Daily Caregiving Appraisals, Future Self-Views, and Physical Activity Goals Among Adult-Daughter Dementia Caregivers

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Abstract

Objectives: Caregiving dynamics may shape caregivers' views on their own aging in ways that affect their (de)motivation to improve their current and future health and well-being. In this study, we investigated within-person associations of daily positive and negative caregiving appraisals, future self-views (physical functioning, cognitive, and overall health domains), and physical activity goal pursuit among adult daughter dementia caregivers.

Method: Data came from 33 middle-aged caregivers (M = 55.03) who participated in a 30-day microlongitudinal study of caregiving (*N* of occasions = 855). We used multilevel modeling to analyze within-person associations.

Results: Daily positive caregiving appraisals were not associated with daily future self-views. However, on days when caregivers reported higher negative caregiving appraisals, they thought more negatively about their future older selves in all domains. On days when caregivers thought more negatively about their future older selves in all domains, they reported lower physical activity goal pursuit. Future self-views in all three domains mediated the association between negative caregiving appraisals and physical activity goal pursuit. Future self-views did not mediate the association between positive caregiving appraisals. However, cognitive future self-views moderated the association between positive caregiving appraisals and physical activity goal pursuit.

Discussion: Results suggest that one pathway through which subjective caregiving experiences, especially negative caregiving appraisals, impact caregivers' physical activity goal pursuit is through future self-views. Thus, this study offers a deeper theoretical understanding of caregivers' self-regulatory health behavior and new empirical information on how caregiving might impact lifespan developmental motivation.

Keywords: subjective age, family relationships, motivation, microlongitudinal, midlife

Introduction

Caregiving for older parents is now considered a "defining feature" of midlife (Infurna et al., 2020, p.474). Millions of middle-aged adults, especially women, navigate age-related changes while providing high-intensity care for older parents. Because midlife is a "pivotal period" in shaping later life health and well-being, it is imperative to understand how caregiving plays a role in that process (Infurna et al., 2020, p. 473; Lachman et al., 2015, p. 1). Inadequate physical activity, extended over a long period, could impact caregivers' health in the near and long term. In this study, we explore how caregiving dynamics for middle-aged adult daughters providing dementia care to a parent are associated with their health motivation. Specifically, we examine how caregivers view their future older selves on a day-to-day basis, and the extent to which those views are associated with daily physical activity goal pursuit.

Caregiving and Women's Physical Health

Demographers suggest that there are anywhere from 20 million to 40 million caregivers to older adults in the United States (Freedman & Wolff, 2020), with an estimated 11 million providing care to an older adult with Alzheimer's disease or a related dementia, or "ADRD" (Alzheimer's Association, 2022). Middle-aged women typically become responsible for dementia family care; nearly 60% of caregivers to older adults with dementia are middle-aged adult daughters (Moon & Dilworth-Anderson, 2015). The care they provide is both intensive and enduring. Dementia caregivers spend an average of three hours each day providing care, with over 30 minutes spent on physical and medical care needs (Freedman et al., 2022). When care is more intensive, women carry more of the responsibility; of dementia caregivers who spend 40 hours per week providing care, 73% are women (Alzheimer's Association, 2022). Moreover, nearly 10% of women's adult lives—6.1 years—is spent caring for an older relative (Schulz & Eden, 2016). Ultimately, the high intensity care provided each day may be a barrier to health promotive behaviors like physical activity.

Research conducted on all types of family caregivers to older adults suggests that they perceive challenges to maintaining their health. For example, in a 2017 poll, 66% of caregivers reported that caregiving interfered with their ability to take care of themselves, and 27% felt they delayed or neglected taking care of their health (Solway et al., 2017). More recently, the Alzheimer's Association (2022) reported that 74% of caregivers were *somewhat concerned* or *very concerned* about maintaining their health. With respect to physical activity, caregivers have noted difficulties completing strength and aerobic activities (Farran et al., 2016). Moreover, although there are no known estimates of physical activity among adult daughter caregivers specifically, only half of all middle-aged women in the U.S. meet physical activity recommendations (National Center for Health Statistics, 2019).

Middle-aged daughters who provide care to a parent with dementia face unique challenges that seem likely interfere with health promotive behavior. For example, the Alzheimer's Association (2022) estimates that 60% of dementia caregivers are employed outside the home and 25% are caring for at least one child at home. Middle-aged adults who are caring for parents and children simultaneously report feeling time-starved, and they relinquish their own plans because of their unpredictable schedules (Igarashi et al., 2013). Thus, adult daughter caregivers may be particularly prone to disruptions in physical activity. Understanding whether or how they engage in physical activity is vital to promoting their longer-term health.

Notably, Sörensen et al.'s (2006) model of caregiver stress and burden outlines subjective caregiving dynamics, such as the extent to which the caregiver is positively and negatively appraising the caregiving experience, as an influencer of caregiver physical health behaviors and longer-term physical health outcomes. However, to our knowledge, there are no existing studies that analyzed how positive and negative caregiving appraisals impact caregivers' physical activity. In this study, we analyzed the connections between caregivers' subjective positive and negative caregiving appraisals and their physical activity goal pursuit, and we asked whether the connections were mediated and moderated by their future self-views.

Lifespan Developmental Motivation & Future Self-Views

Motivation is a central construct of theories of lifespan development (Baltes, 1997) and has long

been connected to health maintenance and to coping with and adjusting to health-related losses (e.g.,

Wrosch & Schulz, 2008). Intentional goal pursuit is also viewed as tool for healthy aging and

incorporated into health-related interventions and programs as a health promotion strategy (Robinson et

al., 2019). Motivation and goal pursuit interact with environmental and contextual factors (Freund et al.,

2021; Heckhausen et al., 2019) and vary from day-to-day (Hoppman et al., 2015). Knowing how

caregiving affects motivation and goal pursuit related to daily physical activity can both deepen

knowledge about how family caregiving shapes lifespan development and inform applications to

caregivers' self-management of their health, such as health behavior interventions.

A major component of health behavior motivation, especially in midlife, is how people view their

own aging. Two decades of literature has connected self-perceptions of aging to health outcomes. In a

now landmark study, Levy et al. (2002) found that, among adults aged 50 years and older, those who had

more positive self-perceptions of aging (measured up to 23 years earlier) lived seven-and-a-half years

longer than those with less positive self-perceptions of aging. Later theoretical work proposed health

behavior as a key mechanism through which self-perceptions of aging are associated with health

outcomes (Levy & Myers, 2004; Wurm et al., 2017). For example, Wurm and colleagues' (2017) model

of views of aging and lifespan developmental regulation points to self-perceptions of aging as having an

influence on developmental regulation and personality, which in turn shape health-related outcomes.

Indeed, those with more positive views of aging engage in healthier behavior, such as physical activity

(Hooker et al., 2019) and healthier eating (Klusmann et al., 2019).

Importantly, in addition to having direct relationships with health behavior, researchers have

identified self-perceptions of aging as both a mediator and moderator of the relationships between various

psychosocial constructs and health behaviors. For example, Hooker and colleagues (2019) found that self-

perceptions of aging mediated the longitudinal association between experiencing age discrimination and

engaging in physical activity. Additionally, Wurm and colleagues (2013) found that the extent to which participants engaged in self-regulatory compensation strategies after a serious health event depended on (i.e., was moderated by) their self-perceptions of aging. These studies further reinforce self-perceptions of aging as salient and dynamic contributor to health behavior, and they raise the possibility that self-perceptions of aging may be a mechanism connecting caregiving dynamics to caregivers' health behavior.

As the scholarship on self-perceptions of aging has evolved—and as the linkages between self-perceptions of aging and health behavior motivation have become clearer—researchers have turned attention to its linkages to future possible selves as well (e.g., Turner & Hooker, 2022). Historically, self-perceptions of aging have been measured by asking respondents to appraise their current aging self (e.g., asking participants how much they agree with statements such as "things keep getting worse as I get older"). Newer measures, such as Kornadt and colleagues' (2020) Domain-Specific Brief Scale of Future Self-Views, asks respondents to appraise their future older selves across several life domains. The scale includes three health-related questions, asking respondents to appraise their future physical functioning, cognition, and overall health (e.g., "When I am older, I will be able to stay physically fit by being active."). Researchers using Kornadt et al.'s (2020) scale have found that more positive future self-views are associated with more preparation for age-related change (Park et al., 2020). Findings such as these reinforce self-perceptions of aging as interconnected with views of one's future self and with the motivation to achieve a self that is hoped for or avoid a self that is feared. As such, future-oriented approaches to theorizing and measuring views of aging are a gateway to a clearer representation of mechanisms that connect views of aging to health behavior.

Dementia Caregivers' Future Self-Views. Middle-aged caregivers may be especially prone to thinking about their future older selves relative to non-caregivers and caregivers in other age groups, making future self-views a particularly salient construct in their motivation. Middle adulthood, especially late middle adulthood, is a time when people contemplate their future older selves (Hooker, 1992, 1999). Moreover, adult children would seem especially likely to contemplate their possible course of aging in

relation to what they see in their parents. The nature of intergenerational interactions is thought to shape views of aging too, with subjectively-appraised positive interactions resulting in positive views of aging and subjectively-appraised negative interactions resulting in negative views of aging. The nature of contact with an older adult more generally can affect the attitudes younger people have towards older people (Cadieux et al., 2018) and their perceptions of themselves as older adults in the future (Jarrott & Savla, 2016).

Caregiving scholars have long approached caregiving as a personal role simultaneously comprised of both positive and negative subjective appraisals that shape caregiver identity and overall sense of self (e.g., Eifert et al., 2015; Skaff & Pearlin, 1992). This scholarship, however, has focused on caregivers' *current* sense of self and, specifically, the extent to which they identify as a caregiver. Limited scholarship has examined how caregiving affects views of aging, and, to our knowledge, none has examined how it affects perceptions of future older selves. Yet, 91% of dementia caregivers report that being a caregiver has prompted them to think about their future care needs (Solway et al., 2017). Igarashi and colleagues' (2013) interviews with middle-aged caregivers revealed that caregiving often prompted caregivers to anticipate and plan for their future care needs; some described purchasing long-term care insurance, de-cluttering their homes, and exploring long-term care housing. One caregiver stated, "We learn from [our parents] to maybe not be like them" (Igarashi et al., 2013; p. 108).

Children of parents with dementia may be acutely aware of genetic predispositions in cognitive degeneration that may render them like their parent in the future. García-Toro et al. (2020) interviewed 27 caregivers to family members with early onset dementia who themselves were possible carriers of the E280A mutation for Early-onset Alzheimer's Disease. In the study, one caregiver described learning that they were a possible carrier as feeling as though dementia had "touched [them] in the flesh" (p. 1477), and one way that caregivers coped with the possibility of inheriting the mutation themselves was to be highly planful, even to the point of "over-intellectualization in attempts to stay one step ahead" (p. 1483). Understanding how daily caregiving dynamics shape these future self-views, and how future self-views

impact caregivers' physical activity goal pursuit not only directly but also indirectly and via their interaction with daily caregiving dynamics, can offer insight into lifespan motivational mechanisms that shape caregivers' longer-term development.

The Present Study

Ultimately, caregiving dynamics may shape caregivers' thoughts about their aging in ways that affect their motivation to improve their current and future health and well-being. That is, the ways in which caregiving dynamics are associated with caregivers' health behavior may be dependent on (i.e., moderated by) – or otherwise explained by (i.e., mediated) – future self-views. Notably, existing literature suggests that caregiving dynamics, motivation and goal pursuit, and health behavior, fluctuate on a daily basis. In this study, we therefore analyzed within-person associations between positive and negative caregiving appraisals, future self-views, and physical activity goal pursuit. Because future self-views are likely to be domain-specific, we analyzed future self-views in three health-related domains: physical health, cognitive health, and overall health. Using a within-person approach, we asked three questions:

(1) How are daily positive and negative caregiving appraisals associated with daily future self-views?

(2) How are daily future self-views associated with daily physical activity goal pursuit?

(3) Do daily future self-views moderate or mediate the associations between daily positive and negative caregiving appraisals and daily physical activity health goal pursuit?

Method

Study Procedure and Participants

Data came from the *ACHIEVE (Assessing Caregiver Health In Everyday Contexts) Study*, a 30-day microlongitudinal study on dementia caregivers' health behavior motivation for physical activity (Turner et al., 2022; Turner, 2021-2022). The ACHIEVE Study focused on the impact of caregiving on middle-aged daughters specifically. To participate, caregivers had to (a) self-identify as women, (b) be between the ages of 40 and 64, (c) consider themselves to be the primary caregivers of a parent or parent-in-law with ADRD, and (d) provide at least 20 hours of care per week.

The ACHIEVE Study followed Kreft's (1996) "30/30 rule," which suggests that a sample size of 30 participants with 30 days of data per participant offers sufficient statistical power to measure the fixed effects of a two-level multilevel model. As such, we aimed to have at least 30 days of data nested within at least 30 caregivers. The convenience sample was generated through outreach to community organizations, advertisements in social media, and existing research registries. Data were collected between March 2021 and May 2022. The study was approved by Oregon State University's Institutional Review Board (IRB-2020-0638). Given the month-long participation, caregivers received up to $200 for participating.

At the start of the ACHIEVE Study, caregivers completed a baseline survey where they identified and described a personally meaningful physical activity goal on which they would work for the next 30 consecutive days. Then, for each of those 30 days, they rated their pursuit towards their goal that day, and provided their positive and negative caregiving appraisals and views of their future overall health, physical functioning, and cognition as older adults.

Thirty-three caregivers participated in the study for a total of 855 days. The average number of missing days was four (*SD* = 5.78); nine caregivers completed all 30 days of data. Caregivers ranged in

age from 46 to 64, with a mean age of 55.03 (*SD* = 4.45). Twenty-five of the caregivers were White; three were Black, and five were Asian American. One caregiver identified as Hispanic, specifically Mexican, Mexican-American, or Chicano; that caregiver also identified as White. Caregivers came from 11 states, with the majority coming from Oregon, California, Florida, and New York. Seventeen caregivers were currently married or partnered. Ten were currently single (divorced or widowed), and six were currently single (never married/partnered). Twenty-three were employed at least part-time. Daily data revealed that caregivers worked in paid employment on 418 days. On days worked, the average was 6.61 hours (Range = 0.07 – 21 hours, *SD* = 3.26 hours). Only two caregivers shared that they had a child under the age of 18 living in their home. However, daily data revealed that 11 caregivers spent time caring for a child on at least one of the study days (for a total of 149 days); those caregivers cared for a child for an average of 2.45 hours per day, on average (Range = 0.02 - 17.85 hours, *SD* = 2.33 hours).

Measures

Physical Activity Goal

In the initial survey, caregivers selected a physical activity health goal that they would work on for 30 days as part of the study. Caregivers described their goal and created a cue using three to five words to populate into their daily surveys. To support their goal selection, the survey included information about national recommendations for adults' physical activity and about how to create S.M.A.R.T. (Specific, Measurable, Attainable, Relevant, and Time-Bound) goals (Doran, 1981).

Daily Physical Activity Goal Pursuit

The person-specific physical goal identified in the baseline survey became a part of the daily survey on which participants reported for 30 consecutive days. In each daily survey, participants responded to the following question: "Rate today's progress towards your goal of _____" [populated with caregiver's individualized physical activity goal]. Caregivers rated their daily goal pursuit on a sliding visual analog scale ranging from *no progress* (0) to *much progress* (100). Corresponding numbers

on the visual analog scale were not visible to caregivers to help ensure data independence (Brose & Ram, 2012; Hooker, 1991).

Daily Subjective Care Appraisals

To measure daily negative appraisals, we used a validated, shortened version of the Zarit Burden Interview (ZBI) (Bédard et al., 2001). Caregivers responded on a sliding visual analog scale ranging from *not at all* (0) to *very much so* (100) to four items (e.g., "Today did you feel strained when you were around your relative?"). With this study's analytic sample, the average within-person and between-person Cronbach's alpha was .79 and 1.0 respectively.

To measure daily positive caregiving appraisals, we selected four items from the nine-item Positive Aspects of Caregiving Scale (Tarlow et al., 2004). We wanted the number of items in the scale to parallel the measure for negative daily appraisals, while also seeking to minimize daily survey burden for caregivers. We therefore selected two items from the Positive Aspects of Caregiving Scale's caregiver self-affirmation subscale and two items from the Positive Aspects of Caregiving Scale's caregiver outlook on life subscale. Caregivers responded on a sliding visual analog scale ranging from *not at all* (0) to *very much so* (100) to four items (e.g., "Today did caring for your parent(s) make you feel strong and confident?"). With this study's analytic sample, the average within-person and between-person Cronbach's alpha was .77 and .99 respectively.

Daily Future Self-Views

To measure future self-views, we used three questions from the Domain-Specific Future Selves Brief Scale (Kornadt et al., 2020): physical and mental fitness, cognition, and overall health. For the physical and mental fitness domain, we excluded mental fitness so that the question item was not double-barreled. As with both health goal progress and positive and negative caregiving appraisals, caregivers responded on a 100-point visual analog scale with two opposing poles. We analyzed each domain separately, rather than combining the three items into

a composite score, in order to delineate any differences in our models based on each future-self

domain. Each items' poles were as follows:

(1) "When I am older, I will have problems staying physically fit." vs. *"When I am older, I will be able to stay physically fit by being active."*

(2) "When I am older, I will have memory or other cognitive problems." vs. *"When I am older, I will not have memory or other cognitive problems."*

(3) "When I am older, I will be severely limited in my daily routine by health problems." vs. *"When I am older, I will not be limited in my daily routine by health issues."*

Covariates

Demographic questions included caregivers' age, race/ethnicity, marital status, education,

income, and employment. Each day, caregivers reported how much time they spent caring for their

parent(s), in paid employment, and caring for children. The wording for these daily time use questions

was informed by the National Study on Daily Experiences (NDSE; Ryff & Almeida, 2017).

Analytic Strategy

We used multilevel modeling (Raudenbush & Bryk, 2002) to explore within-person associations

between physical activity goal pursuit, care appraisals, and future self-views. We nested days within

caregivers and, thereby considered caregivers as their own contexts within which future self-views,

caregiving appraisals, and goal pursuit occur and vary over time (Hoffman & Stawski, 2009). We used

SAS PROC MIXED using Maximum Likelihood estimation for multilevel analyses to test the main

effects of the associations between caregiving appraisals and future self-views (research question 1),

future self-views and physical activity goal pursuit (research question 2), and whether future self-views

moderated the association between caregiving appraisals and physical activity health goal pursuit

(research question 3). To test whether future self-views mediated the association between positive and

negative caregiving appraisals and physical activity goal pursuit (research question 3), we used MPLUS

for 1-1-1 mediation analysis in a multilevel structural equation modeling (mSEM) framework (Preacher, Zyphur & Zhang, 2010). We utilized estimates and tests of indirect effects as evidence for mediation. For all analyses, we utilized Maximum Likelihood estimation.

We calculated intraclass correlations (ICCs), an estimate of the amount of within-person variability in each daily variable, using an unconditional model. To create each within-person predictor (positive and negative caregiving appraisals for research questions 1 and 3; future self-views for research questions 2 and 3), we person-mean centered the variable and then subtracted that person-mean centered value from participants' daily values. We did not person-mean center the time-variant covariates (daily time spent caring for a child, in paid employment, and caring for a parent). To consider missing data, we calculated how many survey days each caregiver missed and included this variable as a time-invariant covariate in the models. Full statistical models are available in Supplemental Materials.

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Results

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Descriptive Statistics

Twenty-three caregivers rated their health as *good* or *excellent*, and the other 10 rated their health as *fair*. Caregivers' physical activity goals included a variety of physical activities such as yoga, walking, and fitness classes both at home and in studios/gyms. Caregivers' daily health goal pursuit ranged from 0 (*no progress*) to 100 (*much progress*), with a person mean-centered average of 62.27 (Range = 11 – 96.72, SD = 19.01).

Caregivers spent time caring for their parents on 843 of the 855 days and averaged eight hours per day caring. Caregivers' daily negative caregiving appraisals ranged from 0 (*low negative appraisals*) to 99.5 (*high negative appraisals*), with a person-mean centered average of 43.75 (Range = 6.82 – 75.08, SD = 16.43). Caregivers' daily positive caregiving appraisals ranged from 0 (*low positive appraisals*) to 100 (*high positive appraisals*), with a person-mean centered average of 53.32 (Range = 7.12 – 97.91, SD = 21.45). Caregivers' daily future self-views all ranged from 0 (*more negative*) to 100 (*more positive*),

with a person-mean centered averages as follows: physical functioning: 61.12 (Range = 3.46 – 99.86, *SD* = 27.07), cognition: 55.23 (Range = 2.86 – 97.93, *SD* = 28.66), overall health: 61.93 (Range = 4.38 – 100, *SD* = 27.12).Additional descriptive statistics and bivariate correlations appear in Table 1.

Multilevel Model Results

Our first research question asked: *How are daily positive and negative caregiving appraisals associated with daily future self-views at the within-person level?* On days when caregivers had higher negative caregiving appraisals, they thought more negatively about their future selves in the physical fitness and activity domain (β = -0.07, *SE* = 0.02, *p* = 0.001), the cognition domain (β = -0.05, *SE* = 0.02, *p* = 0.03), and the overall health domain (β = -0.07, *SE* = 0.02, *p* = 0.001), even after controlling for that day's positive caregiving appraisals. However, positive caregiving appraisals were not associated with caregivers' future self-views in any domain. Full model results appear in Table 2.

Our second research question asked: *How are daily future self-views associated with daily physical activity goal pursuit at the within-person level?* All three domains of caregivers' future self-views were associated with their physical activity goal progress. Caregivers had higher goal pursuit on days when they thought more positively about their future selves in the physical fitness and activity domain (β = 0.45, *SE* = 0.09, *p* < 0.001), cognitive domain (β = 0.22, *SE* = 0.09, *p* = 0.02), and overall health domain (β = 0.36, *SE* = 0.10, *p* = 0.003). Full model results appear in Table 3.

Finally, our third research question asked: *Do daily future self-views moderate or mediate the associations between daily positive and negative caregiving appraisals and daily physical activity health goal pursuit?* Moderation analyses revealed that cognitive future self-views moderated the association between positive caregiving appraisals and physical activity goal pursuit (β = 0.01, *SE* = 0.01, *p* = 0.02. Future self-views in other domains did not moderate the associations between daily negative or positive caregiving appraisals and physical activity goal pursuit. Full model results for the moderation analysis appear in Table 4.

Mediation analyses revealed that future self-views mediated associations between negative caregiving appraisals and daily health goal pursuit (see Table 5). Tests of the indirect effects indicated that health (Est. = 0.024, p = .001), cognition (Est. = 0.014, p = .047), and physical (Est. = 0.023, p = .002) future self-views emerged as significant mediators. Future self-views in the physical functioning, cognitive, and overall health domains did not mediate the association between positive caregiving appraisals and daily physical activity goal pursuit.

Discussion

This study adds to the growing body of research that illuminates how views of aging are developed in ways that uniquely influence the self-regulatory health behavior of certain populations, such as the middle-aged women in this study who were caring for parents with dementia. As such, through bringing a developmental theoretical lens to scholarship on dementia caregiving, it advances empirical knowledge of caregivers' motivational processes. Analyses showed that subjective caregiving appraisals were associated with adult daughter dementia caregivers' views of their future older selves, which in turn were associated with the pursuit of their physical activity goal on a daily basis. Further, future self-views mediated the relationship between subjective caregiving appraisals and physical activity goal pursuit. These findings suggest that one mechanism through which caregiving impacts health behavior may be via caregiving's impact on future self-views. These results will inform lifespan developmental theorists interested in how views of aging affect later-life experiences, as well as translational researchers who are invested in designing new, innovative programs to support caregivers' daily health behavior.

Key Findings

Only Negative Caregiving Appraisals Were Associated with Future Self-Views

The finding that negative subjective caregiving appraisals were associated with caregivers'
(negative) views of their future older selves is consistent with existing literature noting that the nature of
intergenerational contact shapes people's views on aging. To our knowledge, this is the first study
connecting caregiving to the views on aging construct of future self-views and our findings should
stimulate research on the mechanisms that connect caregiving to future self-views. Older care recipients
may offer reference points for younger caregivers to judge their own future older adulthood. It is possible
that caring for a parent can develop or reinforce caregivers' negative old age stereotypes. Adult-child
caregivers then may incorporate these negative age stereotypes into their view of themselves as future
older adults. These types of internalization are consistent with theory of old age stereotypes as the pre- or
sub-conscious and implicit antecedent to the more conscious and explicit self-perceptions of aging (Wurm
et al., 2017). Biological family and kinship caregiving arrangements are especially interesting in this
regard, as younger caregivers might feel they "see" themselves in their parent or other older relatives for
whom they are caring (Igarashi et al., 2013; Settersten, 2018).

**Future Self-Views Mediate the Relationship between Negative Caregiving Appraisals and
Physical Activity Goal Pursuit.** Results suggested that caregivers' views of their future older selves
were associated with how they pursued their physical activity goals on a daily basis, with more positive
views of their future self being associated with higher physical activity goal pursuit. Moreover, future
self-views mediated the association between negative caregiving appraisals and physical activity goal
pursuit. Thus, when caregivers thought more negatively about caregiving in ways that made them think
worse about their own future older selves, there were consequences for their physical activity goal
pursuit. This finding is consistent with other studies and samples that show positive views of aging to be

associated with better health behavior (Westerhof, et al., 2014) and with action and lifespan developmental theories that underscore motivation as deeply connected to one's sense of self (Baltes et al., 2007; Heckhausen et al., 2019). Because caregiving dynamics are associated with future self-views, and future self-views are associated with physical activity goal pursuit, caregivers may be particularly at risk for poor physical activity, especially on days when they feel more negatively about their caregiving than is typical for them.

The (Limited) Role of Positive Caregiving Appraisals

Notably, in this study, only negative (not positive) caregiving appraisals were associated with future self-views, which suggests that caregiver stress and burden may be more salient than caregiving benefits (such as feeling useful, strong, or confident) in shaping what caregivers imagine for their own future selves. Further, though future self-views mediated the relationship between negative caregiving appraisals and physical activity goal pursuit, the only significant moderation or mediation relationship in which positive appraisals of caregiving were involved was when cognitive future self-views moderated the association between positive caregiving appraisals and physical activity goal pursuit. Taken together, these findings highlight the differential role of positive and negative caregiving appraisals, including possible different processes and mechanisms that link subjective caregiving experiences to health outcomes.

To understand how positive and negative caregiving appraisals differentially impact caregivers' health behavior more fully, it is necessary to better examine caregivers' motivation processes. One helpful avenue may be to consider our finding that cognitive future self-views moderated the association between positive appraisals of caregiving and future self-views, which was the only significant moderation or mediation relationship in which positive appraisals of caregiving were involved. Given the caregivers in this sample were dementia caregivers, it is likely that this finding reflects the domain specificity of future self-views, and the saliency future cognitive health is to dementia caregivers. Positive caregiving appraisals may be particularly relevant to health behavior when the domain in question (i.e., cognitive

future self-views) is highly salient to the caregiving dynamic (i.e., dementia caregiving). Future analyses comparing dementia caregivers' future self-views to non-dementia caregivers' future self-views could be helpful to parsing how positive versus negative caregiving appraisals differentially impact health behavior motivation.

Intraindividual Variability in Study Constructs

The 30-day microlongitudinal nature of this study allowed for findings about the situation-specificity of caregivers' health behavior motivation. In our sample, intraclass correlations revealed substantial within-person day-to-day variability in both positive and negative appraisals of caregiving. However, the variability in future self-views in our sample was mostly at the between-person level, which is consistent with existing scholarship on daily variability in views on aging (O'Brien & Smyth, 2023). That our theoretically-informed predictors exhibit (statistically significant) associations with outcomes of interest supports the reliability and validity of these within-person associations, despite the relative distribution of variation between- and within-persons. Nonetheless, we acknowledge that the higher proportion of between-person variability may have impacted our ability to detect significant time-varying associations, even with the sizeable number of observations per participant in this study. The distribution of variation of future self-views in our study can be used to inform the burgeoning scholarship analyzing future selves and other views on aging constructs in a daily level.

Limitations

A key limitation to this study is the likelihood of sampling bias. By virtue of their interest in participating in the study, caregivers who enrolled probably already had some level of motivation to engage in physical activity. Their baseline motivation could have impacted their day-to-day experience in the study. Heckhausen and Gollwitzer's (1987) "Rubicon" model of action phases posits that once a person has decided to engage in a behavior and, thereby, moves into the action phase, they are more protected from contextual factors that could pull them away from that behavior. It is the pre-decision

phase when people are most prone to contextual factors that would deter their motivation. It could be argued, then, that caregivers in the ACHIEVE Study were likely in the post-Rubicon phase and therefore highly motivated.

Additionally, some measures were adopted from validated instruments and adapted for use in a microlongitudinal study. Although we took efforts to ensure independence across days (e.g., using a visual analog scale with corresponding numeric values hidden from the participant), the repetition of the measures may have influenced participants' responses. It is important to note, however, that moving a measure to a visual analog scale format does not compromise the psychometric integrity of the measure (Davey et al., 2007), although additional microlongitudinal research with these measures is needed to ensure replicability.

Conclusion

Millions of women in the United States are entering older adulthood while providing high-intensity care to their parents with dementia. Dementia family caregivers report challenges to maintaining their health, which has repercussion for their health outcomes. We sought to determine how middle-aged daughters caring for a parent with dementia pursued their physical activity goals in light of changing views of their own aging. This study suggests that dementia caregivers have unique windows into the possible realities of old age that shape both how they think of their future older selves and what they do to either achieve who they hope to be or avoid who they fear becoming. Further understanding these types of psychosocial mechanisms, and their application to future caregiver health interventions, will support the healthy aging processes of dementia caregivers.

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References

Alzheimer's Association. (2022). 2022 Alzheimer's disease facts and figures.
https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf

Baltes, P. B. (1997). On the incomplete architecture of human ontogeny: Selection, optimization, and
compensation as foundation of developmental theory. *American Psychologist*, *52*(4), 366-380.
doi:10.1037/0003-066X.52.4.366

Baltes, P. B., Lindenberger, U., & Staudinger, U. M. (2007). Life span theory in developmental
psychology. In R. M. Lerner & W. Damon (Eds.) *Handbook of child psychology: Theoretical
models of human development* (pp. 569-664). Hoboken, NJ, US: John Wiley & Sons Inc.

Bédard, M., Molloy, D. W., Squire, L., Dubois, S., Lever, J. A., & O'Donnell, M. (2001). The Zarit
Burden Interview: a new short version and screening version. *The Gerontologist*, *41*(5), 652-657.
doi:10.1093/geront/41.5.652

Bengtson, V. L., & Roberts, R. E. (1991). Intergenerational solidarity in aging families: An example of
formal theory construction. *Journal of Marriage and the Family*, 856-870. doi:10.2307/352993

Brose, A., & Ram, N. (2012). Within-person factor analysis: Modeling how the individual fluctuates and
changes across time. In M. R. Mehl & T. S. Conner (Eds.) *Handbook of research methods for
studying daily life* (pp. 459-478). New York, NY, US: Guilford Press.

Cadieux, J., Chasteen, A. L., & Packer, D. J. (2019). Intergenerational contact predicts attitudes toward
older adults through inclusion of the outgroup in the self. *The Journals of Gerontology: Series B,
74*(4), 575-584. doi:10.1093/geronb/gbx176

Davey, H. M., Barratt, A. L., Butow, P. N., & Deeks, J. J. (2007). A one-item question with a Likert or
Visual Analog Scale adequately measured current anxiety. *Journal of Clinical
Epidemiology*, *60*(4), 356-360. doi:10.1016/j.jclinepi.2006.07.015

Doran, G. T. (1981). "There's a S.M.A.R.T. way to write management's goals and

objectives". *Management Review*. *70* (11): 35–36.

Eifert, E. K., Adams, R., Dudley, W., & Perko, M. (2015). Family caregiver identity: A literature

review. *American Journal of Health Education*, *46*(6), 357-367.

doi:10.1080/19325037.2015.1099482

Farran, C. J., Etkin, C. D., Eisenstein, A., Paun, O., Rajan, K. B., Sweet, C. M. C., ... & Evans, D. A.

(2016). Effect of moderate to vigorous physical activity intervention on improving dementia

family caregiver physical function: A randomized controlled trial. *Journal of Alzheimer's disease

& Parkinsonism*, *6*(4). doi:10.4172/2161-0460.1000253

Freedman, V. A. & Wolff, J. L. (2020). *The changing landscape of family caregiving in the United States.*

In AEI-Brookings Paid Leave Project's Paid Leave for Caregiving: Issues and Answers.

https://www.aei.org/wp-content/uploads/2020/11/Paid-Leave-for-Caregiving.pdf

Freedman, V. A., Patterson, S. E., Cornman, J. C., & Wolff, J. L. (2022). A day in the life of caregivers to

older adults with and without dementia: Comparisons of care time and emotional

health. *Alzheimer's & Dementia*. Advance online publication. doi:10.1002/alz.12550

Freund, A. M., Hennecke, M., Brandstätter, V., Martin, M., Boker, S. M., Charles, S. T., ... & Zadeh, R.

S. (2021). Motivation and healthy aging: a heuristic model. *The Journals of Gerontology: Series

B*, *76*(Supplement_2), S97-S104. doi:10.1093/geronb/gbab128

García-Toro, M., Sánchez-Gómez, M. C., Madrigal Zapata, L., & Lopera, F. J. (2020). "In the flesh":

Narratives of family caregivers at risk of early-onset familial Alzheimer's

disease. *Dementia*, *19*(5), 1474-1491. doi:10.1177/1471301218801501

Heckhausen, H., & Gollwitzer, P. M. (1987). Thought contents and cognitive functioning in motivational

and volitional states of mind. *Motivation and Emotion*, 11, 101–120

Heckhausen, J., Wrosch, C., & Schulz, R. (2019). Agency and Motivation in Adulthood and Old Age. *Annual Review of Psychology*, *70*(1), 191–217. doi:10.1146/annurev-psych-010418-103043

Hoffman, L., & Stawski, R. S. (2009). Persons as contexts: Evaluating between-person and within-person effects in longitudinal analysis. *Research in Human Development*, *6*(2-3), 97-120. doi:10.1080/15427600902911189

Hooker, K. (1992). Possible selves and perceived health in older adults and college students. *Journal of Gerontology*, *47*(2), P85-P95. doi:10.1093/geronj/47.2.P85

Hooker, K. (1999). Possible selves in adulthood: Incorporating teleonomic relevance into studies of the self. In T. M. Hess & F. Blanchard-Fields (Eds.), *Social cognition and aging* (pp. 97-122). Academic Press. doi:10.1016/B978-012345260-3/50006-9

Hooker, K., Mejía, S. T., Phibbs, S., Tan, E. J., & Stevens, J. (2019). Effects of age discrimination on self-perceptions of aging and cancer risk behaviors. *The Gerontologist*, 59(Supplement_1), S28-S37. doi:10.1093/geront/gny183

Hoppmann, C. A., Lay, J. C., Shayanfar, S. (2015). Intraindividual variability in the context of adults' health behavior. In M. Diehl, K. Hooker, & M. J. Sliwinski (Eds.) *Handbook on intraindividual variability across the lifespan* (pp. 216-228). Routledge.

Igarashi, H., Hooker, K., Coehlo, D. P., Manoogian, M. M. (2013) "My nest is full:" Intergenerational relationships at midlife. *Journal of Aging Studies, 27*(2), 102-112. doi:10.1016/j.jaging.2012.12.004

Infurna, F. J., Gerstorf, D., & Lachman, M. E. (2020). Midlife in the 2020s: Opportunities and challenges. *American Psychologist, 75*(4), 470–485. doi:10.1037/amp0000591

Jarrott, S. E., & Savla, J. (2016). Intergenerational contact and mediators impact ambivalence towards future selves. *International Journal of Behavioral Development*, *40*(3), 282-288. doi:10.1177/0165025415581913

Klusmann, V., Sproesser, G., Wolff, J. K., & Renner, B. (2019). Positive self-perceptions of aging promote healthy eating behavior across the life span via social-cognitive processes. *The Journals of Gerontology Series B Psychological Sciences and Social Sciences, 74*(5), 735-744. doi:10.1093/geronb/gbx139

Kornadt, A. E., Hess, T. M., & Rothermund, K. (2020). Domain-specific views on aging and preparation for age-related changes—development and validation of three brief scales. *The Journals of Gerontology: Series B*. doi:10.1093/geronb/gby055

Kreft, I. G. (1996): Are multilevel techniques necessary? An overview, including simulation studies. California State University, Los Angeles.

Lachman, M. E., Teshale, S., & Agrigoroaei, S. (2015). Midlife as a pivotal period in the life course: Balancing growth and decline at the crossroads of youth and old age. *International Journal of Behavioral Development*, *39*(1), 20–31. doi:10.1177/0165025414533223

Levy, B. R., & Myers, L. M. (2004). Preventive health behaviors influenced by self-perceptions of aging. *Preventive Medicine*, *39*(3), 625-629. doi:10.1016/j.ypmed.2004.02.029

Levy, B. R., Slade, M. D., Kunkel, S. R., & Kasl, S. V. (2002). Longevity increased by positive self-perceptions of aging. *Journal of Personality and Social Psychology*, *83*(2), 261-270. doi:10.1037/0022-3514.83.2.261

Moon, H. & Dilworth-Anderson, P. (2015). Baby boomer caregiver and dementia caregiving: Findings from the National Study of Caregiving. *Age and Ageing, 44*(2), 300-306. doi:10.1093/ageing/afu119

National Center for Health Statistics. (2019). Health, United States, 2019: Table 025. Hyattsville, MD. Available from: https://www.cdc.gov/nchs/hus/contents2019.htm.

O'Brien, E.L. & Smyth, J.M. (2023). Between-person and daily within-person variation patterns in measures of views on aging. The Journals of Gerontology: Series B, gbad083. doi:10.1093/geronb/gbad083

Park, J., Fung, H. H., Rothermund, K., & Hess, T. M. (2020). The impact of perceived control and future-self views on preparing for the old age: Moderating influences of age, culture, and context. *The Journals of Gerontology: Series B*, *75*(5), e18-e28. doi:10.1093/geronb/gbz138

Pearlin, L. I., Mullan, J. T., Semple, S. J., & Skaff, M. M. (1990). Caregiving and the stress process: An overview of concepts and their measures. *The Gerontologist*, 30(5), 583–594. doi:10.1093/geront/30.5.583

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, *15*(3), 209–233. doi:10.1037/a0020141

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: Sage.

Robinson, S. A., Bisson, A. N., Hughes, M. L., Ebert, J., & Lachman, M. E. (2019). Time for change: using implementation intentions to promote physical activity in a randomised pilot trial. *Psychology & Health*, *34*(2), 232-254. doi:10.1080/08870446.2018.1539487

Rothermund, K., & Kornadt, A. E. (2015). Views on aging: Domain-specific approaches and implications for developmental regulation. *Annual review of gerontology and geriatrics*, *35*(1), 121-144. doi:10.1891/0198-8794.35.121

Ryff, C. D. & Almeida, D. M. (2017) Midlife in the United States (MIDUS 2): Daily Stress Project, 2004-2009 (ICPSR 26841) [Data set]. ICPSR. doi:10.3886/ICPSR26841.v2

Schulz, R., & Eden, J. (Eds.). (2016). *Families caring for an aging America*. Washington, DC: National Academies Press. doi:10.17226/23606

Settersten, R. A. (2018). Nine ways that social relationships matter for the life course. In Social networks and the life course (pp. 27-40). Springer, Cham. doi:10.1007/978-3-319-71544-5_2

Skaff, M.M., & Pearlin, L. I. (1992). Caregiving: Role engulfment and the loss of self. *The Gerontologist*, *32*(5), 656-664. doi:10.1093/geront/32.5.656

Solway, E., Clark, S., Singer, D., Kirch, M., Malani, P. (2017). *Dementia caregivers- Juggling, delaying, and looking forward.* University of Michigan National Poll on Healthy Aging. Available at: http://hdl.handle.net/2027.42/139880

Sörensen, S., Duberstein, P., Gill, D., & Pinquart, M. (2006). Dementia care: mental health effects, intervention strategies, and clinical implications. *The Lancet Neurology*, *5*(11), 961-973. doi:10.1016/S1474-4422(06)70599-3

Tarlow, B. J., Wisniewski, S. R., Belle, S. H., Rubert, M., Ory, M. G., & Gallagher-Thompson, D. (2004). Positive aspects of caregiving: Contributions of the REACH project to the development of new measures for Alzheimer's caregiving. *Research on Aging*, *26*(4), 429-453. doi:10.1177/0164027504264493

Turner, S.G. (2021-2022). Adult-daughter caregivers' pursuit of personal physical activity goals: The ACHIEVE Study (Project No: 1R36AG070451-01) [Grant]. National Institute on Aging. https://reporter.nih.gov/search/6Mk20PrwOUSNWmMSEB2OxA/project-details/10107685

Turner, S.G. (2022). *Adult-daughter caregivers' pursuit of personal physical activity goals: The ACHIEVE Study* [unpublished doctoral dissertation]. Oregon State University.

Turner, S. G., & Hooker, K. (2022). Are thoughts about the future associated with perceptions in the present?: Optimism, possible selves, and self-perceptions of aging. *The International Journal of Aging and Human Development*, *94*(2), 123-137. doi:10.1177/0091415020981883

Westerhof, G. J., Miche, M., Brothers, A. F., Barrett, A. E., Diehl, M., Montepare, J. M., ... & Wurm, S. (2014). The influence of subjective aging on health and longevity: A meta-analysis of longitudinal data. *Psychology and Aging, 29*(4), 793-802. doi:10.1037/a0038016

Witzel, D. D., Turner, S. G., & Hooker, K. (2022). Self-perceptions of aging moderate associations of within-and between-persons perceived stress and physical health symptoms. *The Journals of Gerontology: Series B*, *77*(4), 641-651. doi:10.1093/geronb/gbab228

Wrosch, C., & Schulz, R. (2008). Health-engagement control strategies and 2-year changes in older adults' physical health. *Psychological Science*, *19*(6), 537-541. doi:10.1111/j.1467-9280.2008.02120.x

Wurm, S., Diehl, M., Kornadt, A.E., Westerhof, G.J., & Wahl, H.W. (2017). How do views on aging affect health outcomes in adulthood and late life? Explanations for an established connection. *Developmental Review*, *46*, 27–43. doi:10.1016/j.dr.2017.08.002

Wurm, S., Warner, L. M., Ziegelmann, J. P., Wolff, J. K., & Schüz, B. (2013). How do negative self-perceptions of aging become a self-fulfilling prophecy? *Psychology and Aging, 28*(4), 1088–1097. doi:10.1037/a0032845

Table 1

Descriptive Statistics and Correlations for Main Predictor and Outcome Variables

Variable	Between Person Standard Deviation	Within Person Standard Deviation	Intraclass Correlation (ICC)	1.	2.	3.	4.	5.	6.
1. Negative Caregiving Appraisals[a]	16.67	15.43	0.52	--	-0.21*	-0.14*	-0.07*	-0.12*	-0.23*
2. Positive Caregiving Appraisals[b]	21.78	12.30	0.75	-0.39*	--	0.03	-0.01	0.02	0.23*
3. Future Self-Views: Physical Functioning[c]	27.47	9.37	0.89	-0.21	-0.03	--	0.43*	0.63*	0.18*
4. Future Self-Views: Cognition[d]	29.09	9.12	0.90	-0.17	0.28	0.71*	--	0.47*	0.08*
5. Future Self-View: Overall Health[e]	27.53	8.81	0.90	-0.28	0.06	0.98*	0.79*	--	0.12*
6. Physical Activity Goal[f]	19.29	24.42	0.35	-0.26	0.11	0.50*	0.30	0.48*	--

Note. Between-person correlations below diagonal ($N_{persons}$ = 33); Within-person correlations above diagonal ($N_{observations}$ = 836-854)

[a]Not at all = 0, Very much so = 100.

[b] Not at all = 0, Very much so = 100.

[c]"When I am older, I will have problems staying physically fit." = 0, "When I am older, I will be able to stay physically fit by being active." = 100.

[d]"When I am older, I will have memory or other cognitive problems." = 0, "When I am older, I will not have memory or other cognitive problems." = 100

[e]"When I am older, I will be severely limited in my daily routine by health problems." = 0, "When I am older, I will not be limited in my daily routine by health issues." = 100

[f]No progress = 0, Much progress = 100

*$p \leq .05$

Table 2

Multilevel Model Parameter Estimates for the Effects of Positive and Negative Caregiving Appraisals on Future Self-Views (Research Question 1)

	Future Self-Views: Physical		Future Self-Views: Cognition		Future Self-Views: Overall Health	
Fixed Effects	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	-80.22	50.47	5.68	56.42	-81.14	48.19
Day in study	0.16***	0.04	0.18***	0.62	0.16***	0.04
Number of missing days	-0.90	0.55	-1.65*	0.62	-1.03	0.53
Age	1.44	0.80	0.12	0.90	1.45	0.77
Race[a]						
White (reference)	0	0	0	0	0	0
Black	8.55	11.94	27.23*	13.34	15.77	11.40
Asian American	-9.31	9.35	-14.62	10.45	-8.35	8.93
Marital status[a]						
Currently married/partnered (reference)	0	0	0	0	0	0
Currently single: divorced or separated	-31.09***	7.17	-21.10*	8.01	-27.59***	6.85
Currently single: never married/partnered	-11.04	9.16	-19.56	10.23	-9.69	8.74
Education[b]	7.58*	2.99	-1.63	3.34	6.42	2.85
Self-rated health	13.69*	5.52	22.35***	6.17	15.76*	5.27
Time caring for child(ren) (in minutes)	0.003	0.01	-0.005	0.01	-0.001	0.01
Time in paid employment (in minutes)	-0.001	0.002	0.002	0.002	0.001	.002
Time caring for parent(s) (in minutes)	0.001	0.002	0.003	0.002	0.0003	0.002
Positive caregiving appraisals (WP)	0.01	0.03	-0.001	0.03	0.02	0.03

Negative caregiving appraisals (WP)	-0.07**	0.02	-0.05*	0.02	-0.07***	0.02

Variance components

Intercept	271.19***	67.87	340.07***	84.83	247.24***	61.86
Residual	84.06***	4.22	84.71***	4.25	76.70***	3.85

Note. Estimation method: Maximum Likelihood (ML). *SE* = Standard Error. WP = Within-Person (person mean-centered daily variable).

[a]*p*-values for categorical variables represent whether each category is significantly different from the reference category.

[b]Completed 8th grade = 1, Completed graduate degree = 6.

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 3

Multilevel Model Parameter Estimates for the Effects of Future Self-Views on Physical Activity Goal Pursuit (Research Question 2)

	Future Self-Views: Physical		Future Self-Views: Cognition		Future Self-Views: Overall Health	
Fixed Effects	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	-5.23	46.02	-5.71	46.29	-4.24	45.88
Day in study	-0.04	0.10	-0.01	0.10	-0.03	0.10
Number of missing days	-1.06*	0.52	-1.04	0.52	-1.11*	0.52
Age	0.94	0.74	0.95	0.74	0.93	0.74
Race[a]						
White (reference)	0	0	0	0	0	0
Black	-5.91	10.86	-5.88	10.92	-5.39	10.82
Asian American	-9.08	8.49	-8.99	8.54	-8.81	8.46
Marital status[a]						
Currently married/partnered (reference)	0	0	0	0	0	0
Currently single: divorced or separated	-5.65	6.52	-5.41	6.56	-5.41	6.50
Currently single: never married/partnered	8.79	8.49	8.96	8.54	8.51	8.46
Education[b]	5.73*	2.74	5.75*	2.75	5.68*	2.73
Self-rated health	1.14	5.00	1.00	5.03	1.05	4.99
Time caring for a child(ren) (in minutes)	-0.01	0.01	-0.005	0.01	-0.005	0.01
Time in paid employment (in minutes)	-0.01*	0.004	-0.01**	0.004	-0.01**	0.004
Time caring for parent(s) (in minutes)	-0.01**	0.005	-0.01**	0.01	-0.01*	0.005
Future self-views (WP)	0.45***	0.09	0.22*	0.09	0.36***	0.10

Variance components

Intercept	198.12***	55.45	289.73***	91.86	196.09***	55.02
Residual	592.86***	29.65	609.77***	30.58	600.79***	30.07

Note. Estimation method: Maximum Likelihood (ML). *SE* = Standard Error. WP = Within-Person (person mean-centered daily variable).

[a]*p*-values for categorical variables represent whether each category is significantly different from the reference category.

[b]Completed 8th grade = 1, Completed graduate degree = 6.

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 4

Multilevel Model Parameter Estimates for the Effect of Future Self-Views as a Moderator of the Association between Caregiving Appraisals and Physical Activity Goal Pursuit (Research Question 3)

	Future Self-Views: Physical		Future Self-Views: Cognition		Future Self-Views: Overall Health	
Fixed Effects	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	-3.39	46.16	-1.29	46.56	0.88	45.72
Day in study	-0.01	0.10	0.04	0.10	0.004	0.10
Number of missing days	-1.11*	0.52	-1.09*	052	-1.19*	0.52
Age	0.82	0.74	0.78	0.75	0.77	0.73
Race[a]						
White (reference)	0	0	0	0	0	0
Black	-4.42	10.89	-4.68	10.98	-3.97	10.78
Asian American	-6.81	8.72	-7.39	8.78	-7.08	8.63
Marital status[a]						
Currently married/partnered (reference)	0	0	0	0	0	0
Currently single: divorced or separated	-6.15	6.60	-6.29	6.66	-5.95	6.54
Currently single: never married/partnered	6.59	8.52	6.45	8.59	6.20	8.44
Education[b]	5.64*	2.75	5.55	2.78	5.40	2.73
Self-rated health	1.71	5.03	1.83	5.07	1.61	4.98
Time caring for child(ren) (in minutes)	-0.01	0.0	-0.01	0.01	-0.01	0.01
Time in paid employment (in minutes)	-0.01	0.004	-0.01*	0.004	-0.01*	0.004
Time caring for parent(s) (in minutes)	-0.01	0.01	-0.01	0.01	-0.01	0.01
Positive caregiving appraisals (WP)	0.38***	0.07	0.38***	0.07	0.36***	0.07
Negative caregiving appraisals (WP)	-0.24***	0.06	-0.26***	0.06	-0.25***	0.06

Future self-views (WP)	0.41***	0.09	0.18*	0.09	0.32**	0.10
Positive caregiving appraisals (WP) * Future self-views (WP)	0.01	0.01	0.0004	0.01	0.01*	0.01
Negative caregiving appraisals (WP) * Future self-views (WP)	-0.0001	0.01	0.003	0.01	0.003	0.01
<u>Variance components</u>						
Intercept	201.15***	56.44	204.33***	57.41	196.41***	55.17
Residual	552.00***	27.77	563.76***	28.36	556.31***	28.00

Note. Estimation method: Maximum Likelihood (ML). *SE* = Standard Error. WP = Within-Person (person mean-centered daily variable).

[a]*p*-values for categorical variables represent whether each category is significantly different from the reference category.

[b]Completed 8th grade = 1, Completed graduate degree = 6.

*p ≤ .05. **p ≤ .01. ***p ≤ .001.

Table 5

Multilevel Model Parameter Estimates for the Effect of Future Self-Views as a Mediator of the Association between Caregiving Appraisals and Physical Activity Goal Pursuit (Research Question 3)

	Future Self-Views: Physical		Future Self-Views: Cognition		Future Self-Views: Overall Health	
	Estimate	SE	Estimate	SE	Estimate	SE
Positive caregiving appraisals (WP)	0.01	0.01	-0.003	0.01	0.01	0.01
Negative caregiving appraisals (WP)	0.02**	0.01	0.01*	0.01	0.02***	0.01

Note. Estimation method: Maximum Likelihood (ML). *SE* = Standard Error. WP = Within-Person (person mean-centered daily variable).

*p ≤ .05. **p ≤ .01. ***p ≤ .001.