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The COVID-19 anxiety syndrome and selective attentional bias towards COVID-19-related stimuli in UK residents during the 2020–2021 pandemic

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Abstract

The psychological and social effects of the COVID-19 pandemic are pervasive, and there is potential for a long-lasting impact on mental health. In the current study, we sought to provide, in a representative sample of UK residents during the third COVID-19 lockdown in February 2021, further evidence for the validation of the COVID-19 anxiety syndrome construct. We did this by evaluating the COVID-19 anxiety syndrome against measures of personality, health anxiety and COVID-19 anxiety in predicting levels of generalized anxiety and depression and by examining whether increased health anxiety and COVID-19 psychological distress (COVID-19 anxiety and COVID-19 anxiety syndrome) scores were associated with increased attentional bias to COVID-19-related stimuli. A series of correlation analyses revealed that neuroticism, health anxiety, COVID-19 anxiety and COVID-19 anxiety syndrome scores were positively and significantly correlated with generalized anxiety and depression scores and that the perseveration component of the COVID-19 anxiety syndrome predicted generalized anxiety and depression scores independently of age, gender, conscientiousness, openness, health anxiety and COVID-19 anxiety. Furthermore, results indicated that only the total COVID-19 anxiety syndrome score and the scores on the avoidance and perseveration components were positively and significantly correlated with attentional bias indices. More specifically, the general attentional bias index was only shown to be positively and significantly correlated with the total COVID-19 anxiety syndrome score and its perseveration component, while slowed disengagement was only shown to be negatively and significantly correlated with the total COVID-19 anxiety syndrome score and its avoidance component. The implications of these findings are discussed.

KEYWORDS
attentional bias, COVID-19 anxiety, COVID-19 anxiety syndrome, health anxiety, personality traits, psychological distress

1 | INTRODUCTION

The psychological and social effects of the COVID-19 pandemic are pervasive, and there is potential for a long-lasting impact on mental health (Holmes et al., 2020). There has been a clear surge of

pandemic-related psychological distress including fear (Ahorsu et al., 2020), anxiety (Lee, 2020; Lee, Jobe, et al., 2020), perceived threat (Conway et al., 2020), depression (Fancourt et al., 2020), stress (Taylor et al., 2020) and an anxiety syndrome characterized by avoidance, checking, worrying and threat monitoring (Nikčević &

Spada, 2020). In the United Kingdom, for example, in the first few months of the pandemic about a quarter of the population experienced moderate to severe anxiety and a third reported moderate to severe depressive symptoms in response to COVID-19 (Fancourt et al., 2020). Similar findings were reported in China (Wang et al., 2020). Furthermore, those suffering from COVID-19-related psychological distress tend to exhibit elevated levels of post-traumatic stress, health anxiety and suicidality (Chong et al., 2004; Wheaton et al., 2012; Wu et al., 2009), which may last well beyond the course of the COVID-19 pandemic. Understanding individual differences in the types of psychological distress related to COVID-19, as well as identifying behaviours that may hinder psychological adaptation, is of paramount importance in developing effective rehabilitation programmes for the post COVID-19 pandemic phase.

1.1 | The COVID-19 anxiety syndrome

Recently, Nikčević and Spada (2020) developed the COVID-19 Anxiety Syndrome Scale (C-19ASS) to enable researchers and clinical practitioners to assess individual differences in COVID-19-related avoidance, checking, worrying and threat monitoring. Work using this scale has already established solid psychometric properties of the C-19ASS. The C-19ASS has been found to predict generalized anxiety and depression independently of age, gender, employment and risk status, personality traits, health anxiety and COVID-19 anxiety in a US community sample (Nikčević et al., 2021).

The ease of the pandemic and eventual return to normal societal functioning will inevitably entail exposure to environments associated with a greater risk of infection, such as public transport, offices, cinemas and theatres. Nikčević and Spada (2020) and Nikčević et al. (2021) have argued that such return to normal functioning may be hindered in individuals who display maladaptive forms of coping, as captured by the C-19ASS and characterized by perseveration and avoidance of COVID-19-related threat and stimuli. Thus, rehabilitative efforts could focus on reducing such maladaptive coping and in promoting alternative behaviours and styles of thinking that would attenuate the perception of threat and enhance psychological re-adjustment.

1.2 | Further establishment of the construct validity of the COVID-19 anxiety syndrome through the investigation of attentional biases to threat-related stimuli

At this stage of the COVID-19 pandemic, we think further evidence regarding the construct validity of the COVID-19 anxiety syndrome (as measured by the C-19ASS) is needed. One source of validating evidence is to examine known factors that are likely to differentiate those with elevated from those with decreased levels of psychological distress. We argue that because one characteristic of elevated levels of psychological distress is an attentional processing bias for relevant

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Key Practitioner Message

- The perseveration component of the COVID-19 anxiety syndrome predicts generalized anxiety and depression scores independently of all other variables, including health anxiety and COVID-19 anxiety.
- No variable, aside from the total COVID-19 anxiety syndrome score and the scores on the avoidance and perseveration components, was correlated with attentional bias indices.
- Possible psychological interventions aimed at tackling the COVID-19 anxiety syndrome are presented.

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threat-related stimuli (Bar-Haim et al., 2007; Cisler & Koster, 2010) (i.e., attentional bias), the manner in which individuals attend to such cues may prove a good candidate.

A plethora of work has shown that humans orient their attentional resources to salient stimuli in their environment (e.g., van Rooijen et al., 2017) with threat-related stimuli being particularly prominent and attention grabbing (Carlson & Fang, 2020; Mathews & MacLeod, 1985). The prioritization of these resources has been labelled attentional bias and is functional to the extent that individuals can 'prepare' for adaptation to the threat posed (Öhman & Mineka, 2001).

The dot probe task has been the most commonly used method to measure attentional bias (MacLeod et al., 1986). In this task, two stimuli (one threat-related and the other neutral) are presented simultaneously on opposite sides of a computer screen for a brief period. One of these stimuli is then replaced by a target 'dot', and respondents are tasked to react as quickly as possible to the position of the dot (left or right, top or bottom) by pressing the relevant key. If attention is directed to the location of the threat-related stimulus, participants should be quicker to respond to a dot occurring at the location previously occupied by the threatening stimulus (i.e., congruent trials) in comparison to a dot which replaces the neutral stimulus (i.e., incongruent trials).

A robust finding in work using the dot probe suggests that the operation of attentional bias covaries with increased anxiety (see Bar-Haim et al., 2007, and Goodwin et al., 2017 for meta-analyses; Cisler et al., 2009) and may be rooted in an exaggerated amplitude in the P3 event-related potential wave (Gupta et al., 2019). Although COVID-19-related psychological distress has not been examined specifically in relation to attentional biases during the current pandemic, one study has examined the effects of health anxiety and fear of COVID-19 on attentional biases to related picture stimuli in an Italian sample (Cannito et al., 2020). Findings suggest that increased bias was associated with generic levels of health anxiety and that this effect was also mediated by fear-based expectancy formulations (i.e., beliefs about the chances of becoming contaminated and the severity of any anticipated outcomes of contamination).

Findings in the wider attentional bias literature suggest a differentiation between the key stages of attentional allocation in those experiencing psychological distress. Specifically, it has been argued that anxious individuals show a pattern of vigilance towards a threat during immediate threat processing and may switch to an attentional pattern consistent with threat avoidance during a later, more strategic stage (see Zvielli et al., 2014; Kruijt et al., 2016; Koster et al., 2004; Taylor et al., 2016; see Bar-Haim et al., 2007, for meta-analysis). In other words, individuals, when encountering a threat-related stimulus (in our case, those consistent with COVID-19), may be more likely to be both vigilant for processing the threat immediately and to be slower to disengage their attention from the threat source. As originally formulated, the difference between reaction times to congruent and incongruent trials, while showing preferential attention, did not consider the vigilance and disengagement explanatory phases in the attentional allocation cycle. In response, by including a series of neutral-neutral trials into the procedure and comparing response times to congruent and incongruent trials separately, researchers have been able to measure threat vigilance (faster reaction times on congruent vs. neutral-neutral trials) and difficulty in disengagement from the stimulus (slower reaction times on incongruent vs. neutral-neutral trials) (see Koster et al., 2004).

Importantly, these effects of initial orientation to a threat and decreased capacity to move one's attention away from the threat are likely to be exacerbated as a function of increasing psychological distress. In this way, psychologically distressed individuals should show a different pattern of attentional allocation relative to those who are not psychologically distressed (Cisler & Koster, 2010; McNally, 2019; Mogg & Bradley, 2016), and this should be discernible from measures of health anxiety, COVID-19 anxiety and the COVID-19 anxiety syndrome as included in the present study. On this basis, we predict that attentional bias for COVID-19-related stimuli (including measures of vigilance and disengagement) should be magnified as a function of health anxiety, COVID-19 anxiety and the COVID-19 anxiety syndrome.

1.3 | Aims of the current study

In summary, the aims of the current study are twofold: first, to provide further evidence for the validation of the COVID-19 anxiety syndrome (as measured by the C-19ASS) against measures of personality, health anxiety and COVID-19 anxiety in predicting levels of generalized anxiety and depression for the first time in a UK sample; second, to examine whether increased health anxiety, COVID-19 anxiety and COVID-19 anxiety syndrome (as measured by the C-19ASS) scores are associated with increased attentional bias to COVID-19-related stimuli and whether this effect is best explained by vigilance to threat (early phase) and/or inability to disengage (late phase). We also hypothesize that adults at 'high risk' (e.g., age and health related) and those who have had threat enhancing (e.g., death of a close person) or threat reducing (e.g., vaccination) associated experiences with will respectively exhibit increased and decreased attentional bias to COVID-19-related stimuli.

2 | METHOD

2.1 | Participants

2.1.1 | Sample size calculation

Assuming 80% power, an effect size of 0.38 for high versus low psychological distress group differences (two tailed) (based on Bar-Haim et al.'s, 2007, meta-analysis), an alpha is .05 and an allocation ratio of 2:1 (low psychological distress: high psychological distress) (based on ~40% of population experiencing significantly elevated psychological distress related to COVID-19 [ONS, 2020]), a sample size of 248 was required. Assuming a 20% attrition rate a final sample size of 298 was determined.

2.1.2 | Sample achieved

A representative[1] sample of 298 UK-based adults aged 18+ stratified by age, gender and ethnicity was achieved via the Prolific (www.prolific.co) crowd sourcing platform (mean age = 46.27, SD = 15.27; 150 (50.3%) females, 148 (49.7%) males. Once outliers in responses to the dot probe task (responses times [RTs] less than 250 ms and greater than 1000 ms) were removed (see Rodebaugh et al., 2016), as well as participants who recorded greater than 20% errors (invalid and incorrect responses, n = 12), a final sample of 286 participants, comprising 142 (49.7%) females and 144 (50.3%) males (mean age 46.34 years, standard deviation [SD] = 15.21, range = 18–76) was achieved for analysis (see Table 1 for sample demographics).

The ethnic background of this sample was as follows: 79.8% White; 6.4% Black; 8.5% Asian, 5%, Mixed Race and 0.4% Other. The majority of the sample was educated at university level (64.5%), married, co-habiting or in a civil partnership (59.2% vs. 29.4% single) and employed or retired (79.4%). Approximately one half (48.6%) reported no religious affiliation (vs. 44.1% Christian). About one third of the sample (36.7%) had been tested for COVID-19 (of which 9.5% had tested positive), and 22% considered themselves to be at 'high risk' from the disease, with 65.6% of sample reporting a health problem as the justification. Thirty respondents (10.5%) had experienced the loss of someone close to them as a consequence of COVID-19, and nearly a fifth (19.6%) had received the COVID-19 vaccination. The sample displayed a normal distribution of scores (based on skewness and kurtosis measures) on the Patient Health Questionnaire Anxiety and Depression Scale (Kroenke et al., 2016) with over half of the sample (55.2%) scoring below the threshold of 10 indicating the presence of mild psychological distress.

2.2 | Design

A 2 (word type: Covid, neutral) × 2 (word position: left, right) × 2 (probe position; congruent, incongruent) × 2 (Block: Block 1, Block 2) × 2 (presentation order: dot probe-questionnaires, questionnaires-

TABLE 1 Descriptive statistics and inter-correlations for PHQ-ADS, BFI subscales, WI-7, CAS and C-19ASS (including subscales)

	X	SD	2	3	4	5	6	7	8	9	10	11
1. PHQ-ADS	10.47	10.43	−.18**	−.12*	−.29**	.47**	.24**	.46**	.52**	.44**	.20**	.51**
2. BFI-10-Ext	5.60	2.15		.20**	.10	−.30**	.17**	−.06	−.12*	−.07	−.07	−.05
3. BFI-10-Agr	7.12	1.65			.21**	−.22**	−.03	−.02	02	.06	.05	.05
4. BFI-10-con	7.62	1.70				−.30**	−.089	−.16**	−12*	−.01	.07	−.07
5. BFI-10-Neu	5.70	2.20					.35**	.36**	.28**	.20**	.10	.23**
6. BFI-10-Ope	6.06	1.95						.20**	.14*	.04	−.01	.07
7. WI-7	13.72	5.54							.36**	.30**	.18**	.32**
8. CAS	0.84	1.85								.44**	.25**	.48**
9. C-19ASS-Total	13.36	7.31									.81**	.90**
10. C-19ASS-A	6.78	3.64										.48**
11. C-19ASS-P	6.58	4.85										

Note: n = 286.
Abbreviations: BFI-10-Agr, Big Five Inventory-10-Agreeableness; BFI-10-Com, Big Five Inventory-10-Conscientiousness; BFI-10-Ext, Big Five Inventory-10-Extraversion; BFI-10-Neu, Big Five Inventory-10-Neuroticism; BFI-10-Ope, Big Five Inventory-10-Openness; CAS, Coronavirus Anxiety Scale; C-19ASS-A, COVID-19 Anxiety Syndrome Scale-Avoidance; C-19ASS-P, COVID-19 Anxiety Syndrome Scale-Perseveration; C-19ASS-Total, COVID-19 Anxiety Syndrome Scale-Total; PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; WI-7, Whitley Inventory 7.
*p < .05. **p < .01.

dot probe) mixed factorial design was used. Word type, word position, probe position and block were within-participants factors and presentation order a between-participants factor.

2.3 | Materials

2.3.1 | Sociodemographic variables

Participants were asked to state their age, gender, ethnicity, education level, religious affiliation (if any) and employment status.

2.3.2 | COVID-19 risk status measures

Participants were asked whether they considered themselves to be at 'high-risk' health-wise should they contract COVID-19 (yes, no) and to provide a reason from the following categories: current health problem, older age, pregnancy, disability or other. Participants were also asked whether they had had a COVID-19 test, a positive COVID-19 test, a COVID-19 vaccine and whether someone close has died as a result of COVID-19 (yes, no).

2.3.3 | Big Five Inventory-10 (Rammstedt & John, 2007)

This self-report measure includes 10 items, loading on five factors, assessing the personality domains, extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. Participants are asked to rate how well statements describe their personality by marking on a 5-point Likert scale (1 = *Strongly disagree* to

5 = *Strongly agree*). Scores range between 2 and 10 for each of the five factors with increased scores indicating higher levels of a given personality trait. The Big Five Inventory-10 (BFI-10) has shown good reliability and validity across numerous samples (Rammstedt & John, 2007). Given two items per scale, no internal reliability test was performed (e.g., Soto & John, 2017).

2.3.4 | Whiteley Index 7 (Fink et al., 1999)

This self-report measure assessing health anxiety includes seven items, loading on a single factor, (e.g., 'Do you think there is something seriously wrong with your body?'). Participants are asked to rate to what degree each statement applies to them. The original response format (yes or no) was adapted using a 5-point Likert scale (1 = 'Not at all' to 5 = 'A great deal'), (see Nikčević et al., 2021; Welch et al., 2009). Scores range between 7 and 35 with higher scores indicative of increasing levels of a health anxiety. The Whiteley Index 7 (WI-7) has demonstrated good reliability and validity across many sample groups (Fink et al., 1999; Welch et al., 2009). In the current study, the Cronbach α = .89.

2.3.5 | Coronavirus Anxiety Scale (Lee, 2020)

This self-report measure comprises five items, loading on a single factor, assessing physiologically based symptoms that are aroused with COVID-19-related information and thoughts (e.g., 'I felt dizzy, lightheaded, or faint, when I read or listened to news about the Coronavirus'). Participants rate how frequently they experience each symptom by marking a 5-point time anchored scale (0 = *Not at all* to 4 = *Nearly every day over the last 2 weeks*). Scores range between

0 and 20 with increased scores indicative of higher levels of a COVID-19 anxiety. The Coronavirus Anxiety Scale (CAS) has demonstrated good reliability and validity (Lee, Mathis, et al., 2020). In the current study the CAS had a Cronbach $\alpha = .81$.

2.3.6 | C-19ASS (Nikčević & Spada, 2020)

This self-report measure includes nine items, loading on two factors, assessing features of the anxiety syndrome linked to COVID-19. These are (1) avoidance (e.g., of public transport because of the fear of contracting COVID-19); (2) checking (e.g., of symptoms of COVID-19); (3) worrying (e.g., researching symptoms of COVID-19 at the cost of other activities); and (4) threat monitoring (e.g., paying close attention to others displaying possible symptoms of COVID-19. Items relating to checking, worrying and threat monitoring load on the first factor ('perseveration') with a second factor comprising avoidance items ('avoidance'). Participants are asked to rate how frequently they experience each feature of the anxiety syndrome using a 5-point time anchored scale (0 = 'Not at all' to 4 = 'Nearly every day over the last 2 weeks'). Scores range between 0 and 36, with higher scores indicative of increased levels of the anxiety syndrome. The C-19ASS has demonstrated good reliability and validity (Nikčević & Spada, 2020). In the current study, the Cronbach $\alpha = .82$.

2.3.7 | Patient Health Questionnaire Anxiety and Depression Scale (Kroenke et al., 2016)

This self-report measure assesses the severity of generalized anxiety and depression symptoms. The Patient Health Questionnaire Anxiety and Depression Scale (PHQ-ADS) combines the Generalized Anxiety Disorder 7-item (GAD-7; Spitzer et al., 2006) and the PHQ-9 (Kroenke et al., 2001) self-report measures. The combined PHQ-ADS is a reliable and valid composite measure with (see Kroenke et al., 2016) with higher scores indicative of increased symptoms of generalized anxiety and depression. In the current study, the Cronbach $\alpha = .95$.

2.3.8 | Attentional bias measure

To measure preferential allocation of attention to COVID-19-related stimuli, the dot probe task was utilized. The stimuli used consisted of 24 COVID-19-related words and 24 neutral words arranged into two blocks of 12 pairs (Block 1: hands-white, clean-offer, social-league, cough-decor, fever-rocky, temperature-newspaper, mask-fold, glove-lakes, symptoms-objective, wash-bell, handwash-mudflat and close-story; Block 2: distance-computer, hospital-election, ventilator-antiquity, oxygen-tunnel, lungs-rhyme, infection-sculpture, virus-coral, lockdown-pontoon, pandemic-sopranos, shielding-fairways, isolation-equation and lonely-package).

Each trial word was generated initially by requiring 12 individuals (six males and six females) to rate how representative each of 32 COVID-19-related words were on seven-point scales with poles labelled 'Not at all representative' (scored 1) and 'Completely representative' (scored 7). Only words achieving mean ratings above 5.42 and a SD less than 0.8 were selected to ensure that words were representative of the relevant category and that there was minimum variability in responses across individuals. Each COVID-19-related word was then paired with a neutral word to form the 24-word pairs. COVID-19-related and neutral words were matched in terms of word length, number of syllables and frequency of use using Subtlex-UK (van Heuven et al., 2014) such that mean frequencies were shown not differ across word type, $p = .38$. In addition, eight matched pairs of neutral words (four pairs per block) were also generated to act as filler stimuli and to enable the calculation of vigilance to threat and delayed disengagement indices (see below) (Block 1: author-concert, opticians-sultanas, bill-feet and object-valley; Block 2: dollhouse-coffeepot; town-stand, picnic-buses and lecture mammals).

Each trial comprised a fixation cross presented in the middle of the screen. After 750–1100 ms, the fixation cross disappeared and was replaced by the two-word stimuli, one on the left and one on the right of the screen. These stimuli disappeared after 500 ms and were replaced by a dot or 'probe' that appeared at the same location as one of the stimuli (i.e., either left or right) for a maximum of 1500 ms or until a response was made. Participants were instructed to press either the 'f' key (left) or the 'j' key (right) to indicate the location of the probe as quickly and as accurately as possible.

2.4 | Procedure

All data were generated between 15 and 17 February 2021.[2] After initially consenting, participants were presented with the demographic and COVID-19 information questions and then randomly assigned such that order for completion of either the dot probe or self-report (questionnaires) first was counterbalanced across participants (half dot-probe followed by self-report and half self-report followed by dot-probe).

For the dot probe, participants were seated in front of a computer screen, presented with task instructions and then eight practice trials comprising pairs of letter strings (e.g., AAAA-VVVV). Having completed practice trials, the experimental phase comprised two blocks (see above) of 48 trials for 12 COVID-19 neutral word pairs with word position (left, right) and probe position (congruent, incongruent) counterbalanced across participants and eight trials of four neutral-neutral word pairs. (Trials in which probes replaced COVID-19-related words paired with neutral words were congruent trials while those which replaced neutral words opposite COVID-19-related words were incongruent.) Prior to each block participants were reminded of the task instructions. In total, participants completed 120 trials (8 practice + 96 COVID-19 neutral + 16 neutral-neutral trials). All word pairs were randomly presented within each block.

Participants were presented with the BFI-10, WI-7, CAS, C-19ASS and PHQ-ADS in that order with accompanying questionnaire-specific instructions. On completion of the study, participants were debriefed. All procedures were subject to ethical approval by the Kingston University Research Ethics Committee in December 2020.

3 | RESULTS

3.1 | Analysis outline

Data were analysed in phases. The first phase concerned how protective and vulnerability factors predicted levels of generalized anxiety and depression. The second phase tested whether self-report measures (all questionnaires) were associated with differences in the three attentional bias indices.

3.2 | Protective and vulnerability factors in predicting generalized anxiety and depression

Initial Pearson's r correlation coefficients between potential predictors and PHQ-ADS (criterion) were calculated to ascertain significant associations for inclusion in subsequent analyses. Of the demographic and COVID-19 experiential factors, age ($r = -.32$, $p < .001$), gender ($r = .18$, $p < .01$), COVID-19 vaccination (1 = yes, 2 = no) ($r = .13$, $p < .05$) and COVID-19 death of a person close (1 = yes, 2 = no) ($r = -.12$, $p < .05$) were shown to correlate significantly with PHQ-ADS scores. Correlations involving personality, WI-7, CAS, C-19ASS-Total, C-19ASS-Avoidance and C-19ASS-Perseveration with PHQ-ADS were all shown to be positive and significant (all ps < .01) (see Table 1).

Prior to analyses data were subject to assumption testing. First, a sample size of 286 is sufficient given 13 predictor variables. Collinearity statistics were within acceptable limits for multicollinearity (tolerance range, .54–.96; Variance Inflation Factor range, 1.05–1.80). Mahalanobis distance scores, Cook's distance and centred leverage scores identified no significant multivariate outliers and residual analysis (including Loess line fitting and Q-Q plots) and scatterplots showed normality, linearity and homoscedasticity assumptions were adhered to.

A hierarchical multiple regression was performed predicting PHQ-ADS scores from age, gender (1 = male; 2 = female), COVID-19 vaccination (1 = yes, 2 = no) and COVID-19 death of a person close (1 = yes, 2 = no) (Step 1), the addition of the BFI-10 subscales (Step 2), WI-7 (Step 3), CAS (Step 4) and C-19ASS-Avoidance and C-19ASS-Perseveration (Step 5) (see Table 2).

Results showed that on Step 1, age, gender, COVID-19 vaccination and COVID-19 death of a close person together significantly predicted PHQ-ADS scores, $F (4, 285) = 13.21$, $p < .001$. Introducing the BFI-10 subscales (Step 2) resulted in a significant regression equation, $F (9, 285) = 15.86$, $p < .001$, explaining an

additional 18% of variance in PHQ-ADS scores, $\Delta F (5, 276) = 15.27$, $p < .001$. The addition of WI-7 (Step 3) also resulted in a significant equation, $F (10, 285) = 22.23$, $p < .001$, accounting for a further 11% of variance explained in PHQ-ADS scores, $\Delta F (1, 275) = 52.91$, $p < .001$. Adding the CAS in Step 4 again produced a significant equation, $F (11, 285) = 28.19$, $p < .001$, explaining an additional 8% of variability in PHQ-ADS scores, $\Delta F (1, 272) = 48.95$, $p < .001$. Finally, the introduction of the two subscales of the C-19ASS (Step 5) resulted in a significant equation, $F (13, 285) = 26.87$, $p < .001$ and accounting for an extra 3% of variance in PHQ-ADS scores, $\Delta F (2, 272) = 9.74$, $p < .001$. This final model (Step 5) showed that variability in PHQ-ADS scores was significantly predicted by age, gender, conscientiousness and openness, WI-1, CAS and C-19ASS-Perseveration (all ps < .05) and accounted for a total of 56% of variance in PHQ-ADS scores (see Table 2).

3.3 | Attentional bias for COVID-19-related stimuli

Analyses are restricted to mean correct responses (mean percentage error rates = 1.67, $SD = 2.48$) to congruent, incongruent and neutral trials.

An initial three-way analysis of variance (ANOVA) with trial type (congruent and incongruent) and word block (Block 1 and Block 2) as within participants factors and presentation order (dot probe-questionnaires and questionnaires-dot probe) as a between participants factor was applied. Results showed a significant main effect for trial type, $F (1, 284) = 11.28$, $p < .001$, $\eta_p^2 = .04$, indicating that RTs (ms) for congruent trials were significantly faster than for incongruent trials. All other main and interaction effects for block type and presentation order were not significant (all ps > .05) (see Table 3). Furthermore, the effects of factors hypothesized to increase threat (i.e., high risk status and COVID-19-related death in family) and/or reduce threat (i.e., vaccination) were also not significant.

3.4 | Attentional bias indices

An aggregated mean index for attentional bias was calculated by subtracted mean RTs for congruent trials from mean RTs for incongruent trials (see MacLeod et al., 1986) (positive values indicating increasing attentional bias for congruent trials). Aggregated mean indices for vigilance to threat (mean RTs for congruent trials were subtracted from mean RTs for neutral-neutral trials) (positive values equal increasing vigilance) and slowed disengagement from threat (mean RT for incongruent trials subtracted from mean RTs for neutral-neutral trials) (negative values equal increasing slowed disengagement) were also calculated (see Koster et al., 2004) (see Table 3).

Pearson's r correlation coefficients between attentional bias indices, demographics and COVID-19 experiential factors (i.e., high risk status and COVID-19-related death in family) showed *no* significant

TABLE 2 Hierarchical regression statistics predicting PHQ-ADS scores

Predictor	β	t	sr^2	R	R^2	ΔR^2
Step 1				.40	.16	.16***
Age	−.32	5.57***	.09			
Gender	.19	3.46***	.04			
COVID-19 vaccine	.03	0.58	.00			
CCOVID-19 close death	−.13	2.32*	.02			
Step 2				.58	.34	.18***
Age	−.24	4.45***	.05			
Gender	.13	2.61*	.02			
COVID-19 vaccine	−.01	0.15	.00			
COVID-19 close death	−.14	2.81**	.02			
BFI-10-Ext	−.09	1.72	.01			
BFI-10-Agg	−.01	0.23	.00			
BFI-10-con	−.15	2.94**	.02			
BFI-10-Neu	.28	4.44***	.05			
BFI-10-Ope	.13	2.37*	.01			
Step 3				.67	.45	.11***
Age	−.28	5.70***	.07			
Gender	.15	3.24**	.02			
COVID-19 vaccine	−.01	0.14	.00			
CCOVID-19 close death	−.10	2.30*	.01			
BFI-10-Ext	−.11	2.12*	.01			
BFI-10-Agg	−.03	0.69	.00			
BFI-10-con	−.13	2.63**	.01			
BFI-10-Neu	.14	2.37*	.01			
BFI-10-Ope	.10	2.05*	.01			
WI-7	.36	7.27***	.11			
Step 4				.73	.53	.08***
Age	−.28	6.07***	.06			
Gender	.09	2.14*	.01			
COVID-19 vaccine	−.01	0.29	.00			
CCOVID-19 close death	−.07	1.62	.00			
BFI-10-Ext	−.08	1.73	.01			
BFI-10-Agg	−.05	1.15	.00			
BFI-10-con	−.11	2.56*	.01			
BFI-10-Neu	.11	1.94	.01			
BFI-10-Ope	.09	1.87	.01			
WI-7	.26	5.60***	.05			
CAS	.33	6.99***	.08			
Step 5				.75	.56	.03***
Age	−.22	4.69***	.04			
Gender	.10	2.36*	.01			
COVID-19 vaccine	−.00	0.03	.00			
CCOVID-19 close death	−.06	1.33	.00			
BFI-10-Ext	−.09	1.90	.01			
BFI-10-Agg	−.06	1.46	.00			
BFI-10-con	−.12	2.84**	.01			

(Continues)

TABLE 2 (Continued)

Predictor	β	t	sr^2	R	R^2	ΔR^2
BFI-10-Neu	.09	1.80	.01			
BFI-10-Ope	.10	2.19*	.01			
WI-7	.23	4.83***	.04			
CAS	.24	4.79***	.04			
C-19ASS-A	−.01	0.13	.00			
C-19ASS-P	.22	4.01***	.03			

Note: Gender (1 = males, 2 = females); COVID-19 vaccine (1 = yes, 2 = no); COVID-19 close death (1 = yes, 2 = no). n = 286.
Abbreviations: BFI-10-Agr, Big Five Inventory-10-Agreeableness; BFI-10-Com, Big Five Inventory-10-Conscientiousness; BFI-10-Ext, Big Five Inventory-10-Extraversion; BFI-10-Neu, Big Five Inventory-10-Neuroticism; BFI-10-Ope, Big Five Inventory-10-Openness; C-19ASS-A, COVID-19 Anxiety Syndrome Scale-Avoidance; C-19ASS-P, COVID-19 Anxiety Syndrome Scale-Perseveration; C-19ASS-Total, COVID-19 Anxiety Syndrome Scale-Total; CAS, Coronavirus Anxiety Scale; PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; WI-7, Whitley Inventory 7.
*p < .05. **p < .01. ***p < .001.

TABLE 3 Mean correct reaction times (ms) and standard deviations for congruent, incongruent and neutral trials and attentional bias indices

	Trial type			Attentional bias indices		
	Congruent	Incongruent	Neutral	Attentional bias—General	Vigilance to threat	Slowed disengage
X	422.42	425.50	425.08	3.08	2.66	−0.42
SD	64.12	66.26	67.98	16.67	21.55	21.73

Note: Attentional bias—general, incongruent—congruent; Vigilance to threat, neutral–congruent; Slowed disengagement, neutral–incongruent.

	Attentional bias—General	Vigilance to threat	Slowed disengagement
1. PHQ-ADS	.02	.03	.01
2. BFI-10-Ext	.06	.02	−.03
3. BFI-10-Agr	−.04	.04	.07
4. BFI-10-con	−.03	−.07	−.05
5. BFI-10-Neu	.08	.04	−.03
6. BFI-10-Ope	.11	.04	−.04
7. WI-7	.11	−.03	−.11
8. CAS	.04	−.03	−.06
9. C-19ASS-Total	.13*	−.03	−.12*
10. C-19ASS-A	.09	−.06	−.12*
11. C-19ASS-P	.12*	−.01	−.10

TABLE 4 Intercorrelations (Pearson's r) for attentional bias indices (general, vigilance and disengagement), PHQ-ADS, BFI subscales, WI-7, CAS and C-19ASS (including subscales)

Abbreviations: BFI-10-Agr, Big Five Inventory-10-Agreeableness; BFI-10-Com, Big Five Inventory-10-Conscientiousness; BFI-10-Ext, Big Five Inventory-10-Extraversion; BFI-10-Neu, Big Five Inventory-10-Neuroticism; BFI-10-Ope, Big Five Inventory-10-Openness; C-19ASS-A, COVID-19 Anxiety Syndrome Scale-Avoidance; C-19ASS-P, COVID-19 Anxiety Syndrome Scale-Perseveration; C-19ASS-Total, COVID-19 Anxiety Syndrome Scale-Total; PHQ-ADS, Patient Health Questionnaire Anxiety and Depression Scale; WI-7, Whitley Inventory 7; CAS, Coronavirus Anxiety Scale.
n = 286.
*p < .05.

associations (all ps > .23, −.01 < rs < .11). Correlations between all the questionnaires scores and attentional bias indices were also calculated (see Table 4). Only C-19ASS-Total and the component subscales, C-19ASS-Avoidance and C-19ASS-Perseveration were shown to positively, and significantly, correlate with attentional bias indices. More specifically, the general attentional bias index was *only* shown to be positively and significantly correlated with C-19ASS-Total and C-19ASS-Perseveration scores while slowed disengagement was *only* shown to be negatively and significantly correlated with C-19ASS-Total and C-19ASS-Avoidance scores (ps < .05).

4 | DISCUSSION

The aims of the current study were to provide further evidence, in a representative sample of UK residents during the third COVID-19 lockdown in February 2021, towards construct validity of the C-19ASS. Correlational analyses revealed that personality traits, health anxiety, COVID-19 anxiety, C-19ASS-Total and its two subscales were positively and significantly correlated with generalized anxiety and depression. These findings provide additional support for the concurrent validity of the C-19ASS. In addition, the C-19ASS-Perseveration subscale was found to predict generalized anxiety and depression scores independently of age, gender, conscientiousness, openness, health anxiety and COVID-19 anxiety. This finding confirms that the COVID-19 anxiety syndrome is a separate (therefore 'standalone') predictive entity of psychological distress during the COVID-19 pandemic. The C-19ASS-Avoidance subscale was not found to predict psychological distress. This may be due to the fact that the United Kingdom was is national lockdown, and the opportunity to purposefully avoid public places and transport, for example, was removed. It is plausible to assume that the lifting of lockdown may bring to prominence avoidance behaviour associated with the COVID-19 anxiety syndrome.

The present study also showed there was an attentional bias towards COVID-19-related stimuli. In other words, individuals were faster to respond to probes replacing threat-related stimuli (i.e., COVID-19 related) (congruent trials) compared to matched neutral words (incongruent trials). This suggests when presented with a pair of stimuli, one COVID-19-related and the other non-COVID-19-related, individuals' attention is oriented towards the COVID-19-related stimuli. Why should this be the case? One suggestion is that our attentional system is attuned to process stimuli that are salient in terms of potential harm (with threat-related potential) in such a way as to allow us to prepare to act to buffer the anticipated harm (Bar-Haim et al., 2007; Cisler & Koster, 2010). Given the timing of the study, it is of little surprise that we have shown this generic effect across the sample given the indirect/direct prominence of COVID-19-related experiences.

This generic bias was also not shown to vary as a function of factors that may be thought to moderate the operation of our attentional preferences. For example, a priori we might have expected that factors such as one's age and whether or not one had received a vaccination, a positive COVID-19 test or knew of someone close who had died as a result of COVID-19, would have resulted in threat-related stimuli being processed differently (increasing or decreasing bias, dependent upon experiential/demographic factor). The argument is that experiential/demographics that are presumed to put one at increased/decreased risk of infection should make COVID-19-related stimuli more salient resulting in a differential pattern of attentional bias. As this was not shown to be the case such potential moderators are not important in describing how one's attentional system processes relevant stimuli. We did however observe that both increasing age and the experience of knowing a person who had died as a result of COVID-19 were shown to be significant predictors of generalized anxiety and depression (as measured by the PHQ-ADS) but that generalized anxiety and depression were not associated with attentional bias. This highlights the importance of experiential factors in psychological well-being but not for cognitive makers in the processing of related threat.

Results also indicated that this attentional bias towards COVID-19-related stimuli was *only* positively and significantly correlated with the C19-ASS. In other words, increased COVID-19 anxiety syndrome scores were positively and significantly correlated with the size of the bias. This suggests that increasing attentional bias is a cognitive marker for increasing COVID-19 anxiety syndrome as measured by the C19-ASS and is not associated with either COVID-19 anxiety (as measured by the CAS) or health anxiety (as measured by the WI-7 Index). That this pattern is also shown for the perseveration subscale of the C19-ASS (positive and significant correlation with attentional bias) adds to this observation. In other words, participants' preferential attention towards COVID-19-related stimuli is associated with a number of factors, which have been shown to be important in predicting psychological distress (e.g., increased obsessive thinking, perseverative worry, checking and threat monitoring) (Jungmann & Witthöft, 2020; Nikčević et al., 2021; Nikčević & Spada, 2020). This points to the idea that how individuals use their attentional systems in interacting with threat-related stimuli may serve as a specific marker of this type of thinking. This is of importance to the extent that perseverative thinking may lead to an escalation in obsessional thinking about COVID-19 and the emergence of anxiety and maladaptive coping (Lee, 2020; Nikčević et al., 2021; Nikčević & Spada, 2020). The coping captured by C19-ASS therefore represents a strategy that leads to amplification rather than diminishment of distress in relation to the COVID-19-related stimuli.

In addition, our results suggest that an increasing slowing of the capacity for an individual to shift their attention away from the stimulus (to disengage attention) is of particular importance in describing characteristics of anxiety associated with COVID-19. More specifically, it appears that (a) increasing attentional bias is explained better by detriments in the attentional system to disengage than increased threat vigilance, (b) increasing COVID-19 anxiety syndrome scores in general are significantly correlated with a slowing of disengagement and (c) that aspect of the COVID-19 anxiety syndrome associated with an individual's 'need' to take avoidant action against the threat is of primary importance. That increased avoidant behaviours are associated with an increasing likelihood of being slower to shift attention away from COVID-19 stimuli suggests that psychological distress, as operationalized via the C-19ASS, is best articulated as a late-stage attentional processing deficit. That none of the C-19ASS measures were associated with vigilance to threat adds to this reasoning suggesting that inflated syndrome scores are specific to those aspects of attentional allocation characterized more by a deficit in disengagement than by vigilance to the threat per se. Individuals who show an inflated slowing in their ability to disengage from the stimulus word also report a propensity to avoid situations which are likely to expose them to the threat, and it is this cognitive–behavioural relationship that may form the core of the psychological distress experienced.

Although this reasoning may be accepted, understanding the causal relationship between inflated COVID-19 anxiety syndrome features and the observation that individual's attentional systems are biased towards the threat source cannot be specified. It could be argued that frequency of exposure to COVID-19-related threat creates the attentional bias demonstrated in this study, which manifests itself as a component of a related syndrome. Alternatively, it could reasonably be argued that the observed attentional bias is the result of any increased experienced syndrome. These observations point to the idea that the relationships observed between (a) the operation of the attentional bias in general with increasing perseverative thinking and (b) detriments in disengaging from the COVID-19 threat being associated with increased avoidant thinking, are either components of and/or markers of a COVID-19 anxiety syndrome.

Showing that increased attentional bias, and in particular slowed disengagement, is associated with C19-ASS total and subscales scores, whereas other candidate factors, such as health anxiety and COVID-19 anxiety, are not, points to the significance of the COVID-19 anxiety syndrome (as measured by the C-19ASS) as providing a useful understanding of psychological distress experienced during the COVID-19 pandemic. It appears that perseverative thinking and avoidant intentions are particularly important in detailing how individuals attend in a biased manner to COVID-19 threat-related material.

We have shown that individuals respond faster to congruent versus incongruent trials, indicative of an attentional bias towards COVID-19-related stimuli presented for 500 ms. Although this is consistent with other work, which has shown this effect using the same presentation threshold in individuals with elevated trait anxiety, work has also shown that at presentation speeds of circa 1200-ms individuals show a pattern of responding indicative of attentional avoidance (e.g., Koster et al., 2006; Mogg et al., 2004). In other words, at increased stimulus durations individuals are slower to respond to congruent versus incongruent trials because their attention is elsewhere to avoid any threat posed. Our work is limited to the extent that we cannot rule out the possibility that individuals may deliberately avoid the stimuli when they are given sufficient time to and that this is influential in terms of any potential association with C-19ASS subscales. Future work should examine this alternative.

The interpretation of our findings is also limited to the extent that, although we have used a single well-established measure of attentional bias, which shows consistent variability with measures associated with anxiety and depression (see Cisler & Koster, 2010), a more comprehensive picture necessitates further validation and replication of COVID-19 anxiety syndrome indices with other relevant measures (e.g., eye tracking technology, gaze contingency task, Posner cueing task and visual search task).

A further limitation concerns the idea that we have provided a 'snapshot' of the relationship between the measures in our study and attentional bias. This is interesting to the extent that we can generalize in terms of how individuals may respond to similar pandemics in the future. However, to derive a better understanding of how individuals adapt to such threat over time requires measurement at different points during the pandemic experience. Future work should detail the possible changing relationship between the measures in our study and attentional biases to establish the pervasiveness and generalizability of effects over time. Furthermore, indicative cut-offs of severity for the COVID-19 anxiety syndrome should be delineated as well as determining of the presence of such syndrome exists de novo in those without prior depression or anxiety.

4.1 | Implications for interventions

Our findings align themselves to important emerging research in the field of COVID-19 psychological distress. For example, items on the C-19ASS-Perseveration subscale tap into obsessive thinking and other forms of perseveration (worry), which may be associated, as recently argued by Lee, Mathis, et al. (2020), to an exacerbation of a maladaptive form of coping (e.g., addictive behaviours). Other items of the C-19ASS-Perseveration tap into constructs which have been found to be of central importance in COVID-19 psychological distress, including safety behaviours (Lee, Mathis, et al., 2020; Taylor et al., 2020) and excessive online information searching (Jungmann & Witthöft, 2020).

The capacity of being able to identify the COVID-19 anxiety syndrome (avoidance, worry, checking and threat monitoring) may be of value during and post the current health crisis (Asmundson & Taylor, 2020). For example, interventions aimed at interrupting perseverative thinking (e.g., metacognitive therapy; Wells, 2000), reducing checking, safety behaviours and avoidance (e.g., graded exposure and response prevention; Barlow et al., 2014) as well as training and re-calibrating attention (e.g., attention training technique; Wells, 2000) may serve to weaken the COVID-19 anxiety syndrome and possibly reduce the longer term occurrence of psychological distress, which is typically linked to pandemic events, in particular post-traumatic stress, general stress, anxiety, health anxiety and suicidality (Chong et al., 2004; Lee, Mathis, et al., 2020; Wheaton et al., 2012; Wu et al., 2009).

5 | SUMMARY

This study has shown, in a representative sample of UK residents during the third national lockdown, the importance of the COVID-19 anxiety syndrome in predicting both generalized anxiety and depression, as well as attentional biases towards COVID-19-related stimuli. In order to improve the generalizability of the findings, the replication of this study to include participants from other countries as well as clinical samples would be of value.

AUTHOR CONTRIBUTIONS

All authors designed the study. I.P.A. conducted the study and statistical analyses. All authors took part in writing the manuscript. All authors have read and agreed to submitted version of the manuscript.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

ETHICS APPROVAL

This was obtained from Kingston University Research Ethics Committee.

ENDNOTES

[1] See https://researcher-help.prolific.co/hc/en-gb/articles/360019238413 for details of generating representative samples in the Prolific system.

[2] The United Kingdom was in the midst of its third pandemic lockdown.

DATA AVAILABILITY STATEMENT

Data for this study can be obtained from the first author.

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REFERENCES

Ahorsu, D. K., Lin, C.-Y., Imani, V., Saffari, M., Griffiths, M. D., & Pakpour, A. H. (2020). The fear of COVID-19 scale: Development and initial validation. *Journal of Mental Health and Addiction*. Published online 27 March 2020

Asmundson, G. J. G., & Taylor, S. (2020). Coronaphobia: Fear and the 2019-nCoV outbreak. *Journal of Anxiety Disorders*, 70, 102196. https://doi.org/10.1016/j.janxdis.2020.102196

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin*, 133(1), 1–24. https://doi.org/10.1037/0033-2909.133.1.1

Barlow, D. H., Sauer-Zavala, S., Carl, J. R., Bullis, J. R., & Ellard, K. K. (2014). The nature, diagnosis, and treatment of neuroticism: Back to the future. *Clinical Psychology Science*, 2, 344–365. https://doi.org/10.1177/2167702613505532

Cannito, L., Di, A., Palumbo, R., Ceccato, I., Anzani, S., La, P., ... Di, A. (2020). Health anxiety and attentional bias toward virus-related stimuli during the COVID-19 pandemic. *Scientific Reports*, 10(1), 1–8.

Carlson, J. M., & Fang, L. (2020). The stability and reliability of attentional bias measures in the dot-probe task: Evidence from both traditional mean bias scores and trial-level bias scores. *Motivation and Emotion*, 44, 657–669. https://doi.org/10.1007/s11031-020-09834-6

Chong, M., Wang, W., Hsieh, W., Lee, C., Chiu, N., Yeh, W., Huang, T., Wen, J., & Chen, C. (2004). Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *British Journal of Psychiatry*, 185, 127–133. https://doi.org/10.1192/bjp.185.2.127

Cisler, J. M., Bacon, A. K., & Williams, N. L. (2009). Phenomenological characteristics of attentional biases towards threat: A critical review. *Cognitive Therapy and Research*, 33(2), 221–234. https://doi.org/10.1007/s10608-007-9161-y

Cisler, J. M., & Koster, E. H. (2010). Mechanisms of attentional biases towards threat in anxiety disorders: An integrative review. *Clinical Psychology Review*, 30(2), 203–216. https://doi.org/10.1016/j.cpr.2009.11.003

Conway, L. G., Woodard, S. R., & Zubrod, A. (2020). Social psychological measurements of COVID-19: Coronavirus perceived threat, government response, impacts, and experiences questionnaires. *PsyArXiv*. https://psyarxiv.com/z2x9a/

Fancourt, D., Steptoe, A., & Bu, F. (2020). Trajectories of depression and anxiety during enforced isolation due to COVID-19: Longitudinal analyses of 59,318 adults in the UK with and without diagnosed mental illness. *medRxiv*. Retrieved from https://www.medrxiv.org/content/10.1101/2020.06.03.20120923v1

Fink, P., Ewald, H., Jensen, J., Sørensen, L., Engberg, M., Holm, M., & Munk-Jørgensen, P. (1999). Screening for somatization and hypochondriasis in primary care and neurological in-patients: A seven-item scale for hypochondriasis and somatization. *Journal of Psychosomatic Research*, 46(3), 261–273. https://doi.org/10.1016/S0022-3999(98)00092-0

Goodwin, H., Yiend, J., & Hirsch, C. R. (2017). Generalized anxiety disorder, worry and attention to threat: A systematic review. *Clinical Psychology Review*, 54, 107–122. https://doi.org/10.1016/j.cpr.2017.03.006

Gupta, R. S., Kujawa, A., & Vago, D. R. (2019). The neural chronometry of threat-related attentional bias: Event-related potential (ERP) evidence for early and late stages of selective attentional processing. *International Journal of Psychophysiology*, 146, 20–42. https://doi.org/10.1016/j.ijpsycho.2019.08.006

Holmes, E., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., & Ford, T. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*. Published online 15 April 2020

Jungmann, S. M., & Witthöft, M. (2020). Health anxiety, cyberchondria, and coping in the current COVID-19 pandemic: Which factors are related to coronavirus anxiety? *Journal of Anxiety Disorders*, 73, 102239. https://doi.org/10.1016/j.janxdis.2020.102239

Koster, E. H., Crombez, G., Verschuere, B., & De, J. (2004). Selective attention to threat in the dot probe paradigm: Differentiating vigilance and difficulty to disengage. *Behaviour Research and Therapy*, 42(10), 1183–1192. https://doi.org/10.1016/j.brat.2003.08.001

Koster, E. H., Crombez, G., Verschuere, B., Van, S., & Wiersema, J. R. (2006). Components of attentional bias to threat in high trait anxiety: Facilitated engagement, impaired disengagement, and attentional avoidance. *Behaviour Research and Therapy*, 44(12), 1757–1771. https://doi.org/10.1016/j.brat.2005.12.011

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kroenke, K., Wu, J., Yu, Z., Bair, M. J., Kean, J., Stump, T., & Monahan, P. O. (2016). The patient health questionnaire anxiety and depression scale (PHQ-ADS): Initial validation in three clinical trials. *Psychosomatic Medicine*, 78(6), 716–727. https://doi.org/10.1097/PSY.0000000000000322

Kruijt, A. W., Field, A. P., & Fox, E. (2016). Capturing dynamics of biased attention: Are new attention variability measures the way forward? *PLoS ONE*, 11(11), e0166600. https://doi.org/10.1371/journal.pone.0166600

Lee, S. A. (2020). Coronavirus anxiety scale: A brief mental health screener for COVID-19 related anxiety. *Death Studies*, 44, 393–401. https://doi.org/10.1080/07481187.2020.1748481

Lee, S. A., Jobe, M. C., Mathis, A. A., & Gibbons, J. A. (2020). Incremental validity of coronaphobia: Coronavirus anxiety explains depression, generalized anxiety, and death anxiety. *Journal of Anxiety Disorders*, 74, 102268. https://doi.org/10.1016/j.janxdis.2020.102268

Lee, S. A., Mathis, A. A., Jobe, M. C., & Pappalardo, E. A. (2020). Clinically significant fear and anxiety of COVID-19: A psychometric examination of the coronavirus anxiety scale. *Psychiatry Research*, 290, 113112. https://doi.org/10.1016/j.psychres.2020.113112

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95(1), 15–20. https://doi.org/10.1037/0021-843X.95.1.15

Mathews, A., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy*, 23(5), 563–569. https://doi.org/10.1016/0005-7967(85)90104-4

McNally, R. J. (2019). Attentional bias for threat: Crisis or opportunity? *Clinical Psychology Rreview*, 69, 4–13. https://doi.org/10.1016/j.cpr.2018.05.005

Mogg, K., Bradley, B., Miles, F., & Dixon, R. (2004). Brief report time course of attentional bias for threat scenes: Testing the vigilance-avoidance hypothesis. *Cognition and Emotion*, 18(5), 689–700. https://doi.org/10.1080/02699930341000158

Mogg, K., & Bradley, B. P. (2016). Anxiety and attention to threat: Cognitive mechanisms and treatment with attention bias modification. *Behaviour Research and Therapy*, 87, 76–108. https://doi.org/10.1016/j.brat.2016.08.001

Nikčević, A. V., Marino, C., Kolubinski, D. C., Leach, D. M., & Spada, M. M. (2021). Modelling the contribution of the big five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic. *Journal of Affective Disorders*, 279, 578–584. https://doi.org/10.1016/j.jad.2020.10.053

Nikčević, A. V., & Spada, M. M. (2020). The COVID-19 anxiety syndrome scale: Development and psychometric properties. *Psychiatry Research*, 292, 113322. https://doi.org/10.1016/j.psychres.2020.113322

Öhman, A., & Mineka, S. (2001). Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning. *Psychological Review*, 108(3), 483–522. https://doi.org/10.1037/0033-295X.108.3.483

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the big five inventory in English and German. *Journal of Research in Personality*, 41(1), 203–212. https://doi.org/10.1016/j.jrp.2006.02.001

Rodebaugh, T. L., Scullin, R. B., Langer, J. K., Dixon, D. J., Huppert, J. D., Bernstein, A., Zvielli, A., & Lenze, E. J. (2016). Unreliability as a threat to understanding psychopathology: The cautionary tale of attentional bias. *Journal of Abnormal Psychology*, 125(6), 840–851. https://doi.org/10.1037/abn0000184

Soto, C. J., & John, O. P. (2017). Short and extra-short forms of the big five inventory–2: The BFI-2-S and BFI-2-XS. *Journal of Research in Personality*, 68, 69–81. https://doi.org/10.1016/j.jrp.2017.02.004

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Taylor, C. T., Cross, K., & Amir, N. (2016). Attentional control moderates the relationship between social anxiety symptoms and attentional disengagement from threatening information. *Journal of Behavior Therapy and Experimental Psychiatry*, 50, 68–76. https://doi.org/10.1016/j.jbtep.2015.05.008

Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. G. (2020). Development and initial validation of the COVID stress scales. *Journal of Anxiety Disorders*, 72, 102232. https://doi.org/10.1016/j.janxdis.2020.102232

van Heuven, W. J. B., Mandera, P., Keuleers, E., & Brysbaert, M. (2014). Subtlex-UK: A new and improved word frequency database for British English. *Quarterly Journal of Experimental Psychology*, 67, 1176–1190. https://doi.org/10.1080/17470218.2013.850521

van Rooijen, R., Ploeger, A., & Kret, M. E. (2017). The dot-probe task to measure emotional attention: A suitable measure in comparative studies? *Psychonomic Bulletin & Review*, 24(6), 1686–1717. https://doi.org/10.3758/s13423-016-1224-1

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17, 1729. https://doi.org/10.3390/ijerph17051729

Welch, P. G., Carleton, R. N., & Asmundson, G. J. (2009). Measuring health anxiety: Moving past the dichotomous response option of the original Whiteley index. *Journal of Anxiety Disorders*, 23(7), 1002–1007. https://doi.org/10.1016/j.janxdis.2009.05.006

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy*. Chichester, UK: Wiley.

Wheaton, M. G., Abramowitz, J. S., Berman, N. C., Fabricant, L. E., & Olatunji, B. O. (2012). Psychological predictors of anxiety in response to the H1N1 (swine flu) pandemic. *Cognitive Therapy and Research*, 36, 210–218. https://doi.org/10.1007/s10608-011-9353-3

Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C. J., Susser, E., Lu, J., & Hoven, C. W. (2009). The psychological impact of the SARS epidemic on hospital employees in China: Exposure, risk perception, and altruistic acceptance of risk. *Canadian Journal of Psychiatry*, 54, 301–311.

Zvielli, A., Bernstein, A., & Koster, E. H. (2014). Dynamics of attentional bias to threat in anxious adults: Bias towards and/or away? *PLoS ONE*, 9(8), e104025. https://doi.org/10.1371/journal.pone.0104025