

**The Toll of Feeling Older: Subjective Age Moderates the Associations between Anxiety Sensitivity  
and Symptoms of Anxiety and Depression during COVID-19 Pandemic**

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## Abstract

**Objectives:** The COVID-19 pandemic is an ongoing stressor that may have detrimental effects on mental health. Theoretical and empirical literature implies that individuals who are characterized by catastrophic appraisals of somatic cues, a tendency known as anxiety sensitivity, as well as by older subjective age, might be particularly vulnerable to depression and anxiety during the pandemic. Furthermore, subjective age might moderate the relations between anxiety sensitivity with depression and anxiety symptoms. Yet, research to date has not explored the contribution of both anxiety sensitivity and subjective age in explaining distress following stress in general, nor in light of the current COVID-19 pandemic. **Method:** Filling this gap, a convenience sample of 828 participants, ( $M_{age} = 43.98$ ,  $SD = 14.06$ ), filled questionnaires measuring background variables, COVID-19 related stressors, anxiety sensitivity, subjective age, and anxiety and depression symptoms during the pandemic. **Results:** Positive associations were found between anxiety sensitivity and subjective age, on the one hand, and anxiety and depression symptoms, on the other. Furthermore, subjective age moderated the associations between anxiety sensitivity with depression and anxiety symptoms. Although higher levels of anxiety sensitivity were related to depression and anxiety during the pandemic, these associations were stronger among participants with an older subjective age. **Discussion:** The findings are consistent with theories that view subjective age as an intra-individual construct involved in modulating important mental health outcomes in the context of coping with stress.

**Keywords:** Anxiety sensitivity; Subjective age; Depression; Anxiety

## Introduction

The SARS-CoV-2 virus (COVID-19) has so far cost the lives of over two million people around the world, and continues to pose a threat to millions more (Lipsitch et al., 2020). It has therefore been proposed that COVID-19 be considered an ongoing traumatic stressor (Estes & Thompson, 2020; Hamam et al., 2020) that may bring about reactions such as depression and anxiety (Lahav, 2020; Shevlin et al., 2020). Nevertheless, similar to other stressors, the implications of the COVID-19 pandemic vary, with some factors increasing individuals' vulnerability for psychological distress. One such factor may be anxiety sensitivity, which is the fear of one's physical sensations (Reiss & McNally, 1985). It involves negative, or catastrophic interpretations of bodily symptoms of arousal, therefore predisposing one to experience an increased sense of threat (Naragon-Gainey, 2010). It has been shown to aggravate reactions to stressors, with potentially detrimental effects for one's mental health (i.e., Taylor, 2004) including anxiety (Olatunji & Wolitzky-Taylor, 2009) and depression (Stein et al., 2018).

Another imperative factor that could explain individuals' distress during the pandemic is subjective age. Subjective age (Barak & Schiffman, 1981) is the age that one feels regardless of one's chronological age (Kastenbaum et al., 1972). Experiencing oneself as younger than one's age can be a powerful predictor of better health and physical functioning, psychological well-being, and is negatively associated with cognitive decline, loneliness, and even mortality (e.g., Palgi, Ayalon, Avidor, Segel-Karpas, & Bodner, 2018; Sargent-Cox, Anstey, & Luszcz, 2014; Stephan, Caudroit, Jaconelli, & Terracciano, 2014; Lahav et al., 2018). Conversely, feeling older than one's age when coping with ongoing stress such as the current pandemic, may at times lead one to feel as though they have fewer coping resources, as suggested by a recent longitudinal findings that negative self-perceptions of aging predicted increased loneliness and distress during the COVID-19 lockdown (Losada-Baltar et al., 2021). Contrary to feeling relatively young which may buffer a sense of threat or helplessness in the face of the pandemic and may help one to downregulate somatic fears and

worries, feeling older might promote a more urgent sense of vulnerability, tension and worry in the face of catastrophic interpretations of somatic sensations rooted in anxiety sensitivity.

In the present study, we examined the relations between anxiety sensitivity and subjective age, on the one hand, and depression and anxiety symptoms during the coronavirus pandemic, on the other, among a sample of adults residing in the community, while taking into account background variables as well as stressors related to the pandemic. We hypothesized that higher levels of anxiety sensitivity and older subjective age would be related to elevated depression and anxiety symptoms during the pandemic. Furthermore, we hypothesized that subjective age would moderate the relations between anxiety sensitivity, depression and anxiety so that they would be stronger among individuals with older subjective age.

## Methods

**Participants and procedure.** An online survey was conducted among a convenience sample of Israeli adults. The survey was accessible through Qualtrics, a secure web-based survey data collection system. The survey took an average of 25 minutes to complete and was open from April 2, 2020 to April 19, 2020. During data collection, Israel was under a strict lockdown that had begun in mid-March. In early April, 6902 people in Israel were tested positive for COVID-19, 241 recovered and twenty-five had died. The survey was anonymous and no data were collected that linked participants to recruitment sources. The [masked for review] institutional review board (IRB) approved all procedures and instruments. A total of 1,500 people began the survey, and 976 answered some of the questionnaires. Of them, 828 participants (84.8%) who provided data concerning the study variables were included in this study. Table 1 describes the demographic characteristics of the sample, the central study variables, and COVID-19 related stressors measured in the present study.

## Measures

**Background variables.** Participants completed a brief demographic questionnaire that assessed age, gender, education, relational status, religiosity, and income.

**COVID-19-related stressors.** Six COVID-19 related stressors were assessed, based on previous research (Fiorillo & Gorwood, 2020; Wang et al., 2020). Participants were asked to indicate 1) how they perceived their own physical health, 2) whether they were in quarantine, 3) whether they were living alone during the outbreak, 4) whether they belonged to a high-risk group for COVID-19, 5) whether they had close others who belonged to a high-risk group, 6) whether they had close others diagnosed with the disease. All stressors, apart from participants' perceived health, were coded as dummy variables, with "0" reflecting the absence of stressor and "1" reflecting the presence of stressor. Participants' perceived health ranged from 1 (*bad*) to 5 (*excellent*).

**Anxiety and depression symptoms during the COVID-19 pandemic.** Levels of anxiety and depression symptoms during the COVID-19 pandemic were assessed by the anxiety and depression subscales of the Brief Symptom Inventory-18 (BSI-18; Derogatis, 2001), consisting of six items each. Participants were asked to indicate the extent to which they had been bothered by the symptom in the prior week, on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Internal consistency reliabilities in this study were good for both the depression ( $\alpha = 0.86$ ) and anxiety subscale ( $\alpha = 0.89$ ).

**The Anxiety Sensitivity Index Revised (ASI-R; Cox, Taylor, Borger, Fuentes, & Ross, 1996).**

The ASI-R is a 36-item, self-report rating scale used to assess anxiety sensitivity. Participants were asked to indicate the extent to which they agreed with each statement on a 5-point Likert-type scale ranging from 0 (Not at all) to 4 (Very much). Total score was computed by summing all items and ranged from 0 to 144, with higher scores reflecting higher levels of anxiety sensitivity. Internal consistency reliabilities in this study for the total score was excellent ( $\alpha = 0.96$ ).

**Subjective age.** Subjective age was measured relying on a four-dimension subjective age measure ("feel as though I am"; "look as though I am", etc.; Kastenbaum et al., 1972). Respondents were

asked to rate subjective perceptions of their age on a five-point scale ranging from 1 (*younger than*), to 5 (*older*) than one's age. The average score for the items was used as a composite subjective age score, with a higher score reflecting a higher subjective age compared with one's chronological age. Cronbach's  $\alpha$  for this scale was 0.79.

### **Analytic Strategy**

The current analyses were conducted using SPSS 25 and PROCESS computational macro (Hayes, 2012). To explore the associations between anxiety sensitivity and subjective age, on the one hand, and depression and anxiety symptoms, on the other, we conducted Pearson's correlation analyses. To explore the moderating role of subjective age in the associations between anxiety sensitivity and depression and anxiety symptoms, moderation analyses were conducted via PROCESS (Model 1) computational macro (Hayes, 2012). Scores of all the variables were standardized.

### **Results**

Pearson's analyses (see Table 2) indicated significant associations, with medium to large effect sizes, between anxiety sensitivity and subjective age on the one hand, and depression and anxiety symptoms, on the other: the higher the scores on anxiety sensitivity the higher the depression and anxiety symptoms; and the greater the subjective age the higher the depression and anxiety symptoms. Supplementary analyses indicated that contrary to subjective age, chronological age was negatively related with depression ( $r_p = -.27, p < .001$ ) and anxiety symptoms ( $r_p = -.20, p < .001$ ): the older the participants the lower the depression and anxiety symptoms.

To explore the moderating role of subjective age in the associations between anxiety sensitivity and depression and anxiety symptoms, moderation analyses were conducted. Anxiety sensitivity served as independent variable; depression and anxiety symptoms as dependent variables; and subjective age as moderator. In addition, covariates were included in the models. These consisted of background characteristics of chronological age, gender, income, and COVID-19-

related stressors of living alone during the outbreak and negative perceived health, which have been found to be related to anxiety and depression symptoms during the pandemic, in previous research (i.e., Fiorillo & Gorwood, 2020) as well as in the present investigation ( $p_s < .05$ ).

Results are presented in Table 3. As can be seen in the table, the models explained 35% and 40% of the variance of depression and anxiety symptoms, respectively, and had large effect sizes. Younger chronological age was associated with higher levels of anxiety and depression and being female was associated with elevated anxiety symptoms. Having a below average income and living alone during the outbreak were associated with elevated depression symptoms. Negative perceived health was associated with elevated anxiety and depression. Higher levels of anxiety sensitivity were related with elevated anxiety and depression, and older subjective age was related to elevated depression.

Furthermore, subjective age significantly moderated the associations between anxiety sensitivity on the one hand, and depression ( $p = .02$ ) and anxiety ( $p = .04$ ) during the COVID-19 pandemic on the other. The significant interactions were probed using the PROCESS (Model 1) computational macro (Hayes, 2012) by computing their conditional effects at 1 SD below and 1 SD above the mean of the moderator, that is, levels of subjective age. Probing these interactions revealed a similar trend: Although anxiety sensitivity had a significant effect in explaining depression and anxiety during the pandemic in general, this effect was significantly stronger among participants who reported older ( $\beta = .42, p < .001$ ;  $.55, p < .001$ , respectively) versus younger ( $\beta = .32, p < .001$ ;  $.47, p < .001$ , respectively) subjective age (see Figure 1).

## Discussion

Given the prominence of mental health problems subsequent to the outbreak of the pandemic, it has become extremely important to map out factors that are related to elevated psychological distress and to uncover their combined effects. In the present study, participants who reported higher levels of anxiety sensitivity and older subjective age had higher levels of depression and anxiety symptoms during the pandemic. These findings are consistent with previous research

concerning the associations between anxiety sensitivity and depression and anxiety (i.e., Stein et al., 2018), as well as between older subjective age, depression, and other psychiatric symptomatology such as posttraumatic stress disorder symptoms (i.e., Avidor, Levin, & Solomon, 2017; Losada-Baltar et al., 2021). The current findings may indicate that being extremely attuned to one's bodily signals during the coronavirus pandemic can possibly intensify a sense of threat, as well as constant rumination, worry, and tension regarding possible infection, and thus be related to distress in the form of depression and anxiety symptoms.

Perhaps counter to intuitive expectations considering the relevance of older age for COVID-related complications, being younger was related to both elevated depression as well as anxiety symptoms in the present sample. In spite of the correlation between age and susceptibility to the effects of COVID-19, being older is generally known to be associated with better emotion regulation and emotional stability (Cartensen et al., 2011). It has been shown, for instance, that life satisfaction increases in later life (i.e., Gana et al., 2013). Thus, in addition to previously known concomitants of vulnerability to COVID-related stressors, a younger age may be related to higher depression and anxiety during the pandemic (Klaiber et al., 2021; Palgi et al., 2020).

An older subjective age, however, was related to elevated depression and anxiety during COVID-19. Feeling older when facing ongoing health-related stress such as the pandemic, may negatively impact evaluations regarding one's own health when one feels older, in a manner similar to the effects of negative perceptions of age (Losada-Baltar et al., 2021; Wurm & Benyamini, 2014), which can lead to health-related fears and pessimism. Furthermore, our moderation analyses showed that the positive associations between anxiety sensitivity with depression and anxiety during the pandemic were significantly stronger among participants who reported an older subjective age. The present findings echo previous evidence on subjective age moderating negative associations between stressors and outcome measures such as posttraumatic stress, and other psychopathology



(i.e., Palgi et al., 2019). This is also in line with findings that pertain specifically to the pandemic, revealing for example that subjective age played a moderating role in the relations between loneliness and psychiatric symptoms (Shrira et al., 2020). As Western cultures worship youth and view old age in a negative and stereotypical manner (Nelson, 2011), older self-perceptions might be themselves a source of strain for one's late-life development (Westerhof et al., 2014), potentially leading to negative feelings of self-alienation. Additionally, feeling older has been found to associated with health-related behaviors, and interpretations of health changes, such that when people interpret health conditions as age-related, they tend to be more passive in fostering protective health habits and adhering to medical recommendations (Stephan, Caudroit, & Chalabaev, 2011). Thus, feeling older might not only hinder buffering of the experience of somatic threat resulting from anxiety sensitivity but may further amplify it.

In spite of its strengths, the present study is not without limitations that should be mentioned. Our data were based on a cross-sectional sample, and we cannot generalize the results, nor establish causality or the directionality of the associations between anxiety sensitivity, subjective age, depression and anxiety. Additionally, data were collected during a pandemic and it cannot be determined whether current findings were specific to the pandemic or whether they can be generalized to other situations of ongoing stress. Future studies based on prospective designs, not only specific to the pandemic, are needed. Furthermore, due to the online nature of the study, it is possible that older adults who are less digitally oriented were precluded from taking part in the study, and it is important to examine the present subject matter using additional data-gathering methods. Lastly, our measures were based on self-report, and it is possible therefore that they were subject to bias.

Nonetheless, the present study sheds light on the moderating role of subjective age in the relations between anxiety sensitivity and depression and anxiety symptoms during the current

pandemic. These findings underscore how the effects of age-related factors are not straightforward and can be quite intricate during times of stress. While an older age may in itself be associated with less depression and anxiety, the sense of feeling older than one's age may underlie risk in the face of anxiety sensitivity during COVID-19. The present findings imply that clinical interventions targeted at coping with older subjective perceptions of age might be particularly beneficial for individuals who are prone to catastrophic appraisals of bodily signals, during stressful times such as the current COVID-19 pandemic.

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**Table 1.** Background variables, COVID-19 related stressors and main study variables among the present sample ( $N = 828$ )

		M (SD) or (%)
Age, Range, M (SD)		18-79, 43.98 (14.06)
Gender, n (%)		
	Female	674 (81.4)
	Male	154 (18.6)
Relationship status, n (%)		
	In a relationship	534 (64.5)
	Not in a relationship	293 (35.4)
	Missing	1 (0.1)
Education, n (%)		
	High school or under	422 (51.0)
	Post high school and up	406 (49.0)
Religiosity, (%)		
	Secular	557 (29.6)
	Religious/traditional	245 (67.3)
	Missing	26 (3.1)
Income, (%)		
	Below-average income	412 (49.8)
	Average income or above	416 (50.2)
Perceived health		3.93 (0.8)
In quarantine (%)		
	Yes	74 (7.9)
Living alone during outbreak (%)		
	Yes	118 (14.3)
Belong to risk group (%)		



	Yes	265 (32.0)
Have close other in risk group (%)		
	Yes	692 (83.6)
Have close other diagnosed with the disease (%)		
	Yes	59 (7.1)
Anxiety sensitivity		31.74 (25.23)
Subjective age		2.53 (0.73)
Anxiety symptoms		0.91 (0.85)
Depression symptoms		0.86 (0.78)

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**Table 2.** Intercorrelations between the main study variables ( $N=828$ )

Measure	1	2	3	4
1. Anxiety sensitivity	-			
2. Subjective age	.22***	-		
3. Depression symptoms	.46***	.32***	-	
4. Anxiety symptoms	.58***	.28***	.75***	-

\*\*\*  $p < .001$

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**Table 3.** The moderating role of subjective age in the relations between anxiety sensitivity, depression and anxiety symptoms during the pandemic ( $N=828$ )

	Depression symptoms			Anxiety symptoms		
	$\beta$	$R^2$	$f^2$	$\beta$	$R^2$	$f^2$
<b>Age</b>	-.25***	.35	.54	-.17***	.40	.67
<b>Gender</b>	-.02			.07**		
<b>Income</b>	-.08**			-.05		
<b>Perceived health</b>	-.15***			-.14***		
<b>Living alone during outbreak</b>	.15***			.04		
<b>Anxiety sensitivity</b>	.36***			.51***		
<b>Subjective age</b>	.11***			.05		
<b>Subjective age X Anxiety sensitivity</b>	.06*			.05*		

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$