Published in final edited form as:

J Appl Dev Psychol. 2010 January 1; 31(1): 38–46. doi:10.1016/j.appdev.2009.06.001.

The Association between Membership in the Sandwich Generation and Health Behaviors: A Longitudinal Study

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Abstract

The current study examined the association between membership in the sandwich generation, defined as providing care to both children and parents or in-laws, and five health behaviors: checking the food label for health value when buying foods, using a seat belt, choosing foods based on health value, exercising regularly, and cigarette smoking. Participants ($N=4943$) were from a longitudinal study of a midwestern community-based sample. Regression analyses tested the unique effect of sandwich generation membership on health behaviors above and beyond demographic factors and prior levels of the same behavior. Compared to other caregivers and noncaregivers, multigenerational caregivers were less likely to check food labels and to choose foods based on health values. Multigenerational caregivers were less likely than noncaregivers and those who cared for children only to use seat belts, and they smoked marginally more cigarettes per day than those groups. Multigenerational caregivers were less likely than noncaregivers and those who cared for parents/in-laws only to exercise regularly. Thus, in general, healthy behaviors were diminished for multigenerational caregivers.

Keywords

caregiving; health behaviors; sandwich generation

Introduction

Midlife has been defined as the period between ages 40 and 60, although there is wide variation both across research studies and individuals' self-labeling (Lachman, 2004). Midlife is an important developmental period both because it is the second fastest growing segment of the US population and because it provides opportunities for behavioral changes that can improve future physical health and quality of life (Lachman, 2004). For many midlife adults, "wake

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up” calls in the form of early health problems in themselves or others in their social networks lead to interest in changing health behaviors (Lachman, 2004). For example, most attempts at smoking cessation are made in the mid-40s (Agrawal et al., 2008).

However, the developmental significance of health behaviors at midlife must also be placed in the context of midlife role occupancies and conditions. One view is that, for mature adults, successfully coping with the midlife demands of work and family leads to resolution of the developmental conflict between generativity and stagnation, thus influencing later well-being (Erikson, 1980). A related view of the midlife demands of work and family is that of life-span development theory (Staudinger & Black, 2001), which provides the theoretical framework for the current study. According to this theoretical perspective, all individuals have limited resources, but the nature of the resources changes over the life span, both in terms of their magnitude and variability. According to Staudinger and Black (2001), midlife individuals generally have high levels of internal and external resources, but also many demands that threaten to exceed those available resources. Specifically, for many people, midlife is a time when multiple roles and responsibilities begin to compete with each other. Therefore, midlife adults are forced to make choices regarding the allocation of their available resources.

In addition, although there is considerable individual variation in roles and responsibilities at midlife, there are also important general trends. In terms of career, for many this age period is a time of career “peaking” and of women returning to the workforce (Moen & Wethington, 1999). In terms of caregiving, midlife can be a time of both parenting adolescent children and caring for aging parents. This combination of providing care to both children and aging parents has led to labeling these individuals as members of the “sandwich” generation (Hamill & Goldberg, 1997; Hunter, Sundel, & Sundel, 2002).

Several demographic trends have led to an increase in the number of midlife adults caring for multiple generations (Lachman, 2004). These trends include longer life expectancy, delayed marriage and childbearing, and more adult children choosing to live at home and returning home after divorce (Riley & Bowen, 2005). Recent estimates are that 33.9 million Americans, or 16% of the population, provide care for an older family member (National Alliance for Caregiving and the AARP, 2004), and among a nationally representative sample, 44% of those who were married and in early midlife (ages 35-44) both lived with children and had at least one parent in fair to poor health (Marks, 1996).

The increased likelihood that midlife individuals will be caring for multiple generations of family members raises an important question about whether such multigenerational caregiving has effects on physical health and health behaviors. There are several reasons why multigenerational caregiving could compromise health and health behaviors. First, caring for multiple generations may impair health behaviors simply because such caregiving reduces the amount of time available for engaging in health behaviors. Given the time demands of adult roles, adding more hours of caregiving responsibility may make it difficult to spend time on exercise or food preparation. Second, multigenerational caregiving may negatively influence health behaviors because of reduced salience of personal health goals. That is, those who are preoccupied with meeting the needs of others may be less likely to focus on their own health. The addition of a second generation of caregiving responsibility may increase cognitive complexity in a simple quantitative way (for example, increasing the number of medical appointments that need to be scheduled). However, caring for two generations may also create complex cognitive demands in that it requires multiple skills and the ability to address a very broad range of life challenges. In either case, those who are preoccupied with caregiving tasks may be less likely to focus on their own health needs. Finally, multigenerational caregiving could increase stress, which in turn leads to poor health behaviors (Aldwin & Levenson, 2001).

Thus, there are several reasons to hypothesize that multigenerational caregiving could impair health behaviors. Moreover, there are data linking individual health behaviors to increased risk of morbidity and mortality (Glanz et al., 2002). Indeed, behavioral factors such as tobacco use, diet, physical activity, alcohol and drug use, sexual practices, and preventable injuries are the most important contributors to mortality in the United States (McGinnis & Foege, 1993). According to Glanz et al. (2002), improving such health behaviors can substantially reduce suffering, premature mortality, and medical costs. Thus, a potential impact of multigenerational caregiving on health behavior also has public health implications.

Although to our knowledge no studies have directly examined the effects of multiple generation caregiving on health behaviors, there is an extensive literature comparing those who are and are not engaged in caregiving. These findings have been inconsistent. Some studies find that caregivers are less likely than non-caregivers to engage in regular exercise (Burton, Newsom, Schulz, Hirsch, & German, 1997) and healthy eating (Acton, 2002; Castro et al., 2007). Other studies report no differences between caregivers and non-caregivers for health behaviors such as physical activity and cigarette smoking (Acton, 2002; Castro et al., 2007; Scharlach, Midanik, Runkle, & Soghikian, 1997). Similarly, findings from research exploring the link between caregiving and health outcomes have been mixed. Although studies have found poorer immune status in caregivers as compared with non-caregivers (Kiecolt-Glaser et al., 2003; Vedhara et al., 1999), results from a meta-analysis indicate that differences between caregivers and non-caregivers on measures of physical health are relatively small (Pinquart & Sorensen, 2003).

Why would health behaviors and health outcomes be preserved even in the face of such task demands as caregiving for multiple generations? First, this could reflect a selection effect such that, when there are multiple possible caregivers, those individuals who are themselves the healthiest and engaging in the healthiest behaviors are also most likely to assume multiple caregiving roles. Second, it is possible that caregivers receive some benefits from their responsibilities, and this leads to better health behaviors. Indeed, some studies have suggested that, for middle-aged adults, multiple roles and responsibilities have a beneficial effect on caregivers (Chisholm, 1999; Loomis & Booth, 1995). Likewise, other researchers have argued that the stereotype of a frantic and overloaded “sandwiched” individual may be overstated (Aldwin & Levenson, 2001). Third, caregivers may be particularly motivated to maintain their own health because others depend on them for care or because they observe the declining health of others. Finally, middle-aged adults may have developed the skills to better deal with task demands as compared to other age groups, thereby offsetting any negative effects (Lachman, 2004). Given the inconsistent findings about caregiving in general, the goal of the current study was to test whether membership in the “sandwich” generation was associated with lower or higher levels of positive health behaviors.

However, it may be overly simplistic to think that all health behaviors would be affected in the same way by multigenerational caregiving, and the breadth of the hypothesized sandwich generation effect on multiple health behaviors is unknown. Therefore, this study explored the association between membership in the sandwich generation and five health behaviors: checking the ingredient label for health value when buying foods, choosing foods to eat based on health value, using a seat belt, exercising regularly, and cigarette smoking. Moreover, different mechanisms underlying sandwich generation effects are likely to affect different health behaviors. For example, if the effect of multigenerational caregiving operates through reduced available time, then this would affect only health behaviors that require time. In this case, multigenerational caregivers might be less likely to exercise but not less likely to use seat belts. Similarly, if multigenerational caregivers take better care of their health because they feel responsible for others, then the effect of multigenerational caregiving might selectively impact those health behaviors that have more immediate consequences, such as seat belt use,

rather than long-term effects, such as healthy eating. For these reasons, we examined a range of health behaviors that did and did not require time and had both short-term and long-term potential consequences for health.

In testing the effects of sandwich generation membership on health behaviors, we utilized a large, longitudinal, community sample. Importantly, our longitudinal design allowed us to examine prior levels of the same behavior. We also examined sandwich generation membership effects above and beyond the effects of sex, age, marital status, employment status, and educational attainment, all of which were expected to influence the health behaviors. National epidemiologic data demonstrate that health behaviors vary as a result of demographic factors. For example, females are less likely to smoke cigarettes and more likely to eat a healthy diet, those with more education are less likely to smoke, more likely to exercise, and more likely to eat a healthy diet, and those who are married are less likely to smoke and more likely to eat a healthy diet (CDC, 2005). Based on these data, we expected that females, those who were married, and those with higher educational attainment would be more likely to engage in healthy behaviors. Because of demographic differences in health behaviors, we controlled for these demographic predictors in our models. Moreover, demographic factors may moderate the effects of sandwich generation membership on health behaviors. Prior research has shown that caregivers who are white (Fredman et al., 1995) and female (Pinquart & Sorensen, 2003) report higher levels of stress and depressive symptoms than other caregivers. In addition, male caregivers have demonstrated poorer immune response (Scanlan et al., 2001) and higher rates of health decline (Fredman et al., 2008) than female caregivers. Accordingly, we also tested interactions between sandwich generation membership and demographic predictors.

In addition to controlling for demographic predictors and prior levels of the health behavior, we also tested the effects of multigenerational caregiving above and beyond single generation caregiving and total hours spent providing care. Thus, any impacts would not be due to caregiving in general, but rather to the unique impact of simultaneously caring for both parents and children. Although these methods create a very conservative test, they increase confidence that any significant findings can be attributed to the unique demands of sandwich generation caregiving rather than caregiving in general.

Method

Participants

Participants were from the Indiana University Smoking Survey, an ongoing cohort-sequential study of the natural history of cigarette smoking (see e.g., Chassin, Presson, Sherman, & Pitts, 2000). Between 1980-1983, all consenting 6th-12th graders in a Midwestern county school system completed annual surveys. The total sample size of those who were assessed at least once was 8,487. Follow-up surveys were conducted in 1987, 1993, 1999, and 2005. In each case, 70% or more of the original sample were successfully retained. Because the sample is 96% non-Hispanic Caucasian, ethnic differences are not considered.

Demographically, the sample is similar to the community from which it was drawn. For example, the marriage rate is 64% in this sample compared to 66% among similarly-aged adults in the Midwest (Lugaila, 1998), and the high school graduation rate is 97% in this sample compared to 92% among similarly aged adults in the Midwest (Day & Curry, 1998). At the most recent follow-up conducted in 2005, the smoking rate in the sample was 23% compared to a 2006 statewide rate of 24% (CDC, 2006) and regional rate of 17% (ITPC, 2006). Thus, the sample is representative of its community, one that is predominantly white and well educated. At the most recent follow-up, 45.7% reported educational attainment of at least a bachelor's degree. Attrition biases have been discussed in detail elsewhere (e.g., Rose, Chassin, Presson, & Sherman, 1996). For each follow-up, those who were lost were compared with

those who were retained in terms of their earlier data. Dropouts were more likely to be smokers and to have more positive attitudes and beliefs about smoking, as well as to have parents and friends who were more likely to smoke. Although these biases are small in magnitude, caution is warranted when making generalizations. This same small bias was observed in the sample used in the current study.

For the current study, we selected those participants from the most recent follow-up survey (2005) who provided data on the number of hours per week spent providing unpaid help to their children, to their parents or the people who raised them, and to their in-laws. This yielded a sample of 4943 (mean age=37.8, SD=2.7, range 32-47, see Table 1 for other demographics). Although there is great variability in the definition of midlife, with age boundaries ranging from 30-60, this sample might best be considered to represent entry into midlife (Lachman, 2004).

Procedures

The original survey data were collected from 1980 to 1983 with group-administered questionnaires in school. In 1987, these procedures were followed for cohorts who were still in high school, and for older cohorts, and for all participants in 1993, 1999, and 2005, a survey was sent by mail followed up by telephone interviews if questionnaires were not returned. Participants were paid \$15-\$30 over the waves, and in 1999 and 2005 they were also entered into a lottery for cash prizes. Data collected in 2005 were used for this study except for the participants' prior level of each health behavior, which was taken from a prior assessment closest to age 30.

Measures

Predictor variables

Demographics: Because demographic characteristics are known to influence health behaviors, we tested the effects of multigenerational caregiving over and above other known predictors of health behavior. These included sex, age, marital status, and educational attainment, all measured in 2005. Marital status was dichotomized into currently married and unmarried, and educational attainment was dichotomized into less than bachelor's degree and bachelor's degree or higher. Employment status was dichotomized into 20 hours or less per week and more than 20 hours per week.

Prior levels of health behavior: Importantly, we were able to use our prior waves of longitudinal data to control for the effects of prior health behaviors. Because we did not have information about the precise timing of initiation of multigenerational caregiving, we used health behaviors measured at the wave at which the participant was closest to age 30. This age was selected to be young enough to minimize the likelihood that the participant had already entered into multigenerational caregiving but old enough to capture their "adult" levels of health behaviors. These items were identical to those used to assess health behaviors in 2005, the outcome variables described below.

Multigenerational caregiving: To assess multigenerational caregiving, we used items from the Midlife in the United States study (Brim et al., 2004). These ask participants to report their average number of hours per week providing unpaid help such as help around the house, transportation, or health or personal care to their children and to their parents or the people who raised them, and to their in-laws. Participants were grouped into those who provided care to zero generations, those who provided care to one generation further divided into those who provided care to children only and those who provided care to parents and/or in-laws only, and those who provided care to two generations, the sandwich generation (see Table 1). The total number of hours of help provided was entered as a covariate to test whether there was a unique

effect of multigenerational caregiving above and beyond simply the numbers of hours spent in caregiving activities.

Health behavior outcomes: Participants reported their current level of five health behaviors. First, participants reported their smoking status and the quantity of cigarettes usually smoked in a day. As reported elsewhere, the validity of the self-reported smoking in this sample has been supported in a substudy using an unannounced bioassay (Chassin et al., 1990). For the cigarette smoking item, we created a count variable of the number of cigarettes smoked per day by assigning values to the response categories as follows: I do not smoke cigarettes at all = 0, 1-4 = 2.5, 5-9 = 7, 10-14 = 12, 15-20 = 17.5, 21-30 = 25.5, 31-40 = 35.5, and more than 40 = 45. Participants also self-reported their frequency of seat belt use (never, rarely, sometimes, often, always) and their frequency of vigorous exercise or participation in sports or other similar activities (less than once a month, at least once a month, once a week, 2-3 times a week, more than three times a week). Finally, participants reported frequency of deciding what to eat based on the health value of foods (never, rarely, sometimes, often, always) and their extent of agreement (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree) to the statement, “When buying food products, I first check the ingredient label to make sure of its health value.” For each health behavior, except smoking, we used median splits to create dichotomous outcome variables.

Statistical Analyses

We used SAS Version 9.1.3 to conduct sequential logistic regressions for the four dichotomized categorical outcome variables. Adjusted odds ratios and 95% confidence intervals were obtained for each of the health behavior correlates. We ordered the variable entry in the sequential model as: (1) the prior level of the outcome variable, sex, age, marital status, education, working 21 hours or more per week; (2) total hours of care provided per week; and (3) the caregiving variable. The caregiving variable compared four groups – those who provided care to no generations, to children only, to parents/in-laws only, and to both children and parents/ in-laws, with those who provided care to both children and parents/in-laws as the reference category. To examine the statistical significance of the sequential logistic models, $-2 \log$ likelihood was tested using the χ^2 distribution. We also employed the Hosmer-Lemeshow test to determine the goodness-of-fit of each model to the data (Hosmer & Lemeshow, 2000). The assumption of linearity between the logit and each continuous predictor was checked through the Box-Tidwell approach (Hosmer & Lemeshow, 2000). None of the continuous predictors violated the linearity assumption. For the count outcome variable “Number of cigarettes usually smoked per day,” we used Mplus Version 5.2 to conduct a zero-inflated Poisson regression given the many zeros due to non-smokers (Long, 1997). For the Poisson regression, the Satorra-Bentler Scaled χ^2 was used to test model χ^2 differences (Satorra, 2000). We tested two-way interactions between the caregiving variable and each of the other predictors (sex, age, marital status, educational attainment, employment status, and the total number of hours spent providing care).

Results

The primary aim of the current study was to test whether multigenerational caregiving was associated with engaging in five different health behaviors in a large, longitudinal, community sample. We tested these relations after controlling for prior levels of the same behaviors, demographic characteristics, employment status, and hours spent providing care. Overall, the sample showed favorable changes between their prior age 30 reports and their 2005 reports for three of the health behaviors (28.5% to 44.0% for “Checking food label when buying food,” 57.9% to 77.0% for “Always using a seat belt,” and 42.4% to 46.7% for “Choosing foods based on health values”) and showed a small unfavorable change in exercise behavior (39.4% to

38.0% for “Exercising twice a week or more”). The proportion of smokers in the overall sample declined from 24.1% at age 30 to 20.7% in 2005, but among those who smoked at both times the average number of cigarettes smoked per day remained constant at 17.5. Frequencies and percentages of these health behaviors as a function of sex, marital status, education, employment, and number of generations cared for are reported in Table 1, and the demographic predictors of the health behaviors are reported within our regression models below.

Table 2 shows the relations between caregiving and demographic variables. In terms of caregiving, the overall mean number of total hours spent per week providing care to children was 23.8 and to parents and in-laws was 3.5. The mean number of total caring hours per week was 27.3. In terms of number of hours of care provided, those who were female, married, had less than a bachelor's degree, and worked 20 hours or less per week provided significantly more compared to males, those who were unmarried, those with a bachelor's degree or higher level of education, and those who worked more than 20 hours per week (see Table 2). There were also significant demographic correlates of caregiving patterns. Compared to those with no caregiving activities, those who cared for children only were more likely to be female; those who cared for children only or for two generations were more likely to be married; and those who cared for parents/in-laws only or for two generations were more likely to have a bachelor's degree or higher level of education. There was a significant but small effect of age, such that those who cared for children only were slightly older than the other groups, $F(3, 4939) = 7.7$, $p < .001$.

Results of regression analyses predicting health behaviors from demographic variables, prior health behaviors, caregiving hours, and caregiving patterns are presented in Table 3. This table shows the results after the final block, with all predictors entered. As shown in Table 3, for all health behaviors, an individual's prior level of the behavior was a significant predictor of their later level of behavior. In terms of demographic predictors, males were significantly less likely than were females to check food labels, use seat belts, and choose foods based on their health values, and less educated individuals had significantly lower levels of all health behaviors (see Table 3 for significance tests and Table 1 for descriptive data). Those who were married were more likely to use seatbelts, and older participants were more likely to check food labels and wear seat belts. Those who worked more than 20 hours per week were significantly less likely than those who did not to check food labels, choose foods based on health values, and exercise twice a week or more. Total hours of care per week had no significant unique effects.¹

For the current study, we were most interested in the association between multigenerational caregiving and health behaviors. As shown in Table 3, even after adjusting for effects of prior levels of the health behavior, age, marital status, sex, education, working more than 20 hours per week, and total hours of care provided per week, the number of generations cared for had significant effects on health behaviors. For checking food labels, all other groups engaged in this behavior more than did sandwich generation members (ORs from 1.18 to 1.69, all $ps < .04$, see Table 3). For the overall model, the Cox and Snell R^2 value was .138, and the Nagelkerke R^2 value was .185. The Hosmer-Lemeshow test χ^2 value ($df = 8$) was 6.88, $p = .550$, and correct classification of cases was 66.7%, indicating good model fit. The same pattern was found for choosing foods based on health value, although with weaker effects. That is, those with no caregiving responsibilities were more likely to engage in this behavior than were sandwich generation members (OR = 1.55, $p < .001$); those who cared for children only were marginally more likely than were sandwich generation members to choose foods based on health values

¹When entered in Block 2, total number of hours of care provided per week showed small significant unique effects over and above demographic factors for a reduced likelihood of exercise (odds ratio (OR) = .99, $p = .001$) and less checking of food labels (OR = .99, $p = .029$). However, as shown in Table 3, after the caregiving variable was included in the final block of the model, these effects were no longer significant.

(OR = 1.15, $p = .085$), and those who cared for parents only were marginally more likely than were sandwich generation members to choose foods based on health values (OR = 1.24, $p = .066$). For this model, the Cox and Snell R^2 value was .229, and the Nagelkerke R^2 value was .306. There was good model fit with the Hosmer-Lemeshow test χ^2 ($df = 8$) = 14.72, $p = .065$ and 73.3% correct classification.

For seat belt use, those who cared for children only were significantly more likely than were sandwich generation members to use seat belts (OR = 1.47, $p < .001$), and those without caregiving responsibilities were marginally more likely to use seatbelts than were sandwich generation members (OR = 1.26, $p = .092$). Sandwich generation members did not significantly differ from those who cared for parents only (see Table 3). The pseudo R^2 values for this model were .224 for the Cox and Snell R^2 and .340 for the Nagelkerke R^2 . The Hosmer-Lemeshow χ^2 ($df = 8$) = 10.22, $p = .250$, and correct classification = 80.8% indicated good model fit.

The same pattern with weaker effects was found for cigarette smoking. Sandwich generation members and those who cared for parents only did not significantly differ, but those with no caregiving responsibilities smoked marginally less per day than did sandwich generation members (estimate = $-.09$, $p = .099$), and those who cared for children only smoked marginally less than did sandwich generation members (estimate = $-.07$, $p = .096$). The log likelihood of the full zero-inflated Poisson model was -5640.756 compared to -6135.746 for the null model without covariates, which translates into 389.4 Satorra-Bentler Scaled χ^2 ($df = 18$, $p < .0001$; scaling correction factor = 2.608 for the full model and 2.906 for the null model), indicating good model fit. The Bayesian information criterion value decreased from 12305.505 to 11468.130 when the null model was expanded to the full model.

Finally, for exercise, results showed a different pattern in which sandwich generation individuals differed from everyone except those who cared for children only. Those with no caregiving responsibilities were significantly more likely to exercise than were sandwich generation members (OR = 1.45, $p = .001$). Those who cared for parents only were significantly more likely to exercise than were sandwich generation members (OR = 1.28, $p = .036$). For the overall model, the Cox and Snell R^2 value was .145, and the Nagelkerke R^2 value was .197. The Hosmer-Lemeshow χ^2 ($df = 8$) = 4.20, $p = .839$ and correct classification = 70.3% indicated good model fit.

None of the two-way interactions between the number of generations providing care to and each of the other predictors was statistically significant at the .05 level.

Discussion

The current study is the first to our knowledge that explicitly tests the association between sandwich generation membership and health behaviors. This is an important area for study because midlife individuals who are able to engage in healthy behaviors, despite the demands of multigenerational caregiving, are more likely to experience positive health outcomes. This is the case in both the short-term, as seat belt use prevents injury and death due to automobile crashes, and the long term, as healthy eating promotes cardiovascular health, for example.

Our first goal was to test the association between multigenerational caregiving and engagement in positive health behaviors. In general, health behaviors were significantly diminished for those who provided unpaid help such as help around the house, transportation, or health or personal care to multiple generations. More specifically, individuals in the sandwich generation were less likely than all other groups to check the ingredient label when buying food and to make decisions about what to eat based on the health value of foods. Sandwich generation members were less likely than noncaregivers and those who cared for children only to use seatbelts, and they smoked marginally more cigarettes per day than those groups. Sandwich

generation members were less likely to exercise regularly than either noncaregivers or those who cared for parents only. Importantly, these associations were present after controlling for demographic characteristics, employment status, and total number of hours spent providing care per week. Moreover, by controlling for initial levels of these behaviors, the effects of multigenerational caregiving were demonstrated above and beyond age-related changes in health behaviors. Although the size of the effect of multigenerational caregiving on the health behaviors was modest, these are conservative estimates due to the large number of covariates included in the models. Moreover, this sample was young and spent a relatively small number of hours per week caring for parents and in-laws. The effects sizes may increase as these individuals provide more care for aging parents and the parents' needs become more demanding.

The second question was whether the effects of multi-generational caregiving differed for different health behaviors. The clearest relation to multigenerational caregiving was for the two eating behaviors, for which multigenerational caregivers differed from all other groups. For exercise, the main impact was child-rearing responsibility, and adding a second generation of caregiving did not further decrease the likelihood of exercising. It is plausible that those who maintain frequent exercise in the face of caregiving responsibilities for one generation are committed to exercise as a "way of life" and additional responsibilities do not influence this commitment.

As noted earlier, one possible mechanism for the effects of multigenerational caregiving is the effect of reduced available time to spend on health behaviors. However, a reduced time mechanism cannot account for the current effects of multigenerational caregiving because they were unique, above and beyond the number of hours per week spent in caregiving activities. Moreover, the effects of caring for parents, either as sandwich generation members or parents only, extended to automatic behaviors, such as seat belt use, that do not require time. The fact that reduced time itself cannot account for our findings is consistent with the conclusions of Amirkhanyan and Wolf (2006), who studied mental health rather than physical health behaviors and found that it was having a parent who needs care, rather than the actual caregiving activities, that was associated with women's depression.

Another possible explanation for the poorer health behavior of sandwiched individuals may be a reduced salience of personal health goals. That is, those caring for multiple generations may place more importance on the health of others than on their own health. For example, when choosing foods, emphasis may be placed on the needs of others and convenience rather than maximizing nutritional value for themselves (Castro et al., 2007). Furthermore, due in large part to the addictive nature of cigarette smoking, decisions about cutting down or quitting smoking may take a back seat to the immediate needs of the loved ones for whom care is provided. Finally, multigenerational caregiving may create heightened levels of stress, which could impair health behaviors (Aneshensel et al., 1995; Son et al., 2007). Future research should evaluate these different mediating mechanisms, which are not mutually exclusive.

Although the current study contributes to the literature by being the first to explicitly test the unique effects of multigenerational caregiving on health behaviors, the study also has limitations that must be considered. First, we did not empirically identify the mechanisms by which membership in the sandwich generation impacts health behaviors. Second, our data did not allow us to explore the precise timing of onset of multigenerational caregiving or the type of care that was provided to children and parents. Individuals caring for very ill or elderly parents have different demands from those providing routine care for generally healthy parents. Similarly, individuals caring for a large number of very young children or for chronically ill children have different demands from those providing routine care for older children or adolescents. Third, the community from which this representative sample was drawn is

predominantly White and well educated, so some caution is warranted in generalization. Fourth, the mean age of the sample analyzed for the current study was 37.8 years, placing the sample on the young end of the midlife period. However, there is no clear beginning age for midlife, and some consider middle age to begin at 30 (Lachman, 2001). Also, 41% of the married individuals in the sample were providing care to two generations. Despite slightly different definitions of “sandwiched,” this proportion is similar to the 44% reported by Marks (1996).

Despite these limitations, this study is important in utilizing longitudinal data to demonstrate the association between sandwich generation membership and unhealthy behaviors. Even after controlling for prior behavior and multiple demographic correlates, health behaviors were generally diminished for sandwich generation members. As the U.S. population continues to age, and increasing numbers of individuals are faced with the challenge of providing care to multiple generations, preserving the health of the caregiver will remain an important issue for further study and program development. Interventions designed to encourage healthy behaviors amidst the constraints caused by competing responsibilities have the potential to prevent illness and premature mortality due to preventable causes. Moreover, the midlife period is an especially important time for engaging in healthy behaviors that can prevent health problems later in life. As Lachman (2004) notes, midlife is often a time during which there are “wake up” calls in the form of early health problems but still opportunities to make behavioral changes that produce meaningful improvements in future health and quality of life.

Acknowledgments

This research was supported by the National Institute on Drug Abuse (Grant DA13555).

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Table 1

Demographic Characteristics, by Health Behavior Outcome

Predictor	Total Sample	Health Behavior Outcome, <i>n</i> (%) ^a				
		Checking food label when buying food	Always using seat belt	Often or always choosing foods based on health values	Exercising two times or more a week	Number of cigarettes usually smoked per day
Overall	4943 (100) ^b	2171 (44.0)	3798 (77.0)	2306 (46.7)	1869 (38.0)	3.4 (8.1)
Sex						
Male	2306 (46.7)	822 (35.7)	1507 (65.4)	865 (37.6)	864 (37.6)	3.6 (8.6)
Female	2637 (53.3)	1349 (51.2)	2291 (87.0)	1441 (54.6)	1005 (38.3)	3.2 (7.6)
Marital Status						
Married	3435 (69.6)	1513 (44.1)	2718 (79.2)	1628 (47.5)	1305 (38.1)	2.6 (7.2)
Not Married	1497 (30.4)	653 (43.7)	1076 (72.0)	671 (44.9)	559 (37.6)	5.3 (9.6)
Education						
Less than BA	2530 (52.1)	802 (31.7)	1727 (68.4)	838 (33.2)	677 (26.9)	5.7 (10.0)
BA or higher	2328 (47.9)	1339 (57.6)	2013 (86.5)	1435 (61.7)	1165 (50.2)	0.7 (3.4)
Working > 20 hours per week						
Yes	3950 (80.3)	1660 (42.1)	2959 (75.0)	1754 (44.5)	1463 (37.2)	3.2 (7.9)
No	966 (19.7)	499 (51.8)	822 (85.4)	539 (56.0)	394 (41.1)	4.0 (9.1)
No. of generations cared for						
None	813 (16.4)	435 (53.6)	642 (79.1)	450 (55.4)	384 (47.5)	3.1 (7.4)
One generation						
Children only	1676 (33.9)	790 (47.2)	1411 (84.4)	861 (51.5)	644 (38.6)	2.0 (6.4)
Parents/In-laws only	691 (14.0)	311 (45.0)	490 (71.0)	305 (44.2)	276 (40.1)	4.7 (9.1)
Two generations	1763 (35.7)	635 (36.1)	1255 (71.2)	690 (39.2)	565 (32.2)	4.4 (9.2)

^aFor the count variable number of cigarettes smoked per day, mean and standard deviation are reported.^bThe percentages may not add to 100 due to missing data or rounding errors.

Table 2

Demographic Characteristics, by Caregiving Status (N=4943)

Demographic characteristic	Hours of care provided per week				Number of generations cared for, <i>n</i> (%)			
	Provided to Children		Provided to Parents/In-Laws		One generation only			
	M (SD)	<i>t</i> (df)	M (SD)	<i>t</i> (df)	Neither	Children	Parents	Both
Total sample	23.8 (29.2)		3.5 (9.9)		813 (16.4)	1676 (33.9)	691 (14.0)	1763 (35.7)
Sex								
Male	15.9 (21.8)	18.9*** (4623.3)	3.9 (11.0)	2.4* (4429.1)	409 (50.3)	667 (39.8)	384 (55.6)	846 (48.0)
Female	30.7 (32.8)		3.2 (8.9)		404 (49.7)	1009 (60.2)	307 (44.4)	917 (52.0)
Marital Status								
Married	29.1 (30.0)	22.2*** (3692.6)	2.9 (7.7)	5.8*** (1935.6)	340 (41.9)	1449 (86.6)	252 (36.6)	1394 (79.2)
Not married	11.7 (22.8)		5.0 (13.5)		471 (58.1)	225 (13.4)	436 (63.4)	365 (20.8)
Education								
Less than BA	23.3 (29.2)	1.4 (4822.1)	5.2 (12.6)	12.8*** (3386.0)	301 (37.6)	706 (42.7)	378 (56.2)	1145 (66.1)
BA or higher	24.5 (29.2)		1.7 (5.1)		499 (62.4)	948 (57.3)	295 (43.8)	586 (33.9)
Work > than 20 hr/wk								
Yes	19.6 (25.3)	17.2*** (1198.6)	3.4 (9.6)	0.7 (1362.3)	706 (87.4)	1235 (74.0)	570 (83.1)	1439 (82.1)
No	41.0 (36.7)		3.7 (10.8)		102 (12.6)	434 (26.0)	116 (16.9)	314 (17.9)

* *p* < .05,
** *p* < .01,
*** *p* < .001

Table 3
Results for Final Step of Sequential Regression of Health Behaviors of Sandwich Generation Caregivers (N=4943)

Outcome Variable: Predictor	Check food label when buying food AOR (95% CI)	Always using seat belt AOR (95% CI)	Choosing foods based on health values AOR (95% CI)	Exercising two times or more a week AOR (95% CI)	Num. cigarettes usu. smoked /day Poisson b (SE)
Step 3, -2LL difference	24.8 (df=3) ***	14.6 (df=3) **	14.3 (df=3) **	12.3 (df=3) **	18.5 (df=6) **
Same behavior at baseline	2.84 (2.46, 3.29) ***	7.49 (6.291, 8.91) ***	5.49 (4.80, 6.28) ***	3.80 (3.34, 4.33) ***	0.028 (0.002) ***
Yes (vs. No)					
Sex	0.58 (0.51, 0.66) ***	0.34 (0.29, 0.40) ***	0.62 (0.54, 0.71) ***	0.88 (0.77, 1.01)	0.033 (0.032)
Male (vs. Female)					
Education	0.36 (0.32, 0.41) ***	0.52 (0.44, 0.62) ***	0.44 (0.39, 0.51) ***	0.45 (0.39, 0.51) ***	0.394 (0.057) ***
Less than BA (vs. BA+)					
Marital status	1.06 (0.91, 1.23)	1.24 (1.02, 1.48) *	1.06 (0.90, 1.24)	1.08 (0.92, 1.27)	0.030 (0.032)
Married (vs. Not married)					
Age	1.03 (1.00, 1.05) *	1.05 (1.02, 1.08) ***	1.02 (0.999, 1.05)	1.02 (0.99, 1.04)	0.009 (0.006)
Working 21 hours+					
Yes (vs. No)	0.80 (0.68, 0.94) **	0.83 (0.66, 1.05)	0.80 (0.67, 0.96) *	0.77 (0.65, 0.92) **	-0.043 (0.040)
Total hours of care No. of generations care-giving	1.00 (.998,1.00)	1.00 (1.00, 1.01)	1.00 (1.00, 1.00)	0.998 (0.996, 1.001)	0.000 (0.001)
None (vs. two)	1.69 (1.36, 2.10) ***	1.26 (0.96, 1.66) †	1.55 (1.23, 1.95) ***	1.45 (1.16, 1.82) ***	-0.093 (0.056) †
One generation (vs. two)					
Children only	1.18 (1.01, 1.37) *	1.47 (1.20, 1.79) ***	1.15 (0.98, 1.35) †	1.02 (0.87, 1.20)	-0.068 (0.041) †
Parents/in-laws only	1.48 (1.19, 1.85) ***	1.17 (0.90, 1.51)	1.24 (0.99, 1.57) †	1.28 (1.02, 1.61) *	-0.05 (0.045)

Note. The -2LL difference is tested against the previous step using Chi-square distribution. For binary categorical predictor variables, the reference category is shown after the “vs.” AOR = adjusted odds ratio; CI = confidence interval; LL = log likelihood; BA = Bachelor of Arts.

† $p < .10$,
 * $p < .05$,
 ** $p < .01$,
 *** $p < .001$