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Testing a Self-Determination Theory Perspective of Informal Caregiving: A Preliminary Study

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Abstract

Informal caregivers provide valuable care for ill or disabled adults. Nevertheless, many caregivers experience negative consequences from caregiving such as reduced mental health. Balancing personal costs of caregiving with caregivers' desires or obligations to provide care, is necessary to promote the well-being of these individuals and their care recipients. Drawing on a self-determination theory perspective, caregivers whose psychological needs for relatedness, autonomy, and competence are satisfied with their care recipient, and their care recipients' healthcare providers, should be more autonomously motivated to care. Greater autonomous motivation should promote better mental health. This study tested mediation models in a sample of 158 caregivers in the United States. Autonomous motivation was examined as a mediator of the (a) associations between caregivers' need satisfaction with their care recipient and caregiver burden and depressive symptoms, and (b) associations between caregivers' autonomy support received from their care recipients' healthcare providers and caregiver burden and depressive symptoms. Next, specific types of motivation that vary in their relative autonomy were examined as unique mediators. Support was found for models using autonomous motivation as the mediator. Additionally, caregivers' autonomy support and female caregivers' need satisfaction were positively associated with intrinsic motivation to care which was negatively associated with burden. Although much research suggests caregivers' outcomes stem from the care recipients' condition, such as their functional dependence on others, the present study focused on the caregivers' relationships and motivations. Results support a SDT perspective of caregiving.

Keywords: Self-Determination Theory, Informal Caregivers, Motivation, Caregiver Burden, Depressive Symptoms

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Study

Nearly forty million people in the United States are informal caregivers-- people who help a family member or friend who has a chronic illness or disability for little or no compensation. Caregiving tasks often include medical and nursing tasks, communicating with healthcare providers, facilitating healthcare visits, and helping with instrumental and personal activities of daily living (IADLs and ADLs respectively) such as transportation and dressing (National Alliance for Caregiving [NAC] & the AARP Public Policy Institute [PPI], 2015). Given the tasks caregivers can and do perform, caregivers improve quality of life for care recipients and reduce healthcare costs for families and society (Van Houtven & Norton, 2004).

Although beneficial for families and society, caregiving can take a toll on caregivers' mental health (NAC & the AARP PPI, 2015). Indeed, caregivers tend to experience a higher prevalence of depression than non-caregivers (Cuijpers, 2005; Lee et al., 2015) and caregiving is associated with a unique type of stress, caregiver burden (see Adelman et al., 2014 for a review). Caregivers' depressive symptoms and burden reduce their quality of life and may interfere with their ability to provide care (Clarke, 2004).

Models detailing how caregiving leads to stress and depressive symptoms maintain that caregiving develops within relationship contexts such as the relationship between the caregiver and care receiver, and relationships they have with others in their social network (i.e., stress process model of caregiving, SPMC; Pearlin et al., 1990). This model views caregiving as a behavioral expression of a person's commitment to the welfare of another. Caregiving contributes to caregivers' stress and depressive symptoms to the extent that they perceive caregiving as overwhelming and unfairly distributed within their relationship with the care

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recipient. Such perceptions are influenced by the quality of the care dyad relationship, how functionally dependent the care recipient is, and access to other family, financial, and community resources to assist the caregiver (Pearlin et al., 1990). In the context of having fewer resources and overwhelming caregiving demands, a caregiver may tend to feel "trapped" and controlled.

Self-determination theory (SDT) may be used to further elaborate how relationships associated with caregiving contribute to caregiver burden and depressive symptoms. Based on SDT, caregivers whose psychological needs are satisfied in social relationships associated with caregiving, such as their relationship with the care recipient or healthcare providers, will develop more autonomous (and less controlled) motivation to care for their recipient, which will contribute to their better mental health (Ryan & Deci, 2000; 2017). Indeed, people who are more autonomously motivated to care --or who perceive they more *freely choose* to engage in caregiving -- tend to have better mental health compared to those whose caregiving is less autonomously motivated (see Dombestein et al., 2019 for a review).

SDT identifies several distinct types of motivation that can be placed on a continuum with regard to how autonomous versus controlled they are (Howard et al., 2017). More autonomous types of motivation include intrinsic, integrated, and identified motivations. Intrinsic motivation characterizes behavior that is engaged in for pleasure, interest, or satisfaction. Consistent with this, some caregivers report receiving benefits from caregiving such as a sense of personal satisfaction and growth and relationship enhancement with the care recipient (Li & Loke, 2013; Yu et al., 2018). Integrated motivation refers to behavior that is engaged in because it is consistent with the person's sense of self. Identified motivation refers to behavior that is engaged in because the individual perceives the importance and value of the activity. In contrast, less autonomous or more controlled motivations, include external and introjected motivations.

External motivation refers to behavior engaged in to receive a reward or avoid a punishment. Introjected motivation characterizes behavior enacted to avoid negative feelings such as guilt or shame. Although not a focus of the present study, SDT also discusses amotivation -- a lack of intentional motivation for the behavior, or motivation not to engage in the behavior. People may be motivated to engage in a behavior for many, often interrelated reasons and thus, experience many motivations simultaneously (Ryan & Deci, 2017).

Social relationships that satisfy a person's psychological needs for autonomy, competence and relatedness enhance a person's capacity for intrinsic motivation and promote internalization and integration of the value of the behaviors, thereby facilitating integrated and identified motivation (Ryan & Deci, 2017). Autonomy needs refer to feeling that one is able to make choices for oneself. Competence needs characterize experiences of oneself as effective in mastering one's tasks. Relatedness needs refer to feeling socially connected (Ryan & Deci, 2017). Considering the SPMC, if one finds caring for another as intrinsically motivating, it seems less likely that they would also experience it as overwhelming and unfairly distributed. Thus, it is reasonable to expect that intrinsically motivated caregivers would experience lower caregiver burden and depressive symptoms. Nevertheless, some caregiving tasks are unlikely to be perceived as interesting or enjoyable (e.g., toileting). For these behaviors, internalization and integration of their value for the care recipient's well-being, and the resulting integrated and identified motivation to care, should be associated with lower burden and depressive symptoms. When a person's needs are not satisfied or are frustrated within social relationships associated with caregiving, people should tend to develop more controlled motivations or amotivation to care (Ryan & Deci, 2017). Consistent with SDT, research examining caregivers of people with chronic pain has found that caregivers' overall need satisfaction, and satisfaction of each of their

specific needs for autonomy, competence, and relatedness, with care recipients are positively associated with caregivers' autonomous motivation (Kindt et al., 2015; Kindt et al., 2016).

Research on SDT has varied in whether the types of motivation or an index of the relative autonomy of motivations are studied (Howard et al., 2017). Research examining the specific types of motivation indicated in SDT tend to show that the more autonomous types of motivation (i.e., intrinsic and identified) are associated with caregivers' better mental health; and the more controlled types of motivation (i.e., external and introjected) tend to be associated poorer mental health. For example, two studies examined introjected and external motivations in addition to autonomous motivation (Kim et al., 2008; Kim et al., 2015). One study found that male caregivers' introjected motivation was negatively associated with their life satisfaction and positively associated with depressive symptoms, whereas female caregivers' introjected and external motivations were not associated with outcomes (Kim et al., 2008). In a second study, female caregivers' early external motivation uniquely predicted their poorer mental health 5 years later (Kim et al., 2015). A third study examined identified and introjected motivations in a small sample of caregivers for people with dementia and found that identified motivation was positively associated with well-being (Pierce et al., 2001). Thus, when specific types of motivations are examined, more autonomous caregiving motivations tend to be associated with better mental health, although these associations may differ based on caregiver gender and the specific type of motivation examined.

Although SDT indicates that need satisfaction promotes caregivers' development of more autonomous motivation to care, which promotes better mental health, this model – with autonomous motivation as the mediator -- has not been tested. Instead, two studies have examined need satisfaction as a mediator of the association between caregivers' autonomous

motivation and their health and well-being (Kindt et al., 2015; Kindt et al., 2016). This research examined couples in which one partner had chronic pain. One study used daily diary data and found that caregivers' daily autonomous motivation to care predicted their increased daily need satisfaction with their partner, which predicted an improvement in daily outcomes including affect, helping exhaustion, and relationship conflict (Kindt et al., 2016). Another study found that the effects of caregivers' greater autonomous motivation to care on their outcomes (including well-being and lower distress) were mediated by their need satisfaction and lower helping exhaustion (Kindt et al., 2015). This alternative direction of effects between need satisfaction and autonomous motivation is also consistent with SDT because autonomously regulated prosocial behavior should promote mutual need satisfaction with the recipient of the behavior (Ryan & Deci, 2017). Additionally, SDT purports need satisfaction promotes mental health directly in addition to indirectly through its association with autonomous motivation (Ryan & Deci, 2000).

Another social relationship that should facilitate caregivers' autonomous motivation is their relationship with their care recipients' healthcare providers (HCPs; Moore, 2012). Caregivers often play an essential role in the provision and facilitation of healthcare for their care recipients. The extent to which HCPs treat caregivers as members of the care recipient's healthcare team, should increase need satisfaction with HCPs. Specifically, HCPs can show caregivers respect and empathy which should help to satisfy caregivers' relatedness needs; HCPs can provide caregivers with education about their care recipient's illness and provide referrals to training and support programs to help satisfy caregivers' competence needs; and HCPs can provide options to caregivers on how to fulfil their caregiving role that can help satisfy caregivers' autonomy needs. Nevertheless, previous research using an SDT framework to study healthcare providers has focused on patients rather than caregivers and has primarily examined

the effects of providers' autonomy support of patients. Autonomy support characterizes the extent to which a person facilitates the decision-making ability and autonomy needs of another individual. Patients' perceptions of autonomy support received from healthcare providers predicts their greater need satisfaction with those providers, and their subsequent autonomous motivation to engage in better health-related self-care (e.g., Halvari et al., 2013; 2010). Applied to caregiving, the autonomy support caregivers receive from HCPs should increase their autonomous motivation to care, and more autonomous motivation should promote caregivers' better mental health.

Overview of the Present Study

There were three aims of this study. First, we aimed to test whether autonomous motivation for caregiving mediated the associations between caregivers' need satisfaction with their care recipients and their burden and depressive symptoms. We expected that need satisfaction would be positively associated with autonomous motivation to care and that autonomous motivation would be negatively associated with burden and depressive symptoms. Although two studies have examined associations among similar variables in mediation models (but had autonomous motivation as the predictor and need satisfaction as the mediator), those studies examined couples in which one partner had chronic pain (Kindt et al., 2015; Kindt et al., 2016). Thus, the present study extends previous research by examining the SDT mediation model that explains how autonomous motivation develops and is associated with better mental health outcomes and examining a sample of caregivers with different types of relationships with care recipients, and care recipients with different types of disorders.

Our second aim was to test whether caregivers' autonomous motivation mediated the association between caregivers' autonomy support from HCPs and their burden and depressive

symptoms. We expected that autonomy support would be associated with stronger autonomous motivation to care which in turn would be associated with less burden and depressive symptoms. To our knowledge, this is the first study to test an SDT perspective of caregivers' experiences with HCPs.

Our third aim was to test whether individual types of motivation uniquely mediated the associations between the predictors and outcomes discussed above. SDT includes several distinct types of motivation that vary in their relative autonomy (Howard et al., 2017), and these types have been found to have different associations with caregivers' outcomes (Kim et al., 2008; Kim et al, 2015; Pierce et al., 2001). To our knowledge, no previous research has examined whether types of motivation mediate the association between caregiver need satisfaction and caregiver well-being. This study examined this question in an exploratory manner as current theoretical development does not permit specification of the exact motivation(s) involved in the mediation pathways.

Additionally, although not the primary focus of this research, cultural and contextual factors influence caregivers' experiences and outcomes (Cook et al., 2018; Sörenson & Pinquart, 2005). Thus, we examined whether several possible covariates and moderators should be included in our models. First, much of the research on stress experienced by caregivers has focused on the care recipients' condition; for example, how dependent the care recipient is on others for help with ADLs (Pérez Mérmol et al., 2018). This is because care recipients vary in the amount of care they require, and greater dependence on the caregiver should increase burden (e.g., Lin et al., 2019; Pearlin et al., 1990). Therefore, we examined whether care recipients' functional dependence should be included as a covariate in our models. Second, because some research has suggested gender differences in the associations between caregivers' motivations

and mental health outcomes (Kim et al., 2008; Kim et al, 2015), we examined gender as a

potential moderator in our models. Third, some researchers have found that people from non-

Western ethnic groups tend to have cultural values that promote caregiving (Sörenson &

Pinquart, 2005). Thus, we examined whether caregivers' ethnicity should be retained as a

covariate in models.

Method

Participants

Informal caregivers' ($N = 158$) demographic and caregiving information is presented in

Table 1. Participants ranged in age from 18 to 88 years. Most participants were female and non-

Hispanic/White. Most participants were caring for their parent or parent-in-law and most

frequently indicated their care recipient's diagnosis as Alzheimer's disease or dementia. Care

recipients had a moderate level of functional dependence on average (functional dependence for

IADLs $M = 4.39$, $SD = 1.69$; and ADLs $M = 3.12$, $SD = 2.01$).

Procedure

Potential participants responded to flyers posted in public places (e.g., libraries, grocery

stores, post offices), and handed out at local events; letters sent to an older adult research

participant pool in the authors' university; and advertisements in newsletters or on websites. To

be eligible to participate, people were required to be: (1) an informal caregiver of an adult who

had a chronic illness or disability providing care for a minimum of two hours per week, for two

months or longer, and (2) at least 18 years of age or older. In advertisements, we described

informal caregivers as people who helped an adult friend or family member who was chronically

ill or disabled with one or more IADLs or ADLs and did not receive significant pay for their

help. Participants could complete the survey via internet, mail or telephone. Participants who

completed the survey online used the Qualtrics survey platform. Participants who completed the survey via mail were sent a paper-and-pencil survey with a postage-paid stamped envelope for its return. Participants who completed the survey over the telephone were asked the questions over the phone by a trained research assistant. Most participants completed the survey online (81%), or via mail (16%). Participants first read informed consent documents and indicated their agreement to participate. Next, participants completed questionnaires included in the present study as well as measures beyond the scope of the present research. After completing the survey, participants were mailed $10 to compensate them for their time. All procedures were approved by the Institutional Review Board at the authors' university.

Measures

Caregiver Burden

Caregiver burden was assessed using the role captivity, overload, and relational deprivation subscales of the Caregiver Reactions Scale (O'Malley & Qualls, 2016). Role captivity assesses feelings of being trapped in the caregiving role with 4 items such as "Wish you were free to lead a life of your own". Overload assesses feelings of being overwhelmed or exhausted due to caregiving with 4 items such as "You are exhausted when you go to bed at night". Relational deprivation captures feelings that one has lost important relationships due to caregiving with 7 items such as having lost "being able to confide in your care recipient". Participants rated each item on a scale of 1 (*Not at All*) to 4 (*Completely*). Internal consistency alphas were above .87 across subscales suggesting good reliability. Because the inter-correlations among the subscales were strong (rs $\geq$ .60, ps < .01), we averaged across them to create a caregiver burden composite. Internal consistency across burden items was high (α= .93).

Depressive Symptoms

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Depressive symptoms were assessed using the 20-item Center for Epidemiological Studies-Depression (CES-D; Radloff, 1977). The CES-D has been used with informal caregivers (Pinquart, & Sörensen, 2003). Examples of items are "I felt depressed" and "I was bothered by things that don't usually bother me". Participants rated items on a scale of 0 (*Rarely or None of the Time (Less than 1 day)*) to 3 (*Most of the time (5-7 days)*). Items were summed to create composite scores. A score of 16 or higher indicates risk for clinical depression (Lewinsohn et al., 1997). The internal consistency alpha was .79 suggesting good reliability.

Caregivers' Psychological Need Satisfaction with their Care Recipient

Need satisfaction was assessed using a modified version of the Need Satisfaction Scale (NSS; La Guardia et al., 2000). The NSS measures autonomy (i.e., the degree to which one feel one's actions are volitional), competence (i.e., the degree to which one experiences oneself as effective), and relatedness (i.e., the degree to which one experiences social connection) experienced within specific relationships (La Guardia et al., 2000). The original NSS included 9 items with 3 items assessing each of the three domains. For this study, we modified the NSS to refer to the caregiver's relationship with their care recipient. There were 3 items assessing each subscale. Example items were "When I am with my care recipient I feel free to be who I am" for autonomy; "I feel very capable and effective" for competence; and "I feel loved and cared about" for relatedness. The full measure is provided in supplemental online material.

Participants responded to items using a 7-point scale ranging from 0 (*Not true at* all) to 6 (*Very true*). Internal consistency alphas were adequate (αs= .64, .65, and .70 for autonomy, competence, and relatedness, respectively). Inter-correlations among the subscales were high (*r*s > .50, *p*s < .01), and internal consistency across need satisfaction items was high (α= .84). Thus, we averaged the subscales to create a need satisfaction composite score.

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Healthcare Provider Autonomy Support

Autonomy support from HCPs was assessed using a modified version of the Health Care Climate Questionnaire (HCCQ; Williams & Deci, 2001). The original HCCQ included 15 items and measures how supportive a person who smoke's healthcare provider is of their autonomy for smoking cessation. For the present study, items were modified to refer to how supportive caregivers felt their care recipient's healthcare providers were of their caregiving activities. Example items include "My care recipient's healthcare providers give me choices and options about my caregiving activities". Four items from the original HCCQ were removed because of difficulty adapting them to refer to the caregiving context. A fifth item was removed because it reduced the reliability of the scale "I don't feel very good about the way my care recipient's healthcare providers talk to me". We added two new items for a total of 12 items. Participants responded using a 7-point scale, which ranged from 0 (*Not at all true*) to 6 (*Very true*). The full measure is provided in supplemental online material. The internal consistency alpha was good (α= .94).

Motivations for Caregiving

The extent to which caregivers' motivations for caregiving were autonomous vs. controlled was measured using the Relative Autonomy Index (RAI; Ryan & Deci, 2017) which was calculated from four subscale scores of an adapted version of the Self-Regulation Questionnaires (SRQ; Ryan & Connell, 1989). The SRQ measures different types of motivation for a behavior. The types of motivation assessed in the present study include intrinsic, identified, external, and introjected. We modified SRQ items to assess reasons why the caregiver cares for their care recipient. Participant instructions were "The next questions ask about reasons you provide care for your recipient. Please read each statement then decide how true that statement is

for you. I provide care for my care recipient…". There were 5 items assessing intrinsic motivation (e.g., "because it is satisfying to help others"), 5 items assessing identified motivation (e.g., "because I really value spending time with the person I am caring for"), 8 items assessing external motivation (e.g., "because other family members would get angry at me if I didn't"), and 4 items assessing introjected motivation (e.g., "because I'd feel ashamed of myself if I didn't"). The full measure is provided in supplemental online material. Participants responded to each item on a 7-point scale ranging from 0 (*Not true at all*) to 6 (*Very true*). Scores for each subscale were calculated by averaging across the items. Internal consistency alphas were .85 for intrinsic, .88 for identified, .84 for external, and .81 for introjected motivations. The RAI was calculated using the formula [(-2*External) + (-1*Introjected) + (1*Identified) + (2*Intrinsic)] (Ryan & Deci, 2017).

Demographic and Caregiving Information

We assessed caregivers' age, gender, race and ethnicity, income, and educational achievement. Caregivers entered their age and gender into open fields. We coded gender as 1 (*female*), 0 (*male*); no other gender identities were written in. For race and ethnic identities, participants could select as many categories as applied to them from options listed in Table 1. Each category was treated as a dichotomous variable and coded as 1 if a participant self-identified as a member of that group and 0 if they did not. For income, and educational achievement participants selected from several options that are listed in Table 1.

For caregiving situation, we asked about caregivers' relationship to the care recipient, what their care recipient's diagnosis was (if known); approximate number of hours spent providing care to their recipient each week; approximate length of time they had been providing care; and living situation of the recipient. For all but living situation of the care recipient,

participants wrote in responses to questions and research assistants categorized them. For living situation, caregivers first indicated if their care recipient lived with them. If their care recipient did not live with them, they were asked to indicate their care recipient's living situation by selecting one of options listed in Table 1.

IADL and ADL Dependence

The two subscales of the 15-item Caregiver Assessment and of Function and Upset scale (CAFU; Gitlin et al., 2005) that assessed care recipient functional independence on IADLs and ADLs were used to assess care recipient functional dependence. Eight IADLs (e.g., using the telephone) and 7 ADLs (e.g., restroom use) were assessed. For each activity, participants were asked whether their care recipient needed any type of help during the past week (yes or no). If they responded "no" they were asked if their care recipient needs an assistive device to complete the activity. An answer of "no" to needing an assistive device indicated the care recipient was fully independent on the activity and scored 7 for that item. If the participant responded "yes" to their care recipient needing an assistive device, they scored 6 on the item. Alternatively, if the participant responded "yes" to the first question, that their care recipient needed help on the activity, the participant was then asked to rate the type of help provided on a scale that ranged from 5 (*Only Supervision, directing, setting-up items, or reminding*) to 1 (*Complete Help or activity no longer attempted*). We recoded items so that higher scores indicated greater dependence. Items were then averaged within each subscale to range from 1 (fully independent) to 7 (fully dependent). Internal consistency alphas were .86 for IADLs and.94 for ADLs indicating good reliability.

Data Analyses

For preliminary analyses, we examined whether study variables were adequately normally distributed by examining skewness and kurtosis for each variable. We next conducted tests of collinearity and multi-colinearity for our models. Then we examined associations between demographic and caregiving situation variables and the study variables to determine whether demographic and caregiving situation variables should be retained as covariates in subsequent analyses. For these analyses, types of associations estimated depended on variables' scales of measurement. Pearson correlations were estimated between study variables and continuous variables such as hours spent caregiving; point biserial correlations were estimated between study variables and dichotomous variables such as gender and each race/ethnic identification; and we estimated Spearman correlations between study variables that were ordinal such as educational achievement.

Path analyses were used to test all mediation models using MPlus 6.11 (Muthén & Muthén, 1998-2011) with 1000 bootstrapped samples for bias corrected confidence intervals. Models were estimated using a full information maximum likelihood method, to address issues of missing data and use all available information to estimate models. We examined several goodness-of-fit indices including chi-square statistics, the Root Mean Square Error of Approximation (RMSEA), and the Comparative Fit Index (CFI). We determined model fit to be good if the chi-square value was nonsignificant at $p < .05$, RMSEA $\leq .06$, and CFI $\geq .95$ (see Hooper et al., 2008 for a review).

Models 1 - 4 tested autonomous motivation as the mediator (see Figure 1). Models 5 - 8 tested types of motivation as parallel multiple mediators to see whether each type of motivation uniquely mediated the associations between the predictors and outcomes (see Figure 2).

To test whether there were significant gender differences in mediation models, we performed multiple group analyses. For each model, we first estimated an unconstrained two-group model with the grouping variable as caregiver gender. After determining the unconstrained model was an adequate fit for the data, we next estimated a model with mediation paths (i.e., the paths representing the effects of the independent variable on the mediator, the mediator on the dependent variable, and the independent variable on the dependent variable) constrained to be equal across female and male caregivers. If model constraints significantly reduced model fit compared to the unconstrained model (as indicated by a significant chi-square change test), then we tested specific paths individually to determine which paths differed significantly by gender. Next, we used Wald tests of parameter constraints to test whether indirect effects differed across female and male caregivers in each model. If the Wald test was significant, we tested indirect effects individually to determine which effects differed significantly by gender. We report results of tests of gender differences in Table S1 in supplemental online material. If significant gender differences were found, we reported results and fit indices of the unconstrained multiple-groups model in which caregivers were grouped by gender. When no gender differences were found, we reported results and fit indices of the unconstrained single-group model.

Results

Preliminary and Descriptive Analyses

Skewness for study variables ranged from -1.77, $SE = .19$ for identified motivation to .67, $SE = .19$ for external motivation. Kurtosis ranged from -1.08, $SE = .39$ for autonomy support to 3.77, $SE = .38$ for identified motivation. Thus, variables' skewness and kurtosis were all within acceptable ranges (West et al., 1996).

Multi-collinearity and collinearity statistics indicated that across models, variance inflation factors ranged from 1.11 to 2.44 and tolerance ranged from .41 to .90 which are all within acceptable limits. Collinearity diagnostics for the models that included the RAI as the mediator showed that condition indices for the final dimensions were above 15, and for the models that included types of motivation as mediators, the condition indices for the final two dimensions were above 15; however, examining the variance proportions for those dimensions suggested no problems with collinearity.

Demographic and caregiving situation variables that had significant associations with study variables are shown in Table S2 in supplemental online material. Care recipients' dependence for IADLs was positively associated with depressive symptoms and burden, and was thus retained as a covariate in all models. Caregivers who identified as Hispanic tended to have lower introjected motivation compared to caregivers who did not identify as Hispanic. Caregivers who identified as non-Hispanic/White, tended to have lower need satisfaction, less autonomous motivation, and higher caregiver burden compared to those who did not identify as non-Hispanic/White. Caregivers who identified as Black/African American tended to have higher autonomous motivation, and higher HCPs autonomy support compared to those who did not identify as Black/African American. Because non-Hispanic/White and Black/African American identification were associated with both predictor and outcome variables, they were included as covariates in analyses testing those associations[1].

To conduct post-hoc power analyses, we estimated expected effect sizes using results from previous research (i.e., Halvari et al., 2013; Kindt et al., 2015). For mediation models testing whether autonomous motivation mediated the effect of need satisfaction on caregiver burden (Model 1) and depressive symptoms (Model 2) we estimated expected indirect effect

sizes of .20 and .07 respectively. For mediation models testing whether autonomous motivation

mediated the effect of autonomy support on burden (Model 3) and depressive symptoms (Model

4) we estimated expected indirect effect sizes of .01 and .005 respectively. Using an app to run

Monte Carlo power analyses for indirect effects (Schoemann et al., 2017), we estimated that with

our sample size and a 95% confidence interval, we had high power (1-β = 1.00) to find the

estimated effect in Model 1, low power (1-β = .27) for Model 2, and moderate power for Models

3 and 4 (1-β = .54 and .57 respectively).

Next, we examined means and standard deviations and correlations among the study

variables (see Table 2). Caregivers tended to have high levels of need satisfaction, and autonomy

support. On average, caregivers were above the midpoint on autonomous motivation. Mean

depressive symptoms suggested that caregivers tended to be at risk for clinical depression.

Caregivers had moderate burden. Caregivers' need satisfaction was positively associated with

HCPs autonomy support. Associations among the individual types of motivation ranged from

nonsignificant to positive. One surprising correlation was that external motivation was weakly

positively associated with intrinsic motivation. Examining the items of external motivation

suggested that items reflecting external rewards (i.e., approval of others), were positively

associated with intrinsic motivation and items reflecting avoidance of punishment were not

associated with intrinsic motivation.

Main Analyses

For Model 1, we examined whether need satisfaction was associated with burden through

autonomous motivation (see Figure 1 and Table 3). Tests suggested no evidence of gender

differences (see Table S1 in supplemental online material). Model fit was good (χ^2 [1] = 1.5, p =

.28; RMSEA = .03; CFI = 1.0). Caregivers' need satisfaction was positively associated with

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autonomous motivation. Care recipients' dependence for IADLs was positively associated with burden; and need satisfaction and autonomous motivation were negatively associated with burden. There was a significant indirect effect suggested that the effect of need satisfaction on burden was partially mediated through autonomous motivation.

For Model 2, we examined whether need satisfaction was associated with depressive symptoms through autonomous motivation for caregiving (see Figure 1 and Table 3). Tests indicated no evidence of gender differences in mediation model paths, although the indirect effect differed for male and female caregivers (see Table S1 in supplemental online material). Model fit was good (χ^2 [2] = 1.21, p = .55; RMSEA = .00; CFI = 1.0). Care recipients' dependence for IADLs was positively associated with caregivers' depressive symptoms; and need satisfaction and autonomous motivation were negatively associated with depressive symptoms. There was a significant indirect effect of female caregivers' need satisfaction on depressive symptoms through autonomous motivation.

For Model 3, we examined whether autonomy support from HCPs was negatively associated with burden through autonomous motivation (see Figure 1 and Table 4). Tests indicated no evidence of gender differences (see Table S1 in supplemental online material). Model fit was good (χ^2 [2] = .15, p = .93; RMSEA = .00; CFI = 1.0). Caregivers' autonomy support was positively associated with autonomous motivation. Care recipients' dependence for IADLs was positively associated with burden, and autonomous motivation was negatively associated with burden. There was a significant indirect effect of autonomy support on burden through autonomous motivation.

For Model 4, we examined whether caregivers' autonomy support was negatively associated with depressive symptoms through autonomous motivation (see Figure 1 and Table

4). Tests suggested no gender differences in mediation model paths, although the indirect effects

differed for male and female caregivers (see Table S1 in supplemental online material). Model fit

was good (χ^2 [2] = .60, p = .74; RMSEA = .00; CFI = 1.0). Care recipients' dependence for

IADLs was positively associated with depressive symptoms, and autonomy support and

autonomous motivation were negatively associated with depressive symptoms. There was a

significant indirect effect of female caregivers' autonomy support on depressive symptoms

through autonomous motivation.

In Model 5, we examined whether need satisfaction was associated with burden through

each of the types of motivation (see Figure 2 and Table 5). Tests of gender differences suggested

there was at least one gender difference in the model (see Table S1 in supplemental online

material). Model fit was good (χ^2 [14] = 10.67, p = .71; RMSEA = .00; CFI = 1.0). Female

caregivers' need satisfaction was positively associated with intrinsic and identified motivations

and negatively associated with introjected motivation. Females' need satisfaction and intrinsic

motivation were negatively associated with burden; and identified and external motivations were

positively associated with burden. Male caregivers' need satisfaction was positively associated

with identified motivation. Results suggested that the only significant gender differences were

the association between identified motivation and burden and the indirect effects. For women,

but not men, we found significant specific indirect effects for intrinsic and identified

motivations. This suggests that the female caregivers' need satisfaction was associated with

burden through intrinsic and identified motivations. The indirect effect for female caregivers'

identified motivation was in the opposite direction than would be expected given the zero-order

correlations. To understand this finding, we removed predictors from the model one at a time.

When need satisfaction was removed from the model, the effect of identified motivation on

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burden was nonsignificant. Thus, when need satisfaction was controlled for, the unique

association between identified motivation and burden was positive for female caregivers.

For Model 6, we examined whether need satisfaction was associated with depressive

symptoms through each of the types of motivation (see Figure 2 and Table 6). Tests indicated no

gender differences (see Table S1 in supplemental online material). Model fit was good (χ^2 [8] =

7.19, p = .52; RMSEA = .00; CFI = 1.0). Need satisfaction was positively associated with

intrinsic and identified motivations and negatively associated with external and introjected

motivations. Introjected motivation and dependence for IADSLs were positively associated with

depressive symptoms; and need satisfaction was negatively associated with depressive

symptoms. All indirect effects were nonsignificant.

For Model 7, we examined whether autonomy support from HCPs was associated with

caregiver burden through each of the types of motivation (see Figure 2 and Table 7). Tests

indicated no gender differences (see Table S1 in supplemental online material). Model fit was

good (χ^2 [4] = 4.60, p = .33; RMSEA = .03; CFI = 1.0). Autonomy support was positively

associated with intrinsic and identified motivations. Intrinsic motivation was negatively

associated with burden; and external motivation and care recipient's dependence for IADLs were

positively associated with burden. Only the specific indirect effect of intrinsic motivation was

significant, suggesting that the effect of autonomy support on burden was partially uniquely

mediated by intrinsic motivation.

For Model 8, we examined whether autonomy support was associated with depressive

symptoms through each of the types of motivation (see Figure 2 and Table 7). Tests indicated no

evidence of gender differences (see Table S1 in supplemental online material). Model fit was

good (χ^2 [4] = 4.86, p = .30; RMSEA = .04; CFI = 1.0). External and introjected motivations and

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care recipient's dependence for IADLs were positively associated with depressive symptoms and autonomy support was negatively associated with depressive symptoms. All specific indirect effects were nonsignificant.

Discussion

This research tested an SDT perspective of caregiving. Drawing on SDT, when caregivers' psychological needs are satisfied in their relationships with their care recipient and HCPs, caregivers should be more autonomously motivated to care and, in turn, should have better mental health. We examined the effects of need satisfaction with the care recipient and autonomy support received from HCPs on caregiver burden and depressive symptoms through caregivers' autonomous motivation. Because SDT includes multiple distinct types of motivation that lie on a continuum with regard to their relative autonomy (Howard et al., 2017), we tested autonomous motivation as a composite variable and as types of motivation. Although advocates and researchers have argued that it is important for healthcare providers to effectively engage caregivers (e.g., Glazer & Ali, 2017; Reinhard, & Ryan, 2017), to our knowledge, this is the first study to examine the associations of autonomy support received from HCPs with caregiver burden and depressive symptoms. Additionally, to our knowledge, this is the first study to examine whether caregivers' types of motivation mediate the association between need satisfaction and mental health.

Summary and Interpretation of Findings

Our first hypothesis was that caregivers' need satisfaction with care recipients would be positively associated with autonomous motivation to care and that their autonomous motivation would be negatively associated with burden and depressive symptoms. Our results were consistent with our hypothesis for burden; and although power analyses indicated there was low

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power to find an indirect effect of need satisfaction on depressive symptoms through autonomous motivation, our hypothesis for depressive symptoms was supported for female caregivers. Our results are similar to previous research that examined couples in which one partner had chronic pain (Kindt et al., 2015; Kindt et al., 2016). These studies specified autonomous motivation as the predictor and need satisfaction as the mediator. Taken together, this research suggests a bi-directional relationship between need satisfaction and autonomous motivation for caregiving. Autonomously motivated caregivers tend to be more enthusiastic caregivers (Pierce et al., 2001). Care recipients likely respond to such care more positively, thus increasing caregivers' need satisfaction, in turn, this should further enhance autonomous motivation to care. Indeed, previous research suggests that care recipients express more gratitude and appreciation when their caregivers are more autonomously motivated, and caregivers' perception of care recipient gratitude increases their autonomous motivation to care (Kindt et al., 2017). Our findings are also consistent with previous research showing caregivers' autonomous motivation is positively associated with their mental health (Dombestein et al., 2019).

Our second hypothesis was that caregivers' autonomy support from HCPs would be negatively associated with burden and depressive symptoms through its association with autonomous motivation to care. This hypothesis was supported for burden and for female caregivers' depressive symptoms. Our findings are consistent with research showing that healthcare providers' autonomy support for patients is associated with patients' higher autonomous motivation to engage in better health-related self-care (e.g., Austin et al., 2013; Umeukeje et al., 2016). These findings are in line with the call for healthcare providers to support the role of caregivers in patient care, to include them in healthcare decision-making, and

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to be mindful of their well-being (e.g., Glazer & Ali, 2017; Hudson, 2013; Reinhard, & Ryan, 2017).

We also examined the unique associations of types of motivations in the mediation models. We found some evidence that intrinsic motivation had a specific indirect effect in our models predicting caregiver burden. Specifically, female caregivers' intrinsic motivation mediated the association between need satisfaction with their care recipient and burden; and intrinsic motivation (regardless of caregiver gender) mediated the association between autonomy support from HCPs and burden. One reason intrinsic motivation may be uniquely negatively associated with burden is because caregivers who are intrinsically motivated experience caregiving as more enjoyable, interesting, and satisfying, therefore it makes sense that they would experience lower burden. Adding to the SPMC (Pearlin et al., 1990), this study shows that caregivers' motivations should be taken into account; in particular caregivers who are intrinsically motivated to care are unlikely to perceive caregiving as overwhelming and thus experience lower levels of burden. In contrast, the other types of motivations included are all extrinsic. Extrinsic motivations may have been internalized and integrated by the person through the process of socialization (Ryan & Deci, 2017), but the behaviors may still be experienced as burdensome.

Interestingly, we also found an effect that was in the opposite direction than expected. Female caregivers' need satisfaction was associated with identified motivation, which was unexpectedly associated with higher burden. These findings suggest that for female caregivers, once need satisfaction is accounted for, being motivated to provide care because they believe it is important and valuable is associated with poorer mental health. Additional research is needed to better understand this finding.

In models predicting caregivers' depressive symptoms, none of the types of motivation were unique mediators. Nevertheless, these models were underpowered to test parallel mediators.

We examined whether there were gender differences in our models because some research has found evidence of different associations between motivations to care and mental health for female and male caregivers (Kim et al., 2008; Kim et al., 2015). We found some gender differences. First, in models predicting caregivers' depressive symptoms, mediation by autonomous motivation was only supported for female caregivers. That is, only female caregivers' need satisfaction and autonomy support were indirectly associated with lower depressive symptoms through autonomous motivation. In the model testing the association of need satisfaction on burden through types of motivation, female caregivers' need satisfaction was indirectly associated with less burden through intrinsic motivation. Gender differences are not surprising given the gendered nature of caregiving. Caregiving is more frequently done by women, female caregivers tend to perform more personal caregiving tasks (i.e., bathing; NAC & the AARP PPI, 2015), and experience greater caregiver burden compared to male caregivers (Schrank et al., 2016). Moreover, based on traditional gender roles, women are often expected to take on caregiving roles (Williams et al., 2017). Thus, greater need satisfaction within caregiving contexts and autonomous motivation to provide care may be stronger protective factors against burden for women.

Drawing on SDT, caregivers whose needs are satisfied in social relationships associated with caregiving should develop more autonomous motivation. Need satisfaction should enhance intrinsic motivation and promote internalization and integration of the value of caregiving. We found evidence supporting these theoretical arguments. Specifically, need satisfaction with the care recipient was positively associated with caregivers' autonomous, intrinsic, and identified

motivations, and negatively associated with introjected motivation. Greater autonomy support from HCPs was also positively associated with caregivers' autonomous, intrinsic, and identified motivations.

Our results are also consistent with the SPMC that indicates that caregiving and related outcomes emerge from relationship contexts (Pearlin, 1990). Drawing on this model, caregivers who have better relationships with care recipients and with people in their social networks including HCPs should be less likely to experience burden because they experience caregiving as less overwhelming or unfairly distributed within the relationship with the care recipient.

Despite the fact that our sample was recruited from the community rather than clinical settings, the average level of depressive symptoms indicated that caregivers in this study were at risk of clinical depression. This highlights the distress many caregivers experience and is consistent with research finding that caregivers have a higher prevalence of depression compared to non-caregivers (Cuijpers, 2005; Lee et al., 2015).

Caregiver race/ethnicity was associated with caregiving experiences. Caregivers who identified as Black/African American tended to have higher autonomy support and were more autonomously motivated. Hispanic caregivers tended to have lower introjected motivation, and non-Hispanic/White caregivers tended to have lower need satisfaction, lower autonomous and higher introjected motivations, and higher caregiver burden. These results are consistent with previous research examining associations between ethnic identification and experiences of caregiving (Sörensen & Pinquart, 2005). These differences may reflect different cultural values. For example, familism reflects a cultural value where there is a greater focus on the needs of the family over the needs of the individual and tends to be higher in people who identify as Hispanic or Black/African American (Knight at al., 2010). Some studies suggest people who are higher in

familism tend to experience more personal fulfillment in caregiving and are more likely to have support from other family members in their caregiving journey (Scharlach et al., 2006), although other studies suggest that meanings and effects of familism may differ across cultures (e.g., Youn et al., 1999).

Limitations and Strengths

There were several weaknesses in this study that limit the inferences that can be drawn from findings. First, the study was cross-sectional. Cross-sectional mediation analyses are subject to substantial bias (Maxwell & Cole, 2007). Cross-sectional mediation analyses also limited our ability to determine the direction of effects among the variables in the proposed mediational chain. Future research should examine the hypothesized mediational chains using longitudinal data. Second, most of the mediation models we tested had moderate or low power to find the expected effects. Third, the model comparisons based on gender and ethnicity were limited by the relatively small number of male caregivers and caregivers from various ethnic backgrounds in this study. Fourth, reliance on self-report increases concerns about mono-method bias. Fifth, there were several sources of heterogeneity in the present study. For example, we examined a sample that included caregivers with various types of relationships with care recipients (e.g., spouse, adult child), and care recipients with various diagnoses. Thus, it is possible that these sources of heterogeneity may have influenced some associations. Sixth, our study focused on negative outcomes related to caregiving; however, caregivers also have positive experiences of caregiving that are associated with caregiving motivations (e.g., Kindt et al., 2015). Seventh, although amotivation is a type of motivation that has been located on the SDT continuum with the other types of motivation (Howard et al., 2017), it was not included in the present research.

There were also several strengths of this research. First, we drew our hypotheses from theory. Second, allowing participants to complete the study using their preferred method (e.g., internet, mail) should have made the study more accessible and inclusive. Third, we examined autonomous motivation as a composite and as specific types of motivation. This provides a more nuanced understanding of the associations of caregivers' motivations with need satisfaction, autonomy support, caregiver burden, and depressive symptoms. Finally, to our knowledge this is the first study to examine an SDT perspective of caregivers' relationships with their care recipients' healthcare providers.

Future Directions

Longitudinal research is needed to strengthen evidence for the mediational processes proposed in the present study. Longitudinal research with caregivers can be challenging for several reasons. First, many caregivers already feel overwhelmed by their responsibilities (e.g., Sherwood et al., 2005). Thus, researchers should ensure their research designs do not overly burden caregivers. Second, longitudinal research with caregivers is complicated by the fact that care recipients' disease processes also progress over time. Even with the same disease, disease progression differs markedly across people, and disease progress will likely impact on many aspects of the caregiving experience. Some diseases, such as dementia may alter the care recipient's behavior so as to alter the relationship between the caregiver and care recipient. In such a case, need satisfaction with the care recipient, autonomous motivation, and mental health may suffer. Third, although most research including the present study treats caregiving and care receiving as fixed roles, many care dyads (particularly spouses) provide reciprocal care for one another, or there are often multiple caregivers involved with a single care recipient (Lingler et al., 2008). Fourth, to study longitudinal mediation, it is necessary to determine the optimal time

lag between assessments to observe change processes over time (Cole & Maxwell, 2003). The studies by Kindt and colleagues (2016; 2017) suggests daily change may be a good starting point.

Another potential direction for future research is further integration of a SDT perspective with the SPMC. This study suggests that adding caregivers' motivations to the SPMC is needed. The SPMC indicates that caregiving is embedded within social relationships (Pearlin et al., 1990). SDT suggests that need satisfaction or frustration are important relationship facets to study and that one reason these facets are important for caregiving is because they should increase or decrease autonomous motivation to care.

Future research may also benefit from examining whether meaningful reductions in caregiver burden and depressive symptoms can be achieved through interventions aimed at increasing caregivers' need satisfaction or autonomous motivation. Previous randomized controlled trials testing interventions using trained healthcare providers to provide autonomy support for better health self-care behaviors (e.g., Halvari et al., 2012; Williams et al., 2006) suggest that training providers to be autonomy supportive of caregivers may improve caregivers' autonomous motivation and sustained caregiving. With respect to need satisfaction with care recipients, interventions have yet to be developed and tested.

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Footnotes

[1] We also analyzed whether hours spent caregiving or non-Hispanic/White identification

moderated the mediation models. As shown in Tables S3 – S11 in supplementary online

material, neither variable moderated mediation models.

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Table 1
Sample Demographics and Caregiving Situation

	M	SD	Missing % (n)
Caregiver age	44.9	18.7	4.4% (7)
Hours per week spent caregiving	34.9	43.3	3.2% (5)
Years spent caregiving	5.2	7.5	2.5% (4)
Caregiver Race/Ethnicity	Yes % (n)	No % (n)	Missing % (n)
Non-Hispanic/White	70.8% (112)	25.9% (41)	3.2% (5)
Hispanic	10.1% (16)	86.7 (137)	3.3% (5)
African American/Black	11.4% (18)	84.8% (134)	3.8% (6)
Asian	8.9% (14)	87.34 (138)	3.8% (6)
American Indian/Alaska Native	1.3% (2)	94.8% (150)	3.8% (6)
Native Hawaiian/Pacific Islander	0	96.2% (152)	3.8% (6)
	% (n)		Missing % (n)
Caregiver Gender			
Female	65.2% (103)		15.2% (24)
Male	19.6% (31)		
Caregiver educational achievement			2.6% (4)
Less than high school	0.6% (1)		
Some high school	0.6% (1)		
High school graduate	14.6% (23)		
Some college	35.3% (56)		
College graduate	34.0% (54)		
Post-college degree	12.0% (19)		
Caregiver household income			3.8% (6)
Under $9,000	2.5% (4)		
$9,000 – $11,999	4.4% (7)		
$12,000 - $19,999	9.5% (15)		
$20,000 - $39,999	16.5% (26)		
$40,000 - $59,999	19.6% (31)		
$60,000 – $79,999	14.6% (23)		
$80,000 - $99,999	11.4% (18)		
$100,000 or over	9.5% (15)		
"Prefer not to respond"	8.2% (13)		
Caregivers who live with care recipient	55.1% (87)		3.8% (6)
Care recipients (who do not live with caregiver) live		41.1% (65)	0
…alone in community	10.1% (16)		
…with spouse	8.2% (13)		
…with other family	10.1 (16)		
…independent living	3.2% (5)		
…care facility (assisted living or nursing home)	9.5% (15)		

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	% (n)	Missing % (*n*)
Caregiver is caring for their		0
Parent or parent-in-law	32.9% (52)	
Spouse or intimate partner	22.8% (36)	
Friend	8.2% (13)	
Sibling or sibling-in-law	5.1% (8)	
Adult child or spouse of their adult child	4.4% (7)	
Other adult relative (most were grandparents)	9.5% (15)	
Other adult non-relative (neighbors, ex-spouses, friends)	16.5% (26)	
Care recipient's diagnosis		5.1% (8)
Alzheimer's disease or dementia	29.1% (46)	
Cancer	5.7% (9)	
Stroke or aneurism	5.1% (8)	
Intellectual or developmental disorder	4.4% (7)	
Multiple sclerosis	4.4% (7)	
Arthritis or Osteoporosis	4.4% (7)	
Pain disorder or injury	3.8% (6)	
Mental illness	3.8% (6)	
Parkinson's disease	3.2% (5)	
Diabetes	2.5% (4)	
Organ failure (i.e., heart, kidney, or liver)	2.5% (4)	
Traumatic brain injury	1.3% (2)	
Other autoimmune disease	1.3% (2)	
Para- or Quadriplegia	1.3% (2)	
Cerebral palsy	1.3% (2)	
Chronic obstructive pulmonary disorder	0.6% (1)	
More than one non-dementia related disorder	12.7% (20)	
Unknown to caregiver	7.6% (12)	

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Table 2

Correlations, Possible Ranges, Means and Standard Deviations for All Study Variables

	1	2	3	4	5	6	7	8	9
1. Need Satisfaction		.30***	.60***	.52***	.61***	-.14	-.19*	-.55***	-.44***
2. HCPs Autonomy Support			.30***	.34***	.41***	.06	-.09	-.19*	-.29***
3. Relational Autonomy Index				.65***	.56***	-.48***	-.60***	-.53***	-.44***
4. Intrinsic Motivation					.58***	.29***	-.10	-.41***	-.24**
5. Identified Motivation						.03	.06	-.27**	-.22*/*
6. External Motivation							.42***	.21**	.25**
7. Introjected Motivation								.25**	.31**
8. Caregiver Burden									.62***
9. Depressive Symptoms									
Possible Range	1 - 6	0 - 6	-21 – 21	0 - 7	0 - 7	0 – 7	0 – 7	1 - 4	0 – 60
M	5.27	5.14	4.77	4.21	6.00	2.73	4.23	2.15	17.90
SD	1.16	1.25	4.90	1.60	1.03	1.33	1.60	.72	13.11
N	158	155	158	158	158	158	158	154	153

Note. HCPs Autonomy Support = Autonomy support received from care recipient's healthcare providers. For the measure of depressive symptoms scores of 16 or higher indicates individuals at risk of clinical depression (Lewinsohn et al., 1997).

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

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Table 3

The Effect of Caregivers' Psychological Need Satisfaction with the Care Recipient on Burden and Depressive Symptoms through Autonomous Motivation for Caring

Predictors	Mediator: Autonomous Motivation						Outcome: Caregiver Burden					
					95% CI						95% CI	
	β	b	SE	p	LL	UL	β	b	SE	p	LL	UL
Model 1												
Need Satisfaction	**.60**	2.58	.28	.000	2.04	3.12	**-.33**	-.21	.06	.000	-.32	-.10
Autonomous Motivation							**-.30**	-.04	.01	.002	-.07	-.02
Non-Hispanic/White	-.06	-.70	.77	.36	-2.21	.80	.04	.07	.12	.58	-.17	.31
CR IADLs							**.22**	.09	.03	.003	.03	.16
Indirect effect of Need Satisfaction on Burden through Autonomous Motivation							**-.18**	-.11	.04	.005	-.19	-.03
Model 2							Outcome: Depressive Symptoms					
Need Satisfaction							**-.27**	-3.04	1.13	.007	-5.26	-.82
Autonomous Motivation							**-.27**	-.70	.27	.009	-1.23	-.18
Non-Hispanic/White												
CR IADLs							**.15**	1.20	.54	.03	.14	2.25
Indirect effects of Need Satisfaction on Depressive Symptoms through Autonomous Motivation												
Female caregivers							**-.19**	-2.13	.90	.02	-3.90	-.36
Male caregivers							.04	.19	1.20	.87	-2.16	2.55

Note. CR = Care Recipient's; IADLs = instrumental activities of daily living; CI = Confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized. Model 2 effects of predictors on mediators were the same as Model 1. Significant effects are bolded.

Table 4

The Effect of Autonomy Support from Care Recipients' Healthcare Providers on Burden and Depressive Symptoms through Autonomous Motivation for Caring

| | Mediator: Autonomous Motivation | | | | | | Outcome: Caregiver Burden | | | | | |
| | | | | | 95% CI | | | | | | 95% CI | |
Predictors	β	b	SE	p	LL	UL	β	b	SE	p	LL	UL
Model 3												
Autonomy Support	**.28**	1.12	.35	.001	.44	1.80	-.03	-.02	.05	.71	-.11	.07
Autonomous Motivation							**-.50**	-.07	.01	.000	-.10	-.05
Black/African American	.14	2.00	1.30	.12	-.54	4.54						
CR IADLs							**.26**	.11	.03	.001	.05	.17
Indirect effect of Autonomy Support on Burden through Autonomous Motivation							**-.14**	-.08	.03	.004	-.14	-.03
Model 4							Outcome: Depressive Symptoms					
Autonomy Support							**-.17**	-1.76	.81	.03	-3.35	-.17
Autonomous Motivation							**-.38**	**-.99**	.20	.000	-1.39	-.59
Black/African American												
CR IADLs							**.17**	1.35	.51	.008	.35	2.35
Indirect effect of Autonomy Support on Depressive Symptoms through Autonomous Motivation												
Female caregivers							**-.13**	-1.44	.55	.009	-2.52	-.36
Male caregivers							.002	.02	.64	.97	-1.23	1.27

Note. CR = Care Recipient's; IADLs = instrumental activities of daily living; HCPs = care recipients' healthcare providers; CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized. Model 3 effects of predictors on mediators were the same as Model 4. Significant effects are bolded.

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Table 5
Model 5: The Effect of Caregivers' Need Satisfaction with their Care Recipient on Burden through Types of Motivation

	Female Caregivers						Male Caregivers					
					95% CI						95% CI	
	β	*B*	*SE*	*p*	LL	UL	*β*	*b*	*SE*	*p*	LL	UL
Predictors → Mediators												
Need Satisfaction →Intrinsic	**.58**	.76	.09	.000	.58	.93	.09	.18	.33	.59	-.47	.83
Need Satisfaction →Identified	**.64**	.54	.08	.000	.38	.71	**.44**	.54	.20	.006	.15	.93
Need Satisfaction →External	-.13	-.14	.08	.07	-.29	.01	-.18	-.34	.30	.25	-.93	.24
Need Satisfaction →Introjected	**-.17**	-.23	.11	.03	-.44	-.02	-.08	.06	.65	.93	-.76	.46
Mediators →Outcome												
Intrinsic →Burden	**-.41**	-.18	.06	.001	-.30	-.07	.08	.04	.13	.78	-.22	.29
Identified →Burden	**.33**	.23	.09	.008	.06	.40	-.52	-.36	.25	.15	-.85	.13
External →Burden	**.23**	.13	.05	.01	.03	.23	.28	.13	.13	.33	-.13	.38
Introjected →Burden	-.04	-.02	.04	.63	-.10	.06	.17	.08	.09	.38	-.09	.24
Predictors → Outcome												
Need Satisfaction → Burden	**-.50**	-.30	.06	.000	-.41	-.18	-.07	-.06	.12	.65	-.30	.65
Non-Hisp/W → Burden	-.005	-.01	.15	.95	-.30	.28	.16	.23	.21	.28	-.19	.65
CR IADLs → Burden	**.23**	.10	.03	.001	.05	.16	.10	.04	.06	.53	-.08	.16
Specific Indirect Effects of Need Satisfaction on Burden through Types of Motivation												
Intrinsic	**-.24**	-.14	.05	.003	-.23	-.05	.01	.01	.05	.90	-.09	.10
Identified	**.21**	.12	.05	.02	.02	.23	-.23	-.20	.16	.22	-.51	.12
External	-.03	-.02	.01	.14	-.04	.01	-.05	-.04	.08	.58	-.20	.11
Introjected	.01	.01	.01	.69	-.02	.03	-.01	-.01	.04	.79	-.09	.07

Note. CR = Care Recipient's; IADLs = instrumental activities of daily living; Need Satisfaction= Caregivers' need satisfaction with care recipient; Non-Hisp/W = Caregivers' non-Hispanic/White identification; CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized. Significant effects are bolded.

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Table 6
Model 6: The Effect of Caregivers' Need Satisfaction with their Care Recipient on Depressive Symptoms through Types of Motivation

	β	b	SE	p	95% CI LL	UL
Predictor → Mediators						
Need Satisfaction →Intrinsic	**.51**	.70	.09	.000	.52	.88
Need Satisfaction →Identified	**.61**	.54	.08	.000	.39	.70
Need Satisfaction →External	**-.14**	-.16	.07	.03	-.30	-.02
Need Satisfaction →Introjected	**-.16**	-.22	.10	.03	-.42	-.03
Mediators →Outcome						
Intrinsic →Depressive Symptoms	-.06	-.48	.90	.59	-2.24	1.27
Identified → Depressive Symptoms	-.01	-.10	1.32	.94	-2.68	2.49
External → Depressive Symptoms	.17	1.66	.97	.09	-.23	3.56
Introjected → Depressive Symptoms	**.18**	1.44	.72	.05	.03	2.86
Predictors → Outcome						
Need Satisfaction → Depressive Symptoms	**-.34**	-3.89	1.17	.001	-6.19	-1.60
Non-Hisp/W → Depressive Symptoms	**.15**	1.20	.55	.03	.12	2.28
Specific Indirect Effects of Need Satisfaction on Depressive Symptoms through Types of Motivation						
Intrinsic	-.03	-.34	.63	.59	-1.57	.90
Identified	-.01	-.05	.72	.94	-1.46	1.35
External	-.02	-.26	.21	.20	-.67	.14
Introjected	-.03	-.32	.25	.19	-.80	.16

Note. CR = Care Recipient's; IADLs = instrumental activities of daily living; Need Satisfaction= Caregivers' need satisfaction with care recipient; Non-Hisp/W = Caregivers' non-Hispanic/White identification; CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized. Significant effects are bolded.

Table 7
The Effect of Autonomy Support on Caregiver Burden and Depressive Symptoms through Types of Motivation

Models 7 and 8	β	b	SE	p	LL	UL	β	b	SE	p	LL	UL
					95% CI						95% CI	
Predictor→ Mediators												
Aut Sup→Intrin	**.34**	.43	.10	.00	.24	.63						
Aut Sup→Ident	**.42**	.34	.08	.00	.20	.49						
Aut Sup→Exter	.04	.04	.09	.62	-.12	.21						
Aut Sup→Introj	-.10	-.12	.10	.22	-.32	.07						
			Model 7						Model 8			
		Outcome: Caregiver Burden						Outcome: Depressive Symptoms				
Mediators→Outcome												
Intrin	**-.45**	-.20	.05	.00	-.29	-.11	-.13	-1.07	.90	.23	-2.83	.69
Ident	-.03	-.02	.08	.80	-.18	.14	-.10	-1.25	1.25	.32	-3.70	1.19
Exter	**.34**	.18	.05	.00	.09	.27	**.24**	2.41	.88	.01	.68	4.14
Introj	.06	.03	.04	.48	-.05	.10	**.19**	1.54	.75	.04	.08	3.00
Predictors→Outcome												
Aut Sup	-.04	-.02	.04	.63	-.10	.06	**-.20**	-2.13	.82	.01	-3.74	-.51
CR IADLs	**.24**	.11	.03	.00	.04	.17	**.18**	1.43	.53	.01	.40	2.47
Indirect effects of Types of Motivation on Outcome												
Intrin	**-.15**	-.09	.03	.00	-.14	-.03	-.04	-.46	.41	.25	-1.26	.33
Ident	-.01	-.01	.03	.81	-.06	.05	-.04	-.43	.45	.34	-1.30	.45
Exter	.01	.01	.02	.64	-.02	.04	.01	.11	.23	.64	-34	.55
Introj	-.01	-.00	.01	.61	-.02	.01	-.02	-.19	.20	.32	-.70	.19

Note. Aut Sup = Autonomy support received from care recipient's healthcare providers, Intrin = intrinsic; Ident = identified; Exter = external; Introj = introjected; CR = Care Recipient's; IADLs = instrumental activities of daily living; CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized. Effects of predictors on mediators were the same for Models 7 and 8. Significant effects are bolded.

Supplemental Online Material

Psychological need satisfaction within the caregiving relationship was assessed using a modified version of the Need Satisfaction Scale (NSS; La Guardia, Ryan, Couchman, & Deci, 2000). This modified version is provided below. Participants responded to items using a 7-point response scale, which ranged from 0 (*Not true at* all), 3 (*Somewhat True*), to 6 (*Very true*). Participant instructions were "please read each statement. Then decide how true it is for you. When I am with my care recipient …"

1 …I feel free to be who I am.

2. …I feel like a competent person.

3. …I feel loved and cared about.

4. …I often feel like I cannot do anything right.

5. …I have a say in what happens, and I can voice my opinion.

6. …I often feel a lot of distance in our relationship.

7. …I feel very capable and effective.

8. …I feel a lot of closeness and intimacy.

9. …I feel controlled and pressured to be certain ways.

Items 4, 6, and 9 are reverse-coded. Items 1, 5, and 9 comprise the autonomy subscale, items 2, 4, and 7 comprise the competence subscale, and items 3, 6, and 8 are the relatedness subscale.

Healthcare provider support for caregiver autonomy. Autonomy support from the care recipient's health care provider was assessed using a modified version of the Health Care Climate Questionnaire (HCCQ; Williams & Deci, 2001). Participants responded using a 7-point scale, which ranged from 0 (*Not at all true*), 3 (*Somewhat true*), to 6 (*Very true*). Participant instructions were "The next questions ask about your relationship with your care recipient's healthcare providers. For each statement, please indicate how true each it is for you. My care recipient's health-care providers…"

1. …give me choices and options about my caregiving activities.

2. … understand my point-of-view.

3. … show confidence in my ability to provide care.

4. … encourage me to ask questions.

5. … try to understand how I see my caregiving activities before suggesting I make changes.

6. … make sure I really understand my care recipient's condition and what I need to do.

7. … answer my questions fully and carefully.

8. … listen to me.

9. … care about me as a person.

10. … help me get the guidance and training I need to provide care.

11. … talk to me about my needs and well-being as a caregiver.

12. I trust my care recipient's health-care providers.

Autonomous regulation of Caregiving. The extent to which caregivers' motivations for caregiving were autonomous vs. controlled was measured using the Relative Autonomy Index (RAI, Ryan & Deci) which was calculated from four subscale scores an adapted version of the Self-Regulation Questionnaires (SRQ; Ryan & Connell, 1989). Participants responded to each item on a 7-point scale, which ranged from 1 (*Not true at all*), 4 (*Somewhat True*), to 7 (*Very true*).

Participant instructions were "These questions ask about reasons you provide care for your care recipient. For each statement, please indicate how true each it is for you. I provide care for my care recipient …"

1. Because I deeply care about the person I'm providing care for

2. Because I really value spending time with the person I am caring for

3. Because I think it's important to provide this kind of care for a loved one

4. Because doing this is personally important to me

5. Because providing this care is important and beneficial for my care recipient

6. Because I want others to acknowledge that I am doing this work

7. Because others respect and praise me for doing it

8. Because I want others to see me as a person who provides care for my care recipient

9. So the person I'm caring for will think well of me

10. Because others provide me money or other necessities for doing it

11. Because others would be upset if I didn't do it

12. Because others really want me to do it

13. Because the person I'm caring for would get angry at me if I didn't

14. Because other family members would get angry at me if I didn't

15. Because I'd feel like a bad person if I didn't

16. Because I will feel bad about myself if I don't

17. Because I'd feel ashamed of myself if I didn't

18. Because I am afraid of what will happen to my loved one if I don't

19. Because I simply enjoy providing this kind of care for this person

20. Because I like to provide this kind of care

21. Because it is satisfying to help others

22. Because it is fun and interesting

Items 1 to 5 are identified motivation; 6 to 14 are external motivation; 15 to 18 are introjected motivation; and 19 to 22 are intrinsic motivation.

Table S1
Tests of Gender Differences

		χ^2 (df)	RMSEA	CFI
Model 1	Paths unconstrained	4.36 (2)	.12	.98
	Paths constrained across genders	9.29 (5)	.10	.97
	χ^2 test of model difference	4.93 (3)		
	Wald test of model constraints on indirect effects	.76 (1)		
Model 2	Paths unconstrained	6.06 (4)	.08	.98
	Paths constrained across genders	11.49 (7)	.09	.96
	χ^2 test of model difference	5.44 (3)		
	Wald test of model constraints on indirect effects	3.91* (1)		
Model 3	Paths unconstrained	6.41 (4)	.09	.97
	Paths constrained across genders	11.12 (7)	.09	.94
	χ^2 test of model difference	4.71 (3)		
	Wald test of model constraints on indirect effects	.37 (1)		
Model 4	Paths unconstrained	8.40 (4)	.12	.92
	Paths constrained across genders	15.13 (7)	.12	.86
	χ^2 test of model difference	6.73 (3)		
	Wald test of model constraints on indirect effects	7.32** (1)		
Model 5	Paths unconstrained	10.67 (14)	.00	1.00
	Paths constrained across genders	30.54 (23)	.06	.98
	χ^2 test of model difference	19.87* (9)		
	Paths except the effect of identified motivation on burden constrained	14.59 (8)		
	Wald test of model constraints on indirect effects	16.32** (4)		
	Wald test of model constraints on non-significant indirect effects	.39 (2)		
Model 6	Paths unconstrained	12.66 (16)	.00	1.00
	Paths constrained across genders	28.67 (25)	.04	.99
	χ^2 test of model difference	16.01 (9)		
	Wald test of model constraints on indirect effects	4.15 (4)		
Model 7	Paths unconstrained	8.32 (8)	.02	1.0
	Paths constrained across genders	24.96 (17)	.08	.97
	χ^2 test of model difference	16.64 (9)		
	Wald test of model constraints on indirect effects	7.64 (4)		
Model 8	Paths unconstrained	8.83 (8)	.04	1.0
	Paths constrained across genders	25.31 (17)	.08	.96
	χ^2 test of model difference	16.48 (9)		
	Wald test of model constraints on indirect effects	6.79 (4)		

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

Table S2

Correlations among Demographic and Caregiving Situation Variables and Independent, Dependent, and Mediator Variables

	CR IADLS	CG Gender	CG Hisp	CG W/NH	CG B/AA	Hours Care	CG Ed	Live With	CG Income	CG Age	CR AD
Need Satisfaction	-.09	-.02	.07	-.20*	.16	.02	-.07	-.12	-.06	-.11	-.04
HPCs Autonomy Support	-.01	-.08	-.01	-.13	.26**	-.07	-.03	.09	-.07	.04	.09
Relative Autonomy Index	-.01	.03	.14	-.19*	.20*	.13	-.18*	-.09	-.05	.06	.04
Intrinsic Motivation	-.12	.03	.06	-.16	.17	.06	-.21*	-.06	-.05	-.16	-.13
Identified Motivation	.04	.01	.06	-.09	.17	.09	-.09	.04	-.04	.00	.06
External Motivation	-.10	-.06	-.05	.03	-.02	-.01	.04	.02	-.03	-.20*	-.20*
Introjected Motivation	.02	.01	-.18*	.18*	-.17	.06	.08	.17*	.05	-.10	.01
Caregiver Burden	.26**	.07	-.08	.21*	-.16	-.03	.14	.15	.02	.18*	.04
Depressive Symptoms	.18*	.09	.01	.12	.00	.04	.04	.09	-.17**	-.06	-.05

Note. Only variables with significant correlations are shown; CR = Care Recipient's; CG = Caregiver's; IADLs = functional dependence for instrumental activities of daily living; Hisp = Hispanic; W/NH = White, non-Hispanic; B/AA = Black or African American; caregivers could indicate multiple race/ethnicity identities each category was coded as 1 = yes if caregiver identified as that identity and 0 = no if caregiver did not. Hours Care = number of hours the caregiver provides care for the care receiver per week; Ed = education, Live with = whether the caregiver lives with the care recipient (1 = yes, 0 = no). AD = Care recipient's diagnosis was Alzheimer's disease or dementia (1 = yes, 0 = no). HCPs Autonomy Support = Autonomy support received from care recipient's healthcare providers; gender was coded 1 = female, 0 = male. Pearson correlations were estimated between study variables and hours of care and age. Point biserial correlations were estimated between study variables and gender, each race/ethnic identification, whether the caregiver lives with the care recipient, and whether the care recipient's diagnosis was Alzheimer's disease or dementia. Spearman correlations were estimated between study variables and income, and educational achievement.

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

Table S3

Tests of Differences based on Caregivers' Non-Hispanic/White Identification

		χ^2 (df)	RMSEA	CFI
Model 1	Paths unconstrained	1.20 (2)	.00	1.0
	Paths constrained across groups	4.65 (5)	.00	1.0
	χ^2 test of model difference	3.45 (3)		
	Wald test of model constraints on indirect effects	2.41 (1)		
Model 2	Paths unconstrained	1.15 (2)	.00	1.0
	Paths constrained across groups	3.54 (5)	.00	1.0
	χ^2 test of model difference	2.39 (3)		
	Wald test of model constraints on indirect effects	1.83 (1)		
Model 3	Paths unconstrained	.14 (2)	.00	1.0
	Paths constrained across genders	1.70 (5)	.00	1.0
	χ^2 test of model difference	1.56 (3)		
	Wald test of model constraints on indirect effects	.60 (1)		
Model 4	Paths unconstrained	.12 (2)	.00	1.0
	Paths constrained across groups	1.46 (5)	.00	1.0
	χ^2 test of model difference	1.34 (3)		
	Wald test of model constraints on indirect effects	.83 (1)		
Model 5	Paths unconstrained	9.99 (8)	.06	.99
	Paths constrained across groups	17.09 (17)	.01	1.0
	χ^2 test of model difference	7.10 (9)		
	Wald test of model constraints on indirect effects	3.46 (4)		
Model 6	Paths unconstrained	10.04 (8)	.00	1.00
	Paths constrained across groups	14.51 (17)	.00	1.0
	χ^2 test of model difference	4.47 (9)		
	Wald test of model constraints on indirect effects	1.24 (4)		
Model 7	Paths unconstrained	7.93 (8)	.00	1.0
	Paths constrained across groups	13.64 (17)	.00	1.0
	χ^2 test of model difference	5.71 (9)		
	Wald test of model constraints on indirect effects	1.47 (4)		
Model 8	Paths unconstrained	8.06 (8)	.01	1.0
	Paths constrained across groups	12.81 (17)	.00	1.0
	χ^2 test of model difference	4.75 (9)		
	Wald test of model constraints on indirect effects	.46 (4)		

Table S4

Testing Moderated Mediation of the A Path in Models 1 and 2 by Number of Hours Spent Caregiving

Model 1	Mediator: Autonomous Motivation				Outcome: Caregiver Burden			
Predictors	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Hours	.02	.42	-.06	.10				
Need Satisfaction	2.61***	.37	1.87	3.35	-.23***	.05	-.34	-.13
Hours X Need Satisfaction	-.003	.008	-.02	.01				
Autonomous Motivation					-.04**	.01	-.07	-.02
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Need Satisfaction					.0001	.0003	-.0006	.0008
Model 2					Outcome: Depressive Symptoms			
Hours								
Need Satisfaction					-3.03**	1.03	-5.06	-1.00
Hours X Need Satisfaction								
Autonomous Motivation					-.74**	.24	-1.23	-.27
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Need Satisfaction					.002	.006	-.01	.01

Note. A Path = Association between the independent and mediator variables in a mediation model; Hours = Number of hours spent caregiving, Need Satisfaction = psychological need satisfaction with care recipient, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.
*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S5

Testing Moderated Mediation of the B Path in Models 1 and 2 by Number of Hours Spent Caregiving

Model 1	Mediator: Autonomous Motivation				Outcome: Caregiver Burden			
Predictors	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Hours					.003	.002	-.0005	.006
Need Satisfaction	2.50***	.28	1.94	3.06	-.23***	.05	-.33	-.12
Hours X Auto Motivation					-.0003	.0003	-.0008	.0003
Auto Motivation					-.04*	.02	-.07	-.005
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Auto Motivation					-.0007	.0008	-.002	.0008
Model 2					Outcome: Depressive Symptoms			
Hours					.03	.03	-.04	.10
Need Satisfaction					-2.96***	1.04	-5.01	-.91
Hours X Auto Motivation					-.003	.005	-.01	.007
Auto Motivation					-.68*	.30	-1.27	-.09
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Auto Motivation					-.007	.01	-.03	.01

Note. B Path = Association between the mediator and outcome variables in a mediation model; Hours = Number of hours spent caregiving, Need Satisfaction = psychological need satisfaction with care recipient, Auto Motivation = Autonomous Motivation; CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.
*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S6

Testing Moderated Mediation of the A Path in Models 3 and 4 by Number of Hours Spent Caregiving

Model 3		Mediator: Autonomous Motivation				Outcome: Caregiver Burden		
Predictors	*b*	*SE*	*LL*	*UL*	*B*	*SE*	*LL*	*UL*
Hours	.03	.04	-.05	.11				
Autonomy Support	1.39**	.42	.55	2.22	-.03	.05	-.12	.06
Hours X Autonomy Support	-.006	.01	-.02	.009				
Autonomous Motivation					-.07*	.01	-.10	-.05
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Autonomy Support					.0005	.0006	-.0005	.002
Model 4						Outcome: Depressive Symptoms		
Hours								
Autonomy Support					-1.73*	.83	-3.37	-.09
Hours X Autonomy Support								
Autonomous Motivation					-1.06****	.21	-1.48	-.64
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Autonomy Support					.007	.009	-.007	.03

Note. A Path = Association between the independent and mediator variables in a mediation model; Hours = Number of hours spent caregiving, Autonomy Support = autonomy support from care recipients' healthcare providers, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.

$*p < .05. ** p < .01. *** p < .001. **** p < .0001.$

Table S7

Testing Moderated Mediation of the B Path in Models 3 and 4 by Number of Hours Spent Caregiving

Model 3		Mediator: Autonomous Motivation				Outcome: Caregiver Burden		
Predictors	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Hours					.003	.002	.003	.002
Autonomy Support	1.15***	.32	.52	1.78	-.04	.05	-.13	.05
Hours X Autonomous Motivation					-.0002	.0003	-.0008	.0004
Autonomous Motivation					-.07****	.01	-.10	-.04
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Autonomous Motivation					-.0003	.0004	-.001	.0005

Model 4						Outcome: Depressive Symptoms		
Hours					.04	.04	-.03	.11
Autonomy Support					-1.84*	.83	-3.49	-.19
Hours X Autonomous Motivation					-.003	.006	-.01	.008
Autonomous Motivation					-.96***	.28	-1.51	-.41
Index of Moderated Mediation								
					Index	Boot SE	Boot LL	Boot UL
Hours X Autonomous Motivation					-.003	.005	-.01	.007

Note. B Path = Association between the mediator and outcome variables in a mediation model; Hours = Number of hours spent caregiving, Autonomy Support = autonomy support from care recipients' healthcare providers, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.
*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S8

Testing Moderated Mediation of the A Path in Models 5 and 6 by Number of Hours Spent Caregiving

A Path Models 5 and 6 — Mediators

Predictors	Intrinsic Motivation				Identified Motivation				External Motivation				Introjected motivation			
	b	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Hours	-.003	.01	-.03	.02	.005	.009	-.01	.02	-.01	.01	-.04	.02	-.004	.02	-.04	.03
Need Sat	.70****	.13	.45	.95	.57****	.08	.42	.72	-.20	.12	-.45	.04	-.25	.15	-.55	.04
Hours X Need Sat	.001	.003	-.004	.01	-.001	.002	-.004	.003	.002	.003	-.004	.01	.001	.003	-.01	.01

B Paths

	Model 5				Model 6			
	Outcome: Caregiver Burden				Outcome: Depressive Symptoms			
	b	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Need Sat	-.28****	.06	-.40	-.17	-3.99***	1.13	-6.22	-1.75
Intrinsic	-.15**	.05	-.25	-.06	-.72	.91	-2.51	1.07
Identified	.14*	.07	.001	.27	.28	1.35	-2.38	2.95
External	.12*	.05	.03	.22	1.58	.89	-.19	3.35
Introjected	.01	.04	-.06	.09	1.45*	.71	.04	2.87

Index of Moderated Mediation

	Index	Boot SE	Boot LL	Boot UL	Index	Boot SE	Boot LL	Boot UL
Intrinsic	-.0001	.001	-.001	.001	-.001	.004	-.01	.005
Identified	-.0001	.000	-.001	.001	-.0002	.004	-.01	.005
External	.0002	.000	-.000	.001	.002	.005	-.01	.01
Introjected	.0000	.000	-.000	.000	.001	.005	-.01	.01

Note. A Path = Association between the independent and mediator variables in a mediation model; B Path = Association between the mediator and outcome variables in a mediation model; Hours = number of hours spent caregiving, Need Sat = need satisfaction with the care recipient, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.

*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S9

Testing Moderated Mediation of the B Path in Models 5 and 6 by Number of Hours Spent Caregiving

A Path Models 5 and 6

	Mediators															
	Intrinsic Motivation				Identified Motivation				External Motivation				Introjected motivation			
Predictors	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Need Sat	.73****	.09	.54	.91	.55****	.06	.43	.67	-.15	.09	-.33	.04	-.20	.11	-.43	.02

B Paths

	Model 5					Model 6			
	Outcome: Caregiver Burden					Outcome: Depressive Symptoms			
	b	*SE*	*LL*	*UL*		*b*	*SE*	*LL*	*UL*
Need Sat	-.28****	.06	-.40	-.16		-3.97**	1.16	-6.26	-1.68
Intrinsic	-.14*	.06	-.27	-.02		-.97	1.22	-3.38	1.44
Identified	.17	.09	-.01	.35		1.07	1.79	-2.46	4.61
External	.18**	.06	.05	.30		1.97	1.18	-.36	4.31
Introjected	-.02	.05	-.12	.08		1.08	.98	-.86	3.01
Hours	.007	.01	-.01	.02		.10	.16	-.22	.41
Hours X Intrinsic	-.001	.00	-.003	.002		.005	.02	-.04	.05
Hours X Identified	-.0004	.00	-.004	.003		-.02	.03	-.09	.05
Hours X External	-.001	.00	-.003	.001		-.004	.02	-.04	.04
Hours X Introjected	.001	.00	-.001	.002		.007	.01	-.02	.04

Index of Moderated Mediation

	Index	Boot SE	Boot LL	Boot UL		Index	Boot SE	Boot LL	Boot UL
Intrinsic	-.0004	.00	-.004	.002		.003	.01	-.03	.03
Identified	-.0002	.00	-.004	.003		-.01	.02	-.06	.02
External	.0001	.00	-.000	.001		.0006	.004	-.007	.008
Introjected	-.0001	.00	-.001	.0005		-.002	.004	-.007	.01

Note. A Path = Association between the independent and mediator variables in a mediation model; B Path = Association between the mediator and outcome variables in a mediation model; Hours = number of hours spent caregiving, Need Sat = need satisfaction with the care recipient, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.

*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S10

Testing Moderated Mediation of the A Path in Models 7 and 8 by Number of Hours Spent Caregiving

A Path Models 7 and 8 — Mediators

Predictors	Intrinsic Motivation				Identified Motivation				External Motivation				Introjected motivation			
	b	*SE*	*LL*	*UL*	*B*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Hours	-.001	.01	-.03	.03	-.01	.01	-.03	.007	-.02	.01	-.05	.003	.001	.01	-.03	.03
Aut Support	.50***	.13	.24	.76	.29**	.08	.12	.45	-.03	.12	-.26	.21	-.07	.14	-.36	.21
Hours X Aut Support	-.000	.002	-.005	.004	.001	.002	-.002	.004	.004	.002	-.001	.01	-.000	.003	-.01	.01

B Paths

	Model 7				Model 8			
	Outcome: Caregiver Burden				Outcome: Depressive Symptoms			
Aut Support	-.03	.05	-.12	.07	-2.15*	.89	-3.90	-.40
Intrinsic	-.22****	.05	-.32	-.12	-1.53	.91	-3.34	.28
Identified	.01	.07	-.14	.16	-.66	1.36	-3.35	2.02
External	.18**	.05	.08	.29	2.54*	.90	.76	4.33
Introjected	.02	.04	-.06	.10	1.43	.75	-.04	2.91

Index of Moderated Mediation

	Index	Boot SE	Boot LL	Boot UL	Index	Boot SE	Boot LL	Boot UL
Intrinsic	.0000	.0005	-.001	.001	.001	.004	-.006	.01
Identified	.0000	.0002	-.001	.000	-.001	.003	-.01	.003
External	.0007	.0004	.000	.002	.01	.007	-.002	.02
Introjected	.0000	.0001	-.000	.000	-.000	.005	-.01	.01

Note. A Path = Association between the independent and mediator variables in a mediation model; B Path = Association between the mediator and outcome variables in a mediation model; Hours = number of hours spent caregiving, Aut Support = autonomy support from care recipients' healthcare providers, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.

*p <.05. ** p < .01. *** p < .001. **** p < .0001.

Table S11

Testing Moderated Mediation of the B Path in Models 7 and 8 by Number of Hours Spent Caregiving

A Path Models 7 and 8 — Mediators

Predictors	Intrinsic Motivation				Identified Motivation				External Motivation				Introjected motivation			
	b	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*	*b*	*SE*	*LL*	*UL*
Aut Support	.47****	.10	.27	.66	.33****	.06	.20	.45	.08	.09	-.10	.26	-.05	.11	-.27	.16

B Paths

	Model 7				Model 8			
	Outcome: Caregiver Burden				Outcome: Depressive Symptoms			
Aut Support	-.04	.05	-.13	.06	-2.26*	.91	-4.07	-.46
Intrinsic	-.21**	.07	-.34	-.07	-1.55	1.28	-4.09	.99
Identified	.04	.10	-.15	.24	-.05	1.84	-3.69	3.59
External	.23***	.07	.10	.36	2.72*	1.21	.32	5.11
Introjected	-.01	.06	-.13	.10	1.16	1.02	-.87	3.18
Hours	.006	.01	-.01	.02	.09	.17	-.24	.42
Hours X Intrinsic	-.0007	.001	-.003	.002	-.0007	.02	-.05	.05
Hours X Identified	-.0001	.002	-.004	.004	-.01	.04	-.08	.06
Hours X External	-.0008	.001	-.003	.001	.0008	.02	-.04	.04
Hours X Introjected	.0005	.0008	-.001	.002	.005	.01	-.02	.03

Index of Moderated Mediation

	Index	Boot SE	Boot LL	Boot UL	Index	Boot SE	Boot LL	Boot UL
Intrinsic	-.0003	.001	-.003	.002	-.0003	.01	-.03	.02
Identified	.000	.001	-.003	.002	-.005	.01	-.04	.02
External	-.0001	.0002	-.0005	.0002	.0001	.003	-.005	.007
Introjected	.000	.0001	-.0003	.0002	-.0004	.002	-.004	.005

Note. A Path = Association between the independent and mediator variables in a mediation model; B Path = Association between the mediator and outcome variables in a mediation model; Hours = number of hours spent caregiving, Aut Support = autonomy support from care recipients' healthcare providers, CI = confidence interval, LL = lower limit, UL = upper limit; values shown for UL and LL of confidence intervals for paths are unstandardized; Boot = bootstrapped. For both the model predicting burden and the model predicting depressive symptoms, effects of predictors on mediators were the same. These analyses were conducted using the Process Macro by Hayes, 2018.

*p <.05. ** p < .