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ARTICLE

Care-giving activities, positive and negative care-giving appraisals, and care-giver psychological wellbeing during the Covid-19 pandemic

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Abstract

Public health crises like Covid-19 profoundly influence informal care-givers of older adults with functional health limitations. This study deepens existing understanding of care-giving processes during the pandemic to uncover insights useful for developing effective care-giving interventions for the post-pandemic era and future public health crises. Specifically, it examined (1) how care-giving activities during the pandemic impacted care-giver psychological wellbeing by affecting caregiving burden and the positive aspects of caregiving and (2) the moderating effect of pandemic-specific factors (i.e., care recipients' unmet health-care needs due to the pandemic). Multiple-group analyses were conducted on data on 906 informal care-givers of older adults with functional health limitations, obtained from the Covid-19 Supplement and Round 10 Survey of the National Health and Aging Trends Study conducted in the United States. The mean age of participants was approximately 60 years, and most were white women. Positive aspects of care-giving significantly mediated the relationships between providing assistance in activities of daily living (ADL), instrumental ADL, and emotional support and positive affect. Care-giving burden significantly mediated the relationship between assistance in ADL and positive and negative affect. Care recipients' unmet health-care needs moderated the relationships between assistance in ADL and burden, assistance in ADL and negative affect, and emotional support and positive affect. In sum, this study underscores the positive aspects of care-giving as well as care-giving burden and demonstrates that greater attention should be paid to care-givers caring for individuals with unmet health-care needs during public health crises. The results suggest that more-effective responses to public health crises must be developed, especially within health-care systems.

Keywords: positive aspect of care-giving; burden; unmet health-care need; care-giver; Covid-19; psychological wellbeing; public health crisis; United States

Introduction

The trend of accelerated population ageing has triggered a significant demand for geriatric care. The long-term care needs of older adults with functional health limitations are primarily addressed by their informal care-givers. As of 2020, nearly one-fifth of Americans were providing informal care to adults with health or functional needs, and nearly 80 per cent of these informal care-givers were caring for adults aged 50 or above (AARP and National Alliance for Caregiving 2020). Accordingly, informal care-givers are an integral part of America's long-term services and support systems. In terms of economic benefits alone, the estimated value of informal care-giving in 2021 was USD 600 billion (Reinhard et al. 2023).

In acknowledging the contributions of informal care-givers, society has begun to pay more attention to their psychological wellbeing. Enhancing the psychological wellbeing of care-givers not only benefits them personally but also promotes higher quality of care-giving and prevents premature institutionalisation (Beach et al. 2005; Colerick and George 1986). Therefore, it is necessary to establish an effective and comprehensive system to support the psychological wellbeing of care-givers. One way to achieve this is to explore the underlying factors and mechanisms that affect care-givers' wellbeing.

Care-giving activities have long been regarded as primary factors in care-givers' psychological wellbeing (Lawton et al. 1991; Liu et al. 2017). However, studies on the impact of care-giving activities have generated ambiguous results. While care-giving activities can result in both positive and negative appraisals (Lawton et al. 1991), the majority of these studies tend to focus on care-givers' negative appraisals and explore the adverse consequences for their psychological wellbeing (Chiao et al. 2015; Pearlin et al. 1990). More recently, researchers have observed that care-giving can also be a rewarding experience (i.e., positive aspects of care-giving; hereafter, PAC) that enhances care-givers' wellbeing (Lawton et al. 1991; Yu et al. 2018). While scholars have already widely explored care-giving burden, relatively few studies have considered the protective function of PAC, and even fewer have examined how PAC and burden may simultaneously shape care-givers' psychological wellbeing (Chiao et al. 2015; Quinn and Toms 2019). This polarised state of existing research can create bias in terms of understanding the care-giving process and developing and applying related interventions. Therefore, there is a need to explore how PAC and burden may jointly impact care-givers' psychological wellbeing, which requires adopting a strength-based perspective (i.e., PAC) while still acknowledging care-giving's negative aspects (i.e., care-giving burden).

In addition to the mechanisms linking care-giving activities and care-giver outcomes, the care-giving process is intricately woven into the social context (Hill 2015; Pearlin et al. 1990). Public health crises are such contexts that have profound and long-lasting effects not only on the economy, politics and culture but also on individuals – this fact has recently been highlighted by the Covid-19 outbreak. Although informal care-givers already face certain risks (e.g., job loss, infection and social isolation), the spread of Covid-19 exposed them to additional pandemic-related challenges that were specific to their roles (Irani et al. 2021; Walters and Petrakis 2023). Care-givers for older adults with functional health limitations experienced a decline in access to timely geriatric care during the pandemic compared to the pre-pandemic period (Leggett et al. 2021; Zhong et al. 2022). As a result, care-givers took on more care-giving responsibilities to compensate for the lack of formal support for these older adults during the pandemic; additionally, it is also notable that care-givers tended to feel more worried during the pandemic (Irani et al. 2021; Savla et al. 2021). These factors might have caused differences in the levels of care-giver burden, PAC and psychological wellbeing between the pre-pandemic and the pandemic periods (Chyu et al. 2022; Lightfoot et al. 2021; Walters and Petrakis 2023), and even reshaped the care-giving process of informal care-givers. Therefore, it is necessary to identify the comprehensive mechanism linking care-giving antecedents and outcomes during the pandemic and examine whether pandemic-specific factors (e.g., the unmet health-care needs of care recipients) affected this relationship. The results of this study can further guide research and interventions during the pandemic and post-pandemic eras, and inform best practices for more-efficient reactions to future crises.

Therefore, the current study aimed to (1) examine how care-giving activities during the Covid-19 pandemic impacted care-givers' psychological wellbeing through care-giving burden and PAC, and (2) examine whether care recipients' unmet health-care needs during the pandemic moderated this relationship.

Theoretical framework

This study used the two-factor model proposed by Lawton et al. (1991). Based on the stress and coping theory (Lazarus and Folkman 1984; Pearlin et al. 1990), care-giving is viewed as a sequential process in the two-factor model, in which objective stressors (e.g., care recipients' symptoms and dependency) and background factors (e.g., care-giving history, care-givers' health status) trigger care-giving activities; these activities lead to secondary care-giving appraisal, which, in turn, impacts care-giving outcomes (e.g., psychological wellbeing). In addition, within this process, resources (which are commonly defined as 'strengths either within the person or in the external environment') can modify the above mechanism (Lawton et al. 1991, 181).

Notably, while previous theories and studies conceptualised secondary appraisal solely as a care-giving burden (Lazarus and Folkman 1984; Zarit et al. 1980), Lawton et al. (1991) expanded the concept by incorporating its positive aspects. Specifically, in their two-factor model, they suggest that care-giving is a mixed process and that care-givers can have both negative and positive appraisals of care-giving (i.e., burden and PAC). On the one hand, potential conflicts between care-givers' personal needs and care-giving activities, combined with inadequate resources when handling care-giving tasks, can cause care-givers to feel burdened. On the other hand, by engaging in care-giving activities, care-givers fulfil their commitment to their care-giving role and their care-giving recipients. Accordingly, care-givers may experience a sense of uplift or satisfaction, enhanced self-competence and improved relationships with care recipients as a result of providing care – these benefits comprise PAC. The deeper point here is that care-giving activities can affect care-givers' psychological wellbeing through both positive and negative pathways in ways unaccounted for by the aforementioned traditional theoretical model (Lawton et al. 1991).

Care-giving activities and care-givers' psychological wellbeing

Studies on the impacts of care-giving activities on the indicators of psychological wellbeing have yielded mixed findings. Compared with non-care-givers, care-givers –

especially those providing high levels of support – have a higher risk of developing mental and physical health problems (Koyanagi et al. 2018; Moon et al. 2020). However, as suggested earlier, care-giving activities may also enhance care-givers' psychological wellbeing through pathways different from those with negative consequences, and these distinct pathways may exist simultaneously (Lawton et al. 1991; Liu et al. 2017).

Apart from these general findings, there are three major types of care-giving activities, namely, activities of daily living (ADL) assistance, instrumental activities of daily living (IADL) assistance and emotional support (Lou et al. 2015). While these care-giving activities share some similarities in affecting care-givers' psychological wellbeing, subtle differences exist (Bassi et al. 2020; Liu et al. 2017; Lou et al. 2015; Pakenham 2012). With regard to these activities, the literature generally supports the positive association between the provision of emotional support (i.e., from care-givers to care recipients) and the psychological wellbeing of care-givers (Liu et al. 2017; Lou et al. 2015). However, a non-significant association between emotional support and psychological wellbeing was also observed by studies targeting other types of care-givers (e.g., care-givers of adults with multiple sclerosis; Bassi et al. 2020). Furthermore, most relevant studies indicated a negative association between levels of ADL and IADL assistance from care-givers and psychological wellbeing (Liu et al. 2017; Lou et al. 2015; Moon et al. 2020). However, non-significant and positive associations between these variables were also identified in care-giving studies (Bassi et al. 2020; Pakenham 2012; Williams 2005).

In summary, the findings of the direct effects of care-giving activities on psychological wellbeing among care-givers are mixed. This implies the existence of potential mediators and moderators in the care-giving process from care-giving activities to psychological wellbeing, which needs to be further investigated.

The mediating roles of PAC and burden

The two-factor model showed that care-giving activities tend to affect indicators of care-giver psychological wellbeing through various pathways (Lawton et al. 1991). As mentioned earlier, PAC and burden may be two important yet distinct mediators in these pathways, and care-givers can simultaneously experience both burden and PAC due to the difficulties and rewards derived from care-giving activities (Lawton et al. 1991). However, there are few empirical studies examining the mediating roles of burden and PAC in the above two paths simultaneously.

Studies on each path regarding the associations between care-giving activities and appraisals, and appraisals and psychological wellbeing, have generated initial evidence (Del-Pino-Casado et al. 2019; Pakenham 2012; Pinquart and Sorensen 2003; Quinn and Toms 2019). Care-giving activities can affect how care-givers appraise their care-giving situation. While more care-giving activities are related to a higher care-giving burden (Liu et al. 2017; Moon et al. 2020; Pinquart and Sorensen 2003), they can also lead to higher levels of PAC (Huo and Kim 2022; Lawton et al. 1991). Regarding the impacts of different types of care-giving activities, most relevant studies found that ADL assistance, IADL assistance and emotional support were associated with higher levels of burden (Liu et al. 2017; Riedel et al. 1998; Riffin et al. 2017). Moreover, compared with the other two types of care-giving activities, ADL assistance seemed to have a dominant role in affecting care-giving burden (Hvalic-Touzery et al. 2022). Furthermore, to the best of our knowledge, no studies have hitherto examined the impacts of different types of care-giving activities on PAC among care-givers of older adults with functional health limitations simultaneously. One study conducted among care-givers of adults with mental health illness found that the three types of care-giving activities could significantly promote benefit-finding (i.e., a concept similar to PAC; Pakenham 2012), thus providing initial evidence for this study.

PAC and burden are strong predictors of care-givers' psychological wellbeing; specifically, PAC can promote care-giver psychological wellbeing, while burden can worsen it (Del-Pino-Casado et al. 2019; Quinn and Toms 2019). Moreover, psychological wellbeing includes both positive and negative aspects (e.g., positive affect and negative affect; Bradburn 1969; Lawton et al. 1991). Theoretically, PAC and burden are distinctively associated with both positive and negative aspects of care-givers' psychological wellbeing (Kramer 1997; Lawton et al. 1991). Specifically, PAC is associated with positive indicators, whereas burden is associated with negative ones (Kramer 1997). Nevertheless, empirical studies have generated mixed results – while some evidence supports potential differences among the aforementioned paths (Haley et al. 2003), other studies have yielded opposite results, suggesting that both PAC and burden can independently affect the positive and negative aspects of psychological wellbeing (Jiang et al. 2020; Quinn et al. 2019; Williams 2005). Burden might even play a dominant role in affecting psychological wellbeing, regardless of the positive or negative aspects (Liu et al. 2012; Morano 2003).

Therefore, care-giving activities could influence both positive and negative aspects of care-givers' psychological wellbeing through the dual pathways of PAC and burden. All three types of care-giving activities have the potential to enhance PAC during care-giving and, consequently, promote care-givers' psychological wellbeing. However, these activities can also magnify care-giving burden and, in turn, have negative effects on care-givers' psychological wellbeing. Despite this, few studies have simultaneously examined the aforementioned pathways, which may lead to inaccurate conclusions due to overlooking the other side of the picture. Moreover, potential differences may exist among the different types of care-giving activities and the various aspects of care-giving appraisals, which need to be further uncovered.

Furthermore, as mentioned earlier, the care-giving process can be shaped by social contexts. During a public health crisis like the Covid-19 pandemic, care-givers are more likely to experience increased mental health problems than non-care-givers (Chyu et al. 2022). Existing studies have reported that care-giving activities during the pandemic have caused care-givers to more negatively appraise care-giving activities and have worsened care-giver psychological wellbeing (Hvalic-Touzery et al. 2022; McGarrigle et al. 2022; Walters and Petrakis 2023). However, studies have also demonstrated that care-givers still experienced PAC during the pandemic; for example, the pandemic enabled care-givers to work at a slower pace, spend more time with care recipients, and focus more on care-giving (Lightfoot et al. 2021; Tulloch et al. 2022). Therefore, the features of care-giving during the Covid-19 pandemic might be characterised by ambivalence, where care-givers might simultaneously experience relatively high levels of burden and PAC. However, to our knowledge, no study regarding the care-giving process during the pandemic has investigated the coexistence of PAC and burden. In addition, given that care-giving is a contextually sensitive process (Hill 2015; Pearlin et al. 1990), it is also important to examine the care-giving process in the pandemic context by considering the impact of context-specific factors such as unmet health-care needs during this period (Chyu et al. 2022; Leggett et al. 2021).

The moderating role of unmet health-care needs

Unmet health-care needs exist when there are no effective treatments available to promote an individual's health (Allin et al. 2010). Among care recipients, unmet health-care needs have a significant negative impact on wellbeing; moreover, care recipients' unmet health-care needs can also influence care-giver wellbeing by decreasing available supportive resources (Lawton et al. 1991; Monin et al. 2020). During the Covid-19 pandemic, lockdown and quarantine policies prevented older adults with functional health limitations from obtaining timely health care, which negatively affected their physical and mental health (Zhong et al. 2022). In addition to the effects on older adults, scholars have also reported that care-givers were greatly concerned about care recipients' unmet health-care needs during the pandemic (Irani et al. 2021; Walters and Petrakis 2023) and these unmet needs had a detrimental impact on care-givers' psychological wellbeing (Leggett et al. 2021). Despite this, researchers have not yet addressed how care recipients' unmet health-care needs have shaped the care-giving process during the pandemic. In the absence of health-care resources, care-givers had no choice but to preserve the health of the care recipients by intensifying care-giving activities as much as possible. In this case, care-giving activities may have reduced worry among care-givers, which in turn may have improved their psychological wellbeing. However, as mentioned earlier, there is still a lack of evidence and studies need to be conducted to examine the above assumption.

The present study

Based on the above-mentioned theoretical framework and previous literature, this study proposes the following three sets of hypotheses.

First, we hypothesise that PAC plays a significant mediating role in the association between care-giving activities and psychological wellbeing among care-givers of older adults with functional health limitations in the United States during the Covid-19 pandemic. Specifically, the three types of care-giving activities are positively associated with PAC. Moreover, PAC is positively associated with positive affect and negatively associated with negative affect.

Second, we hypothesise that burden played a significant mediating role in the association between care-giving activities and care-giver psychological wellbeing during the Covid-19 pandemic. Specifically, the three types of care-giving activities are negatively associated with care-giver burden. In addition, burden is negatively associated with positive affect and positively associated with negative affect.

Third, we hypothesise that care recipients' unmet health-care needs during the Covid-19 pandemic moderate the associations between care-giving activities and psychological wellbeing. Specifically, compared to care-givers of individuals whose health-care needs were met during the Covid-19 pandemic, care-givers of older adults with unmet health-care needs derived more benefits from their care-giving activities.

Materials and methods

Data

We obtained data from the Covid-19 Supplement of the National Health and Aging Trends Study (NHATS), a nationally representative study targeting Medicare beneficiaries aged 65 years and older in the United States (the data is available from the NHATS website, https://nhats.org/researcher/data-access). Initiated in 2011, NHATS conducts annual surveys to assess age-related changes and their implications (Freedman et al. 2022). After the Round 10 survey (i.e., the 2020 survey of NHATS), the Covid-19 supplementary study was conducted between June 2020 and March 2021. Round 10 survey respondents were eligible to participate as Sample Persons (SP) in this survey. In addition, up to two adult family members and friends who assisted the targeted older adults during the outbreak were invited to participate in a Family Members and Friends (FF) survey, which aimed to evaluate the care-giving experiences, appraisals and wellbeing of informal care-givers during the pandemic. The unweighted response rates for the SP and FF surveys were 82.2 per cent and 65.4 per cent, respectively (Freedman and Hu 2020).

This study's analyses were mainly conducted using the FF results, with supplementary information obtained from the SP results and the NHATS Round 10 survey. The total sample included 2,062 care-givers of 1,365 older adults. After excluding those who provided care for people without health or functional limitations (n = 955), cared for care recipients living in facilities (n = 154) or had missing values for the moderator (i.e., care recipients' unmet health-care needs during Covid-19; n = 47), the final analytic sample included 906 care-givers of 729 older adults with functional health limitations.

Measurements

Dependent variable

The dependent variable in this study was care-giver psychological wellbeing. Following Bradburn (1969)'s measurement method, psychological wellbeing was operationalised as positive and negative affect and measured using a five-point scale (1 = *every day* to 5 = *never*). For positive affect, we reversed, recoded and calculated the mean score of the three items extracted from this scale (i.e., 'During the Covid-19 outbreak, in a typical month, how often have you felt cheerful/calm and peaceful/full of life?'). The higher the score, the higher the level of positive affect ($\alpha = 0.86$). Three other items (which asked the respondents if they were bored, lonely or upset during the pandemic) were employed to assess negative affect ($\alpha = 0.72$). These items were also reverse-coded and an average score was generated, with higher scores indicating more severe negative affect.

Independent variables

The three types of care-giving activities listed in the previous section were selected as the independent variables: ADL assistance, IADL assistance and emotional support

(Lou et al. 2015; Moon et al. 2022). Respondents were asked whether they had helped care recipients with nine ADL items (e.g., bathing, eating and using the toilet) and five IADL items (e.g., doing laundry, preparing meals and shopping for groceries) during the outbreak. As the items were dichotomous variables, with 1 indicating 'yes', we calculated the number of items scored 1 to indicate the level of ADL and IADL support the respondents provided.

Regarding emotional support, we selected a question asking about the frequency with which respondents gave advice, encouragement or emotional support to care recipients. The variable ranged from 1 (*at least daily*) to 5 (*never*) and was reverse-coded, with a higher score indicating more frequent support.

Mediators

PAC and care-giver burden were the two mediators used in this study (Huo and Kim 2022; Liang et al. 2022). Specifically, we measured PAC using the average of four items rated from 1 (*very much*) to 3 (*not so much*). Respondents were asked about the extent to which they agreed that helping care recipients during Covid-19 made them more confident about their abilities, taught them to deal with difficult situations, brought them closer to the care recipients and satisfied them ($\alpha = 0.82$). For convenience, all items were reverse-coded. The higher the score, the more PAC care-givers experienced.

In line with PAC, care-giving burden was generated based on the mean score of another 4-item scale (1 = *very much* to 3 = *not so much*). The scale was also reverse-coded, with higher scores indicating a greater burden. The statements in this scale were: 'I have been exhausted when I have gone to bed at night'; 'I have had more things to do than I can handle'; 'I haven't had time for myself'; and 'As soon as I have gotten a routine going, the NHATS participant's needs have changed'. The Cronbach's α of this scale was 0.79.

Moderator

Care recipients' unmet health-care needs during the pandemic were included as a moderator. During the Covid-19 supplement survey, care recipients were asked 'During the Covid-19 outbreak, has there ever been a time when you needed or had planned to see a doctor or other health-care provider but put off getting care?'. Those who answered 'yes' were categorised into the unmet health-care needs group.

Covariates

Sociodemographic characteristics, including care-giver age, sex (1 = *male*, 0 = *female*), race (1 = *white*, 0 = *other*), marital status (1 = *married or living with a partner*, 0 = *other marital status*), educational achievement (1 = *associate's degree or higher*, 0 = *lower than associate's degree*), total household income in 2019 (1 = *USD 50,000 or more*, 0 = *less than USD 50,000*) and care recipients' age, were selected as covariates in this study.

Additional covariates regarding care-giver and care recipient characteristics, and the relationship between care-givers and care recipients were included. Based on the Round 10 survey, a dummy variable indicating the care recipient's dementia status (probable dementia, possible dementia or no dementia) was derived (Kasper et al. 2013; Skehan and Spillman 2013). The care recipient's level of dependence on ADL and IADL support was generated by counting the number of activities that they had difficulty performing. We also calculated the number of diseases (e.g., heart disease, hypertension, arthritis, diabetes and stroke) with which the care recipient had been diagnosed. Additionally, we assessed care-giver self-rated health (1 = *poor* to 5 = *excellent*) and co-residence status with care recipients during the pandemic (1 = *yes*, 0 = *no*). Two variables were generated for the relationship between care-givers and care recipients: first, a dummy variable denoting the type of relationship, with the spousal care-giver as the reference group (e.g., spousal care-giver, child care-giver or other); second, the quality of the relationship measured by the average scores for items scored using a four-item scale (e.g., enjoy interacting with the care recipient, argue with the care recipient) rated from 1 (*a lot*) to 3 (*a little*). The positive items were reverse-coded, with the higher average scores indicating a better quality of relationship.

Statistical analysis

Descriptive statistics were computed using Stata 16SE. Three pathway models were constructed within the framework of structural equation modelling in Mplus 8.7 to examine the proposed hypotheses (Muthén and Muthén 2017). The relationships between the three types of helping activities and care-giver psychological wellbeing were initially tested after adjusting for covariates. In this model, we used maximum likelihood estimation with robust standard errors to adjust for the nonnormality and non-independence of observations and handle missingness (Yuan and Bentler 2000; Yuan et al. 2012). Subsequently, we examined the mediating roles of PAC and burden by performing bootstrapping with 5,000 replications, with a 95 per cent confidence interval without zero indicating significant mediating effects (Preacher and Hayes 2008). During this process, we used a combination of the maximum likelihood estimator and bootstrapping, which yielded effects similar to the maximum likelihood estimation with robust standard errors (Muthén and Muthén 2017). Finally, a multiple-group analysis was conducted to examine the moderating role of the unmet health-care needs of care recipients during the pandemic (Muthén and Muthén 2017). Model fit was measured using the chi-square value, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR).

In the analytical sample, some care recipients (n = 177) had more than one care-giver. Therefore, considering the nested structure of the data as well as potential observational interdependence, we used the CLUSTER function in Mplus, which can adjust for the non-independence of data due to cluster sampling (Muthén and Muthén 2017). In addition, to obtain nationally representative estimates, all analyses were adjusted for different probabilities of selection and response using survey weights. For further details, please refer to Hu et al. (2021).

Results

Sample characteristics

Table 1 shows the weighted sample characteristics and missingness values (unweighted missingness values are shown in Supplementary Material 1). The weighted analytical

Table 1. Weighted descriptive statistics (weighted n = 12,023,120; unweighted n = 906)

	Percent (%)	Mean (SD)	Missingness (%)
Dependent variables			
Positive affect		3.40 (0.77)	3.6
Negative affect		2.64 (0.83)	3.2
Independent variables			
ADL assistance		2.63 (2.42)	0.0
IADL assistance		2.96 (1.61)	0.0
Emotional support		3.92 (1.13)	2.4
Mediators			
PAC		2.10 (0.59)	10.9
Care-giving burden		1.48 (0.51)	10.1
Moderator			
Unmet health-care needs			0.0
Yes	44.5		
No	55.5		
Control variables			
Care-giver			
Age		60.53 (13.17)	0.6
Sex			0.5
Male	31.1		
Female	68.4		
Race			0.8
White	70.5		
Other	28.6		
Marital status			0.5
Married or living with a partner	65.2		
Other marital status	34.3		
Education			0.5
Lower than associate's degree	52.4		
Associate's degree or higher	47.2		
Household income			10.2
Less than USD 50,000	42.2		
USD 50,000 or more	47.6		
Co-reside with care recipient	51.0		3.6
Type of relationship			0.2
Spouse or partner	24.8		
Child	57.1		

(*Continued*)

Table 1. (*Continued.*)

	Percent (%)	Mean (SD)	Missingness (%)
Other	18.0		
Quality of relationship		2.63 (0.43)	2.0
Self-rated health		3.51 (0.95)	2.1
Care recipient			
Age		80.68 (7.04)	0.0
ADL dependence		2.79 (2.58)	0.0
IADL dependence		2.93 (1.70)	0.0
Number of diseases		3.24 (1.37)	0.0
Dementia status			0.0
Probable dementia	16.0		
Possible dementia	8.7		
No dementia	75.3		

Note: PAC, positive aspects of care-giving; ADL, activities of daily living; IADL, instrumental activities of daily living.

sample in this study represented 12,023,120 care-givers who performed care-giving duties during the Covid-19 pandemic in the United States. The mean ages of the care-givers and their care recipients were 60.53 and 80.68 years, respectively. Among the care-givers, the majority were female (68.4 per cent), white (70.5 per cent), married or living with a partner (65.2 per cent) and co-residing with care recipients during the pandemic (51.0 per cent). Approximately half (47.2 per cent) of the care-givers had earned an associate's degree. Among the care-giver households, 47.6 per cent had an annual income higher than USD 50,000 before the pandemic. The average quality of the relationship between care-givers and care recipients was good (2.63). Children care-givers constituted the main source of care-giving (57.1 per cent), while spouse or partner care-givers accounted for approximately a quarter (24.8 per cent). Additionally, care-givers reported good self-rated health during the pandemic, with an average score of 3.50. Nearly half (44.5 per cent) of the care recipients had unmet health-care needs during the pandemic. Meanwhile, before the pandemic, care recipients reported nearly three types of ADL and IADL dependence on average, and an average of 3.24 diseases. Care recipients without dementia comprised 75.3 per cent of the entire sample.

Regarding care-giving activities, care-givers frequently provided emotional support to care recipients during the pandemic, with nearly 40 per cent of care-givers providing emotional support to care recipients daily. Care-givers helped care recipients with an average of 2.63 ADL and 2.96 IADL activities. More specifically, approximately 60 per cent of the care-givers provided help with fewer than three out of the nine ADL items studied or three or more out of the five IADL items studied.

Furthermore, the average scores for positive and negative affect were 3.40 and 2.64, respectively, indicating that the care-givers' psychological wellbeing was relatively good during the pandemic. In addition, the mean scores for PAC and burden were 2.10 and 1.48, respectively, indicating that care-givers' positive appraisals of care-giving generally outweighed their negative ones.

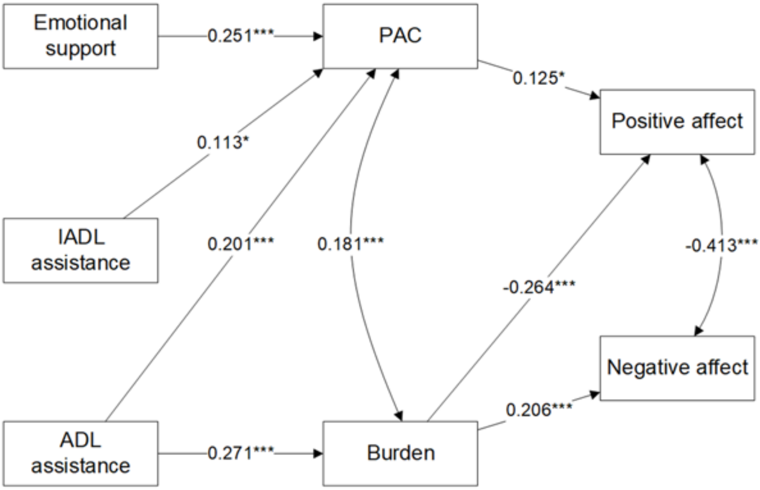

Figure 1. Significant paths from care-giving activities to psychological wellbeing.
Notes: (1) $\chi^2(1) = 0.018$, $p = 0.893$, RMSEA = 0.000, CFI = 1.000, TLI = 1.165, SRMR = 0.000. (2) PAC, positive aspects of care-giving; ADL, activities of daily living; IADL, instrumental activities of daily living. (3) All parameters were standardised.*Significance levels*: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Impacts of care-giving activities

By building a regression model that controlled for covariates, the total effects of care-giving activities were examined. The model fit the data well in this analysis (χ^2 (1) = 0.000, $p = 0.984$, RMSEA = 0.000, CFI = 1.000, TLI = 1.161, SRMR = 0.000). We found a significant relationship between emotional support and care-giver positive affect (b [SE] = 0.076 [0.033], $p < 0.05$), demonstrating that the more emotional support a care-giver provides, the more positive affect he/she would have. Meanwhile, ADL assistance and IADL assistance were not correlated with care-giver positive affect (all $p > 0.05$). Additionally, care-giving activity did not impact negative affect (all $p > 0.05$).

The mediating role of PAC and care-giver burden

After introducing PAC and care-giver burden into the regression model, we further uncovered the direct effects and the indirect effects of PAC and burden. The model fit indices were $\chi^2(1) = 0.018$, $p = 0.893$, RMSEA = 0.000, CFI = 1.000, TLI = 1.165 and SRMR = 0.000, indicating a satisfactory model fit. The standardised parameters for the significant paths are shown in Figure 1.

In terms of positive affect, the results suggested that PAC played a significant mediating role in the relationship between emotional support and positive affect ($b = 0.021$, 95% CI = [0.002, 0.047]). Although the total and direct effects of assistance with ADL were non-significant, the indirect effects of burden and PAC were significant but opposite (burden: $b = -0.021$, 95% CI = [−0.035, −0.010]; PAC: $b = 0.007$, 95% CI = [0.001, 0.017]), suggesting a cancelled effect in the previous regression model. Despite the non-significant total effect, the paths from assistance with IADL to positive affect were also significant through PAC but non-significant through burden (PAC: $b = 0.007$, 95% CI = [0.000, 0.016]; burden: $b = 0.005$, 95% CI = [−0.008, 0.019]). Regarding negative affect, the results suggested that only the pathway of ADL assistance–burden–negative affect was significant ($b = 0.018$, 95% CI = [0.008, 0.031]). A summary of the total effects, the total indirect effects, the single indirect effects and the direct effects is provided in Table 2.

Table 2. Total effect, direct effect and indirect effect (weighted n = 12,023,120; unweighted n = 906)

Paths	Estimate	[95% CI]
ADL assistance – positive affect		
Total effect	−0.004	[−0.036, 0.028]
Direct effect	0.010	[−0.022, 0.041]
Indirect effect		
Total indirect	−0.014	[−0.028, − 0.001]
ADL assistance → PAC → positive affect	0.007	[0.001, 0.017]
ADL assistance → burden → positive affect	−0.021	[−0.035, − 0.010]
IADL assistance – positive affect		
Total effect	−0.023	[−0.071, 0.031]
Direct effect	−0.035	[−0.082, 0.019]
Indirect effect		
Total indirect	0.012	[−0.003, 0.028]
IADL assistance→ PAC → positive affect	0.007	[0.000, 0.016]
IADL assistance → burden → positive affect	0.005	[−0.008, 0.019]
Emotional support – positive affect		
Total effect	0.076	[0.010, 0.143]
Direct effect	0.066	[−0.005, 0.132]
Indirect effect		
Total indirect	0.010	[−0.014, 0.040]
Emotional support → PAC → positive affect	0.021	[0.002, 0.047]
Emotional support → burden → positive affect	−0.011	[−0.030, 0.005]
ADL assistance – negative affect		
Total effect	0.015	[−0.018, 0.049]
Direct effect	0.001	[−0.033, 0.036]
Indirect effect		
Total indirect	0.014	[0.002, 0.027]
ADL assistance→ PAC → negative affect	−0.004	[−0.013, 0.002]
ADL assistance → burden → negative affect	0.018	[0.008, 0.031]
Assistance with IADL– negative affect		
Total effect	−0.050	[−0.103, 0.003]

(*Continued*)

Table 2. (*Continued.*)

Paths	Estimate	[95% CI]
Direct effect	−0.042	[−0.094, 0.009]
Indirect effect		
Total indirect	−0.008	[−0.021, 0.005]
IADL assistance→ PAC → negative affect	−0.003	[−0.011, 0.002]
IADL assistance→ burden → negative affect	−0.005	[−0.016, 0.007]
Emotional support – negative affect		
Total effect	−0.017	[−0.087, 0.050]
Direct effect	−0.016	[−0.086, 0.054]
Indirect effect		
Total indirect	−0.001	[−0.027, 0.022]
Emotional support → PAC → negative affect	−0.011	[−0.031, 0.007]
Emotional support → burden → negative affect	0.009	[−0.004, 0.025]

Note: PAC, positive aspects of care-giving; ADL, activities of daily living; IADL, instrumental activities of daily living.

In addition, by adding covariance, we found a significant positive relationship between PAC and burden, meaning that higher levels of PAC correlated with higher levels of burden (b [SE] = 0.042 [0.010], $p < 0.001$). A negative correlation was found between positive and negative affect (b [SE] = −0.185 [0.024], $p < 0.001$).

The moderating role of care recipients' unmet health-care needs during Covid-19

We examined the moderating role of care recipients' unmet health-care needs using multiple-group analyses. First, we conducted a freely estimated model by allowing all the parameters to vary across the two groups. The results indicated a satisfactory model fit: $\chi^2(17) = 15.261$, $p = 0.577$, RMSEA = 0.000, CFI = 1.000, TLI = 1.030 and SRMR = 0.012. Subsequently, we examined whether constraining one path between the two groups would significantly worsen the model fit. Paths in the two groups were constrained to be equal sequentially, and the results showed that the model fit could be decreased only by constraining the effects of assistance with ADL to care-giving burden (χ^2 difference = 10.212, df = 1, $p < 0.01$), ADL assistance to negative affect (χ^2 difference = 4.260, df = 1, $p < 0.05$) or emotional support to positive affect (χ^2 difference = 8.320, df = 1, $p < 0.01$).

Therefore, we built a final model to examine the potential discrepancies between the two groups by constraining all paths except the above three to be equal. Model fit was adequate: $\chi^2(31) = 28.198$, $p = 0.611$, RMSEA = 0.000, CFI = 1.000, TLI = 1.026 and SRMR = 0.020. The results showed that providing emotional support would promote positive affect only among care-givers whose care recipients had unmet health-care needs (yes: b [SE] = 0.135 [0.042], $p < 0.01$; no: b [SE] = 0.016 [0.038], $p = 0.672$; Wald test: $\chi^2(1) = 5.201$, $p < 0.05$). While assistance with ADL contributed to higher levels of care-giving burden, the significance and effect size were more remarkable among care-givers who cared for individuals with unmet health-care needs (yes: b

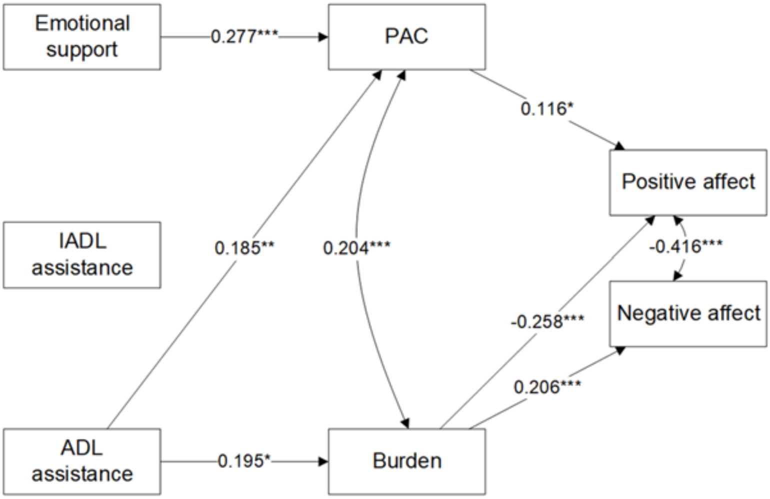

Figure 2. Final model for care-givers caring for individuals whose health-care needs were met.
Notes: (1) $\chi^2(31) = 28.198$, $p = 0.611$, RMSEA = 0.000, CFI = 1.000, TLI = 1.026, SRMR = 0.020. (2) PAC, positive aspects of care-giving; ADL, activities of daily living; IADL, instrumental activities of daily living. (3) Only significant paths were included. (4) All parameters were standardised.*Significance levels*: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

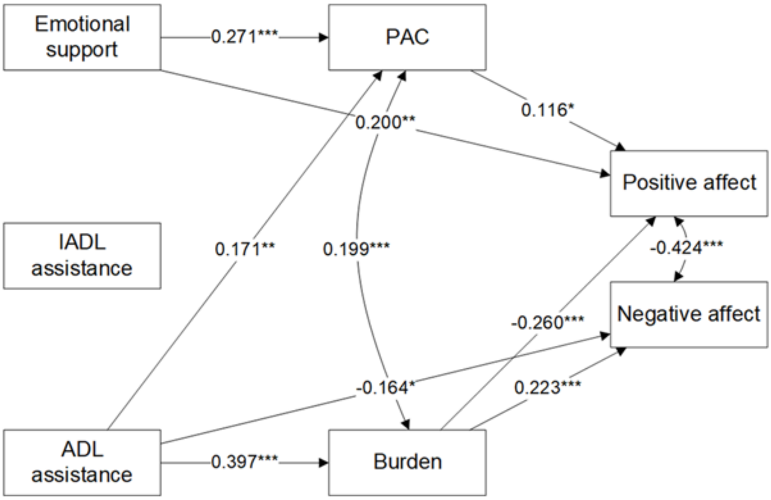

Figure 3. Final model for care-givers caring for individuals with unmet health-care needs.
Notes: (1) $\chi^2(31) = 28.198$, $p = 0.611$, RMSEA = 0.000, CFI = 1.000, TLI = 1.026, SRMR = 0.020. (2) PAC, positive aspects of care-giving; ADL, activities of daily living; IADL, instrumental activities of daily living. (3) Only significant paths were included. (4) All parameters were standardised.*Significance levels*: $^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

$[SE] = 0.086$ [0.017], $p < 0.001$; no: b $[SE] = 0.039$ [0.017], $p < 0.05$; Wald test: $\chi^2(1) = 4.408$, $p < 0.05$). Notably, although no significant relationship was found between ADL assistance and negative affect in the above mediation model, the results of the multiple-group analysis indicated that in the group with unmet health-care needs, ADL assistance significantly mitigated negative affect (yes: b [SE] = −0.052 [0.024], $p < 0.05$; no: b [SE] = 0.026 [0.020], $p = 0.195$; Wald test: $\chi^2(1) = 7.778$, $p < 0.01$). The final models for these two groups are shown in Figures 2 and 3, respectively.

Discussion

In the present study, we examined the relationship between care-giving activities and care-givers' psychological wellbeing during the Covid-19 pandemic and the mediating effects of care-givers' positive and negative appraisals of care-giving (i.e., PAC and burden). We further uncovered potential differences between care-givers who cared for individuals with unmet health-care needs. The results indicated that PAC played a significant mediating role in the relationship between all three types of care-giving activities and positive affect; meanwhile, burden significantly mediated the relationship between ADL assistance and both positive and negative affect. For care-givers who cared for individuals with unmet needs, providing emotional support directly enhanced positive affect. The results also suggested that while assisting individuals with unmet health-care needs with ADL can increase the care-giving burden, it can also directly mitigate depressive symptoms. Instead of viewing care-giving as a stressful process, this study acknowledged that care-givers can experience both PAC and a sense of burden, especially in the context of a public health crisis. The findings of our study will contribute to the development of interventions to improve responses, including health-care system responses, to public health crises.

More specifically, in this study, we first differentiated the impacts of different types of care-giving activities to clarify the nuanced roles of each type of activity, thus providing evidence for the development of tailored interventions. First, in line with previous studies and our hypotheses (Hvalic-Touzery et al. 2022; Lawton et al. 1991; Pakenham 2012), we found that ADL assistance can simultaneously increase PAC and care-giving burden, confirming that informal care-givers can positively and negatively appraise their care-giving situation at the same time. This could also explain the non-significant total effect of ADL assistance on positive affect. In other words, although ADL assistance can increase the care-giver's sense of burden and, in turn, weaken their positive affect, it can also increase PAC, which protects positive affect. These findings underscore the ambivalent nature of ADL assistance, in which the two opposing effects cancel each other out, making the total effect non-significant.

We also found that emotional support was positively related to PAC. When care-givers provide care recipients with emotional support, they may experience a closer emotional bond – an essential component of PAC (Yu et al. 2018). In addition, providing older adults with emotional support may help care-givers find meaning in and benefit from the care-giving process (Liu et al. 2017; Pakenham 2012), which contribute to PAC. Furthermore, IADL assistance had a positive impact on care-giver PAC, although this effect was less salient. These results indicate that increases in the three types of care-giving activities increased PAC during the pandemic. However, in contrast to our initial hypotheses, we did not find significant impacts of emotional support and IADL assistance on burden. Although some previous studies suggested that these two types of care-giving activities were negatively associated with care-giver burden (Liu et al. 2017; Riedel et al. 1998), this finding supported previous evidence that suggested the dominant role of ADL assistance (Hvalic-Touzery et al. 2022). One potential explanation for this might be the specific context of the Covid-19 pandemic. As noted earlier, during the pandemic, care-givers might be able to spend more time handling care-giving activities, have more flexibility regarding their care-giving arrangement and focus more on the care-giving role compared to the pre-pandemic period (Lightfoot et al. 2021; Tulloch et al. 2022). In this case, activities that do not require a timely response (i.e., IADL assistance and emotional support) might be less overwhelming and, therefore, less burdensome for care-givers.

Regarding the relationship between care-giving appraisal and care-giver psychological wellbeing, we found that care-giving burden can negatively impact both positive and negative affect, while PAC improves only positive affect. This finding is partially consistent with previous theoretical and empirical evidence, suggesting that PAC may be associated only with positive outcomes (Haley et al. 2003; Kramer 1997). Meanwhile, in line with previous studies suggesting the dominant role of care-giving burden (Liu et al. 2012; Morano 2003), care-giving burden emerged as a pivotal factor in care-giver psychological wellbeing during the pandemic, because it had larger impacts on both negative and positive affect compared to PAC.

We observed that unmet health-care needs significantly moderated the direct effects of ADL assistance on negative affect and of emotional support on positive affect, which partially supports our hypothesis. Put differently, compared with care-givers of care recipients whose health-care needs were met, we found that ADL assistance mitigated negative affect and providing emotional support enhanced positive affect among care-givers of individuals with unmet health-care needs. This may be because during a public crisis, such as the Covid-19 pandemic, care-givers may become worried due to the loss of previously available supportive resources (Irani et al. 2021; Savla et al. 2021). Meanwhile, in response to the care recipients' needs, care-givers could respond only by providing care-giving activities. Under these circumstances, providing care-giving activities can serve as a means to compensate for reduced support, occupy care-givers and empower them to take action to alleviate worry (Irani et al. 2021). Therefore, care-giving activities directly promoted care-givers' psychological wellbeing. In addition to our original hypothesis, we found that care-givers who provided higher levels of ADL assistance to individuals with unmet health-care needs experienced a higher sense of burden. This finding highlights the need to pay more attention to this group during public health crises. Moreover, the above results also indicate that care-giving burden may have a suppression effect. In other words, ADL assistance can exacerbate negative affect by increasing care-giver burden and simultaneously directly relieve negative affect among care-givers of individuals with unmet health-care needs. This suggests that although helping a care recipient with ADL can be exhausting and time-consuming, it can also create psychological benefits. However, the underlying mechanism remains unclear, and the result might vary according to different outcome variables.

This study also revealed a surprising finding. Although the relationship between PAC and burden remains uncertain, most previous studies have shown that they have a non-significant or negative relationship (Lawton et al. 1991; Quinn and Toms 2019; Riedel et al. 1998). However, this study found that they have a significant positive relationship – that is, the more PAC a care-giver enjoyed, the higher the care-giver's perceived burden. We assume that this result may be due to the specific context of the public health crisis. The Covid-19 pandemic caused care-givers and care recipients to face primary life threats, increased care-giving responsibility and decreased formal support; these changes ultimately increased the burden of care-giving (Chyu et al. 2022; Hvalic-Touzery et al. 2022). However, when care-givers can successfully handle such challenges and independently manage their care-giving burden, they may feel affirmed and as if they have fulfilled their responsibilities. These feelings may be interpreted as 'hardship rewards' and, therefore, as facilitating PAC (Lou et al. 2015; Riedel et al. 1998). In addition, in such a stressful environment and given a high care-giving burden, care-givers may try to find PAC as a coping or self-care strategy (Folkman 2008; Walters and Petrakis 2023). Specifically, when care-givers experience high burdens and cannot obtain external support, discovering PAC in their care-giving activities may help them balance their feelings and protect themselves from the negative psychological effects of a high care-giving burden. Moreover, PAC, such as stronger relationships and high levels of satisfaction, may also make care-givers more motivated and willing to take on more care-giving duties (Zarzycki and Morrison 2021). However, it is important to remember that over-investment in care-giving responsibilities can increase the care-giving burden (Zarzycki and Morrison 2021). This may be the reason increases in PAC and burden are correlated.

Limitations

Despite this study's contributions, it had some limitations. First, because we used cross-sectional data, we could not derive causal inferences. Second, although the effectiveness of the measurements used to collect the secondary data we analysed was verified by previous studies (Huo and Kim 2022; Liang et al. 2022), future studies would do well to use more validated scales to better capture the comprehensiveness of the concepts. Finally, this study did not identify the long-term effects of the pandemic on care-giving; future studies should conduct follow-up surveys targeting care-givers to uncover how care-giving trajectories may be more specifically affected by public health crises over the long term, which would offer insights into crucial antecedents that can guide prevention and interventions.

Implications

This study has several implications for social work practice and policy. First, it is of great importance for social workers or therapists to acknowledge the coexistence of PAC and burden, and to design comprehensive interventions to help care-givers obtain more PAC from their care-giving activities while mitigating their burdens. Second, it highlights the importance of providing additional attention and support to care-givers caring for individuals with unmet health-care needs during a public crisis. Future public policies need to develop a more comprehensive system to respond to public health crises and ensure that the needs of certain groups with special needs can be met. Flexible alternatives may be another method for supplementing health-care resources during public crises. For instance, telehealth or other types of remote health care could be developed to address care recipients' basic and most urgent needs, which may be an effective method for promoting the wellbeing of both care-givers and care recipients. Finally, ADL assistance was more closely related to care-giving burden than to other types of care-giving activities. Therefore, corresponding supportive interventions, especially online interventions, need to be designed to enhance care-givers' abilities to carry out such activities to mitigate the negative effects.

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