Scandinavian Journal of Caring Sciences

WILEY

ORIGINAL ARTICLE OPEN ACCESS

Multidimensional Factors Are Related to Caregiver Burden: Findings From a National Experience Sampling Survey

Samantha B. Randolph[1] | SangJin Lee[2] | Stephen Lau[3] | Jessica Kersey[2] | Lisa Tabor Connor[2]

[1]Department of Occupational Therapy, Texas Christian University, Fort Worth, Texas, USA | [2]Program in Occupational Therapy, Washington University School of Medicine, St. Louis, Missouri, USA | [3]Department of Rehabilitation Science, The Hong Kong Polytechnic University, Hong Kong, China

Correspondence: Samantha B. Randolph (s.randolph@tcu.edu)

Received: 23 October 2025 | **Revised:** 14 January 2026 | **Accepted:** 23 January 2026

Keywords: caregivers | daily diary | experience sampling | multidimensional model | multilevel modelling

ABSTRACT

Purpose: Paid and informal caregivers experience negative well-being outcomes. The present study aimed to: (1) examine the fluctuation of caregivers' emotions and daily physical health concerns, (2) identify factors associated with everyday fluctuations in positive emotions, negative emotions and daily health concerns to inform future supports.

Materials and Methods: Researchers conducted a secondary analysis of the Midlife in the United States (MIDUS) Daily Diary dataset. Baseline and intensive longitudinal factors of 392 adults performing caregiving activities were included in the analysis. Guided by the Multidimensional Model of Caregiving, researchers built multilevel models to examine factors that relate to the daily emotional and physical health of caregivers.

Results: Emotions and health concerns fluctuated throughout the study period. Model fit varied, with the negative emotions and daily health models demonstrating stronger performance than the positive emotions model. Negative emotions were related to income, hours spent caregiving, self-esteem and emotional support. Positive emotions were related to income, caregiver stressors and self-esteem. Caregiver daily health concerns were related to marital status, self-esteem, leisure activities and emotional support.

Conclusions: Caregiver well-being is associated with individual, socioemotional and environmental factors. Support groups and cognitive behavioural interventions may mitigate the impact of caregiver stressors on well-being.

1 | Introduction

There has been a continuous increase in the demand for caregiving in the United States and worldwide [1, 2]. With decreasing lengths of hospital stays and increasingly advanced options for treatment that result in chronic medical complexity, more people are being discharged from the hospital with greater needs for caregiving support [1]. The caregiver's role has become more complex and intensive as it fills in gaps of the formal caregiving infrastructure of the United States, resulting in physical, emotional, psychological and financial strain [1]. Because caregivers play a vital role in the health and well-being of care recipients, understanding the caregiver's physical and psychological health is critical in developing interventions and guiding public policy to promote the health and well-being of caregivers [1].

The Multidimensional Model of Caregiver Burden developed by Raina and colleagues offers a theory of individual, socioemotional and environmental factors that contribute to health and psychological outcomes among caregivers [3]. It is a comprehensive model that takes into account various domains, including the caregiver's background and context (e.g., socioeconomic status and the setting where caregiving occurs), the care recipient's characteristics (e.g., level of functioning and behaviours), caregiver strain, caregiver's intrapsychic factors (e.g., self-esteem and sense of mastery over the caregiving situation) and coping

and supportive factors that influence caregiver's health (e.g., social support, family functions and/or stress management). These dimensions influence each other, and their interactions contribute to psychological and physical health outcomes among caregivers [3].

Although there is an abundance of research on caregiver burden, some important limitations exist in the available literature. Many studies investigate univariable relationships between one key variable and a single outcome of interest [3]. Approaches primarily utilise between person (i.e., individual differences) analyses to assess the relationship of a factor measured at a single point in time on an outcome that is also measured at a single point in time [4, 5]. The body of work using this more traditional method has supported advances in understanding risk factors related to general caregiver burden, including socioeconomic status, mental health conditions and lack of adequate social support [4, 5]. This approach, however, does not identify important fluctuations in emotions and health that are related to caregiver stressors, which can point to underlying conditions, such as depression [6–8]. Incorporating approaches that study daily fluctuations in factors to measure within-person variability is critical to comprehensively describe caregiver health [9]. Additionally, many studies focus on narrow populations, such as caregivers for people living with dementia [10, 11]. Although these projects provide valuable insights regarding the impact of functional and behavioural needs on caregivers of adults living with cognitive impairments, they may not be generalisable to caregivers of individuals with other conditions or disabilities [10, 11]. Finally, studies that have taken a longitudinal approach tend to use longer time periods (e.g., months) between surveys and assess caregivers of individuals with specific diagnoses (e.g., head and neck cancer) [12, 13]. These efforts reveal important information about patterns and changes regarding caregiver burden, but questions remain about fluctuations within short time periods.

Our study aims to investigate the relationship of multidimensional factors with emotional and physical health of caregivers across the United States. Accordingly, the purpose of the present study was to: (1) examine the fluctuation of caregivers' emotions and daily physical health concerns, (2) identify factors associated with daily fluctuations in positive emotions, negative emotions and daily health concerns to inform future supports and services.

2 | Materials and Methods

2.1 | Study Design and Participants

We used data from the Midlife in the United States Study (MIDUS 3) [14], which leverages traditional longitudinal and intensive longitudinal (i.e., Daily Diary; [15]) methodologies. Participants were at least 25 years of age, community-dwelling and able to complete interviews in English. Daily Diary collection occurred from 2017 to 2019. During this phase, participants completed questionnaires one time per day for eight consecutive days. For the present study, we selected caregivers based on participants' responses to the following question: 'Did you provide assistance to a person with a disability?' If participants responded 'yes' to the question on any day of the survey, they were classified as a caregiver. We included data from each day of the survey for all participants classified as caregivers, regardless of whether they provided care on a given day. The University of Wisconsin-Madison (2016–1051) and The Pennsylvania State University (PRAMS00042558) institutional review boards approved the original study. All participants provided written informed consent prior to their study involvement.

2.2 | Variables

In line with the Multidimensional Model of Caregiving [3] we selected negative emotions, positive emotions and daily health concerns as key dependent variables for the present study. We calculated negative and positive composite scores based on criteria from the original study. Composites were created by averaging emotion scores within each category. Negative composites consisted of the following emotions: nervous, worthless, sad, effortful, hopeless, lonely, afraid, jittery, ashamed, upset, angry and frustrated. Positive composites consisted of the following emotions: good spirits, cheerful, happy, calm, satisfied, full of life, close to others, sense of belonging, enthusiastic, attentive, proud, active and confident. Scores on negative and positive emotions ranged from 0 to 4, with higher scores indicating more amounts of each emotion. Daily health concerns were computed as the sum of the following symptoms and conditions: allergies, headache, backache, soreness, fatigue, joint pain, weakness, cough, sore throat, fever, chills, flu, nausea, diarrhoea, constipation, appetite, stomach problems, chest pain, dizziness, shortness of breath and other (not specified) physical conditions. We provide independent variables for the present study in Table 1. These variables are characterised by their status as a level 1 (measured daily) or level 2 (measured once at baseline) factor. We further classified independent variables according to the Multidimensional Model: background and contextual factors; recipient characteristics; caregiver strain; intrapsychic factors; and coping and supportive factors [3].

2.3 | Data Analysis

We calculated descriptive statistics, including age, average amount of daily caregiving hours, sex, race, marital status and income level, to better understand the characteristics of our sample. We plotted the fluctuations of negative emotions, positive emotions and daily health concerns to visualise the range and changes of daily outcomes across the eight-day study period. Next, we built univariable multilevel models to examine the relationship between independent variables and dependent variables. For primarily level 1 variables, we separated within and between person variances. Within-person variance was calculated by centring the individual's daily score according to their average score. Between-person variance was represented by centring the individual's average score according to the sample's average score. Using the independent variables that were identified as significant in the univariable models, we then built multivariable multilevel models that comprehensively examined the various factors associated with daily fluctuations in negative emotions, positive

TABLE 1 | Model variables.

Factor	Category	Description
Level 1 (Within-person)		
Time spent caregiving	Recipient characteristics	Number of hours spent caregiving each day. As the available dataset did not provide detailed information regarding recipient characteristics, time spent providing care was used as a proxy for recipient disability severity
Home stressors	Caregiving strain	Perceived stress of daily home events, with the following options: not at all, not very, somewhat, very
Physical activity	Coping and supportive factors	Percentage of time spent participating in physical activities, as compared to all time use reported by the participants
Leisure activity	Coping and supportive factors	Percentage of time spent participating in leisure activities, as compared to all time use reported by the participants
Emotional support	Coping and supportive factors	Yes/No response option to assess whether emotional support was received during the day. *Did you receive any emotional support from anyone or any organisations?*
Level 2 (Between-person)		
Income	Background and context	Quartile representations of income reported by participants
Marital status	Background and context	Single-selection answer choice, with the following options: married, separated, divorced, widowed, never married
Self-esteem	Intrapsychic factors	Sum of 7 items scored on a 7-point Likert-scale, with higher scores indicating greater amounts of self-esteem [15]

Note: Category of factor is derived from the Multidimensional Model of Caregiving [3].

emotions and health concerns. We used random intercepts for every model, and all estimates are reported in standardised units. Because multilevel models are robust to missing data, we did not use imputation techniques for missing values. Conditional and marginal r-squared values were used to assess model fit. Statistical significance for all analyses was set at $p < 0.05$.

3 | Results

3.1 | Descriptive Statistics

We present participant demographics in Table 2. Out of the total dataset of 1124 individuals, 392 participants were classified as caregivers. In general, participants were middle-aged or older adults. Income varied greatly among participants, with values ranging from $0–$300,000 and a median income of $45,000. Average caregiving hours per individual ranged from 0 to 20.5 h per survey day. Figure 1 describes fluctuations in negative emotions, positive emotions and health concerns across the study period. Positive emotions demonstrated a slightly larger range than negative emotions throughout the day. Daily health concerns were concentrated between zero and five illnesses, injuries, or symptoms.

3.2 | Univariable Models

We report comprehensive fixed effects in standardised units from all univariable models in Table 3. Based on the results of the univariable models, we included the following factors in the multivariable models: income (all models), marital status (all models), race (positive and negative emotions models), caregiving hours (positive and negative emotions models), caregiver stressors (positive emotions model), self-esteem (all models), physical activity (positive emotions model), leisure activity (daily health model) and receipt of emotional support (all models).

3.3 | Multivariable Models

We describe comprehensive results of multivariable modelling in Table 4. All effect sizes are reported in standardised estimates, with a one unit change corresponding to one standard deviation. Caregiving hours (both between and within person differences), self-esteem and receipt of emotional support were significantly related to daily negative emotions. Daily positive emotions were associated with caregiver stressors and self-esteem. Marital status (in particular, being widowed, separated, or divorced), self-esteem, leisure activity participation and receipt of emotional support were related to the quantity of daily health concerns.

4 | Discussion

The purpose of this study was to: (1) examine the fluctuation of caregivers' emotions and daily physical health concerns, (2) identify factors associated with daily fluctuations in positive emotions, negative emotions and daily health concerns

TABLE 2 | Participant demographics.

Characteristic	Value
Mean (SD)	
Age	63.15 (9.71)
Caregiving Hours Per Day	2.5 (3.5)
n (%)	
Sex	
Female	234 (59.7)
Male	158 (40.3)
Race	
Asian	0
Black	14 (3.6)
Native American or Alaska Native	6 (1.5)
Native Hawaiian or Pacific Islander	0
White	345 (88.5)
Others	25 (6.4)
Marital status	
Married	274 (69.9)
Divorced	45 (11.5)
Widowed	39 (10.0)
Never married	25 (6.4)
Separated	9 (2.3)

to inform future supports and services. Our findings revealed that positive emotions tended to demonstrate the greatest amount of daily fluctuations and identified several factors from the multidimensional model of caregiving that can guide future interventions.

4.1 | Fluctuations in Emotions and Health

There was fluctuation in all three outcomes of interest throughout each of the study days, with the greatest variability observed in positive emotions. This finding reinforces the importance of studying emotions in the daily context in which they occur. Understanding fluctuations in emotions throughout the day provides an opportunity to develop interventions that are responsive to the everyday stressors and supports that are present in an individual's life at any point in time [16]. Moreover, daily emotional stability may be indicative of greater well-being among caregivers and is thus an important end goal [17]. Less is known about the significance of daily health fluctuations. In other studies, caregivers have previously reported that negative emotions seem to be linked to their health status on a given day [18]. Given that caregivers in our study demonstrated fluctuations in their negative emotions throughout each day, it is possible that these daily dips and rises had an impact on health status. Future work should use lagged modelling techniques [19], which analyse the impact of one variable on another variable that is measured at the next timepoint, to examine the associations of momentary negative emotions with later health outcomes within a short period of time.

4.2 | Model Fit

Model fit varied for each health and emotional factor, with conditional r-squared values reflecting low to moderate levels of explained variance. In general, the positive emotions model demonstrated a weaker performance than the other models, suggesting that daily fluctuations in positive emotions may be attributed to factors not included in the present study's representation of the Multidimensional Model of caregiving. Increased use of emotional regulation techniques, for instance, has been found to correlate with higher levels of positive emotions among caregivers [20]. Skills such as attending to positive circumstances, practicing gratitude, engaging in mindfulness and utilising positive reappraisal have been linked to improvements in positive emotions among dementia caregivers [21]. In contrast, the coping and support factors included in our models emphasise physical and leisure activity, in addition to emotional support. Although these coping strategies can be helpful means to manage stressful situations, activity participation and emotional support may impact the stress response by limiting the impact of negative emotions and physiological stress reactions on overall well-being [22, 23]. In other words, the variables in our study may reduce overall stress by stifling the negative consequences of stressors [24] rather than directly increasing positive emotions. Future work should investigate other forms of coping and supportive strategies to better understand how to effectively boost positive emotions among caregivers.

In the negative emotions and daily health models, conditional *r*-squared values indicated better model fit than the positive emotions model. However, marginal *r*-squared values representing the explained variance of fixed effects were low in each model. Together, these findings suggest that random effects (i.e., differences at the individual level), rather than fixed effects (i.e., patterns of association that occur across the entire sample) were better at explaining variance in emotions and daily health status across the survey period. This finding is not unsurprising, given that individual differences in stress responses have long been established [25]. Some individuals, for instance, report physiological stress responses (e.g., indigestion, muscle pain), while others report socioemotional changes (e.g., irritation, anhedonia) [26]. Researchers have linked genetic and environmental factors to this phenomenon, with differences in gene–environment interactions leading to variations in how individuals respond to daily stressors [27]. Likewise, individuals report differences in how they prefer to cope with stressors (e.g., emotion-focused or problem-focused), as well as how effective those coping strategies are in managing adaptive stress response [28, 29]. This finding supports the need to develop interventions that can be tailored to the unique stress-response pattern of each individual.

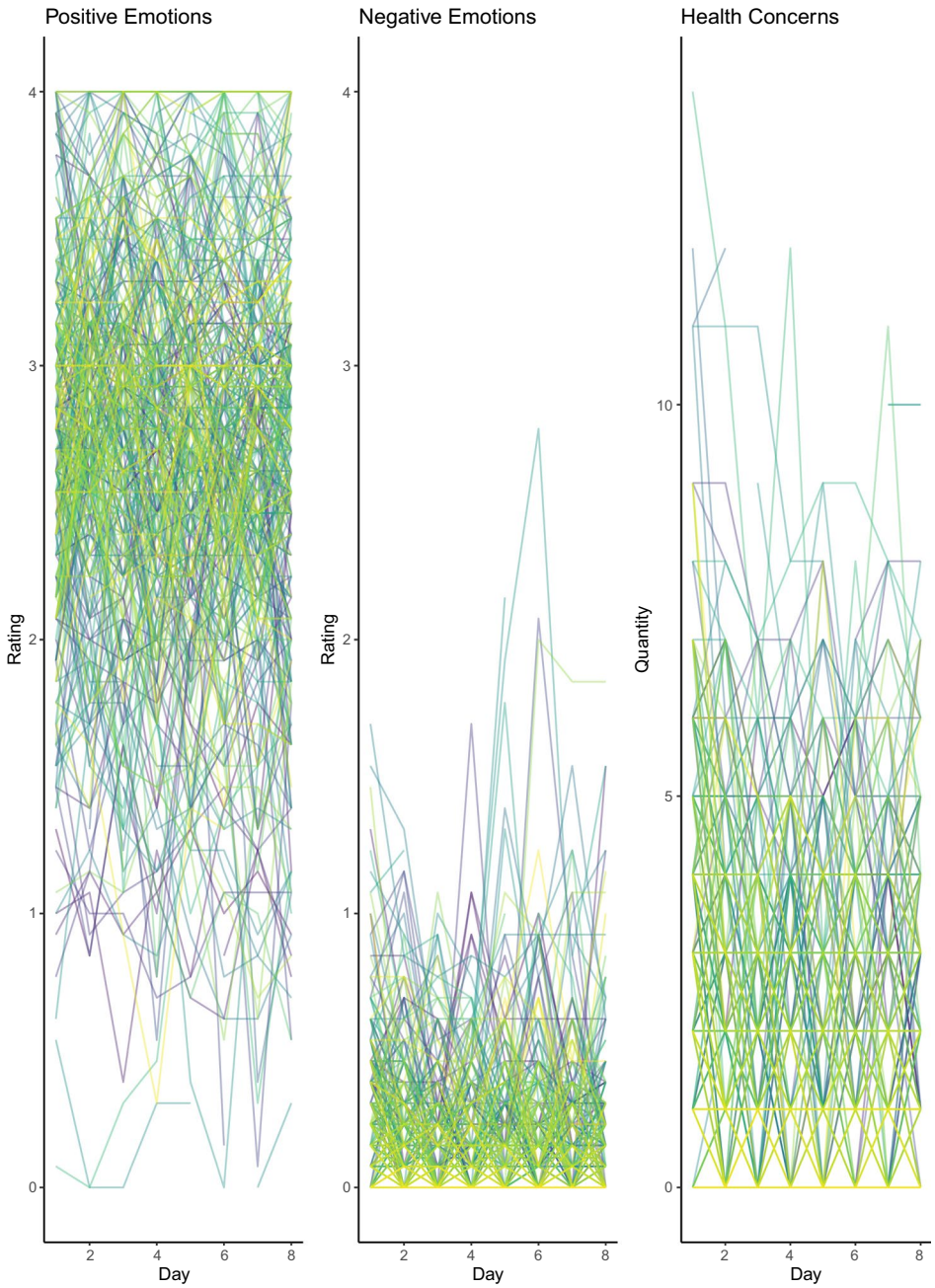

FIGURE 1 | Fluctuations in positive emotions, negative emotions and daily health concerns across the study period. Line colours indicate unique participants. Colour of lines indicate unique participants.

4.3 | Important Predictors of Health

Strength and significance of relationships between variables varied across all three models. In this section, we will review a few important relationships that demonstrated larger effect sizes or were significant across all models.

Notably, baseline self-esteem was the sole factor that significantly associated with all three outcomes of interest in the multivariable models. Individuals with higher average self-esteem compared to the study sample tended to have lower amounts of negative emotions, less daily health concerns and more positive emotions. Low self-esteem has been linked to caregiver stress [30] and poor quality of life [31] in studies among caregivers of people with dementia and mental illness. Establishing high levels of baseline self-esteem using interventions such as cognitive behavioural therapy strategies [32] could protect individuals from some of the inherent stressors of caregiving.

The relationship between daily stressors and positive emotions demonstrated the largest effect size in the multivariable models, with individuals who reported 'very' severe stressors tending to report a decrease of one standardised unit in daily positive emotions. Maintaining high levels of positive emotions is important—accumulated positive emotions can buffer individuals against the health impacts of acute and chronic stress, contributing to both health and quality of life [33–35]. Interestingly, the association between negative emotions and

TABLE 3 | Results of univariable modelling.

		Negative emotions			Positive emotions			Daily health concerns		
		Est.	95% CI	*p*	Est.	95% CI	*p*	Est.	95% CI	*p*
Caregiver background and context										
Income	< 24,000	0.17*	0.11–0.38	< 0.01	2.75*	2.57–2.93	< 0.01	1.66*	1.17–2.14	< 0.01
	24,000–45,000	−0.03	−0.09 to 0.02	0.26	0.08	−0.10 to 0.27	0.38	0.01	−0.49 to 0.51	0.97
	45,001–75,000	−0.01	−0.07 to 0.05	0.69	0.05	−0.14 to 0.24	0.59	−0.23	−0.75 to 0.29	0.39
	> 75,000	−0.02	−0.08 to 0.04	0.48	0.03	−0.16 to 0.22	0.77	−0.44	−0.97 to 0.09	0.10
Marital status	Married	0.19*	0.06–0.33	< 0.01	2.84*	2.74–2.94	< 0.01	1.44*	1.16–1.71	< 0.01
	Separated	0.04	−0.09 to 0.16	0.58	−0.03	−0.44 to 0.37	0.88	−1.12	−2.22 to −0.01	0.05
	Divorced	0.02	−0.04 to 0.08	0.60	−0.15	−0.34 to 0.04	0.13	0.53	−0.0002 to 1.06	0.05
	Widowed	−0.02	−0.09 to 0.04	0.47	−0.01	−0.23 to 0.21	0.91	−0.63*	−1.23 to −0.03	0.04
	Never married	0.09*	0.01–0.16	0.03	−0.32*	−0.57 to 0.07	0.01	0.30	−0.39 to 0.99	0.40
Race	White	0.15*	0.12–0.18	< 0.01	2.80*	2.71–2.90	< 0.01	1.52*	−0.75 to 1.51	< 0.01
	Black	−0.05	−0.15 to 0.05	0.35	0.20	−0.13 to 0.53	0.24	−0.35	−1.27 to 0.56	0.45
	Native American/ Alaskan Native	0.03	−0.12 to 0.18	0.69	0.26	−0.24 to 0.75	0.31	−0.42	−1.79 to 0.96	0.55
	Other	−0.03	−0.10 to 0.05	0.49	−0.12	−0.37 to 0.13	0.34	−0.37	−1.06 to 0.32	0.29
Care recipient characteristics										
Caregiving hours	Within care hours	0.04*	0.02–0.035	< 0.01	−0.03*	−0.05 to −0.007	0.01	0.07	−0.01 to 0.14	0.09
	Between care hours	0.03*	0.001–0.05	0.04	−0.10*	−0.16 to −0.03	< 0.01	−0.05	−0.26 to 0.16	0.62
Caregiver strain										
Stressors	Not at all	0.18	−0.07 to 0.43	0.15	2.62*	2.17–3.06	< 0.01	2.26*	0.74–3.78	< 0.01
	Not very	−0.04	−0.30 to 0.22	0.77	−0.01	−0.46 to 0.45	0.97	−0.95	−2.53 to 0.62	0.24
	Somewhat	0.03	−0.22 to 0.28	0.80	−0.10	−0.53 to 0.33	0.65	−0.48	−1.98 to 1.01	0.53
	Very	0.25	−0.01 to 0.50	0.06	−0.41	−0.86 to 0.03	0.07	−0.30	−1.85 to 1.25	0.71
Intrapsychic factors										
Esteem	Between-person self-esteem	−0.06*	−0.08 to −0.04	< 0.01	0.28*	0.22–0.34	< 0.01	−0.30*	−0.47 to −0.13	< 0.01
Coping and supportive factors										

(Continues)

TABLE 3 | (Continued)

		Negative emotions			Positive emotions			Daily health concerns		
		Est.	95% CI	*p*	Est.	95% CI	*p*	Est.	95% CI	*p*
Physical activity	Within-person	0.002	−0.01 to 0.01	0.51	−0.02*	−0.03 to −0.01	<0.01	−0.01	−0.05 to 0.03	0.64
	Between-person	0.004	−0.02 to 0.02	0.67	−0.08*	−0.14 to −0.02	0.01	0.01	−0.16 to 0.17	0.95
Leisure activity	Within-person	0.01	−0.000 to 0.01	0.05	0.01	−0.000 to 0.03	0.06	0.08*	0.04–0.12	<0.01
	Between-person	−0.01	−0.03 to 0.01	0.53	0.04	−0.03 to 0.10	0.29	−0.24*	−0.42 to −0.06	0.01
Support	Yes	0.23*	0.19–0.26	<0.01	2.78*	2.67–2.88	<0.01	1.86*	1.57–2.14	<0.01
	No	−0.09*	−0.12 to −0.07	<0.01	0.03	−0.01 to 0.07	0.15	−0.43*	−0.57 to −0.30	<0.01

Note: Models are adjusted for age and gender identity. Estimates are reported in standardised units. *indicates $p < 0.05$.

stressors was not significant. It is possible that other factors mediate the relationship between experiencing stressors throughout the day and negative emotions. As discussed above, positive emotions and related resilience can protect against negative emotions following stressful events [33–35]. Other variables in the dataset provide additional explanations. Receipt of emotional support was significantly related to negative emotions and daily health, with individuals who did not receive emotional support reporting less severe negative emotions and less daily health concerns. There may have been a mediation effect in which individuals experienced a stressor, sought emotional support and were subsequently protected against negative emotions related to the stressful event. Caregivers are resourceful individuals who are adept at using a variety of coping strategies, including seeking emotional and instrumental support, cognitive reframing, engaging in spiritual activities and problem-solving [36].

Marital status was significantly associated with daily health concerns in unexpected ways. Consistent with previous research that has shown that unmarried individuals tend to report worse health than their married counterparts, divorced individuals in our current sample tended to report more daily health concerns than their married counterparts. Individuals who were separated or widowed, however, reported less health concerns than married individuals—a deviation from prior research. Like many factors, marital status is complex; important characteristics related to marriage include age of divorce, separation, or widowhood; gender identity; perceived quality of the marriage; whether there were any prior marriages; alternative forms of social support such as friends; and living arrangements [37, 38]. It is also possible that married individuals have a partner who required caregiving support, leading to negative health outcomes. Future research with more detailed information about marriage characteristics may reveal additional insights into the varying relationships between marital status and daily health outcomes. Additionally, alternative measures of daily health, such as heartrate or heartrate variability, fatigue, or cortisol level may be more sensitive to daily fluctuations than broader health concerns and could therefore reveal more about the marital status-health relationship [39, 40].

4.4 | Clinical Implications

Although more research is required to advance the understanding of caregiver health, findings from this project offer insights about strategies that may support daily well-being among caregivers in the United States. For example, our results illustrated the unique relationships between predictive factors and caregiver well-being, alluding to the personal nature of stress-responses. Supporting caregivers in recognising their distinct stress-response profiles to build tailored strategies for mitigating daily stress [41] will be a key step in promoting wellness among the caregivers that represent about 20% of adults in the United States [42]. Self-esteem was highlighted as an especially important factor across all three models. Interventions that focus on increasing overall levels of self-esteem, including cognitive and social support strategies [43], could have a beneficial impact on caregivers' emotional and

TABLE 4 | Results of multivariable modelling.

		Negative emotions			Positive emotions			Daily health concerns		
		Est.	95% CI	*p*	Est.	95% CI	*p*	Est.	95% CI	*p*
Caregiver background and context										
Income	Intercept	0.31*	0.23–0.39	< 0.01	2.90*	2.05–3.75	< 0.01	1.82*	1.53–2.12	< 0.01
	24,000–45,000	−0.03	−0.09 to 0.04	0.45	0.37	−0.03 to 0.76	0.07	NA	NA	NA
	45,001–75,000	−0.02	−0.09 to 0.06	0.67	−0.04	−0.45 to 0.37	0.85	NA	NA	NA
	> 75,000	−0.004	−0.08 to 0.07	0.92	0.24	−0.19 to 0.66	0.28	NA	NA	NA
Marital Status	Separated	0.13	−0.03 to 0.29	0.12	−0.87	−1.78 to 0.06	0.07	−1.13*	−2.21 to −0.06	0.04
	Divorced	0.02	−0.05 to 0.10	0.56	−0.25	−0.65 to 0.16	0.24	0.60*	0.08–1.12	0.02
	Widowed	0.02	−0.08 to 0.11	0.75	−0.38	−0.90 to 0.15	0.16	−0.68*	−1.26 to −0.10	0.02
	Never married	0.08	−0.02 to 0.17	0.12	−0.28	−0.72 to 0.17	0.23	0.18	−0.49 to 0.86	0.60
Race	Black	−0.05	−0.19 to 0.09	0.48	0.16	−0.50 to 0.81	0.64	NA	NA	NA
	Native American/ Alaskan Native	−0.04	−0.21 to 0.13	0.62	NA	NA	NA	NA	NA	NA
	Other	−0.03	−0.13 to 0.07	0.61	−0.18	−0.93 to 0.59	0.65	NA	NA	NA
Care recipient characteristics										
Caregiving Hours	Within-person hours	0.03*	0.02–0.04	< 0.01	−0.04	−0.12 to 0.03	0.27	NA	NA	NA
	Between-person hours	0.03*	0.003–0.01	0.03	−0.10	−0.24 to 0.04	0.17	NA	NA	NA
Caregiver strain										
Stressors	Not very	NA	NA	NA	−0.62	−1.44 to 0.20	0.14	NA	NA	NA
	Somewhat	NA	NA	NA	−0.72	−1.50 to 0.05	0.07	NA	NA	NA
	Very	NA	NA	NA	−1.01*	−1.81 to −0.20	0.02	NA	NA	NA
Intrapsychic factors										
Esteem	Between-person self-esteem	−0.05*	−0.07 to −0.02	< 0.01	0.28*	0.14–0.42	< 0.01	−0.27*	−0.44 to −0.10	< 0.01
Coping and supportive factors										
Physical activity	Within-person physical	NA	NA	NA	−0.01	−0.11 to 0.08	0.77	NA	NA	NA
	Between-person physical	NA	NA	NA	−0.06	−0.19 to 0.07	0.40	NA	NA	NA

(Continues)

TABLE 4 | (Continued)

		Negative emotions			Positive emotions			Daily health concerns		
		Est.	95% CI	*p*	Est.	95% CI	*p*	Est.	95% CI	*p*
Leisure activity	Within-person leisure	NA	NA	NA	NA	NA	NA	0.08*	0.04–0.12	< 0.01
	Between-person leisure	NA	NA	NA	NA	NA	NA	−0.20*	−0.38 to −0.03	0.03
Emotional support	No	−0.14*	−0.18 to −0.09	< 0.01	0.21	−0.04 to 0.46	0.10	−0.42*	−0.56 to −0.29	< 0.01
Marginal R-squared		0.10			0.32			0.11		
Conditional R-squared		0.39			0.74			0.68		

Note: Models are adjusted for age and gender identity. Estimates are reported in standardised units. *indicates $p < 0.05$.

physical health. Finally, receipt of emotional support was a key factor. In-person [44, 45] or online [46, 47] support groups can be offered by community-based providers to support caregivers as they experience day-to-day fluctuations in emotional and health status.

5 | Limitations

This analysis has limitations which should be acknowledged. We used a pre-existing, publicly available dataset, which limited analysis to those variables collected in the original project. Most prominently, the variables used to represent care recipient characteristics were limited to caregiving hours, lacking information about disability and caregiver relationship status. Additionally, we were unable to discern which of the individuals in our sample were paid or informal caregivers and experiences may differ between those groups. Furthermore, our dataset consisted of predominantly white-identifying individuals. In future analyses, it will be important to include a more diverse range of perspectives; culture impacts the caregiving experience [48] and will be a key consideration in future support development. Finally, our analysis used income and marital status as separate factors to investigate the impact of background characteristics on daily emotions experienced by caregivers. Future studies should consider the complex interactions of individual factors—such as income, marital status, race and education—and larger system factors, including neighbourhood and state of residence [49–52].

6 | Conclusion

Caregivers experience fluctuations in negative emotions, positive emotions and health concerns throughout the day. The present study identified factors associated with daily fluctuations, including caregiver background and contextual factors, care recipient characteristics, stressors, caregiver intrapsychic factors and coping strategies. We offer potential strategies (e.g., developing stress-response profiles, increasing sense of self-esteem and offering support opportunities) that can be used to support caregivers, an objective that will become increasingly important given the growing population of older adults and individuals with chronic disabilities in the United States.

Author Contributions

Conceptualising and designing the study: S.B.R., SJ.L., S.L. Data analysis: S.B.R., SJ.L. Interpreting results: S.B.R., SJ.L., S.L., J.K., L.T.C. Manuscript draft and revisions: S.B.R., SJ.L., S.L., J.K., L.T.C. Supervision: J.K., L.T.C.

Acknowledgements

This project used data from the MIDUS study, which is supported by the following: John D. and Catherine T. MacArthur Foundation Research Network, National Institute on Aging (P01-AG020166 and U19-AG051426).

Funding

This work was supported by the National Institute on Aging, U19-AG051426; John D. and Catherine T. MacArthur Foundation, P01-AG020166.

Ethics Statement

Ethics approval for this study was obtained from the University of Wisconsin-Madison (2016–1051) and The Pennsylvania State University (PRAMS00042558) Institutional Review Boards. This project was conducted in accordance with the Declaration of Helsinki.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

This study used publicly available data from the MIDUS study. The data that support the findings of this study are openly available in National Archive of Computerized Data on Aging at https://www.icpsr.umich.edu/web/NACDA/studies/36346, reference number https://doi.org/10.3886/ICPSR36346.v7.

References

1. R. Schulz, S. R. Beach, S. J. Czaja, L. M. Martire, and J. K. Monin, "Family Caregiving for Older Adults," *Annual Review of Psychology* 71, no. 1 (2020): 635–659, https://www.annualreviews.org/content/journals/10.1146/annurev-psych-010419-050754.

2. J. Bom, P. Bakx, F. Schut, and E. Van Doorslaer, "The Impact of Informal Caregiving for Older Adults on the Health of Various Types of Caregivers: A Systematic Review," *Gerontologist* 59, no. 5 (2019): e629–e642, https://doi.org/10.1093/geront/gny137.

3. P. Raina, M. O'Donnell, H. Schwellnus, et al., "Caregiving Process and Caregiver Burden: Conceptual Models to Guide Research and Practice," *BMC Pediatrics* 4 (2004): 1–13, https://link.springer.com/article/10.1186/1471-2431-4-1.

4. L. Ge and S. Z. Mordiffi, "Factors Associated With Higher Caregiver Burden Among Family Caregivers of Elderly Cancer Patients: A Systematic Review," *Cancer Nursing* 40, no. 6 (2017): 471–478, https://journals.lww.com/cancernursingonline/FullText/2017/11000/Factors_Associated_With_Higher_Caregiver_Burden.6.aspx.

5. R. D. Adelman, L. L. Tmanova, D. Delgado, S. Dion, and M. S. Lachs, "Caregiver Burden: A Clinical Review," *JAMA* 311, no. 10 (2014): 1052–1060, https://doi.org/10.1001/jama.2014.304.

6. D. K. Chan, X. Zhang, H. H. Fung, and M. S. Hagger, "Does Emotion and Its Daily Fluctuation Correlate With Depression? A Cross-Cultural Analysis Among Six Developing Countries," *Journal of Epidemiology and Global Health* 5, no. 1 (2015): 65–74, https://doi.org/10.1016/j.jegh.2014.09.001.

7. Y. Liu, L. R. Bangerter, M. J. Rovine, S. H. Zarit, and D. M. Almeida, "Intrinsic Emotional Fluctuation in Daily Negative Affect Across Adulthood," *Journals of Gerontology: Series B* 73, no. 1 (2018): 100–112, https://doi.org/10.1093/geronb/gbw159.

8. J. Gruber, A. Kogan, J. Quoidbach, and I. B. Mauss, "Happiness Is Best Kept Stable: Positive Emotion Variability Is Associated With Poorer Psychological Health," *Emotion* 13, no. 1 (2013): 1, https://psycnet.apa.org/buy/2012-30609-001.

9. W. Hardeman, J. Houghton, K. Lane, A. Jones, and F. Naughton, "A Systematic Review of Just-In-Time Adaptive Interventions (JITAIs) to Promote Physical Activity," *International Journal of Behavioral Nutrition and Physical Activity* 16 (2019): 1–21, https://doi.org/10.1186/s12966-019-0792-7.

10. C. Y. Chiao, H. S. Wu, and C. Y. Hsiao, "Caregiver Burden for Informal Caregivers of Patients With Dementia: A Systematic Review," *International Nursing Review* 62, no. 3 (2015): 340–350, https://doi.org/10.1111/inr.12194.

11. R. van den Kieboom, L. Snaphaan, R. Mark, and I. Bongers, "The Trajectory of Caregiver Burden and Risk Factors in Dementia Progression: A Systematic Review," *Journal of Alzheimer's Disease* 77, no. 3 (2020): 1107–1115, https://doi.org/10.3233/JAD-200647.

12. L. D. Kudrick, K. Baddour, and R. Wu, "Longitudinal Analysis of Caregiver Burden in Head and Neck Cancer," *JAMA Otolaryngology. Head & Neck Surgery* 149, no. 8 (2023): 681–689, https://jamanetwork.com/journals/jamaotolaryngology/fullarticle/2805563.

13. K. Piil, S. L. Skovhus, A. Tolver, and M. Jarden, "Neuro-Ontological Symptoms: A Longitudinal Quantitative Study of Family Function, Perceived Support, and Caregiver Burden," *Journal of Family Nursing* 28, no. 1 (2021): 43–56, https://doi.org/10.1177/10748407211029986.

14. O. G. Brim, C. D. Ryff, and R. C. Kessler, "The MIDUS National Survey: An Overview," in *How Healthy Are We? A National Study of Well-Being at Midlife*, ed. O. G. Brim, C. D. Ryff, and R. C. Kessler (University of Chicago Press, 2004), 1–34.

15. E. J. Urban-Wojcik, J. A. Mumford, D. M. Almeida, et al., "Emodiversity, Health, and Well-Being in the Midlife in the United States (MIDUS) Daily Diary Study," *Emotion* 22, no. 4 (2022): 603, https://doi.org/10.1037/emo0000753.

16. A. T. Gloster, M. Miche, H. Wersebe, et al., "Daily Fluctuation of Emotions and Memories Thereof: Design and Methods of an Experience Sampling Study of Major Depression, Social Phobia, and Controls," *International Journal of Methods in Psychiatric Research* 26, no. 3 (2017): e1578, https://doi.org/10.1002/mpr.1578.

17. J. Dork, E. Mangan, L. Burns, and E. Dimenstein, "Affective Instability: Impact of Fluctuating Emotions on Regulation and Psychological Well-Being," *Behavioral Science* 14, no. 9 (2024): 783, https://doi.org/10.3390/bs14090783.

18. H. Barends, E. Walstock, F. Botman, et al., "Patients' Experiences With Fluctuations in Persistent Physical Symptoms: A Qualitative Study," *BMJ Open* 10, no. 7 (2020): e035833, https://bmjopen.bmj.com/content/10/7/e035833.abstract.

19. N. K. Schuurman, E. Ferrer, M. de Boer-Sonnenschein, and E. L. Hamaker, "How to Compare Cross-Lagged Associations in a Multilevel Autoregressive Model," *Psychological Methods* 21, no. 2 (2016): 206, https://psycnet.apa.org/buy/2016-03904-001.

20. C. Bassal, J. Czellar, S. Kaiser, and E. S. Dan-Glauser, "Relationship Between Emotions, Emotion Regulation, and Well-Being of Professional Caregivers of People With Dementia," *Research on Aging* 38, no. 4 (2016): 477–503, https://doi.org/10.1177/0164027515591629.

21. J. T. Moskowitz, E. O. Cheung, K. E. Snowberg, et al., "Randomized Controlled Trial of a Facilitated Online Positive Emotion Regulation Intervention for Dementia Caregivers," *Health Psychology* 38, no. 5 (2019): 391, https://doi.org/10.1037/hea0000680.

22. J. Cairney, M. Y. Kwan, S. Veldhuizen, and G. E. Faulkner, "Who Uses Exercise as a Coping Strategy for Stress? Results From a National Survey of Canadians," *Journal of Physical Activity and Health* 11, no. 5 (2014): 908–916, https://journals.humankinetics.com/view/journals/jpah/11/5/article-p908.xml.

23. S. L. Hutchinson, A. D. Bland, and D. A. Kleiber, "Leisure and Stress-Coping: Implications for Therapeutic Recreation Practice," *Therapeutic Recreation Journal* 42, no. 1 (2008): 9, https://paradesporto.unifesp.br/repositorio/trabalhos/4083d0568a2a92c47af02311f4bb1abe5ae35.pdf.

24. Y. Iwasaki and R. C. Mannell, "The Effects of Leisure Beliefs and Coping Strategies on Stress-Health Relationships: A Field Study," *Leisure/Loisir* 24, no. 1–2 (1999): 3–57, https://doi.org/10.1080/14927713.1999.9651258.

25. B. J. Ellis, J. J. Jackson, and W. T. Boyce, "The Stress Response Systems: Universality and Adaptive Individual Differences," *Developmental Review* 26, no. 2 (2006): 175–212, https://doi.org/10.1016/j.dr.2006.02.004.

26. R. Jacoby, K. Greenfeld Barsky, T. Porat, H. M. T. Harel S, and G. Goldzweig, "Individual Stress Response Patterns: Preliminary Findings

and Possible Implications," *PLoS One* 16, no. 8 (2021): e0255889, https://doi.org/10.1371/journal.pone.0255889.

27. S. E. Claessens, N. P. Daskalakis, R. van der Veen, M. S. Oitzl, E. R. de Kloet, and D. L. Champagne, "Development of Individual Differences in Stress Responsiveness: An Overview of Factors Mediating the Outcome of Early Life Experiences," *Psychopharmacology* 214 (2011): 141–154, https://link.springer.com/article/10.1007/s00213-010-2118-y.

28. J. P. Baker and H. Berenbaum, "Emotional Approach and Problem-Focused Coping: A Comparison of Potentially Adaptive Strategies," *Cognition and Emotion* 21, no. 1 (2007): 95–118, https://doi.org/10.1080/02699930600562276.

29. M. B. Nielsen and S. Knardahl, "Coping Strategies: A Prospective Study of Patterns, Stability, and Relationships With Psychological Distress," *Scandinavian Journal of Psychology* 55, no. 2 (2014): 142–150, https://doi.org/10.1111/sjop.12103.

30. D. Kim, "Relationships Between Caregiving Stress, Depression, and Self-Esteem in Family Caregivers of Adults With a Disability," *Occupational Therapy International* 2017, no. 1 (2017): 1686143, https://doi.org/10.1155/2017/1686143.

31. W.-L. Cheng, C.-C. Chang, M. D. Griffiths, et al., "Quality of Life and Care Burden Among Family Caregivers of People With Severe Mental Illness: Mediating Effects of Self-Esteem and Psychological Distress," *BMC Psychiatry* 22, no. 1 (2022): 672, https://doi.org/10.1186/s12888-022-04289-0.

32. N. Niveau, B. New, and M. Beaudoin, "Self-Esteem Interventions in Adults—A Systematic Review and Meta-Analysis," *Journal of Research in Personality* 94 (2021): 104131, https://doi.org/10.1016/j.jrp.2021.104131.

33. B. L. Fredrickson, "The Broaden–And–Build Theory of Positive Emotions," *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 359, no. 1449 (2004): 1367–1377, https://doi.org/10.1098/rstb.2004.1512.

34. B. L. Fredrickson, "Cultivating Positive Emotions to Optimize Health and Well-Being," *Prevention & Treatment* 3, no. 1 (2000): 1a, https://psycnet.apa.org/buy/2000-03082-001.

35. C. T. Gloria and M. A. Steinhardt, "Relationships Among Positive Emotions, Coping, Resilience and Mental Health," *Stress and Health* 32, no. 2 (2016): 145–156, https://doi.org/10.1002/smi.2589.

36. A. M. F. Monteiro, R. L. Santos, N. Kimura, M. A. T. Baptista, and M. C. N. Dourado, "Coping Strategies Among Caregivers of People With Alzheimer Disease: A Systematic Review," *Trends in Psychiatry and Psychotherapy* 40, no. 3 (2018): 258–268, https://www.scielo.br/j/trends/a/j5ZY3JWLHjpRpW9BqmHR7xQ/?lang=en.

37. J. Robards, M. Evandrou, J. Falkingham, and A. Vlachantoni, "Marital Status, Health and Mortality," *Maturitas* 73, no. 4 (2012): 295–299, https://doi.org/10.1016/j.maturitas.2012.08.007.

38. J. Bookwala, K. I. Marshall, and S. W. Manning, "Who Needs a Friend? Marital Status Transitions and Physical Health Outcomes in Later Life," *Health Psychology* 33, no. 6 (2014): 505, https://psycnet.apa.org/buy/2014-21751-002.

39. J. Weber, P. Angerer, and J. Apolinário-Hagen, "Physiological Reactions to Acute Stressors and Subjective Stress During Daily Life: A Systematic Review on Ecological Momentary Assessment (EMA) Studies," *PLoS One* 17, no. 7 (2022): e0271996, https://doi.org/10.1371/journal.pone.0271996.

40. M. J. Bernstein, M. J. Zawadzki, V. Juth, J. A. Benfield, and J. M. Smyth, "Social Interactions in Daily Life: Within-Person Associations Between Momentary Social Experiences and Psychological and Physical Health Indicators," *Journal of Social and Personal Relationships* 35, no. 3 (2018): 372–394, https://doi.org/10.1177/0265407517691366.

41. M. E. Copeland, "Wellness Recovery Action Plan: A System for Monitoring, Reducing, and Eliminating Uncomfortable or Dangerous Physical Symptoms and Emotional Feelings," *Occupational Therapy in Mental Health* 17, no. 3–4 (2008): 9, https://doi.org/10.1300/J004v17n03_09.

42. G. Kilmer, J. D. Omura, E. D. Bouldin, et al., "Changes in Health Indicators Among Caregivers—United States, 2015–2016 to 2021–2022," *MMWR. Morbidity and Mortality Weekly Report* 73 (2024): 740–746, https://www.cdc.gov/mmwr/volumes/73/wr/mm7334a2.htm?trk=public_post_comment-text.

43. M. A. Crouch and V. Straub, "Enhancement of Self-Esteem in Adults," *Family & Community Health* 6, no. 2 (1983): 65–78, https://journals.lww.com/familyandcommunityhealth/citation/1983/06020/enhancement_of_self_esteem_in_adults.8.aspx.

44. A. L. Strozier, "The Effectiveness of Support Groups in Increasing Social Support for Kinship Caregivers," *Children and Youth Services Review* 34, no. 5 (2012): 876–881, https://doi.org/10.1016/j.childyouth.2012.01.007.

45. L. Y. Chien, H. Chu, J. L. Guo, et al., "Caregiver Support Groups in Patients With Dementia: A Meta-Analysis," *International Journal of Geriatric Psychiatry* 26, no. 10 (2011): 1089–1098, https://doi.org/10.1002/gps.2660.

46. M. Menke, A. J. Wagner, and S. Kinnebrock, "Communicative Care in Online Forums: How Burdened Informal Caregivers Seek Mediated Social Support," *International Journal of Communication* 14 (2020): 21, https://ijoc.org/index.php/ijoc/article/view/12479.

47. R. Daynes-Kearney and S. Gallagher, "Online Support Groups for Family Caregivers: Scoping Review," *Journal of Medical Internet Research* 25 (2023): e46858, https://www.jmir.org/2023/1/e46858/.

48. J. R. Pharr, C. Dodge Francis, C. Terry, and M. C. Clark, "Culture, Caregiving, and Health: Exploring the Influence of Culture on Family Caregiver Experiences," *International Scholarly Research Notices* 2014, no. 1 (2014): 689826, https://doi.org/10.1155/2014/689826.

49. V. L. Shavers, "Measurement of Socioeconomic Status in Health Disparities Research," *Journal of the National Medical Association* 99, no. 9 (2007): 1013, https://pmc.ncbi.nlm.nih.gov/articles/PMC2575866/.

50. J. J. Tan, M. W. Kraus, N. C. Carpenter, and N. E. Adler, "The Association Between Objective and Subjective Socioeconomic Status and Subjective Well-Being: A Meta-Analytic Review," *Psychological Bulletin* 146, no. 11 (2020): 970, https://doi.org/10.1037/bul0000258.

51. J.-C. Fotso and B. Kuate-Defo, "Measuring Socioeconomic Status in Health Research in Developing Countries: Should We Be Focusing on Households, Communities or Both?," *Social Indicators Research* 72, no. 2 (2005): 189–237, https://doi.org/10.1007/s11205-004-5579-8.

52. P. A. Braveman, C. Cubbin, S. Egerter, et al., "Socioeconomic Status in Health Research: One Size Does Not Fit All," *JAMA* 294, no. 22 (2005): 2879–2888, https://doi.org/10.1001/jama.294.22.2879.