all other variables was less than 1.7%, with the exception of duration of caregiving and on-duty hours, which had 8.2% and 8.6% missing data, respectively.

Results

THE MEASUREMENT MODEL FOR PREDICTING HEALTH BEHAVIOR CHANGE

The accepted measurement model for the total sample is presented in Table 2.

TABLE 2
Standardized Factor Loadings and Measurement Error Variances
for the Measurement Model Predicting Health Behavior Change

| <i>Latent Variable</i> | <i>Indicators</i> | <i>Factor Loading</i> | <i>Measurement Error</i> |
|-------------------------|---|------------------------------|--------------------------|
| Gender | Gender | 1.00 ^a | 0 ^b |
| Age | Age | .98 ^a | .05 ^b |
| Education | Education | .95 ^a | .10 ^b |
| Objective burden | Number of Activities of Daily Living | | |
| | hassles | .69 ^a | .53 |
| | On-duty hours | .57 | .67 |
| | Time burden | .92 | .16 |
| Self-efficacy | Self-efficacy for self-care | .74 ^a | .45 |
| | Self-efficacy for spouse care | .67 | .56 |
| Physical health | Number of chronic conditions | .95 ^a | .10 ^b |
| Health locus of control | Internal health locus of control | .95 ^a | .10 ^b |
| Social support | Perceived social support | .95 ^a | .10 ^b |
| Perceived burden | Social burden | .70 ^a | .51 ^c |
| | Emotional burden | .79 | .38 |
| Depressive symptoms | Center for Epidemiologic Studies Depression Scale (CES-D) depressive symptoms | .82 ^a | .34 |
| | CES-D positive affect | -.46 | .79 |
| | CES-D somatic symptoms | .83 | .31 |
| | CES-D interpersonal | .43 | .82 ^c |
| | Health behavior change | Health behavior change index | .95 ^a |

NOTE: Factor loadings and measurement errors are from the completely standardized solution. All factor loadings and measurement errors are significant at the .001 level.

a. Parameter fixed to 1.0 in the unstandardized solution.

b. Parameter fixed to Error Estimate \times Variance of Indicator in the unstandardized solution.

c. These error variances were allowed to correlate ($r = .18, p < .001$).

Overall, the model provided an adequate fit to the data ($\chi^2 = 204.75, df = 86, GFI = .92, AGFI = .84, RNI = .88$). For all single-item indicators (i.e., gender, age, education, number of chronic illnesses, health locus of control, social support, and health behavior change), the error variance was fixed to an estimate of the measurement error times the variance of the indicator. Measurement error estimates were 0% for gender, 5% for age, and 10% for all other single indicators. These estimates were conservative, as increased error variances result in artificially stronger relationships among factors. Alpha reliability estimates for the scales provided further evidence that a 10% error variance was a reasonable estimate.

A sensitivity analysis was used to assess the degree to which measurement model parameter estimates were dependent on these error variance estimates (Hayduck 1987). The measurement model was reestimated with measurement errors fixed at 0, and again with errors fixed at 20% for all single indicators except gender. Discrepancies in factor correlations were small (less than .035) or nonexistent, indicating the robustness of the measurement model with respect to these error estimates.

All latent variables were allowed to correlate. In addition, error variances for social burden and the interpersonal subscale of the CES-D scale were allowed to correlate because preliminary measurement model estimations indicated strain in this part of the model. This correlated error is conceptually reasonable given that both of these indicators assess aspects of social relationships.

THE STRUCTURAL MODEL PREDICTING HEALTH BEHAVIOR CHANGE

Preliminary modeling analyses with the full sample resulted in the accepted structural model illustrated in Figure 2. (Due to space considerations, these analyses are not described here, but details are available from the first author.) This model provided a good fit to the data ($\chi^2 = 186.70$, $df = 79$, GFI = .91, AGFI = .86, RNFI = .99). In the course of these preliminary analyses, age, physical health, and health locus of control were eliminated from the model because they were not significantly related to any other model element. In addition, paths from social support to perceived burden, depression and health behavior change, and paths from perceived burden to depression and health behavior change, were eliminated due to nonsignificance.

This model was then tested simultaneously for males and females. Table 3 presents the two-group fit statistics. The hypothesis of equivalent covariance structures (Model 1) was rejected. Model 2 indicated that the factor pattern is equivalent across groups. Model 3 resulted in a nonsignificant change in model fit. Therefore, factor loadings are assumed to be invariant. However, when both factor loadings and error variances were constrained (Model 4), model fit worsened significantly, indicating measurement errors are not equivalent for females and males. Therefore, Model 3, in which factor loadings were constrained across groups, but factor variances, factor covariances, and

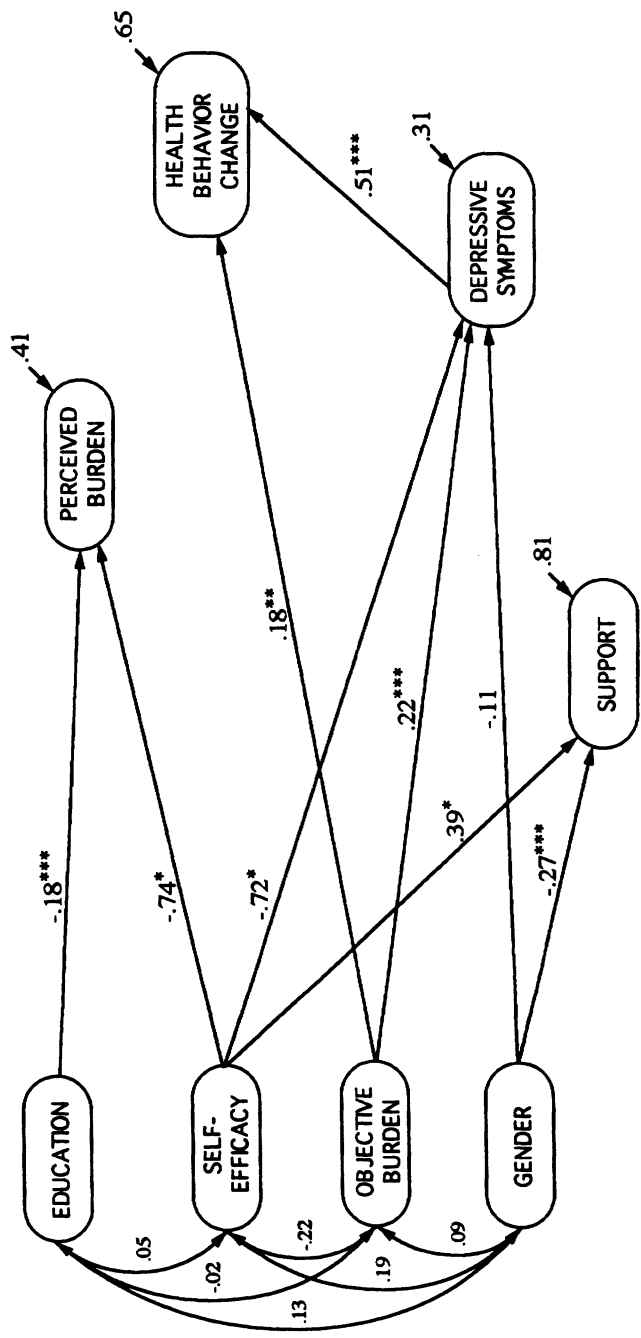


Figure 2: Preliminary Structural Model Predicting Negative Health Behavior Change, Indicating the Standardized Parameter Estimates

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

TABLE 3
Fit Statistics for the Two-Group Model Predicting
Health Behavior Change Among Females and Males

| <i>Model</i> | χ^2 | df | p | <i>GFI</i> ^a | $\Delta\chi^2$ | Δ df | p | <i>RNFI</i> |
|--------------|----------|-----|-------|-------------------------|----------------|-------------|-------|-------------|
| Model 0 | 554.16 | 158 | <.001 | | | | | |
| Model 1 | 171.59 | 105 | <.001 | | | | | |
| Model 2 | 212.01 | 116 | <.001 | .90 .89 | | | | |
| Model 3 | 225.42 | 123 | <.001 | .89 .88 | 13.41 | 7 | <.10 | |
| Model 4 | 266.42 | 135 | <.001 | .87 .86 | 41.00 | 12 | <.001 | .97 |
| Model 5 | 269.70 | 152 | <.001 | .87 .86 | 44.28 | 29 | <.05 | .95 |
| Model 6 | 260.78 | 151 | <.001 | .88 .86 | 35.36 | 28 | >.10 | .98 |
| Model 7 | 267.37 | 155 | <.001 | .88 .86 | 6.59 | 4 | >.10 | .97 |

NOTE: Model 0 = Null model (measurement model with no factor correlations). Model 1 = Test of equivalence of covariance structures. Model 2 = Measurement model with factor pattern constrained. Model 3 = Measurement model with factor loadings constrained. Model 4 = Measurement model with factor loadings and error variances constrained. Model 5 = Full model with measurement model and structural model (i.e., gamma and beta linkages) constrained. Model 6 = Model 5 with self-efficacy—perceived burden path freed across groups. Model 7 = Entire structural model constrained. GFI = Goodness-of-fit index. RNFI = Relative normed fit index.

a. For each model, the top figure indicates the GFI for females, and the bottom figure indicates the GFI for males.

measurement errors were allowed to vary across groups, was accepted as the final two-group measurement model.

Model 5 tested the equivalence of the model's structural relationships (i.e., all relationships among the exogenous and endogenous variables). This model fit significantly worse than Model 3, indicating that some aspect of the structural model was not equivalent. Modification indexes suggested that the path between self-efficacy and perceived burden was causing strain in the model. Estimating the model with this path freed (Model 6) resulted in a significant improvement in fit. Model 7 added the further constraint of equivalence of endogenous variable error variances. Because this model resulted in a nonsignificant change in fit, Model 7 was chosen as the final two-group model. The standardized structural parameters for this final model (Model 7) are presented in Figure 3. This model provided a

good fit to the data ($\chi^2 = 267.37$, $df = 155$; GFI = .88 for females, .86 for males; RNFI = .97) and explained 38% of the variance in health behavior change for both men and women.

For both men and women, higher levels of education predicted lower levels of subjective burden. Greater self-efficacy also predicted lower levels of subjective burden, but this relationship was almost twice as strong among women than among men. Greater self-efficacy was also related to greater levels of social support and to lower levels of depressive symptoms. Also, greater objective burden was directly related to more depressive symptoms, and greater objective burden predicted more negative health behavior change. Finally, higher levels of depressive symptoms were related to greater health behavior change.

Discussion

Although the adverse consequences of caregiving have been well documented, little is known about the mechanisms by which these outcomes occur. The purpose of this study was to examine whether caregiver stress contributed to declines in health behaviors among male and female spouses of older adults with dementia. A model of the caregiver stress process, based on Lazarus and Folkman's (1984) stress and coping theory, hypothesized that personal characteristics and beliefs, objective burden, and social support would influence perceived burden, depressive symptoms, and, ultimately, the health behaviors of caregivers. In summary, the results support the hypothesis that health behaviors are negatively affected by the demands of caregiving among both male and female caregivers.

The present results indicate that the caregiving stress process negatively influences caregiver health behaviors, and the utility of this model to predict health behavior was similar for women and men. Health behaviors, specifically exercise and physical activity, sleep patterns, maintaining a regular meal schedule, proper nutrition, eating breakfast, cigarette smoking, alcohol consumption, and maintaining appropriate body weight, have been associated with physical health status and mortality (Berkman and Breslow 1983; McIntosh et al. 1989). Among older adults, poor health practices have been linked with increased disability and mortality over a 10-year period (Breslow

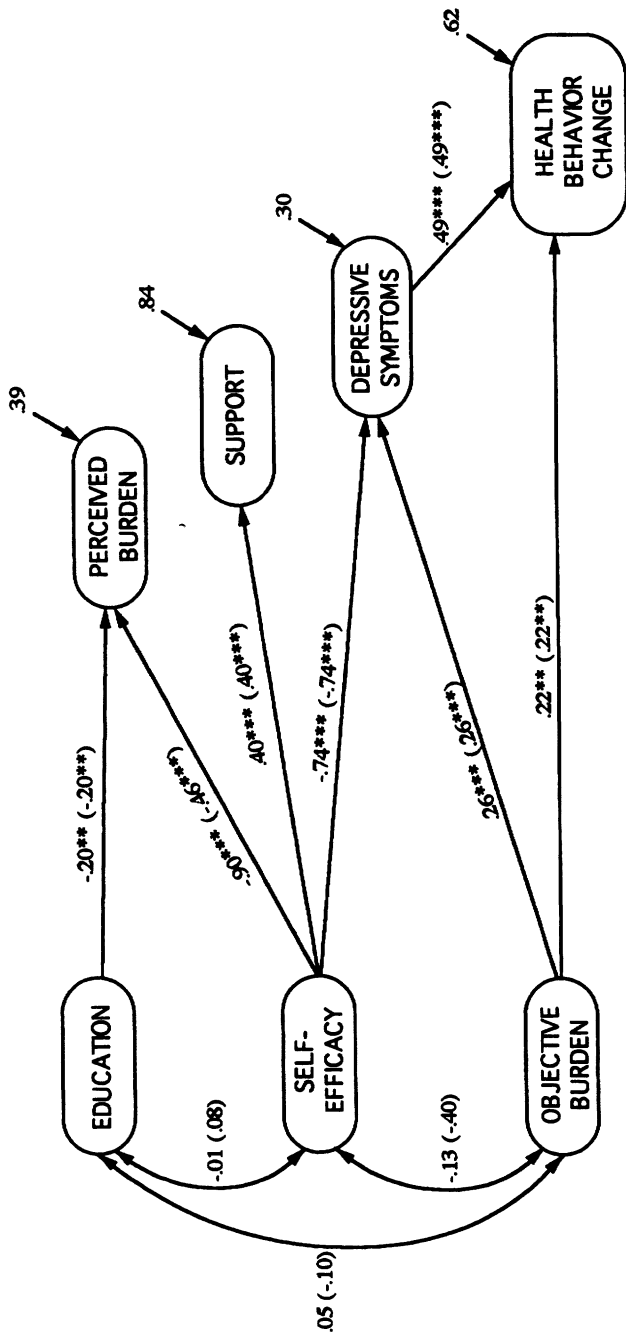


Figure 3: Final Two-Group Structural Model Predicting Negative Health Behavior Change, for Women and Men

NOTE: Estimates for men are in parentheses.

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

and Breslow 1993), exercise and good nutrition have been linked to functional health (Duffy and MacDonald 1990), and, among older women, obesity, smoking, and physical inactivity have been linked with impaired functioning (Ensrud et al. 1994). Given these documented links between the behaviors investigated in this study and physical and functional health outcomes, the present findings lend support to the notion that health behaviors may mediate the relationship between caregiving stress and long-term health outcomes and may represent one mechanism by which the demands of caregiving lead to adverse health outcomes for both men and women.

Depressive symptoms emerged as a strong predictor of health behavior change for both men and women. This finding emphasizes the powerful role of psychological distress in general self-care and supports the hypothesis that depressed caregivers are less likely to take optimal care of themselves. This is not surprising especially given that some depressive symptoms (i.e., lack of appetite, difficulty sleeping) directly involve basic self-care behaviors. Furthermore, this finding supports previous research suggesting that good mental health is important in the maintenance of good physical health (Aneshensel, Frerichs, and Huba 1984). Thus, depression resulting from stress may lead to a decline in personal health practices, which may ultimately affect physical health status.

In the conceptual model, subjective caregiver burden was hypothesized to mediate the effects of personal and environmental factors on depressive symptoms and health behaviors. This hypothesis was not supported—subjective burden had no direct or indirect effects on health behavior change. Furthermore, neither the influence of environmental factors nor the influence of personal characteristics was mediated by subjective burden. Instead, the influence of self-efficacy and objective burden on health behavior change flowed through depressive symptoms. This suggests that health behaviors may be more sensitive to global feelings of well-being and that subjective burden, at least as operationalized here, does not play a salient role in this process.

With respect to background characteristics, better-educated caregivers demonstrated lower levels of subjective burden, consistent with expectations and with previous findings that indicate poorer outcomes for caregivers with less education and lower socioeconomic

status (Biegel et al. 1991). Caregivers with greater educational, and thus financial, resources may be better able to obtain outside assistance and access community resources. It is also possible that caregivers with more formal education have a larger, or different, repertoire of problem-solving or resource mobilization skills. However, these findings should be interpreted with caution given that the present sample is better educated than representative samples of community-dwelling older adults.

Self-efficacy demonstrated a very strong inverse relationship to subjective burden, especially for women, consistent with the underlying theory that posits that personal characteristics act as resources to mitigate the effects of environmental sources of stress on perceived stress. Self-efficacy has been virtually ignored in the caregiver literature, although at least one intervention study demonstrated that with increases in self-efficacy, caregiver coping ability also increased (Schulz et al. 1989). Differences in self-efficacy may partly account for the common finding that subjective burden varies widely even among caregivers facing similar role demands.

How might self-efficacy act to lower subjective burden? One explanation is provided by Intrieri and Rapp's (1994) recent finding that self-control skillfulness, defined as the ability to use conscious self-control strategies to manage the emotional, behavioral, and cognitive consequences of a stressful situation, resulted in decreased subjective burden among spouse caregivers. The researchers theorized that caregivers with such skills are better able to adapt to stressful situations because of their ability to modify existing coping responses and acquire new coping skills to deal with new situations and to regulate their emotional and behavioral responses to stressors. Because the concepts of self-efficacy and self-control skillfulness share a conceptual base in social cognitive theory (Bandura 1986), it is likely that the present findings reflect the same underlying phenomenon. That is, caregivers with greater self-efficacy are better able to use conscious, self-regulating behaviors to modify the environmental demands and manage the emotional responses of stressful situations.

It was hypothesized that self-efficacy would exert its effect on depressive symptoms solely through subjective burden, but results indicate that self-efficacy has a strong direct effect on depressive symptoms. This finding supports previous research that has found

strong direct effects between various conceptualizations of self-efficacy and depression among older adults (Holahan and Holahan 1987). Furthermore, it mirrors the findings of Grembowski et al. (1993) who reported that greater self-efficacy related to health behaviors (e.g., exercise, dietary fat intake, weight control, alcohol intake, and smoking) was related to lower levels of depression among older adults.

Although there were no significant direct effects between self-efficacy and health behavior change, self-efficacy was related to health behaviors indirectly via depressive symptoms. Previous research has found positive relationships between self-efficacy and health behaviors (Holden 1991) but typically has not examined variables that mediate this relationship. Among these caregivers, although self-efficacy is an important predictor of health behavior change, it does not influence this outcome directly, but rather, its influence flows through psychological distress. This finding, along with other findings that consistently link self-efficacy to depression, lends empirical support to Bandura's (1986) assertion that self-efficacy may affect outcomes indirectly by influencing emotional responses.

The current findings suggest the need for a more detailed examination of self-efficacy in caregiving. Given the myriad range of behaviors involved in both general self-care and spouse care, the development of separate multi-item measures that tap a variety of behavior-specific types of self-efficacy important to self-care and spouse care would have both scientific merit and practical implications. The use of such measures would allow for a better understanding of the specific aspects of self-efficacy that are most important to caregiver outcomes and would allow for the development of individualized interventions that target specific caregiver behaviors.

Contrary to expectations, locus of control was not significantly related to health behavior change. This finding supports Wallhagen et al.'s (1994) recent assertion that locus-of-control beliefs may not exert their effects on health outcomes through health behaviors.

Health behavior change was directly influenced by objective burden. This confirms the hypothesis that structural factors, such as lack of time, have an independent influence on the performance of health behaviors, aside from perceived stress and psychological distress. Objective burden also influenced health behavior change indirectly via depression. Contrary to expectation, objective burden did not

influence subjective burden. Although this is intuitively unexpected, it is consistent with some previous research (Montgomery 1989). In addition, perhaps the lack of a relationship demonstrated here is a reflection of the particular way these two constructs were operationalized in this study. Subjective burden, operationalized as social and emotional burden, may be more sensitive to personal characteristics of the caregiver than to ADL tasks performed, on-duty hours, or restrictions on caregiver time.

An unexpected finding was the weak contribution of social support to predicting health behavior change. Although social support was significantly predicted by self-efficacy, as hypothesized, it was not a significant predictor of subjective burden, depression, or health behavior. Perhaps caregivers with a greater sense of self-efficacy for self- and spouse care are better at mobilizing their support networks to obtain additional help with caregiving demands. Alternatively, perhaps knowing that one has other people available to help enhances one's confidence in the ability to care for both self and spouse.

In the present study, social support was operationalized as the perceived availability of caregiving-specific tangible support, appraisal support, and a sense of belonging. Baumgarten (1989) has concluded that the divergent findings in the caregiving literature with respect to social support are partly attributable to various operationalizations of the construct. It could be that among spouse caregivers, actual support received, satisfaction with social support, or caregiving-specific support better predicts caregiver health behaviors. Future research into the effects of caregiver stress on health behaviors would benefit from investigations that include multiple conceptualizations of social support.

Although it was hypothesized that the model would operate differently by gender, the results suggest that the interrelationships among these variables for males and females are quite similar. In addition, gender had no significant main effect. Although descriptive findings indicate that female caregivers report significantly more weight gain and loss of sleep and are significantly less active than male caregivers (Gallant and Connell 1997), the present analysis suggests that the stress process does not operate differently by gender. This finding parallels previous studies of spouse caregivers that have found no gender differences in caregiving outcomes (Miller and Cafasso

1992; Miller and Kaufman 1996) and perhaps can be attributed to the fact that gender was investigated within a particular caregiving relationship.

Because the present study is cross-sectional, caution must be exercised when drawing conclusions about causality. These findings do, however, provide preliminary support for certain causal relationships and argue for further longitudinal investigations. Ideally, such a longitudinal study would include measures of physical health or physical functioning as long-term outcomes so that the assumed link between health behaviors and subsequent health outcomes could be directly assessed. Furthermore, the present dependent variable represents perceptions of health behavior change, which may be influenced by a caregiver's present emotional state. Future research should include a more robust indicator of health behavior change, such as direct observation or in-home assessment.

Furthermore, the conceptualization of the stress process tested here represents just one snapshot of a continuous multistage process. Different snapshot conceptualizations may represent different stages in the process in which the hypothesized flow of causality runs in a different direction. For example, changes in health behavior could cause changes in one's self-efficacy concerning self-care. The absolute direction of causal relationships can only be determined with longitudinal data in which the same constructs are measured at different points in time.

The people recruited for participation in this study all chose to be evaluated at a tertiary care medical center, and all were caring for individuals who had received a diagnosis of a dementing illness. Compared to the study participants, it is likely that caregivers whose spouses have not been referred to a specialist or have not been evaluated by a physician and who may not know the exact nature of the patient's illness most likely have a different caregiving experience. Unfortunately, this population is difficult to reach and recruit for participation in research. On the other hand, the fact that all the patients in this study had received a clinical diagnosis of dementia represents an advantage over a sample of self-identified dementia caregivers.

Given that there may be cultural differences in both the caregiving experience and the determinants of health behaviors, these findings can only be generalized to White caregivers. Unfortunately, the vast

majority of caregiving research suffers from weak minority representation (Connell and Gibson 1997; Kuhlman et al. 1991) in part because of lower use of services provided by voluntary and medical care organizations, typical sources of sample recruitment. The lack of a comparison group of noncaregivers represents a further limitation to this research. Without a comparison group, one cannot conclude whether the amount of behavior change reported by these caregivers is typical of the health behavior change experienced among all older adults over time (see Haley et al. 1995 for a discussion of this issue).

With respect to analysis procedures, because the fit of a model can be dependent on the characteristics of a particular sample (Bagozzi and Yi 1988), using the same sample to both develop a model and test a revised version of that model is not an ideal strategy. Unfortunately, the sample size made it impossible to set aside a random portion of the sample in which to replicate the final models. Replicating these results in another sample would add further credence to these findings.

Despite these limitations, the findings lend support to the hypothesis that the demands of caregiving may be hazardous to caregivers' self-care, and they provide some empirical rationale for the development of caregiver interventions that focus on maintaining and enhancing caregiver health behaviors. Given the link demonstrated here between depressive symptoms and change in exercise, sleep, weight maintenance, drinking, and smoking, such interventions should target caregivers' health behaviors and psychological distress.

NOTES

1. The potential negative impact of social relationships on health behaviors must also be acknowledged; supportive others who engage in maladaptive behaviors may directly or indirectly impede one's efforts to maintain a healthy self-care pattern.

2. Although maximum likelihood estimation procedures assume continuous measurement, they are robust with respect to ordinal measures as long as variable distributions are not highly skewed. For the variables in this analysis, skewness and kurtosis values for each variable indicated that no variable was highly nonnormal in its distribution, and thus, maximum likelihood procedures were considered appropriate.

3. Competing models included a fully saturated model, in which all possible structural paths were estimated, and a primarily mediated model, in which most of the hypothesized relationships with the ultimate outcome were mediated by subjective burden or depression. Modification indexes were examined to identify changes that would improve model fit, although changes were not made unless they made conceptual sense.

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Mary P. Gallant is an assistant professor of social behavior and community health in the Department of Health Policy, Management, & Behavior at the School of Public Health, University at Albany. Her research interests include health behaviors and self-care behaviors of older adults and chronic illness management.

Cathleen M Connell is an associate professor of health behavior and health education at the School of Public Health and the director of the Education and Information Transfer Core of the Michigan Alzheimer's Disease Research Center at the University of Michigan. Her research interests include health behaviors of older adults and the psychosocial context of chronic illness.