



## **Subjective Age Moderates the Association between COVID-19 Health Worries and Generalized Anxiety Symptoms Among Formal Caregivers**

Karni-Efrati, Ziv<sup>1</sup>, Palgi, Yuval<sup>1</sup>, Greenblatt-Kimron, Lee<sup>2</sup>, & Bodner, Ehud<sup>3,4</sup>

<sup>1</sup>Department of Gerontology University of Haifa, Mount Carmel, Israel.

<sup>2</sup>School of Social Work, Ariel University, Ariel, Israel.

<sup>3</sup>Department of Social Sciences, Bar-Ilan University, Ramat-Gan, Israel.

<sup>4</sup>Department of Music, Bar-Ilan University, Ramat-Gan, Israel

**Corresponding author:** Yuval Palgi, Ph.D. Department of Gerontology, University of Haifa, Mount Carmel, 3498838, Israel. Tel: 972-546685805. E-mail address: [ypalgi@research.haifa.ac.il](mailto:ypalgi@research.haifa.ac.il)

ORCID ID:

Palgi: [https://0000-0002-8675-5513](https://orcid.org/0000-0002-8675-5513)

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### **Abstract**

During the COVID-19 pandemic, formal caregivers face increased challenges while assisting older adults. A decline in caregivers' mental health might negatively affect services for older care recipients when they most need it. This study examines the relationship between COVID-19 health worries and generalized anxiety symptoms, and the moderating role of subjective age on this relationship among formal caregivers. A cross-sectional survey was conducted in the homecare services sector. Participants ( $N=400$ ,  $M_{age}=47.79$ ,  $SD=13.8$ ) completed an online questionnaire regarding subjective age, COVID-19 health worries, and anxiety. Older subjective age and higher COVID-19 health worries predicted a higher anxiety level. In addition, subjective age moderated the association between COVID-19 health worries and anxiety, showing that among formal caregivers who reported older subjective age, the association between COVID-19 health worries and anxiety was stronger. Formal caregivers with an older subjective age tend to demonstrate a stronger association between health worries and anxiety during the COVID-19 pandemic. Employers can mitigate the level of COVID-19 health worries by providing adequate personal protective equipment and guidance on how to deal with contagion. In addition, employers may use interventions that focus on healthy behavior to induce younger subjective age.

**Keywords:** Anxiety; COVID-19 health worries; formal caregivers; subjective age; homecare

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## Introduction

Many older adults need assistance with activities of daily living. Their choice to age-at-place requires a growing reliance on formal care. Although the burden of informal caregiving for family members is well known (for a review see Adelman, et al., 2014), there is little research focusing on formal caregivers and their emotional well-being (Cocco, et al., 2003; Duffy, et al., 2009; Griffiths, et al., 2018). During routine days, harsh working conditions and lack of employer support have been found to affect their mental health, while COVID-19 posed additional stress, which deserves investigation (Pfefferbaum, & North, 2020; Rowe, et al., 2020).

During the first phase of the COVID-19 pandemic, by spring 2020, more than half of the world's population experienced a strong containment measures and radical uncertainty (OECD, 2020). The cumulative confirmed cases in Israel at that time rose from 6413 to 15896, with more than 560 new cases per day and 287 cumulative confirmed deaths since the COVID-19 pandemic broke out (Our World in Data). Although daily reports of COVID-19 new cases in Israel dropped down after the first lockdown as compared to other countries, airports, public transportation lines and other public services were shut down (State Controller report, 2021). Due to the increased health risk, the COVID-19 pandemic may have amplified extreme and uncontrollable worry, which is a characteristic of anxiety in the diagnostic criterion for generalized anxiety disorder (American Psychiatric Association, 2013). Official reports revealed that nearly 60% of the adult population were worried about being infected by SARS-CoV-2 and more than a third reported stress and anxiety at that time (Central Bureau of Statistics, 2020).

Since the outbreak of COVID-19, older adults, especially those with chronic illness, were encouraged to stay home. Global and local reports showed a growing demand for homecare services (Ito, et al., 2021; National Insurance Institute of Israel, 2020). While many other health services were provided online, homecare provision remained on site, and formal caregivers continued to provide their services during lockdown days (National Insurance Institute of Israel, 2020). In addition, while government lockdowns impeded informal caregiver's opportunities to visit their older relatives, the care burden inflicted upon formal caregivers increased. Recent research has shown that the overabundance of activities that caregivers perform may induce adverse psychiatric outcomes including worries, anxiety, and depressive symptoms (Diniz, et al., 2018; Karni-Efrati, et al., 2022). However, only a few studies have examined resilience among formal caregivers during the pandemic.

The risk to infect or be infected by SARS-CoV-2 increases in close contact between person-to-person (Centers for Disease Control and Prevention, 2020). Such close contact is unavoidable in homecare settings (Allison, et al., 2020; Sterling, et al., 2020). Nevertheless, unlike healthcare teams in clinics and hospitals, formal caregivers lack personal protective means (Rowe, et al., 2020; Sterling, et al., 2020). Considering this reality, a better understanding of the relationship between factors affecting formal caregivers' resilience during the pandemic is crucial for maintaining care services for older adults. Therefore, one aim of this study was to examine the relationship between COVID-19 health worries and generalized anxiety symptoms among formal caregivers. Following the literature on the effect that subjective age might have on mental health (Kotter-Gruhn et al., 2015; Palgi, 2016), another aim was to examine the effect of subjective age on the relationship between COVID-19 health worries and generalized anxiety symptoms.

### *Subjective age*

During the COVID-19, the infection fatality rate increased with age. Considering older age as an objective risk factor, younger and middle-aged adults are considered as a population at lower risk of COVID-19 complications (Levin, et al., 2020). Nevertheless, studies have shown that not only chronological age, but also subjective age is a relevant measure for health threats in times of pandemics (Terracciano, et al., 2020). Subjective age reflects the way people perceive their age as younger or older than their chronological age (Montepare, 2009). In this regard, the evidence exists even before the COVID-19 pandemic that reaction to health threats is mitigated by a younger subjective age (Kotter-

Grühn et al., 2015; Palgi, 2016), whereas an older subjective age predicts lower adjustment to worsening health (Stephan, et al., 2018, Westerhof & Wurm, 2015). A recent study revealed that the belief that COVID-19 threatens only older adults predicted a younger subjective age among middle-aged adults (Terracciano, et al., 2021). In line with these findings, we hypothesized that a younger subjective age would serve as a protective mental resource against COVID-19 worries and mitigate anxiety among formal caregivers whose clients are older, chronically ill, and functionally impaired adults.

### *COVID-19 health worries*

The COVID-19 pandemic negatively influenced the level of health worries. Among the older population, such worries were positively associated with general anxiety symptoms, death anxiety and peritraumatic distress (Bergman, et al., 2020; Greenblatt-Kimron, et al., 2021; Ring et al., 2020). Among the global population, scholars found a positive connection between COVID-19 health worries and increased anxiety (Sabat, et al., 2020). Beyond the health consequences and the human tragedy, the COVID-19 pandemic has triggered a serious economic crisis (OECD, 2020). However, COVID-19 health worries were found to be so disturbing, that their level was even higher than the economic worries level (Maaravi & Heller, 2020). Moreover, in countries like the USA, UK, and Israel adults reported being more worried about their health than about their changed routine or isolation (Bareket-Bojmel, et al., 2020). In particular, most adults worried more about someone close to them contacting the virus or transmitting it to others; and less about the economic consequences of the pandemic, with a link found between a higher level of worries and a higher level of generalized anxiety symptoms (Barzilay, et al., 2020). Likewise, studies conducted in Europe showed that about 40% of the participants worried about becoming seriously ill, while many more were worried that someone close to them would become critically ill (Varga, et al., 2021). Hence, it seems reasonable to assume that COVID-19 health worries may be associated with a worsening in the mental health of formal caregivers who need to protect both themselves and their older care-recipients. Additionally, following the stigmatization of the COVID-19 pandemic as a “problem of older adults” (Ayalon et al., 2021, p. 1221), a younger subjective age may act as a buffer to help control their fear of the virus.

The current study follows previous studies which demonstrated a link between the COVID-19 outbreak and an increase in levels of fear and anxiety (Ito, et al., 2021; Sabat, et al., 2020), as well as an association with COVID-19 health worries (Barzilay, et al., 2020; Maaravi, & Heller, 2020; Varga, et al., 2021). This study follows earlier research that reported that a younger subjective age could be a benefit in coping with COVID-19 related anxiety (Terracciano, et al., 2021). The current study adds to this literature by examining the mitigating role of a younger subjective age in the relationship between COVID-19 health worries and anxiety among formal caregiver at the beginning phase of the COVID-19 pandemic.

According to public health guidelines, people should avoid close contact with each other to reduce risk of contracting SARS-CoV-2 (CDC, 2020). However, formal caregivers of chronically ill and/or functionally impaired older adults cannot avoid such close contact and therefore face higher health risk. For this reason, they must recruit other psychological resource to face such risk and continue their service. While the state economy relies on resilient workers to provide essential services, only few studies addressed formal caregivers' mental health (Allison & Harrison, 2020; Rowe, et al., 2020; Sterling, et al., 2020). Hence, our study examined the associations between COVID-19 health worries, subjective age, and anxiety among formal caregivers. Our hypotheses are (1) A strong positive relationship will be found between COVID-19 health worries and generalized anxiety symptoms and between subjective age and generalized anxiety symptoms. (2) Subjective age will moderate the association between COVID-19 health worries and generalized anxiety symptoms, so that a positive and stronger association would be found between COVID-19 health worries and generalized anxiety symptoms among formal caregivers with an older subjective age.

## Method

### *Participants*

The sample consisted of 400 formal caregivers from across Israel. Participants' age ranged from 19 to 85 ( $M=47.79$ ,  $SD=13.8$ ). Most were females ( $n=368$ , 92.9%), married or in a committed relationship ( $n=236$ , 59.0%), with a high-school level education ( $n=196$ , 49.0%). The majority reported they had not been diagnosed with any of the chronic medical conditions related to an increased risk due to COVID-19 ( $n=322$ , 80.5%). More than half ( $n=239$ , 59.8%) were not exposed to COVID-19 risk situations by the time the data was collected.

### *Measures*

*Demographic and covariates* were assessed by four items. The participants reported their age and gender. *Education* was reported using a scale ranging from 1 = elementary school) to 6 = tertiary education; *Marital status* was also reported as 1 = not married or 2 = married or cohabitating. *Chronic medical conditions* were measured by the presence 1 = yes, or absence 2 = no, of chronic diseases known to be associated with increased risk of death due to COVID-19 complications (CDC, 2020): "Have you been diagnosed with one or more of the following chronic diseases: cardiovascular disease, chronic respiratory disease, diabetes, hypertension, or cancer?" *Exposure to COVID-19-related risk situations* was measured by a seven-item questionnaire developed for this study. Participants reported whether they had been exposed to COVID-19 risk situations: "I know people who were/are in isolation"; "My family or close friends were/are in isolation"; "I know people who were/are infected"; "My care-recipient was/is in isolation"; "My care-recipient was/is infected"; "I was in isolation"; and "I was infected by the virus". Participants rated their responses by choosing 1 = yes or 2 = no. A higher number of positive answers indicated higher exposure to risk.

*Generalized anxiety symptoms* were measured by the Generalized Anxiety Disorder (GAD-7) scale, which measures anxiety symptoms for the last two weeks prior to the time of the survey (Lowe et al., 2008). Participants reported their generalized anxiety symptoms based on a Likert scale ranging from 0 = not at all to 3 = nearly every day. The summated scale ranges from 0 to 21, with a higher total score reflecting a higher level of anxiety. An acceptable cutoff  $\geq 10$  was equivalent to a clinical diagnosis of generalized anxiety disorder (Spitzer et al., 2006). In the current study, we applied the Hebrew version (Palgi, et al., 2020) and the internal reliability was very good ( $\alpha = .90$ ).

*Subjective age* was measured with an adapted version (Hoffman et al., 2016) of the Kastenbaum et al. (1972) questionnaire. The four items reflect the physical, cognitive, visual, and behavioral aspects of identity associated with age. Participants were asked "How do you feel about your age most of the time since the COVID-19 pandemic began: Physically I feel ... , Mentally I feel ..., I look ..., I do most things as if I was...". They rated their answers on a scale ranging from 1 = much younger than my age to 5 = much older than my age. A higher average score indicated an older subjective age. The internal reliability of these four items was good ( $\alpha = .72$ ).

*COVID-19 health Worries* were measured with three items taken from a questionnaire suggested by Bergman et al. (2020). Participants were asked: "To what extent are you worried about: a) Being infected by the COVID-19 virus? b) That someone close to you would be infected with the COVID-19 virus? c) Infecting others close to you?" They were asked to rate their answers on a scale ranging from 1 = not worried at all to 5 = extremely worried. A mean score was calculated with higher average score indicating higher level of worries and the internal reliability was fair ( $\alpha = .67$ ).

### *Procedure*

The Institutional Review Board at Bar-Ilan University approved conduct of the research (Approval No. 0520). We calculated that with an effect size of 0.15, statistical power of 0.8, and probability level of 0.01 the minimal required sample size was 154 participants (Soper, 2019). A convenience sampling procedure was designed using a snowball recruitment method. Since most Israeli formal caregivers are Jews, Arabs, former soviet-union immigrants or foreign caregivers, the Hebrew version was translated into Arabic, English and Russian, using the forward and back translation method (Beaton et al., 2000). Between May-June 2020, the participants were invited to answer an online questionnaire through a link

sent from the Qualtrics web-based public platform via caregivers' WhatsApp groups. We asked the participants to base their answers on their personal experience at work. All participants digitally marked their informed consent before answering the questionnaire. Overall, 79% of the participants completed the Hebrew version (regardless of their ethnic origin), 8.5%, 6% and 6.5% completed the Arabic, English or Russian versions, respectively. Out of 400 submitted questionnaires, 12 were uncompleted and therefore excluded from the analysis.

### Data analysis

We used IBM SPSS (Ver. 25) to analyze data. All main predictors were mean-centred before the analyses. To examine the study hypotheses, we performed a hierarchical multivariate regression with generalized anxiety as the dependent measure. Demographics and other covariates (age, sex, marital status, education, chronic medical conditions, and exposure to COVID-19) were entered in the first step of the regression. COVID-19 health worries and subjective age were entered in the second step. The interaction between COVID-19 health worries and subjective age was added in the third step. Significant interactions were probed using the PROCESS 3.1 computational tool (Hayes, 2012). Using this tool enabled probing the significance of the moderator's (i.e., subjective age) slopes ( $\pm 1SD$ ).

## Results

The average level of generalized anxiety symptoms was  $M=4.45$ ,  $SD=5.92$ . According to the accepted cutoff, 16.3% of participants reported anxiety at a clinical level. More specifically, 7.9% reported moderate  $\leq 10$  generalized anxiety symptoms, and 8.4% reported severe  $\leq 15$  generalized anxiety symptoms. The level of generalized anxiety symptoms was negatively related to the level of education ( $r = -.15$ ,  $p < .001$ ) and positively related to COVID-19 health worries ( $r = .38$ ,  $p < .001$ ) and subjective age ( $r = .27$ ,  $p < .001$ ). The average level of COVID-19 health worries was  $M = 3.45$ ,  $SD = 1.27$ . While most homecare workers reported being "quite worried" or "very worried", 24.2% reported that they were "extremely worried". Finally, most participants felt younger than their chronological age ( $M = 2.60$ ,  $SD = 0.75$ ) and only 1.5% felt "older" or "much older" than their age (see Table 1).

**Table 1:**

*Means, standard deviations, and bivariate correlations of the study*

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Age	47.79 (13.8)	-								
2. Sex <sup>a</sup>	1.93 (0.2)	-.10	-							
3. Education <sup>b</sup>	4.37 (1.0)	-.09	-.13**	-						
4. Marital status <sup>c</sup>	2.14 (0.7)	.35***	.04	-.08	-					
5. Medical condition <sup>d</sup>	1.83 (0.3)	-.32***	.05	.08	.08	-				
6. Exposure	.80 (1.1)	.00	-.12*	.03	-.03	-.01	-			
7. Worries <sup>e</sup>	3.45 (1.27)	-.14	-.05	-.08	-.05	-.01	.08	-		
8. Subjective age <sup>f</sup>	2.60 (.75)	-.25***	.08	.03	-.12*	-.11*	.01	.11*	-	
9. Anxiety <sup>g</sup>	4.45 (5.9)	-.02	.05	-.15**	-.07	-.08	.01	.38***	.27***	-
N		377	389	380	392	383	393	391	387	397

Note: <sup>a</sup>:1=male, 2=female. <sup>b</sup>: The scale ranged from 1 (elementary school) to 6 (tertiary education).

<sup>c</sup>: 1 (not married), 2 (married or cohabitating). <sup>d</sup>: 1= have, 2=do not have one or more of five chronic

illnesses <sup>e</sup>: higher score=more worries, <sup>f</sup>=Higher score means older subjective age, <sup>g</sup>= Higher score

means higher level of anxiety symptoms.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.000$

To test our first and second hypotheses, we conducted a hierarchical multivariate linear regression analysis. After controlling for demographics and covariates in Step 1 (age, sex, marital status, education, chronic medical condition, and exposure; accounting for 3.8% of the variance of generalized anxiety symptoms), COVID-19 health worries and subjective age were entered in Step 2. COVID-19 health worries and subjective age were significantly related to generalized anxiety symptoms ( $B = 1.59, \beta = .34, t 7.10, p < .001$ ;  $B = 2.04, \beta = .26, t 5.15, p < .001$ , respectively), accounting for an additional 22.9% of the variance. Finally, the interaction between COVID-19 health worries and subjective age was entered in Step 3 ( $B = 1.30, t 4.54, p < .001$ ), accounting for an additional 4.3% of the variance. Overall, the regression model explained 31.0% of the variance in generalized anxiety symptoms (see Table 2).

To probe the source of the interaction, we used a computational PROCESS (Hayes, 2012), which estimated the effects when individuals perceived their subjective age level at  $\pm 1 SD$ . It was found that for individuals who reported that their subjective age level was 1  $SD$  below the mean (younger subjective age), each additional point to the COVID-19 health worries score was associated with a significant increase of 0.71 points in their generalized anxiety symptoms score ( $B = .71, t 2.45, p < .05$ ). For individuals who reported that their subjective age level was 1  $SD$  above the mean (older subjective age), each additional point to the COVID-19 health worries score was associated with a significant increase of 2.69 points in their level of generalized anxiety ( $B = 2.69, t 8.27, p < .001$ ) (see Figure 1).

**Table 2:**

*Coefficients and interactions between COVID-19 health worries and Subjective age predict Anxiety*

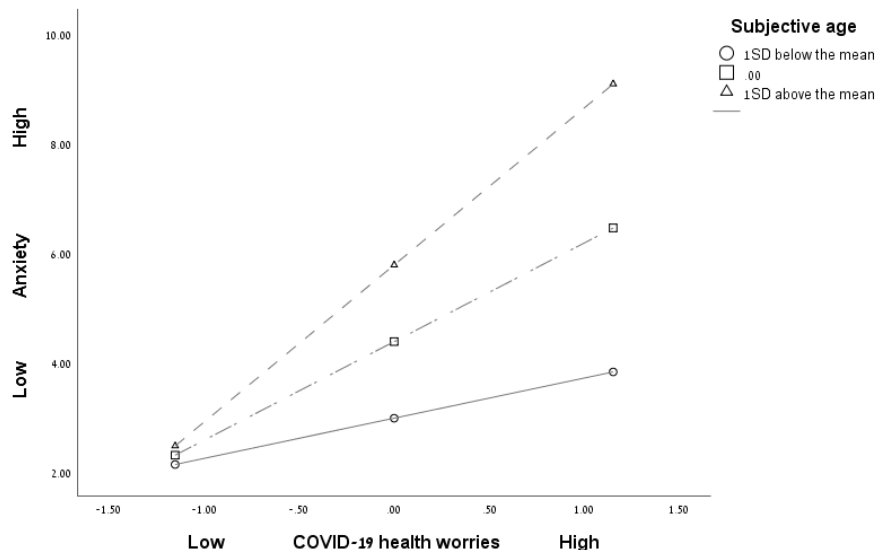
	Predictor	$\Delta R^2$	B	$\beta$	t
Step 1	Age	.038*	-.01	-.04	-.68
	Sex		.97	.04	.77
	Marital status		-.57	-.07	-2.61
	Education		-.81*	-.14	-2.49
	Medical condition		-1.50	-.09	-1.76
	Exposure		.18	-.03	.71
	Step 2	Covid-19 health worries	.229***	1.59***	.34
Subjective age			2.04***	.26	5.15
Step 3	Covid-19 worries X Subjective age	.043***	1.70***		7.76
	Subjective age		1.86***		4.80
Total $\Delta R^2$		.31***			

*Note:* All continuous variables were mean-centered before analyses.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .000$

## Discussion

This study focused on the mental health of formal caregivers, a population that has received very little research attention in general (Cocco et al, 2003; Duffy et al., 2009) and during the COVID-19 pandemic



**Figure 1: Subjective age moderate the association between COVID-19 health worries and generalized anxiety symptoms**

in particular. These devoted formal caregivers were at the risk to contract or transmit the SARS-cov-2 (CDC, 2020) as they provide close and intimate care services to seriously ill and/or impaired older adults. During the current pandemic, their clients were considered a primary at-risk group, with a high number of older adults contracting COVID-19 globally (Niu et al., 2020) and with the highest infection fatality rate (Levin, et al., 2020). While only 7.8% of formal caregivers reported they were "not worried at all" that someone close to them would contract the virus or that they might be infected or infect others with COVID-19, most of them (46.8%) were "quite worried" or "very worried", and almost 25% reported being "extremely worried" of such outcomes. The results also showed that one out of seven formal caregivers reported generalized anxiety symptoms above the clinical level. These findings depict the stress under which formal caregivers functioned during the first wave of the COVID-19 pandemic and its negative effect on their mental health. In line with the first hypothesis, results showed that COVID-19 health worries significantly contributed to generalized anxiety symptoms, as participants with a higher level of COVID-19 health worries had a higher level of anxiety.

Formal caregivers often respond to the needs and well-being of their older clients before their own (Crout et al., 2005). Providing home care for older adults is mentally and physically challenging (Duffy et al., 2009; Testad et al., 2010), with much effort and intimate contact needed when caring for older adults with ADL/IADL insufficiencies. Consequently, formal caregiving enhances the risk of being infected or infecting others with the virus (CDC, 2020).

The data for this study were collected under conditions of radical uncertainty (OECD, 2020). Caregiving for older adults is considered an essential work in times of emergency (National Insurance Institute of Israel, 2020). Therefore, formal caregiving services were not scaled back or halted even at the first lockdown and during times in which containment measures were imposed on the global population. As we keep this in mind, the exposure of formal caregiver to the medical condition of their clients, and the lack of personal protective means against the virus (Rowe, et al., 2020; Sterling, et al., 2020) may explain the increased levels of COVID-19 health worries and generalized anxiety found in this population.

Consistent with the second hypothesis, formal caregivers with a younger subjective age had lower levels of anxiety as compared to those with an older subjective age. A similar effect of subjective age in the general population during a similar time of the COVID-19 pandemic was previously described by Terracciano et al. (2021). Considering the information regarding COVID-19 fatality among the older population held by the public at that time of our survey, a younger subjective age could explain the lower

anxiety level of the formal caregivers. The fact that among caregivers with an older subjective age, the association between COVID-19 health worries and anxiety was stronger strengthens this line of reasoning. This is an important finding as it suggests that a younger subjective age may be a personal resource against the stressful situation that formal caregivers experience during the COVID-19 pandemic, as well as a buffering mechanism against the negative effect of COVID-19 health worries on generalized anxiety symptoms. These findings add to the existing empirical data (Greenblatt-Kimron et al., 2021; Karni-Efrati, et al., 2022; Kotter-Gruhn, et al., 2015; Shrira et al., 2020; Stephan et al., 2018; Terracciano et al., 2021; Westerhof & Wurm, 2015) by demonstrating that individual's reaction to a health threat differs by subjective age.

The current study should be interpreted in light of some limitations. First, it was based on a cross-sectional design; therefore, cannot provide any causal explanations. Second, some of the caregivers chose to answer the questionnaire in Hebrew rather than in Arabic or Russian. Hence, the questionnaire's language does not indicate ethnic origin; therefore, cultural differences between participants could not be assessed. Third, data were only collected during the pandemic; therefore, a differentiation cannot be made between the effect of the pandemic and the pre-pandemic caregiving routine.

To conclude, the present study examined the moderating role of subjective age in the relationship between COVID-19 health worries and generalized anxiety symptoms. This investigation demonstrates the importance of a young subjective age as a personal resource against the stressful conditions under which formal caregivers have to function. On a practical level, we suggest that employers mitigate COVID-19 health worries by providing personal protective equipment. It is also recommended to provide knowledge to formal caregivers regarding the ways to prevent contagion. Finally, employers may apply interventions that focus on health, as these may induce younger subjective age (Diehl, et al., 2020; Johnsen, et al., 2016).

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**Declaration of interest:** We declare no financial support and no conflict of interest.