


# Coping and anxiety symptoms in family carers of dependent older people: Mediation and moderation effects of subjective caregiver burden

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## Abstract

**Introduction:** Coping responses influence anxiety symptoms experienced by informal carers. However, only a few studies have investigated the longitudinal association between coping responses and anxiety symptoms in family carers. We also currently have limited knowledge on the mediating or moderating influence of subjective caregiver burden on this relationship over time. The aim of the present study was to investigate the longitudinal relationship between coping and anxiety symptoms in family carers of dependent older people, and examine the mediating or moderating role of subjective caregiver burden over time.

**Design:** Prospective longitudinal study.

**Methods:** We recruited and enrolled participants from a probability sample of 132 family carers of older dependent relatives. We measured coping strategies, anxiety symptoms, subjective caregiver burden, and several covariates (sex and intensity of care) at baseline and at 1-year follow-up. We used generalized estimating equations with multiple imputations to examine associations over time.

**Results:** Considering both direct and indirect effects through subjective burden, anxiety symptoms were positively associated with proactive coping ( $B=0.13$ ), planning ( $B=0.15$ ), self-distraction ( $B=0.24$ ), denial ( $B=1.15$ ), venting ( $B=0.94$ ) and self-blame ( $B=0.90$ ), and negatively associated with positive reframing ( $B=-0.83$ ) and acceptance ( $B=-0.75$ ). Subjective caregiver burden moderated the relationship between anxiety symptoms and planning, and the use of denial as a form of coping.

**Conclusions:** Our results show that subjective caregiver burden is an important moderator and mediator of the longitudinal association between coping responses and anxiety symptoms in carers.

**Clinical Relevance:** Proactive coping and planning when subjective burden is low, self-distraction, denial, venting, and self-blame significantly increase levels of anxiety and caregiver burden in carers over time. Acceptance and positive reframing however as coping responses are associated with lower levels of anxiety and caregiver burden

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long-term. Our findings highlight the need for a multi-dimensional approach in future caregiving interventions.

#### KEYWORDS

anxiety, coping, family carers, mediation, moderation, older relatives, subjective caregiver burden

## INTRODUCTION

By 2050, the number of people aged 65 years and over is expected to rise to 26% of the global population (Organisation for Economic Co-operation and Development, 2021). For many older people, living longer is associated with frailty and health-related concerns (European Commission, 2021) and increasing daily care needs (Bom et al., 2018). This means that family members often presume primary responsibility for caregiving (Eurostat Statistics Explained, 2022), with the demands for informal care expected to rise sharply in the next decades (European Commission, 2018). Despite informal caregiving being a rewarding experience, it can pose significant challenges to family carers increasing risk of psychiatric distress (Jansen et al., 2018; Loh et al., 2017; Sallim et al., 2015).

### Anxiety symptoms and coping in carers

Several decades of research have shown that informal caregiving is a significant source of psychological distress, with high levels of depression and anxiety being very common (Jansen et al., 2018; Loh et al., 2017; Sallim et al., 2015). It is currently estimated that around 21%–43% of family carers experience clinically significant symptoms of anxiety (Jansen et al., 2018; Loh et al., 2017; Sallim et al., 2015), representing an important public health concern (Sallim et al., 2015). Anxiety remains understudied in family carers, with very few studies evaluating which mechanisms influence or modify the risk of experiencing high levels of anxiety symptoms (Del-Pino-Casado et al., 2021).

Several influential theoretical models such as the Lazarus and Folkman (1984) stress and coping theory have emphasized how coping responses influence carers' anxiety levels. Coping has been defined as the constantly changing cognitive and behavioral efforts by individuals to handle specific external and/or internal demands perceived to be exceeding their current resources (Folkman et al., 1986). Although several coping styles have been identified and studied over the years, coping has been traditionally classified across three dimensions known as problem-focused, emotion-focused, and dysfunctional coping (Carver et al., 1989). Problem-focused coping are responses aimed at directly addressing the problem by finding solutions (by resolving or re-evaluating a problem situation), whereas emotion-focused coping aims at regulating negative emotions associated with a stressful and demanding

situation (Del-Pino-Casado et al., 2011). Dysfunctional or passive coping responses have long been considered as the least helpful coping strategies in stressful situations, representing attempts by individuals to avoid, disengage, or deny a stressful situation (Del-Pino-Casado et al., 2011).

Although several studies to date have evaluated the association between coping and symptoms of anxiety in informal carers (Del-Pino-Casado, Serrano-Ortega, et al., 2019; Parveen et al., 2014), most have used cross-sectional designs (Pérez-Ordóñez et al., 2016; Rahnama et al., 2017; Yu et al., 2018). As a result, longitudinal investigations examining the association between anxiety symptoms and coping responses in carers remain substantially limited, with little knowledge on the mechanisms that may explain this relationship (Del-Pino-Casado, Serrano-Ortega, et al., 2019; Li et al., 2014). This means that it currently remains unknown whether the cross-sectional association of carers' anxiety symptoms and coping responses translates into adverse outcomes over time. Longitudinal follow-up studies however can be informative in quantifying relationships over time, and identifying mechanisms that may be particularly helpful to target in future caregiving interventions.

### Subjective caregiver burden as a mediator or moderator of the relationship between anxiety symptoms and carer coping

Another important adverse outcome directly relevant to informal carers' mental health is subjective caregiver burden (van der Lee et al., 2014). Both cross-sectional and longitudinal studies have shown that caregiver burden negatively influences carer outcomes (Del-Pino-Casado et al., 2021; Del-Pino-Casado, Rodriguez Cardosa, et al., 2019), with several reviews showing that coping influences carers' experiences of subjective caregiver burden (Del-Pino-Casado et al., 2011). The mediating or moderating effects however of levels of subjective caregiver burden on the association between anxiety and coping strategies in carers have not been systematically investigated (e.g., Garcia-Alberca et al., 2012).

Mediating or interaction effects occur when an antecedent variable (a coping strategy) has an indirect effect on an outcome variable (anxiety symptoms) through a mediator variable (subjective caregiver burden), whereas moderation effects take place when the relationship between two variables (a coping strategy and anxiety symptoms) varies according to the values of the

moderator variable (subjective caregiver burden) (MacKinnon & Luecken, 2008). Investigating whether caregiver burden mediates the association between anxiety symptoms and coping responses employed by carers over time may provide a better understanding of the factors influencing carer anxiety symptoms as well as identifying how much of the association between coping and anxiety symptoms is mediated by experiences of subjective caregiver burden.

Examining whether caregiver burden moderates or mediates the relationship between coping and carer anxiety may help identify which carers are more likely to be affected by high levels of anxiety and tailor future caregiving interventions accordingly (Kraemer et al., 2008). Understanding therefore the combined influence of levels of subjective caregiver burden and coping on carers' anxiety symptoms can provide important information for shaping future interventions. The aim of the present study was to analyze the longitudinal relationship between coping and anxiety symptoms in family carers of dependent older people, by examining the possible mediating or moderating role of subjective caregiver burden on this relationship over time.

## DESIGN, MATERIALS AND METHODS

### Study design

Prospective longitudinal study with 1-year follow-up.

### Setting and sample

We recruited primary carers of dependent older adults living in the region of Jaén, located in Andalusia, Spain. Our sampling frame for the study included a population of over 4645 family carers. Inclusion criteria were as follows: (1) being the primary carer of a dependent person aged 65 years or over needing assistance and support with at least one area of activities of daily living, and (2)  $\geq 18$  years of age, with family ties to the person they provided care for. Participants were selected by random sampling with fixation by population center. The estimated sample size was calculated in order to achieve a statistical power of 91% to detect at least the equivalent of a mean difference of 1.6 with a standard deviation of 2.7 and a significance level of 5%, using generalized estimating equations (GEE) analysis (calculations with PASS 2021; NCSS LLC, Kaysville, Utah, USA). This analysis yielded a sample size of 132.

Eighty-one carers completed follow-up measures, yielding a statistical power of 81%. Reasons for loss to follow-up ( $n=51$ ) included: death of the care recipient (33), admission to residential care (9), refusal of care by the care recipient (6), transfer of the care recipient to another location (2), and caring for more than one care recipient for the informal carer (1). Participants in this study were similar to those in previous caregiving studies in the Mediterranean region (Del-Pino-Casado et al., 2017), which generally tend to be female, hold positive attitudes toward the

provision of care of older relatives, and have limited participation in the labor market or access to formal support (Kraus et al., 2010; OECD, 2005).

### Procedure

All participants were contacted by telephone, and provided informed consent. All data were collected by conducting one-to-one individual interviews. A pilot study comprising of 20 participants was conducted at the beginning of the study in order to evaluate and modify the interview protocol as appropriate.

Both studies were approved by the Research Ethics Committee of the province of Jaén Spain (reference number: 2706201306).

### Measures

#### Dependent variable: Anxiety symptoms

Anxiety symptoms were measured using the Goldberg Anxiety Subscale (Goldberg et al., 1988). The scale comprises nine dichotomous items (yes/no), detecting the presence of anxiety symptoms. The scale has good internal and external validity in Spanish (Montón Franco et al., 1993), with higher scores indicating more severe symptoms. Cronbach's alpha in our sample was 0.83. We used the well-established cutoff of  $\geq 4$  points as indicative of clinically significant anxiety symptoms (Goldberg et al., 1988).

#### Independent variable: Coping strategies

Coping strategies were assessed by the Brief COPE (Carver, 1997), a widely used scale comprising 14 subscales that assesses planning, proactive coping, acceptance, humor, positive reframing, religion, emotional support and instrumental support seeking, self-distraction, denial, self-blame, venting, substance use, and behavioral disengagement. Scores on each subscale range from 2 to 8 with higher scores indicative of higher use of each strategy. The Brief COPE has high validity in Spanish (Crespo & Cruzado, 1997). Cronbach's alpha for the different coping subscales in our sample ranged from 0.62 (planning) to 0.94 (substance use).

#### Mediator and moderator variable: Subjective caregiver burden

Subjective caregiver burden was evaluated using the Caregiver Strain Index (Robinson, 1983), consisting of 13 questions with dichotomous answers. Scores range from 0 to 13, with a score of  $\geq 7$  indicative of high levels of burden. The scale has demonstrated strong validity in Spanish (López Alonso & Moral Serrano, 2005). Cronbach's alpha in this study was 0.78.

## Covariates

Sex (male/female) and objective caregiver burden were assessed as covariates. Objective caregiver burden was assessed by intensity of care provision (frequency and complexity), measured by the DeCuida Questionnaire (Serrano-Ortega et al., 2015), comprising 10 questions corresponding to Barthel Index items (Mahoney & Barthel, 1965). Intensity of care for each need was calculated by multiplying the dependency level (theoretical score of the Barthel Index minus the real score) by the frequency of care for each need (0=never to 5=always), with total score ranging from 0 to 100 (Cronbach's alpha=0.86). Higher scores in this scale are indicative of provision of high-intensity care.

## Statistical analysis

We used central tendency and percentages to describe our quantitative and qualitative study variables. We used differences in means (*t*-test or Mann-Whitney *U* test) and percentages (Pearson's chi-square test) to examine differences between participants who remained in the study versus those who were lost. We used multivariate analysis and specifically GEE, a widely used method in longitudinal studies with repeated measurements (Liu & Colditz, 2017), adjusting for covariates (sex and intensity of care), to examine the association between carers' anxiety symptoms, coping responses, and subjective caregiver burden.

To analyze mediation effects of subjective caregiver burden, we used the Sobel test (Sobel, 1982) from GEE analysis outputs, and for examining moderating effects, we utilized interaction or product terms between coping strategies and subjective caregiver burden (Hayes, 2022). Mediation and moderation analyses were also adjusted for covariates (sex and intensity of care). We used multiple imputation methods, by generating five sets of data (Rubin, 1987), using the automatic option in the Statistical Package for Social Sciences (SPSS), which allowed us to correct for attrition bias. GEE analyses were conducted by combining the five data sets generated. All analyses were performed using SPSS, version 24.0 (IBM Corp.). We used a significance level of 5%.

## RESULTS

### Sample demographics

Table 1 shows descriptive statistics of our sample. The average age for informal carers was 56.3 years, and 85.2 years for care recipients. 86.4% of carers and 75.8% of care recipients were female, with the most frequent caregiving relationship of the primary carer being a daughter/son (74.2%). The most frequent cause of dependency of care recipients was frailty (76.5%) followed by cognitive impairment (11.4) and cancer (7.6%). Table 2 presents descriptive statistics for the main study and control variables at baseline (T1).

TABLE 1 Characteristics of the sample.

Variable	M	SD	N	%
Carer age	56.27	11.75		
Carer sex				
Female			114	86.40
Male			18	13.6
Relationship				
Daughter/son			98	74.2
Spouse			17	12.9
Daughter/son-in-law			6	4.5
Other			11	8.3
Care recipient age	85.20	6.20		
Co-residence				
Yes	92	69.7		
No	40	30.3		
Duration of caregiving (years)	9.2	7.9		
Employment status				
Employed			20	15.2
Not employed			112	84.8
Care recipient sex				
Female			100	75.8
Male			32	24.2
Cause of dependency				
Frail older people			101	76.5
Cognitive impairment			15	11.4
Cancer			10	7.6
Other			6	4.5

Abbreviations: %, percentage of each category; M, mean; N, number of persons in each category; SD, standard deviation.

Table 3 presents differences between study variables in participants remaining in the study versus those that were lost, showing no statistically significant differences in any of the study variables between the two groups. The point prevalence of clinically significant anxiety symptoms at baseline was 53.4% (95% CI: 44.1%–61.9%), with cumulative incidence at 1-year follow-up 20.0% (95% CI: 6.4%–33.6%).

### Mediation analyses

#### Direct effects of coping strategies on anxiety symptoms

Our GEE analyses showed that anxiety symptoms were significantly associated with the following coping strategies: positive reframing (Coefficient [*B*] = -0.61, *p* < 0.01), acceptance (*B* = -0.38, *p* < 0.05), denial (*B* = 0.73, *p* < 0.01), venting (*B* = 0.70, *p* < 0.01), and self-blame (*B* = 0.73, *p* < 0.01) (see Table 4, direct effects). The same analyses

TABLE 2 Main study variables at baseline (T1).

Variable	Scales	M	SD	95% CI
Anxiety symptoms	Goldberg	4.06	2.93	3.18–4.98
Brief COPE subscales	Brief COPE			
Proactive coping		5.37	1.765	5.05–5.68
Planning		5.05	1.876	4.72–5.38
Positive reframing		6.22	1.644	5.93–6.51
Acceptance		7.25	1.252	7.03–7.47
Humor		2.98	1.166	2.78–3.19
Religion		5.48	2.097	5.11–5.85
Emotional support		5.48	1.858	5.15–5.80
Instrumental support		4.73	1.675	4.43–5.03
Self-distraction		4.41	1.621	4.13–4.70
Denial		3.22	1.314	2.99–3.45
Venting		3.75	1.282	3.53–3.98
Substance use		2.13	0.506	2.04–2.22
Behavioral disengagement		2.38	0.828	2.23–2.53
Self-blame		3.43	1.417	3.18–3.68
Subjective burden	Caregiver Strain Index	5.39	3.16	4.02–5.98
Intensity of care	DeCuida	56.33	27.9	51.52–61.13

Abbreviations: CI, confidence interval; M, mean; SD, standard deviation.

also showed that female carers experienced higher levels of anxiety symptoms compared with males ( $B = 1.53$ ,  $p < 0.05$ ).

### Mediating effect of levels of subjective caregiver burden on the association between carers' coping responses and anxiety symptoms

Mediation analyses (see Table 4) showed that subjective caregiver burden mediated the relationship between the following coping strategies and anxiety symptoms (see  $p$ -values of the Sobel test between parenthesis): proactive coping ( $p = 0.04$ ), planning ( $p = 0.013$ ), positive reframing ( $p = 0.013$ ), acceptance ( $p = 0.001$ ), self-distraction ( $p = 0.006$ ), denial ( $p = 0.011$ ), venting ( $p = 0.001$ ), and self-blame ( $p < 0.008$ ), with both direct and indirect statistically significant effects.

### Total effects of coping strategies on anxiety symptoms

Considering both direct and indirect effects through subjective caregiver burden (Table 4), anxiety symptoms were positively associated with proactive coping ( $B = 0.13$ ), planning ( $B = 0.15$ ), self-distraction ( $B = 0.24$ ), denial ( $B = 1.15$ ), venting ( $B = 0.94$ ), and self-blame ( $B = 0.90$ ), and negatively associated with positive reframing ( $B = -0.83$ ), and acceptance ( $B = -0.75$ ). Thus, when coping strategies increase by 1 point (16.7%), anxiety symptoms increase 1.5% for proactive coping, 1.7% for planning, 2.7% for self-distraction, 12.7% for denial, 10.5% for venting, and 10.0% for

self-blame, and decrease 9.2% for positive reframing, and 8.45% for acceptance.

### Moderation analyses

Further analyses examining the moderation effect of subjective caregiver burden indicated that subjective caregiver burden had a moderating effect on the relationship of both planning ( $p$ -value of interaction term  $< 0.01$ ) and denial ( $p < 0.05$ ) and anxiety symptoms, but not for other coping strategies. As can be seen in Figure 1, planning was slightly positively related to anxiety symptoms when levels of subjective caregiver burden were low, and negatively related to symptoms of anxiety when levels of subjective caregiver burden were high. Denial was positively related to anxiety symptoms, but this relationship was higher when subjective burden was low than when levels of subjective burden were high (Figure 2).

## DISCUSSION

This study is the first to report on the mediating and moderating effects of subjective caregiver burden on the association between coping and anxiety symptoms in carers of older dependent people over time. Our results have shown that levels of subjective caregiver burden mediate the longitudinal relationship between coping and carers' anxiety symptoms. We found that this effect applied for several coping strategies over time, strengthening the importance of coping responses in understanding carers' psychological health. We found that

TABLE 3 Differences (means or percentages) between the initial (T1) and final sample (T2) across all study variables.

Variables	Remaining	Dropping out	p-value
Anxiety symptoms	3.79	4.51	0.163 <sup>a</sup>
Proactive coping	3.44	3.57	0.603 <sup>a</sup>
Planning	5.22	5.80	0.090 <sup>a</sup>
Positive reframing	4.86	5.51	0.054 <sup>a</sup>
Acceptance	6.20	6.18	1.000 <sup>a</sup>
Humor	7.31	7.18	0.404 <sup>a</sup>
Religion	2.85	3.18	0.174 <sup>a</sup>
Emotional support	5.44	5.74	0.438 <sup>a</sup>
Instrumental support	5.38	5.70	0.313 <sup>a</sup>
Self-distraction	4.65	4.98	0.203 <sup>a</sup>
Denial	4.38	4.49	0.589 <sup>a</sup>
Venting	3.06	3.47	0.082 <sup>a</sup>
Substance use	3.81	3.65	0.413 <sup>a</sup>
Behavioral disengagement	2.12	2.12	0.946 <sup>a</sup>
Self-blame	2.33	2.51	0.214 <sup>a</sup>
Subjective burden	5.20	5.69	0.386 <sup>a</sup>
Intensity of care	55.16	58.18	0.594 <sup>a</sup>
Sex			
Female	84.0%	90.20%	0.309 <sup>b</sup>
Male	16.0%	9.80%	

<sup>a</sup>Mann-Whitney *U*-test.

<sup>b</sup>Pearson's chi-squared test.

lower levels of anxiety symptoms were associated with higher positive reframing and acceptance over time. On the contrary, higher proactive coping, planning, self-distraction, denial, venting, and self-blame were longitudinally associated with higher symptoms of anxiety. The effect sizes were more clinically relevant for positive reframing, acceptance, self-distraction, denial, venting, and self-blame. In comparison with previous studies, prevalence of anxiety symptoms in our sample was generally high based on previous estimates of informal caregivers (Jansen et al., 2018; Loh et al., 2017; Sallim et al., 2015) and the general population (Pan American Health Organization, 2017).

Subjective caregiver burden has long been considered as an important variable influencing carers' perceptions and appraisals of the caregiving situation (Zegwaard et al., 2011). As demonstrated by our data, this appraisal is influenced by the different types of coping strategies carers employ over time, whereby type of coping strategy used either lessens or worsens how stressful caregiving situations are perceived. Our finding that subjective caregiver burden mediated the relationship between coping and anxiety symptoms over time, suggests that coping responses significantly influence anxiety symptoms and subjective caregiver burden over time. Our study adds to the current literature by demonstrating that subjective caregiver burden mediates the relationship between coping responses and carers' anxiety. An important contribution of our work is that we have been able to demonstrate this effect using a longitudinal

dataset, probabilistic sampling, while controlling for several confounders, overcoming therefore important limitations of previous work (Cooper et al., 2008; Garcia-Alberca et al., 2012).

We found that both anxiety symptoms experienced by carers and subjective caregiver burden were inversely related to positive reframing and acceptance over time. These findings indicate that positive reframing and acceptance are generally predictive of low levels of caregiver anxiety (Muscat & Scerri, 2018; Pakenham & Bursnell, 2006; Perez-Cruz et al., 2019; Romero-Moreno et al., 2011) and caregiver burden (Baharudin et al., 2019; Perez-Cruz et al., 2019). This suggests that our findings have important implications in terms of understanding carers' responses. For example, when a caregiving situation becomes highly stressful or difficult to solve, adequate managing of emotions may assist in cognitively re-appraising the problem situation as less stressful which may result in experiencing lower levels of caregiver burden and anxiety. This means that both positive reframing and acceptance coping may influence carers' psychological health long-term by reducing high levels of burden and emotional distress.

Anxiety symptoms were also found to be positively related to the use of planning and proactive coping, two coping strategies that are part of the wider category of problem-focused coping. This finding is consistent with previous studies that the use of planning, at least in some studies, predicts higher levels of anxiety (Muscat & Scerri, 2018; Parveen et al., 2014), and subjective caregiver burden (Baharudin et al., 2019). Our study strengthens existing evidence by providing an estimate of both the direct and indirect influence of planning, proactive coping and subjective caregiver burden on anxiety symptoms simultaneously controlling for several covariates. Several authors (Stanislawski, 2019; Wartella et al., 2009) have argued that when carers are faced with a situation that is difficult to solve (low controllable stressors), such as caring for an older dependent person, focusing on problem-solving is likely to be less effective, increasing the experience of distressing emotions such as subjective caregiver burden and anxiety. The present results indicate that the relationship between anxiety and planning is moderated by levels of subjective caregiver burden. Thus, the use of planning as a coping response increases anxiety symptoms when levels of subjective caregiver burden are low but decreases these symptoms when levels of subjective caregiver burden are high. Our results support this hypothesis and further clarify the conditions through which planning exerts its influence; in the context of low subjective burden, planning is less beneficial for carers, whereas in a scenario of high subjective burden, planning benefits carer well-being over time. This moderating effect may therefore explain why several studies do not find an association between planning and carer anxiety symptoms (e.g., Cruzado & Elvira de la Morena, 2013).

Our study also showed that anxiety symptoms were both directly and indirectly positively related to several dysfunctional coping responses such as self-distraction, denial, venting, and self-blame via levels of subjective caregiver burden. These results contribute to previous evidence by demonstrating these associations using a longitudinal design and by providing a more accurate estimate in terms of both direct and indirect associations. In line with prior theory and empirical



TABLE 4 Coefficients of generalized equation estimations adjusted by sex and intensity of care of coping strategies on anxiety symptoms.

Independent variable (coping strategies)	Indirect effects <sup>a</sup>					Total indirect effects	p-value of the Sobel test	Total effects <sup>a</sup>
	Direct effects (coping strategies on anxiety)	Independent variable on subjective burden	Subjective burden on anxiety <sup>b</sup>	Subjective burden on anxiety	Total indirect effects			
Proactive coping	0.036	0.259*	0.513**	0.133	0.133	0.042	0.133	
Planning	0.081	0.335**	0.454**	0.152	0.152	0.013	0.152	
Positive reframing	-0.611**	-0.597**	0.370**	-0.221	-0.221	0.013	-0.832	
Acceptance	-0.381*	-0.858**	0.434**	-0.372	-0.372	0.001	-0.753	
Humor	0.368					0.185		
Religion	0.128					0.262		
Emotional support seeking	-0.077					0.558		
Instrumental support seeking	0.037					0.059		
Self-distraction	0.325	0.577**	0.422**	0.243	0.243	0.006	0.243	
Denial	0.820**	0.863**	0.379**	0.327	0.327	0.011	1.147	
Venting	0.563**	0.948**	0.400**	0.379	0.379	0.001	0.942	
Substance use	0.688					0.153		
Behavioral disengagement	0.257					0.006		
Self-blame	0.592**	0.781**	0.389**	0.304	0.304	0.008	0.896	

<sup>a</sup>Only statistically significant associations are considered.

<sup>b</sup>Also adjusted by coping strategies.

\* $p < 0.05$ ; \*\* $p \leq 0.01$ .

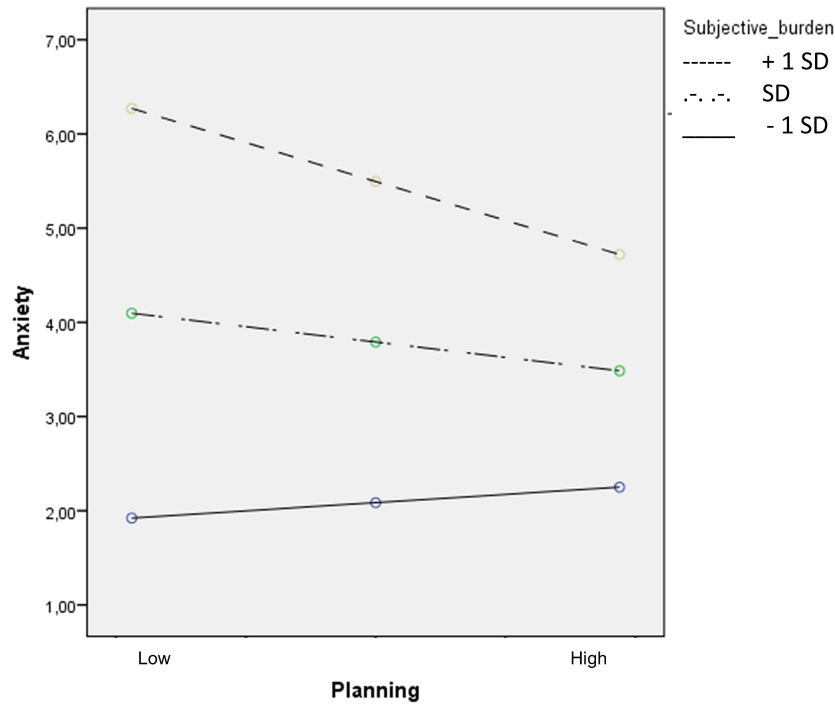


FIGURE 1 Interaction of subjective caregiver burden on the relationship of planning and anxiety symptoms.

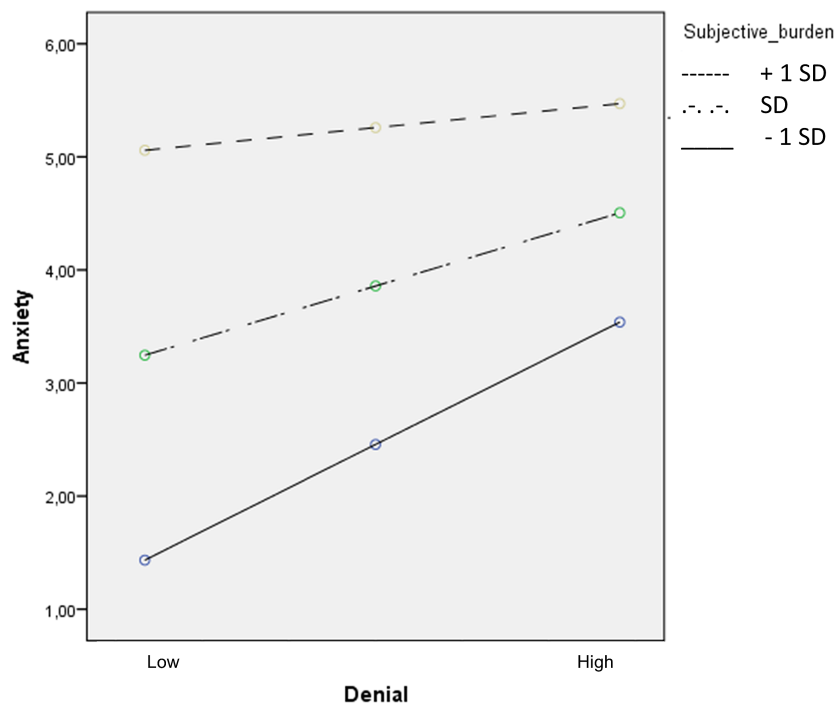


FIGURE 2 Interaction of subjective caregiver burden on the relationship of denial and anxiety symptoms.

work, we find that the higher the level of subjective burden, the more likely carers will employ avoidance coping, which will increase anxiety symptoms over time. Subjective caregiver burden also had a moderating role on the relationship between denial and anxiety symptoms so that the negative relationship between denial and anxiety is higher when experiencing low subjective burden than when levels of subjective burden are high.

## Implications

Our findings have important implications in terms of understanding carers' emotional responses and adapting future interventions (Li et al., 2012; Stanislawski, 2019). When a caregiving situation becomes highly stressful or difficult to solve, managing of emotions by reframing and focusing on positive aspects of the caregiving

situation may decrease caregiver burden and anxiety symptoms in carers. Therefore, positive reframing and acceptance strategies are likely to be associated with better psychological outcomes for carers long-term. Our data however have additionally shown that when carers are faced with situations difficult to solve (low controllable stressors), focusing on problem-solving and particularly planning is likely to be useful when levels of subjective burden are high but less useful when levels of burden are low. Data indicative of significant long-term associations of self-distraction, denial, venting and self-blame with anxiety symptoms suggest that these strategies may be markers of clinically significant anxiety symptoms over time. Future longitudinal studies will be important in terms of identifying the clinical utility of these coping responses in the context of caregiving interventions.

## Limitations

Despite our original findings, there are several limitations. First, we observed a significant number of losses in terms of follow-up which may have increased the risk of attrition bias in our results. Nevertheless, when comparing family carers remaining in our study versus those that were lost, across all study variables, we found no statistically significant differences. In addition, we used multiple imputation analyses to minimize the influence of this bias in our results. Despite therefore decreasing numbers in our sample, we had sufficient statistical power to detect associations over time. Although our study used GEE, which is a highly robust method to obtain estimates in repeated measured designs, this analysis cannot examine the presence of inverse causal relationships. Therefore, both coping and subjective caregiver burden could influence anxiety and vice versa. Despite therefore this being a longitudinal study, causal relationships of the associated variables cannot be inferred. Future studies should consider more rigorous control for potential confounding and reverse causation by baseline carer and care recipient variables. Although our sample was representative of informal carers in Mediterranean countries (Del-Pino-Casado et al., 2012), our data may not necessarily represent caregiving experiences in other cultures and regions. These cultural differences may influence coping strategies over time (Chun et al., 2007); therefore, replicating our results across several cultures will be key in making our findings applicable more widely.

## CONCLUSIONS

Our study is among the few in the literature examining the relationship between carers' coping, caregiver burden, and anxiety symptoms across several time points, examining the potential combined influence of caregiver burden and coping responses. We found that in carers of dependent older people, levels of subjective caregiver burden experienced by carers mediate the longitudinal association between coping responses and anxiety

symptoms. Specifically, subjective caregiver burden mediates the relationships between carers' anxiety and proactive coping responses, planning, the use of positive reframing, and acceptance. Subjective caregiver burden additionally exerted a mediation effect on the association between self-distraction, denial, venting, and self-blame and anxiety symptoms over time. The strategies of self-distraction, denial, venting, and self-blame may increase levels of anxiety and caregiver burden over time whereas acceptance and positive reframing could lower anxiety and levels of caregiver burden long term. Furthermore, the use of proactive coping and planning when subjective burden is low (moderation effect of subjective caregiver burden), was found to increase anxiety symptoms long-term. Conducting further prospective longitudinal studies in the future will be important in examining possible reverse causation in the relationship between carers' coping responses and experience of anxiety symptoms.

Our findings highlight that interventions shaped around specific coping styles and reducing levels of caregiver burden experienced by carers may be useful in preventing symptoms of anxiety in carers. Future large-scale longitudinal studies are needed to identify which types of stressors and coping responses are likely to have the greatest influence on preventing carers' anxiety symptoms.

## CLINICAL RESOURCES

- Family Caregiver Alliance: [www.caregiver.org](http://www.caregiver.org)
- Caregiver Action Network: <https://www.caregiveraction.org/>
- National Alliance for Caregiving: <https://www.caregiving.org/>

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## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author [CLM], upon reasonable request.

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