Activity Limitations, Spousal Care, and Depressive Symptoms Among Older Couples

Sae Hwang Han, MS, Kyungmin Kim, PhD, and Jeffrey A. Burr, PhD

Department of Gerontology

McCormack Graduate School of Policy and Global Studies

University of Massachusetts Boston

Paper Prepared for Presentation at the 2019 PAA Annual Meeting, Austin, Texas, April 11th.

Session 76: Marital Relationships and Well-being

Abstract

Scientific research consistently demonstrates that activity limitations are associated with depression among older adults, and that there are cross-spousal linkages between activity limitations and depression among coupled individuals. Drawing from the stress process model, we aimed to expand the literature on activity limitations and depression by examining the moderating role of spousal care. Longitudinal household data from the *Health and Retirement Study* (2004-2014) were analyzed to estimate within-person associations between one's own and spousal activity limitations, receipt and provision of spousal care, and depressive symptoms. Findings from multilevel models showed a consistent link between one's own activity limitations and depressive symptoms for both spouses, whereas spousal activity limitations were associated with depressive symptoms for wives only. We also found moderating effects of receipt and provision of spousal care in the link between one's own and spousal activity limitations and depressive symptoms. Importantly, our findings suggested that receipt of spousal support may have differential effects on psychological well-being for wives and husbands.

Introduction

Tens of millions of older adults in the United States currently live with daily activity limitations, with the numbers projected to rapidly increase in the coming decades due to population aging (Freedman & Spillman, 2014). The trend poses significant challenges not only for individuals with the limitations, but also for their spouses who often assume informal caregiver roles by providing assistance with daily activities (Freedman & Spillman, 2014). The scientific literature shows that having activity limitations is associated with depression (He et al., 2019; Monserud & Peek, 2014; Schieman & Plickert, 2007; Yang & George, 2005). Further, receiving and providing spousal care in the context of activity limitations has been linked with psychological well-being for both the receiver and the provider of care (Carr, Cornman, & Freedman, 2017; Pinquart & Sörensen, 2006). However, earlier studies have not examined the role of spousal care when examining the link between activity limitations and depression within a couple context. The objective of this study was to address this gap in the literature by examining whether the linkages between activity limitations and depressive symptoms among coupled individuals are moderated by the context of spousal care (i.e., receipt and provision of spousal care).

Activity Limitations and Depression in Later Life

Activity limitations, defined here as difficulty performing basic activities of daily living (ADLs; e.g., walking indoors, dressing, bathing) required for independent living in the community, are a key indicator of disability that occurs at an advanced stage of the disablement process (Wolf, 2015). Activity limitations are consistently associated with compromised well-being, including increased mortality risk (Hennessy et al., 2015), and many researchers have focused on depression as an adverse outcome associated with ADL limitations (He et al., 2019;

Monserud & Peek, 2014; Robb, Small, & Haley, 2008; Schieman & Plickert, 2007; Yang & George, 2005). Although the association between activity limitations and depression is complex and likely bidirectional (Hybels, Pieper, & Blazer, 2009; van Sonderen, Rijsdijk, Kempen, Ormel, & Sullivan, 2002), there is considerable theoretical grounding and empirical evidence suggesting that limitations in daily activities are an important antecedent of depression among older adults. On a theoretical level, stress process model holds that not being able to perform daily activities due to physical and cognitive impairments is a disruptive and chronic stressor that compromises one's independence, self-esteem, and ability to perform meaningful social activities, all of which may lead to depression (Bruce, 2001; Pearlin & Skaff, 1996). Activity limitations are also strong predictors of social disengagement, which in turn places individuals at an increased risk of depression (Rosso, Taylor, Tabb, & Michael, 2013). In accordance with this model, earlier studies based on cross-sectional (Robb et al., 2008) and longitudinal designs (He et al., 2019; Monserud & Peek, 2014; Schieman & Plickert, 2007; Yang & George, 2005) consistently find that activity limitations are associated with depression.

The Couple Context of Activity Limitations

What is widely acknowledged in the research literature on this topic is the need to investigate dyadic associations between activity limitations and depression among older coupled-individuals (He et al., 2019; Hoppmann, Gerstorf, & Hibbert, 2011; Monserud & Peek, 2014; Robb et al., 2008). The emphasis on couples is in large part driven by the fact that the lives of coupled individuals (for both married persons and those in otherwise similar coupled-relationships) are intricately and substantially linked, especially for older couples with a long partnership history (Hoppmann & Gerstorf, 2014). Such interdependence is especially relevant in terms of the significant evidence regarding health concordance among couples (e.g.,

depressive symptoms; Meyler, Stimpson, & Peek, 2007). The interdependence may also be extended to the care implications associated with health declines among coupled-individuals (Freedman & Spillman, 2014). Accordingly, there is an increasing body of evidence linking the activity limitations of one spouse with depression of the other spouse in the marital dyad (He et al., 2019; Hoppmann et al., 2011; Monserud & Peek, 2014; Robb et al., 2008). In the context of activity limitations, spouses of individuals with ADL limitations often assume a caregiver role, which may increase the risk for depression (Pinquart & Sörensen, 2006; Shen, Feld, Dunkle, Schroepfer, & Lehning, 2015). The purpose of this study was to contribute to this growing body of literature by addressing the role of spousal care in the linkage between activity limitations and depression among older couples.

The Moderating Role of Spousal Care

Receipt and provision of spousal care is by definition a dyadic process that has health implications for both spouses in a marital dyad, either as a provider or as a recipient of care and assistance. There is now decades of research that focuses on health outcomes associated with being on the giving end of the spousal care (Roth, Fredman, & Haley, 2015). Often framed within a stress process perspective, earlier studies acknowledged caregiving as a chronic stressor and typically found that assuming the role of caregiver was associated with adverse health outcomes, including depression, especially for female caregivers (Pinquart & Sörensen, 2006; Schulz & Beach, 1999). Given that activity limitations of the self and the spouse are also considered chronic stressors, it is plausible that the distressing effects of one's own and spouse's activity limitations may be further aggravated by caregiver burden and stress, leading to a higher risk of depression.

However, caregiving is increasingly recognized to have potential health benefits (Freedman, Cornman, & Carr, 2014), especially with respect to reduced mortality risk (for a review, see Roth et al., 2015). Researchers suggested that the adverse health outcomes associated with caregiving is at least partly attributable to selection processes underlying the caregiver role, and that health differences between caregivers and non-caregivers diminish when the selection effects are accounted for (Roth et al., 2015). In accordance with this observation, a study by Poulin et al. (2010) demonstrated that within-person associations for caregiving hours and affective well-being among spousal caregivers varied significantly, depending on the between-person differences in the relationship quality spousal caregivers had with the care-receiving spouse. Importantly, they found that caregiving behavior was associated with better positive affect, but not with negative affect, for caregivers who reported having an interdependent spousal relationship (Poulin et al., 2010). As such, providing needed care to a loved one may serve as protective factor in the context of the disablement process, as found with regards to other forms of helping behavior (e.g., volunteering; Kail & Carr, 2016). Based on these findings, we also employed a within-person analytic approach in estimating the potential health effects of caregiving (as well as care-recipient) status.

The literature on health outcomes associated with being on the receiving end of spousal care also paints a complex picture. While researchers generally agree that having social capital in the form of *perceived* social support is beneficial for health, actual receipt of help in the form of instrumental support in the context of activity limitations may lead to both beneficial (Chan, Anstey, Windsor, & Luszcz, 2011) and detrimental outcomes (K. Kim et al., 2016; Reinhardt, Boerner, & Horowitz, 2006). Earlier studies often did not specifically focus on spousal support or were based on measures that aggregated support across multiple kin and non-kin sources. As

such, it is unclear whether and how actual receipt of spousal care may moderate the link between activity limitations and health outcomes. However, findings from a recent study by Carr et al. (2017) provided evidence suggestive of differential effects for wives and husbands; that is, perceived spousal support was found to attenuate the association between activity limitations and negative emotions for wives, whereas perceived spousal support enhanced the association for husbands. One potential explanation for these gendered effects is that spousal support in the context of disability can undermine husbands' sense of autonomy and independence, thereby leading to worse outcomes (Carr et al., 2017).

Study Objectives

In sum, this study aimed to contribute to the literature on activity limitations and depression among couples by focusing on the moderating role of spousal care (i.e., providing and receiving care), using longitudinal data from the *Health and Retirement Study*, a large, national household sample of middle-aged and older adults in the United States. We used a within-person analytic approach to address research questions regarding the association between activity limitations and depressive symptoms among coupled individuals. These questions included: 1a) are activity limitations associated with depressive symptoms over time? and 1b) are there cross-spousal associations between activity limitations and depressive symptoms? We expected that activity limitations of the self and the spouse would be associated with more depressive symptoms.

We also addressed research questions regarding whether the association between one's own activity limitations and depressive symptoms was moderated by receipt and provision of spousal care. The moderating role of receiving care was addressed with the research question: 2a) is the association between activity limitations and depressive symptoms moderated by receipt

of spousal care? By virtue of the research design employed in this study, we were also able to explore the moderating role of providing care, with the question: 2b) is the association between activity limitations and depressive symptoms moderated by provision of spousal care?

Finally, the moderating role of spousal care exchange for the link between spousal activity limitations and depressive symptoms was addressed with the following research questions: 3a) is the association between spouse's activity limitations and depressive symptoms moderated by receipt of spousal care and 3b) is the association between spouse's activity limitations and depressive symptoms moderated by provision of spousal care? Given the lack of clear directionality for these relationships in the scientific literature, no hypotheses are offered for the four research questions addressing the moderating role of spousal care for the linkages between activity limitations and depression among couples.

Methods

Data Source and Study Sample

This study was based on data from the *Health and Retirement Study* (HRS), a longitudinal panel study of over 7,000 households in the United States (Sonnega et al., 2014). Data for this project were taken primarily from the RAND constructed HRS data file that accounted for missing information and inconsistencies across waves (Version P; Bugliari et al., 2016). Measures taken from the RAND file included activities of daily living (ADL) limitations, depressive symptoms, labor force status, household income and wealth, and number of family members in the household. Variables that are not part of the RAND files, including the spousal care measures, were taken from the core public-use files provided by the Survey Research Center at the University of Michigan.

We used six waves of biennial data from 2004 to 2014; information regarding several key variables was not available prior to the 2004 wave. The study sample consisted of pairs of individuals who met the following criteria; a) respondents were married to the same spouse during the waves in which they participated; a small number of same-sex couples were excluded due to our focus on wife- and husband-specific influences; b) couples had to be in the study for at least two waves; and c) both spouses had to be interviewed and information for each spouse could not be provided by a proxy respondent at a given wave. These criteria yielded a sample size of approximately 52,706 person-wave observations, representing 6,614 couples.

Measures

Depressive symptoms. Depressive symptoms were assessed with an eight-item version of the Center for Epidemiological Studies-Depression (CES-D). At each wave, respondents were asked whether the following statements were true for them much of the time during the past week: a) was depressed, b) everything was an effort, c) sleep was restless, d) was (not) happy, e) felt lonely, f) (did not) enjoy life, g) felt sad, and h) could not get going. Each item was rated on a dichotomous scale with (1) and (0), signifying presence and absence of a symptom, respectively. Affirmative responses for the eight items were summed and used in the models, with higher scores indicating more depressive symptoms (range: 0–8).

Activity limitations. At each wave, respondents were asked whether they had any difficulty with the following six ADL items: a) walking across a room, b) dressing, c) bathing, d) eating, e) getting in and out of bed, and f) toileting. Affirmative responses for the six items were summed and used in the models, with higher scores indicating more activity limitations (range: 0–6). Another measure of activity limitation available from the HRS was instrumental activities of daily living (IADL) limitations; however, we decided to focus on ADL limitations because 1)

ADL problems are considered a more serious indicator of well-being compared IADL problems, and 2) ADL limitations entail hands-on assistance, whereas IADL limitations often do not require in-person assistance (Wolf, 2015).

Receipt and provision of spousal care. If respondents reported having difficulty with any ADL task, they were further asked whether they received help from anyone, and if so, they were asked to list the people from whom they received help. Because receipt of spousal assistance was contingent on respondent's ADL limitations, care-recipient status at each wave was coded with a three-category measure (1 = *did not receive ADL assistance*, 2 = *received ADL assistance*, 3 = *did not need ADL assistance*). Further, caregiver status was determined by using care-recipient status information of the spouse at each wave; that is, if the spouse reported having received care at a given wave, the respondent was coded with a three-category measure (1 = *did not give ADL assistance*, 2 = *gave ADL assistance*, 3 = *spouse did not need ADL assistance*).

We also performed sensitivity analyses based on a dichotomous version of the care-recipient status measure (1 = *received ADL assistance*, 0 = *did not receive/need ADL assistance*) and the caregiver status measure (1 = *gave ADL assistance*, 0 = *did not give/spouse doesn't need ADL assistance*); findings from the sensitivity analyses are presented in Supplementary Table 1 for interested readers. We presented results from the models based on the three-category measure 1) to maintain the distinction between respondents who did not receive/give (needed) ADL assistance from those who (or whose spouse) did not need help, especially with regard to the moderation effects of spousal care exchange regarding the linkages between ADL limitations and depressive symptoms; and 2) because the results indicated that the multilevel models based on the three-category measure of care exchange fit the data better than those based on the dichotomous measure, as indicated by model fit indices (see Supplementary Tables 1 and 2).

Control variables. Control variables included both time-invariant covariates (TIC) and time-varying covariates (TVC) measured at the individual- and couple-levels that could confound the relationships between ADL limitations, receipt and provision of spousal care, and depressive symptoms. Individual-level TICs included age at baseline, race-ethnic status (*non-Hispanic White* (reference), *non-Hispanic Black*, *non-Hispanic other race*, and *Hispanic*), and education measured as number of years of completed school (range: 0–17). Couple-level TICs included marital status (1 = *married*; 0 = *non-marital cohabitation*) and duration of current marriage (in years) at baseline. Individual-level TVCs included labor force status (1 = *working for pay*; 0 = *not*) and whether spouse had any doctor-diagnosed memory-related disease (1 = *yes*; 0 = *no*). Couple-level TVCs included household income transformed by the natural log, household wealth transformed by the inverse hyperbolic sine function (Friedline, Masa, & Chowa, 2015), number of persons living in the household, and number of children living within 10 miles (range: 0–4+).

Analytic Strategy

We estimated a series of within-between random effects models (WBRE; Bell & Jones, 2015) that were incorporated within the actor-partner interdependence model framework (APIM; Cook & Kenny, 2005). WBRE approach (also known as hybrid models, Allison, 2009; Bell & Jones, 2015) was utilized to examine within-person associations between independent and dependent variables. In longitudinal model formulations where an effect of a time-varying predictor is estimated to be associated with an outcome, the time-varying predictor predictor usually contains a combined effect of two separate components: between-person (level 2) and within-person (level 1) components (Bell & Jones, 2015). A WBRE model allows the two components to be estimated separately: person-mean for each time-varying predictor is included

as a between-person component of the predictor and the within-person component is the deviation from this person-mean at a given occasion. These models have been shown to perform at least as well as fixed effects models in terms of providing unbiased that are independent of selection effects attributed to all stable inter-individual differences, both observed and unobserved (Bell & Jones, 2015). In the context of this study, the within-person estimates allowed for the investigation of whether changes in activity limitations were associated with changes in depressive symptoms within the same person, net of stable individual characteristics; although not the focus of the study, the approach also allowed us to compare depressive symptoms of a person who received caregiving from a spouse at a given observation point to depressive symptoms of the same person at a later time when he or she did not receive caregiving from spouse.

The WBRE models were incorporated in the actor-partner interdependence model (APIM) framework to examine individuals nested within couples over time. As the household panel data from the HRS are hierarchical in nature, the data were structured so that individuals were nested within couples over time (Cook & Kenny, 2005). The APIM approach allowed for estimation of the unique effects of one's own (i.e., actor) and spousal (i.e., partner) activity limitations and care exchange simultaneously, while accounting for within-couple interdependency in depressive symptoms. The models were specified to have heterogeneous compound symmetry (CSH), which allowed the error variances to differ for the two distinguishable dyad members (i.e., wives and husbands).

We began by estimating an unadjusted model for depressive symptom trajectories (Model 1); specifically, the dual-intercept model was employed to estimate separate trajectories for wives and husbands. Given the wide-range of age cohorts included in the HRS, time as well as

age at baseline were used to estimate the unadjusted model; we added an interaction term for time and baseline age to account for cohort differences in the change rate of depressive symptoms over time (Kashy & Donnellan, 2012; Mendes de Leon, 2007). Random effects were specified for time as well as for the intercept to further partition variance of the longitudinal health outcome into within-person and between-person components (Hoffman, 2015).

We then added to the model the key measures of activity limitations and spousal care exchange along with all study variables, where all time-varying measures were decomposed into within- and between-components. The research questions (1a and 1b) concerning actor and partner effects of activity limitations on depressive symptoms were addressed by examining the significance of the within-person measures for activity limitations of the self and the spouse, respectively (Model 2). The key research questions (2a and 2b, 3a and 3b) regarding the moderating role of spousal care exchange were addressed by introducing interaction terms for the actor and partner effects of activity limitations and spousal care-recipient and caregiving status (Model 3). The interaction terms were also decomposed into within- and between-components so that estimated interaction effects were not biased from stable omitted characteristics (Schunck, 2013). In the interest of parsimony and readability, we presented in the tables estimates of the key variables only (complete model results are provided in Supplementary Table 2). Finally, although we did not offer any hypotheses regarding gender differences, we explored whether the linkages between activity limitations, spousal care, and depressive symptoms were different for wives and husbands, based on an alternative parameterization of the dual intercept model used to formally test gender differences in the APIM framework (Kashy & Donnellan, 2012). All analyses were performed using the PROC MIXED function in SAS (Version 9.4).

Results

Study Sample Characteristics

Study sample characteristics are presented in Table 1. Wives and husbands reported a low average number of ADL limitations at baseline (mean ≈ 0.2). Most spouses (89%) in the sample did not need ADL assistance at baseline and only about 4% of spouses reported receiving (or giving) spousal ADL assistance. Over the course of the study period, however, more than 26% of both wives and husbands reported having at least one ADL limitation, resulting in over 12% of both spouses experiencing receipt (and provision) of spousal ADL assistance (not shown). On average, wives and husbands were approximately 60 and 64 years of age at baseline, respectively. Approximately 94% of couples were in a marital relationship (as opposed to being in a non-marital cohabitation arrangement), and the average length of marriage to current spouse was more than 30 years. The average number of persons living in the household at baseline was 2.7, whereas 65% of the households were in a couple-only living arrangement.

Multilevel Model Results

Unadjusted models. Results from the unadjusted models of depressive symptoms are presented in Table 2. In Model 1A, time and baseline age were specified in the model to estimate time trends of depressive symptoms while adjusting for the age-differences in baseline levels of symptoms. Estimates from this model suggested that wives ($b = 1.82$, $p < .001$) had a higher number of depressive symptoms compared to husbands ($b = 1.45$, $p < .001$) at baseline; further, wives' depressive symptoms did not change over time, whereas husbands' symptoms increased over time ($b = 0.03$, $p < .001$). There were small but significant age-differences in the number of depressive symptoms for both wives ($b = -0.01$, $p < .001$) and husbands ($b = -0.01$, $p < .001$), which suggested that those who were older had a slightly lower number of depressive

symptoms compared to their younger counterparts at baseline. Estimates for all random effects components were statistically significant, indicating significant variability in the number of baseline depressive symptoms and their rate of change over time. Depressive symptom trajectories showed considerable similarity within couples, as indicated by significant within-couple correlations of the intercept ($\rho = .34$, $p < .001$) and the slope ($\rho = .20$, $p < .001$), thereby justifying dyadic investigations of depressive symptoms in subsequent models. In Model 1B, the interaction term for baseline age and time was added to Model 1A; as indicated by the positive and significant coefficients for the interaction term, those who were older at baseline experienced a more rapid increase in the number of depressive symptoms over time compared to their younger counterparts, for both wives and husbands ($b = 0.01$, $p < .001$). Also, this model demonstrated an improved model fit compared to Model 2A, as indicated by the model fit indices; accordingly, the interaction term for baseline age and time was retained in all subsequent multilevel models.

Main effects model. The research questions pertaining to the main effects of ADL limitations, as well as receipt and provision of spousal care, on depressive symptoms are addressed in Model 2 (Table 3). For both wives ($b = 0.29$, $p < .001$) and husbands ($b = 0.25$, $p < .001$), one's own ADL limitations were associated with a higher number of depressive symptoms. Further, spousal ADL limitations were associated with wives' depressive symptoms, but not husbands; that is, as husbands' number of ADL limitations increased, wives' depressive symptoms increased, as well ($b = 0.07$, $p < .01$). As for spousal care exchange, wives' depressive symptoms were unrelated to either care-recipient or caregiver status. For husbands, however, receiving spousal ADL assistance was associated with an increase in number of

depressive symptoms compared to not receiving assistance ($b = 0.16$, $p < .01$); husbands' caregiving status was not associated with number of depressive symptoms**.**

Despite the pattern of results suggestive of gender differences in the main effects model, formal tests of gender differences regarding the effects of activity limitations (actor and partner) as well as spousal care (receipt and provision) were not significant (not shown).

Interaction effects model. We examined whether the associations between ADL limitations and depressive symptoms varied depending on care-recipient/caregiving status by introducing a set of interaction terms in Model 3 (Table 3). Findings from the interaction effects model indicated that the association between one's own ADL limitations and depressive symptoms was moderated by care-recipient status for both spouses, although in different directions for wives and husbands. For wives, the association between own ADL limitations and depressive symptoms was attenuated when wives received assistance from husbands ($b = -0.09$, $p < .05$) compared to when they did not receive such assistance. For husbands, however, the association became more pronounced when they received assistance from wives compared to when they did not receive such assistance ($b = 0.09$, $p < .05$); that is, husbands' own ADL limitations had a more detrimental effect with respect to their number of depressive symptoms when their wives provided caregiving (compared to when wives did not). Additionally, the association between own ADL limitations and depressive symptoms was further moderated by caregiver status for husbands, but not wives; that is, husbands' own ADL limitations had a more detrimental effect for their number of depressive symptoms when they provided assistance to their wives compared to when they did not ($b = 0.12$, $p < .05$).

The association between spousal ADL limitations and depressive symptoms was also moderated by care-recipient status for both wives ($b = -0.21$, $p < .001$) and husbands ($b = -0.10$,

$p < .05$), such that the association became attenuated when they received assistance from their spouse compared to when they did not. Specifically, the detrimental effects of husbands' ADL limitations on wives' depressive symptoms became weaker when the husband, who himself had ADL limitations, provided ADL limitations to wives (vice versa for husbands). However, caregiver status did not moderate the link between spousal ADL limitations and depressive symptoms for both wives and husbands.

Finally, formal tests for gender differences indicated that the moderating effects of receipt of spousal care on the link between actor effects of activity limitations and depressive symptoms were significantly different for wives and husbands ($p < .01$); significant gender differences were not found for the other interaction effects (not shown).

Discussion

The objective of this study was to contribute to the literature on activity limitations and depressive symptoms among coupled-individuals, focusing on the moderating roles of receipt of spousal care, as well as provision of care. Longitudinal data from a national sample of coupled individuals in the *Health and Retirement Study* allowed us to estimate within-person associations of activity limitations, spousal care, and depressive symptoms, and therefore we were able to partially address the social selection issues that undermined our confidence in findings from earlier studies. Our findings highlighted that receipt and provision of ADL-related assistance may contextualize the effects of activity limitations on depressive symptoms among coupled individuals, in a direction that could alleviate or aggravate the risk of depression.

Activity Limitations and Depressive Symptoms

Our findings corroborated the robust link between ones' own activity limitations and depression widely reported in the literature (He et al., 2019; Monserud & Peek, 2014; Schieman

& Plickert, 2007; Yang & George, 2005); when people experienced more activity limitations, they were likely to report more depressive symptoms. However, the link between spousal activity limitations and depressive symptoms found in several earlier studies was only significant for wives, but not husbands, in this study sample (He et al., 2019; Hoppmann et al., 2011; Monserud & Peek, 2014; Robb et al., 2008). The discrepant findings are in part attributable to the differences in research design. Our findings demonstrated the within-person linkages between activity limitations and depressive symptoms, whereas earlier studies largely focused on between-person associations. That is, the within-person estimates were adjusted for any between-person differences in depressive symptoms found for those who were observed to have a higher level of activity limitations during the study period compared to who had a lower level of limitations (same for spousal activity limitations; see Supplementary Table 2). Unlike earlier studies, we explicitly accounted for the potential confounding effects of caregiving behavior in the link between spousal activity limitations and depressive symptoms.

Taking these methodological details into consideration, the lack of significant association between wives' activity limitations and husbands' depressive symptoms is in line with findings from the broader literature, which often demonstrated that husbands' health deterioration influence wives' depressive symptoms, but not vice versa (Ayotte, Yang, & Jones, 2010; Valle, Weeks, Taylor, & Eberstein, 2013). This may be in part because family health problems, including spousal health, contribute to a dismal view of the future among women but not men (Y. Kim, Boerner, Kim, & Han, 2017), and also because grief associated with the family health problems are more likely to be internalized by women to influence mental health, whereas the problems tend to be externalized by men to influence physical health (Valle et al., 2013). More research is needed to test these possibilities.

The Moderating Role of Spousal Care

The key finding of this study is that receipt of spousal care significantly moderated the link between ones' own activity limitations and depressive symptoms. More importantly, our findings underscore the gendered nature of the moderating effects of spousal care; that is, receipt of spousal care weakened the positive link between activity limitations and depressive symptoms for wives, but it made the link more pronounced for husbands. This finding is consistent with findings from a recent study that examined the moderating effects of spousal support on disability and activity-related negative emotion, which also reported contrasting effects of spousal support for wives and husbands (Carr et al., 2017). The stress process model provides a useful conceptual framework for interpreting these findings. While *perceived* social support, in general, is regarded as a coping resource for stressors related to disability (Pearlin & Skaff, 1996), research increasingly demonstrates that *received* social support can also be a source of distress (Reinhardt et al., 2006). This may be especially the case for men, for whom receipt of spousal care can lead to a compromised sense of independence and competency, subsequently increasing the sense of psychological distress for the care-recipient (Thoits, 2011). In accordance with this view, an earlier study found that spousal support was associated with adverse physiological stress-reactivity for husbands, whereas wives benefitted from spousal support (Crockett & Neff, 2013).

For husbands only, providing spousal care in the context of one's own activity limitations was associated with more depressive symptoms. Men, on average, are less effective providers of support and care compared to women (Taylor, 2011), and when present, such ineffectiveness in providing spousal care may also have served as an additional source of distress for husbands who were already suffering from own activity limitations. However, this was the only instance where

caregiving behavior was associated with depressive symptoms among this sample of coupled individuals. The findings that caregiving was not directly associated with depressive symptoms, nor did it interact with spousal activity limitations (i.e., spousal ADL limitations × caregiver status) to heighten the risk of depression, were consistent with the emerging view that caregiving does not necessarily lead to worse mental health when relevant factors are accounted for (Poulin et al., 2010; Roth et al., 2015).

In contrast, we found that the link between spousal activity limitations and depressive symptoms was weakened in the face of receipt of spousal care for both wives and husbands; that is, as long as the partner with activity limitations could provide assistance to one's self, depressive symptoms were largely unaffected by spousal activity limitations. This finding offers a potentially unique understanding of how spousal disability may lead to worse psychological well-being among older coupled-individuals. As discussed earlier, having a spouse in poor health may yield a dismal view of the future, in part because a disabled spouse is less likely to be able to provide needed help and assistance in the future (Y. Kim et al., 2017); such concerns may be eliminated when the spouse with activity limitations demonstrates the ability to be a helpful resource by providing ADL-related assistance. More research is needed here.

Limitations

The findings of this study should be intepreted in light of the following limtations. Despite the focus on the within-person associations between activity limitations and depressive symptoms, it is not possible to discuss the empirical findings in causal terms not only because we are unable to determine the temporal order between activity limitations and depressive symptoms, but also because of the potentail bias caused by time-varying sources of omitted variables. As the study was based on a non-clinical measure of depression, clinical ramifications

of our findings are unclear. Further, the potential mechanisms underlying the key variables were not addressed in the study, in part due to data limitations. Future studies should examine the psychological and relationship pathways underlying the dyadic linkages for activity limitations, spousal care exchange, and depressive symptoms.

Contributions

To the best of our knowledge, this is the first study to report on the empirical associations between activity limitations, spousal care, and depressive symptoms among older couples, based on longitudinal data from a large national sample of coupled-individuals. The study employed a WBRE analytic approach to estimate within-person associations, which helped to account for some of social selection processes and omitted variable bias. Findings from this study provided a foundation for future research on this topic of activity limitations and depression and also provided more evidence of health concordance among couples in later life.

References

Allison, P. D. (2009). *Fixed effects regression models*. Thousand Oaks, CA: Sage.

Ayotte, B. J., Yang, F. M., & Jones, R. N. (2010). Physical health and depression: A dyadic study of chronic health conditions and depressive symptomatology in older adult couples. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 65,* 438-448. doi:10.1093/geronb/gbq033

Bell, A., & Jones, K. (2015). Explaining fixed effects: Random effects modeling of time-series cross-sectional and panel data. *Political Science Research and Methods, 3,* 133-153. doi:10.1017/psrm.2014.7

Bruce, M. L. (2001). Depression and disability in late life: Directions for future research. *The American Journal of Geriatric Psychiatry, 9,* 102-112. doi:10.1097/00019442-200105000-00003

Bugliari, D., Campbell, N., Chan, C., Hayden, O., Hurd, M., Main, R., . . . St.Clair, P. (2016). *Rand HRS data documentation, version p*. Santa Monica, CA: RAND Center for the Study of Aging.

Carr, D., Cornman, J. C., & Freedman, V. A. (2017). Disability and activity-related emotion in later life: Are effects buffered by intimate relationship support and strain? *Journal of Health and Social Behavior, 58,* 387-403. doi:10.1177/0022146517713551

Chan, N., Anstey, K. J., Windsor, T. D., & Luszcz, M. A. (2011). Disability and depressive symptoms in later life: The stress-buffering role of informal and formal support. *Gerontology, 57,* 180-189. doi:10.1159/000314158

Cook, W. L., & Kenny, D. A. (2005). The actor–partner interdependence model: A model of bidirectional effects in developmental studies. *International Journal of Behavioral Development, 29*, 101-109. doi:10.1080/01650250444000405

Crockett, E. E., & Neff, L. A. (2013). When receiving help hurts:Gender differences in diurnal cortisol responses to spousal support. *Social Psychological and Personality Science, 4*, 190-197. doi:10.1177/1948550612451621

Freedman, V. A., Cornman, J. C., & Carr, D. (2014). Is spousal caregiving associated with enhanced well-being? New evidence from the panel study of income dynamics. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 69*, 861-869. doi:10.1093/geronb/gbu004

Freedman, V. A., & Spillman, B. C. (2014). Disability and care needs among older Americans. *The Milbank Quarterly, 92*, 509-541. doi:10.1111/1468-0009.12076

Friedline, T., Masa, R. D., & Chowa, G. a. N. (2015). Transforming wealth: Using the inverse hyperbolic sine (IHS) and splines to predict youth's math achievement. *Social Science Research, 49*, 264-287. doi:10.1016/j.ssresearch.2014.08.018

He, M., Ma, J., Ren, Z., Zhou, G., Gong, P., Liu, M., . . . Zhang, X. (2019). Association between activities of daily living disability and depression symptoms of middle-aged and older chinese adults and their spouses: A community based study. *Journal of Affective Disorders, 242*, 135-142. doi:10.1016/j.jad.2018.08.060

Hennessy, S., Kurichi, J. E., Pan, Q., Streim, J. E., Bogner, H. R., Xie, D., & Stineman, M. G. (2015). Disability stage is an independent risk factor for mortality in medicare beneficiaries aged 65 years and older. *PM&R, 7*, 1215-1225. doi:10.1016/j.pmrj.2015.05.014

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change*. New York: Routledge.

Hoppmann, C. A., & Gerstorf, D. (2014). Biobehavioral pathways underlying spousal health dynamics: Its nature, correlates, and consequences. *Gerontology, 60*, 458-465. doi:10.1159/000357671

Hoppmann, C. A., Gerstorf, D., & Hibbert, A. (2011). Spousal associations between functional limitation and depressive symptom trajectories: Longitudinal findings from the study of asset and health dynamics among the oldest old (AHEAD). *Health Psychology, 30*, 153-162. doi:10.1037/a0022094

Hybels, C. F., Pieper, C. F., & Blazer, D. G. (2009). The complex relationship between depressive symptoms and functional limitations in community-dwelling older adults: The impact of subthreshold depression. *Psychological Medicine, 39*, 1677-1688. doi:10.1017/S0033291709005650

Kail, B. L., & Carr, D. C. (2016). Successful aging in the context of the disablement process: Working and volunteering as moderators on the association between chronic conditions and subsequent functional limitations. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 72*, 340-350. doi:10.1093/geronb/gbw060

Kashy, D. A., & Donnellan, M. B. (2012). Conceptual and methodological issues in the analysis of data from dyads and groups. In K. Deaux & M. Snyder (Eds.), *The Oxford handbook of personality and social psychology*. New York: Oxford University Press. doi:10.1093/oxfordhb/9780195398991.013.0009

Kim, K., Bangerter, L. R., Polenick, C. A., Liu, Y., Zarit, S. H., & Fingerman, K. L. (2016). Middle-aged offspring's support to aging parents with emerging disability. *The Gerontologist, 57*, 441-450. doi:10.1093/geront/gnv686

Kim, Y., Boerner, K., Kim, K., & Han, G. (2017). Aging together: Self-perceptions of aging and family experiences among korean baby boomer couples. *The Gerontologist, 58*, 1044-1053. doi:10.1093/geront/gnx132

Mendes De Leon, C. F. (2007). Aging and the elapse of time: A comment on the analysis of change. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 62*, S198-S202. doi:10.1093/geronb/62.3.S198

Meyler, D., Stimpson, J. P., & Peek, M. K. (2007). Health concordance within couples: A systematic review. *Social Science & Medicine, 64*, 2297-2310. doi:10.1016/j.socscimed.2007.02.007

Monserud, M. A., & Peek, M. K. (2014). Functional limitations and depressive symptoms: A longitudinal analysis of older Mexican american couples. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 69*, 743-762. doi:10.1093/geronb/gbu039

Pearlin, L. I., & Skaff, M. M. (1996). Stress and the life course: A paradigmatic alliance. *The Gerontologist, 36*, 239-247. doi:10.1093/geront/36.2.239

Pinquart, M., & Sörensen, S. (2006). Gender differences in caregiver stressors, social resources, and health: An updated meta-analysis. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 61*, P33-P45. doi:10.1093/geronb/61.1.P33

Poulin, M. J., Brown, S. L., Ubel, P. A., Smith, D. M., Jankovic, A., & Langa, K. M. (2010). Does a helping hand mean a heavy heart? Helping behavior and well-being among spouse caregivers. *Psychology and Aging, 25*, 108-117. doi:10.1037/a0018064

Reinhardt, J. P., Boerner, K., & Horowitz, A. (2006). Good to have but not to use: Differential impact of perceived and received support on well-being. *Journal of Social and Personal Relationships, 23*, 117-129. doi:10.1177/0265407506060182

Robb, C., Small, B., & Haley, W. E. (2008). Gender differences in coping with functional disability in older married couples: The role of personality and social resources. *Aging & Mental Health, 12*, 423-433. doi:10.1080/13607860802224326

Rosso, A. L., Taylor, J. A., Tabb, L. P., & Michael, Y. L. (2013). Mobility, disability, and social engagement in older adults. *Journal of Aging and Health, 25*, 617-637. doi:10.1177/0898264313482489

Roth, D. L., Fredman, L., & Haley, W. E. (2015). Informal caregiving and its impact on health: A reappraisal from population-based studies. *The Gerontologist, 55*, 309-319. doi:10.1093/geront/gnu177

Schieman, S., & Plickert, G. (2007). Functional limitations and changes in levels of depression among older adults: A multiple-hierarchy stratification perspective. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 62*, S36-S42. doi:10.1093/geronb/62.1.S36

Schulz, R., & Beach, S. R. (1999). Caregiving as a risk factor for mortalitythe caregiver health effects study. *JAMA, 282*, 2215-2219. doi:10.1001/jama.282.23.2215

Schunck, R. (2013). Within and between estimates in random-effects models: Advantages and drawbacks of correlated random effects and hybrid model. *The Stata Journal, 13*, 65-76.

Shen, H.-W., Feld, S., Dunkle, R. E., Schroepfer, T., & Lehning, A. (2015). The prevalence of older couples with adl limitations and factors associated with adl help receipt. *Journal of Gerontological Social Work, 58*, 171-189. doi:10.1080/01634372.2014.944248

Sonnega, A., Faul, J. D., Ofstedal, M. B., Langa, K. M., Phillips, J. W., & Weir, D. R. (2014). Cohort profile: The Health and Retirement Study (HRS). *International Journal of Epidemiology, 43*, 576-585. doi:10.1093/ije/dyu067

Taylor, S. E. (2011). Social support: A review. In H. S. Friedman (Ed.), *The handbook of health psychology* (pp. 189-214). New York: Oxford University Press.

Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior, 52*, 145-161. doi:10.1177/0022146510395592

Valle, G., Weeks, J. A., Taylor, M. G., & Eberstein, I. W. (2013). Mental and physical health consequences of spousal health shocks among older adults. *Journal of Aging and Health, 25*, 1121-1142. doi:10.1177/0898264313494800

Van Sonderen, E., Rijsdijk, F. V., Kempen, G. I. J. M., Ormel, J., & Sullivan, M. (2002). Temporal and reciprocal relationship between iadl/adl disability and depressive symptoms in late life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 57*, P338-P347. doi:10.1093/geronb/57.4.P338

Wolf, D. (2015). Late-life disability trends and trajectories. In L. K. George & K. F. Ferraro (Eds.), *Handbook of aging and the social sciences* (8th ed.). Oxford, UK: Elsevier Science & Technology.

Yang, Y., & George, L. K. (2005). Functional disability, disability transitions, and depressive symptoms in late life. *Journal of Aging and Health, 17*, 263-292. doi:10.1177/0898264305276295

Table 1

Descriptive Characteristics of the Study Sample at Baseline

	Wives		Husbands	
Variables	*M*	(*SD*)	*M*	(*SD*)
Depressive symptoms[a]	1.40	(1.97)	1.05	(1.63)
ADL limitations[b]	0.22	(0.75)	0.20	(0.70)
Spousal care				
Care-recipient status, %				
Did not receive ADL assistance	6.89		6.46	
Received ADL assistance	4.45		4.17	
Did not need ADL assistance	88.66		89.37	
Caregiver status, %				
Did not give ADL assistance	6.46		6.89	
Gave ADL assistance	4.17		4.45	
Spouse did not need ADL assistance	89.37		88.66	
Individual-level characteristics				
Age (in years)	60.48	(9.82)	63.69	(9.69)
Race-ethnic status, %				
White (non-Hispanic)	71.58		71.76	
Black (non-Hispanic)	12.17		12.59	
Other race (non-Hispanic)	3.07		2.98	
Hispanic (any race)	13.18		12.67	
Educational attainment (in years)	12.76	(3.01)	12.77	(3.40)
Working for pay, %	46.98		54.20	
Memory-related disease[c], %	1.27		1.78	
Couple-level characteristics				
Married[d], %	93.97			
Duration of current marriage (in years)	31.84	(15.96)		
Household income (log-transformed)	10.81	(1.30)		
Median value (in $1,000)	54.55			
Household wealth (IHS-transformed)	5.24	(2.60)		
Median value (in $1,000)	170.85			
Number of people in household	2.66	(1.17)		
Number of children living within 10 miles	0.80	(1.05)		
Number of waves used in study	3.99	(1.71)		

Notes. Dyads *N* = 6,614. ADL = activities of daily living. IHS = inverse hyperbole sine.
[a]Eight-item version of the Center for Epidemiological Studies-Depression Scale (CES-D).
[b]Count of six ADL limitations. [c]Measured with immediate and delayed word recall memory test (range = 0–8). [d]Marital status (1 = *married*; 0 = *non-marital cohabitation*).

Table 2

Unadjusted Models of Depressive Symptoms

	Model 1A: Time and baseline age				Model 1B: Time × Baseline age			
	Wives		Husbands		Wives		Husbands	
	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)
Fixed effects								
Intercept	1.82***	(0.04)	1.45***	(0.04)	1.86***	(0.04)	1.46***	(0.04)
Time	0.01	(0.01)	0.03***	(0.01)	-0.30***	(0.04)	-0.25***	(0.04)
Baseline age	-0.01***	(0.00)	-0.01***	(0.00)	0.01	(0.00)	0.00	(0.00)
Time × Baseline age					0.01***	(0.00)	0.01***	(0.00)
Random effects								
Intercept variance	2.04***	(0.04)	1.51***	(0.03)	2.03***	(0.04)	1.51***	(0.03)
Time variance	0.04***	(0.00)	0.03***	(0.00)	0.04***	(0.00)	0.03***	(0.00)
Residual variance	1.11***	(0.01)	1.57***	(0.02)	1.11***	(0.01)	1.57***	(0.02)
−2 log-likelihood	189,129.5				189,051.5			
AIC	189,155.5				189,077.5			

Notes. Dyads N = 6,614; Person-Wave Observations N = 52,706.
***$p < .001$.

Table 3

ADL Limitations, Receipt and Provision of Spousal Care, and Depressive Symptoms Among Older Couples

	Model 2: Main effects				Model 3: Interaction effects			
	Wives		Husbands		Wives		Husbands	
	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)
Fixed effects								
Own ADL limitations	0.29***	(0.02)	0.25***	(0.02)	0.38***	(0.05)	0.18***	(0.04)
× Care-recipient status (ref: did not receive assistance)								
Received assistance					-0.09*	(0.05)	0.09*	(0.04)
× Caregiver status (ref: did not give assistance)								
Gave spousal assistance					0.03	(0.06)	0.12*	(0.05)
Spouse did not need assistance					-0.05	(0.04)	0.00	(0.04)
Spousal ADL limitations	0.07**	(0.03)	0.03	(0.02)	0.04	(0.05)	0.05	(0.04)
× Care recipient status (ref: did not receive assistance)								
Received assistance					-0.21***	(0.06)	-0.10*	(0.05)
Did not need assistance					0.05	(0.04)	-0.05	(0.04)
× Caregiver status (ref: did not give assistance)								
Gave spousal assistance					0.01	(0.05)	0.04	(0.04)
Spousal care exchange								
Care-recipient status (ref: did not receive assistance)								
Received assistance	0.02	(0.06)	0.16**	(0.05)	0.27*	(0.11)	0.04	(0.09)
Did not need assistance	-0.05	(0.05)	-0.13**	(0.04)	0.01	(0.07)	-0.18**	(0.06)
Caregiver status (ref: did not give assistance)								
Gave spousal assistance	0.03	(0.07)	-0.06	(0.05)	-0.01	(0.11)	-0.16	(0.09)
Spouse did not need assistance	0.04	(0.05)	-0.03	(0.04)	0.04	(0.07)	-0.06	(0.06)
Random effects								
Intercept variance	1.35***	(0.03)	1.03***	(0.02)	1.34***	(0.03)	1.03***	(0.02)
Time variance	0.03***	(0.00)	0.02***	(0.00)	0.03***	(0.00)	0.02***	(0.00)
Residual variance	1.09***	(0.01)	1.55***	(0.02)	1.09***	(0.01)	1.55***	(0.02)
−2 log-likelihood			184,668.5				184,687.2	
AIC			184,694.5				184,713.2	

Notes. Dyads N = 6,614; Person-Wave Observations N = 52,706. ADL = activities of daily living. All estimates for fixed effects in the table represent within-person (level-1) effects; models are fully adjusted for all covariates; full model results are presented in Supplementary Table 2.
*p < .05. **p < .01. ***p < .001.

Supplementary Table 1

Sensitivity Analyses Using Alternative Measure of Care-recipient and Caregiver Status

	Model 1: Main effects				Model 2: Interaction effects			
	Wives		Husbands		Wives		Husbands	
	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)
Fixed effects								
Within-person (level-1) effects								
Intercept	1.91***	(0.10)	1.25***	(0.09)	1.85***	(0.10)	1.21***	(0.09)
Time	-0.23***	(0.04)	-0.19***	(0.04)	-0.23***	(0.04)	-0.20***	(0.04)
Own ADL limitations	0.31***	(0.02)	0.28***	(0.02)	0.33***	(0.02)	0.27***	(0.02)
× Received caregiving					-0.08*	(0.04)	0.00	(0.03)
× Provided caregiving					0.03	(0.05)	0.14**	(0.05)
Spousal ADL limitations	0.06**	(0.02)	0.04*	(0.02)	0.07**	(0.02)	0.04*	(0.02)
× Received caregiving					-0.21***	(0.06)	-0.07	(0.04)
× Provided caregiving					0.02	(0.04)	0.01	(0.03)
Spousal care exchange								
Received caregiving	0.03	(0.06)	0.17**	(0.05)	0.24**	(0.09)	0.20**	(0.08)
Provided caregiving	0.03	(0.06)	-0.05	(0.05)	-0.03	(0.09)	-0.11	(0.08)
Household income[a]	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)	-0.02	(0.01)
Household wealth[b]	-0.01	(0.01)	-0.02**	(0.01)	-0.01	(0.01)	-0.02**	(0.01)
Working for pay	-0.11***	(0.03)	-0.13***	(0.03)	-0.11**	(0.03)	-0.13***	(0.03)
Spouse has memory-related disease	0.01	(0.10)	0.20*	(0.09)	0.02	(0.10)	0.20*	(0.09)
Household size	0.04*	(0.02)	0.02	(0.01)	0.04*	(0.02)	0.02	(0.01)
No. of children living within 10 miles	-0.02	(0.02)	0.00	(0.01)	-0.02	(0.02)	0.00	(0.01)
Between-person (level-2) effects								
Age at baseline[c]	-0.01*	(0.00)	-0.02***	(0.00)	-0.01**	(0.00)	-0.02***	(0.00)
× Time	0.00***	(0.00)	0.00***	(0.00)	0.00***	(0.00)	0.00***	(0.00)
Race-ethnic status (reference: White, non-Hispanic)								
Black (non-Hispanic)	-0.07	(0.06)	0.08	(0.05)	-0.08	(0.06)	0.10*	(0.05)
Other race (non-Hispanic)	0.16	(0.10)	0.16	(0.09)	0.16	(0.10)	0.16	(0.09)
Hispanic	0.14*	(0.06)	-0.01	(0.05)	0.13*	(0.06)	0.00	(0.05)
Education[c]	-0.06***	(0.01)	-0.04***	(0.01)	-0.06***	(0.01)	-0.04***	(0.01)
Married	-0.31***	(0.08)	-0.01	(0.07)	-0.30***	(0.08)	-0.01	(0.07)
Length of marriage at baseline	0.00*	(0.00)	0.00*	(0.00)	0.00*	(0.00)	0.00*	(0.00)
ADL limitations								
Actor effects	0.73***	(0.04)	0.70***	(0.03)	0.99***	(0.05)	0.93***	(0.04)
Partner effects	0.16***	(0.04)	0.10***	(0.03)	0.17***	(0.05)	0.08*	(0.04)
Spousal care exchange								
Received spousal care	-0.03	(0.14)	-0.01	(0.13)	1.62***	(0.21)	1.17***	(0.19)
Provided spousal care	0.11	(0.15)	0.16	(0.12)	0.24	(0.22)	0.28	(0.18)
Household income[a,c]	-0.07***	(0.02)	-0.06**	(0.02)	-0.07***	(0.02)	-0.05**	(0.02)
Household wealth[b,c]	-0.08***	(0.01)	-0.05***	(0.01)	-0.08***	(0.01)	-0.05***	(0.01)
Working for pay	-0.48***	(0.05)	-0.46***	(0.04)	-0.46***	(0.05)	-0.43***	(0.04)
Spouse has memory-related disease	-0.14	(0.15)	0.04	(0.15)	-0.15	(0.14)	0.02	(0.15)
Household size	-0.01	(0.02)	0.02	(0.02)	-0.01	(0.02)	0.01	(0.02)
No. of children living within 10 miles	-0.03	(0.02)	0.01	(0.02)	-0.03	(0.02)	0.01	(0.02)
Random effects								
Intercept variance	1.41***	(0.03)	1.06***	(0.02)	1.37***	(0.03)	1.04***	(0.02)
Time variance	0.03***	(0.00)	0.02***	(0.00)	0.03***	(0.00)	0.02***	(0.00)
Residual variance	1.09***	(0.01)	1.55***	(0.02)	1.09***	(0.01)	1.55***	(0.02)
−2 log-likelihood			185,004.8				184,830.3	
AIC			185,030.8				184,856.3	

Notes. Dyad N = 6,614; Person-Wave Observations N = 52,706. ADL = activities of daily living. [a]Transformed by the natural log. [b]Transformed by the inverse-hyperbole sine function. [c]Grand-mean-centered. Estimates for between-person effects of interaction terms not shown.

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

Supplementary Table 2

ADL Limitations, Receipt and Provision of Spousal Care, and Depressive Symptoms Among Couples

	Model 1: Main effects				Model 2: Interaction effects			
	Wives		Husbands		Wives		Husbands	
	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)	Estimate	(*SE*)
Fixed effects								
Within-person (level-1) effects								
Intercept	3.72***	(0.19)	2.61***	(0.17)	3.66***	(0.25)	2.61***	(0.22)
Time	-0.23***	(0.04)	-0.19***	(0.04)	-0.23***	(0.04)	-0.20***	(0.04)
Own ADL limitations	0.29***	(0.02)	0.25***	(0.02)	0.38***	(0.05)	0.18***	(0.04)
× Care-recipient status[a]								
Received assistance					-0.09*	(0.05)	0.09*	(0.04)
× Caregiver status[b]								
Gave spousal assistance					0.03	(0.06)	0.12*	(0.05)
Spouse did not need assistance					-0.05	(0.04)	0.00	(0.04)
Spousal ADL limitations	0.07**	(0.03)	0.03	(0.02)	0.04	(0.05)	0.05	(0.04)
× Care recipient status[a]								
Received assistance					-0.21***	(0.06)	-0.10*	(0.05)
Did not need assistance					0.05	(0.04)	-0.05	(0.04)
× Caregiver status[b]								
Gives spousal assistance					0.01	(0.05)	0.04	(0.04)
Spousal care exchange								
Care-recipient status[a]								
Received assistance	0.02	(0.06)	0.16**	(0.05)	0.27*	(0.11)	0.04	(0.09)
Did not need assistance	-0.05	(0.05)	-0.13**	(0.04)	0.01	(0.07)	-0.18**	(0.06)
Caregiver status[b]								
Gave spousal assistance	0.03	(0.07)	-0.06	(0.05)	-0.01	(0.11)	-0.16	(0.09)
Spouse did not need assistance	0.04	(0.05)	-0.03	(0.04)	0.04	(0.07)	-0.06	(0.06)
Household income[c]	-0.02	(0.01)	-0.02	(0.01)	-0.01	(0.01)	-0.02	(0.01)
Household wealth[d]	-0.01	(0.01)	-0.02**	(0.01)	-0.01	(0.01)	-0.02**	(0.01)
Working for pay	-0.11***	(0.03)	-0.13***	(0.03)	-0.11***	(0.03)	-0.13***	(0.03)
Spouse has memory-related disease	0.01	(0.10)	0.20*	(0.09)	0.02	(0.10)	0.20*	(0.09)
Household size	0.04*	(0.02)	0.02	(0.01)	0.04*	(0.02)	0.02	(0.01)
No. of children living within 10 miles	-0.02	(0.02)	0.00	(0.01)	-0.02	(0.02)	0.00	(0.01)
Between-person (level-2) effects								
Age at baseline[e]	-0.01**	(0.00)	-0.02***	(0.00)	-0.01**	(0.00)	-0.02***	(0.00)
× Time	0.00***	(0.00)	0.00***	(0.00)	0.00***	(0.00)	0.00***	(0.00)
Race-ethnic status (reference: White, non-Hispanic)								
Black (non-Hispanic)	-0.07	(0.06)	0.10*	(0.05)	-0.07	(0.06)	0.10*	(0.05)
Other race (non-Hispanic)	0.20*	(0.10)	0.16	(0.09)	0.19	(0.10)	0.16	(0.09)
Hispanic	0.13*	(0.06)	0.00	(0.05)	0.13*	(0.06)	0.00	(0.05)
Education[c]	-0.06***	(0.01)	-0.04***	(0.01)	-0.06***	(0.01)	-0.04***	(0.01)
Married	-0.30***	(0.08)	0.00	(0.07)	-0.29***	(0.08)	0.00	(0.07)
Length of marriage at baseline	0.00*	(0.00)	0.00*	(0.00)	0.00*	(0.00)	0.00*	(0.00)
ADL limitations								
Actor effects	0.21***	(0.05)	0.32***	(0.05)	0.26*	(0.10)	0.33***	(0.10)
Partner effects	0.10*	(0.05)	0.04	(0.04)	-0.04	(0.11)	-0.04	(0.09)
Spousal care exchange								
Care-recipient status[a]								
Received assistance	-0.41**	(0.14)	-0.21	(0.13)	-0.37	(0.28)	-0.07	(0.24)
Did not need assistance	-1.82***	(0.13)	-1.28***	(0.11)	-1.88***	(0.18)	-1.12***	(0.16)
Caregiver status[b]								
Gave spousal assistance	0.14	(0.15)	0.16	(0.12)	0.12	(0.28)	-0.08	(0.24)
Spouse did not need assistance	-0.10	(0.12)	-0.17	(0.11)	0.00	(0.18)	-0.34*	(0.16)
Household income[c,e]	-0.07**	(0.02)	-0.05**	(0.02)	-0.07**	(0.02)	-0.05**	(0.02)
Household wealth[c,e]	-0.07***	(0.01)	-0.05***	(0.01)	-0.07***	(0.01)	-0.05***	(0.01)
Working for pay	-0.44***	(0.05)	-0.41***	(0.04)	-0.44***	(0.05)	-0.41***	(0.04)
Spouse has memory-related disease	-0.12	(0.14)	0.01	(0.15)	-0.10	(0.14)	0.02	(0.15)
Household size	-0.01	(0.02)	0.01	(0.02)	-0.01	(0.02)	0.01	(0.02)
No. of children living within 10 miles	-0.03	(0.02)	0.00	(0.02)	-0.03	(0.02)	0.00	(0.02)
Random effects								
Intercept variance	1.35***	(0.03)	1.03***	(0.02)	1.34***	(0.03)	1.03***	(0.02)
Time variance	0.03***	(0.00)	0.02***	(0.00)	0.03***	(0.00)	0.02***	(0.00)
Residual variance	1.09***	(0.01)	1.55***	(0.02)	1.09***	(0.01)	1.55***	(0.02)
−2 log-likelihood			184,668.5				184,687.2	
AIC			184,694.5				184,713.2	

Notes. Dyads n = 6,614; Person-Wave Observations N = 52,706. ADL = activities of daily living. [a]Reference category = did not receive assistance. [b]Reference category = did not give assistance. [c]Transformed by the natural log. [d]Transformed by the inverse-hyperbole sine function. [e]Grand-mean-centered. Estimates for between-person effects of interaction terms not shown.
*p < .05. **p < .01. ***p < .001.