# Demographic and health factors associated with pandemic anxiety in the context of COVID-19

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# Abstract

**Objectives**

The mental health consequences of COVID-19 are predicted to have a disproportionate impact on certain groups. We aimed to develop a brief measure, the Pandemic Anxiety Scale, to capture the specific aspects of the pandemic that are provoking anxiety, and explore how these vary by health and demographic factors.

**Design**

Data were from a convenience sample of parents (N=4,793) and adolescents (N=698) recruited in the first 6 weeks of lockdown.

**Methods**

Factor analytic and IRT methods were used to validate the new measure in both parent and adolescent samples. Associations between scores on the new measure and age, gender, household income, and physical health status were explored using structural equation modelling (SEM).

**Results**

Two factors were identified in both samples: disease-anxiety (e.g. catching, transmitting the virus) and consequence anxiety (e.g. impact on economic prospects), and unique associations with health and demographic factors were observed.

**Conclusions**

Anxieties due to the COVID-19 are multifaceted, and the PAS is a short, reliable and valid measure of these concerns. These anxieties are differentially associated with demographic, social and health factors, which should be considered when developing strategies to mitigate the mental health impact of the pandemic.

# Introduction

The COVID-19 pandemic is arguably the largest public health crisis of the past century. In addition to the rising number of premature deaths and the burden placed on health services, COVID-19 also poses a significant challenge for population-level mental health (Holmes et al., 2020). Moreover, the mental health consequences of a global pandemic are likely attributable to more than just illness and bereavement from the disease itself (Holmes et al., 2020). Due to the ongoing public health measures, the public are experiencing unprecedented levels of social distancing and isolation. Economic and educational disruption has left many people out of work, with increased responsibilities (e.g. home education and full-time work), and short-term financial difficulties. Beyond this, the economic repercussions of the pandemic are projected to be vast (McKibbin & Fernando, 2020).

Although there are several ongoing investigations into the mental health of the population during the pandemic, the majority are concerned with levels of psychological distress in comparison with pre-pandemic norms (Shevlin et al., 2020). To our knowledge, no studies have yet attempted to profile the *specific aspects* of the pandemic that are provoking anxiety. By furthering our understanding of the types of worry experienced by the public, and how such anxieties vary by demographic factors and health status, we may gain a better understanding of what aspects of the current situation are causing worry and in whom. Given the strong evidence that the risks of serious illness and death from COVID-19 vary by a range of key demographic and health factors, it is possible that similar inequalities will emerge in terms of mental health. As such, understanding the mental health consequences of COVID-19 across the whole population, and in specific groups of interest, is a research priority (Holmes et al., 2020).

Therefore, the present study has two main aims. First, as we could not identify a pre-existing measure designed to capture the various aspects of worry associated with a pandemic situation, we have developed the Pandemic Anxiety Scale (PAS). The PAS is a brief 7-item measure that captures worries about the disease itself (e.g. catching, transmitting) and also short- and long-term outcomes associated with public health response (e.g. current income, economic prospects) and has been designed to be used with both young people and adults. Although the measure in this instance focuses on COVID-19, it is designed to be used within

the context of any infectious disease to provide a holistic overview of the worries people might have in relation to a pandemic situation. The PAS is already being used widely in several studies in different age groups in multiple languages and settings. This paper presents its initial psychometric investigation including factor structure, item distributions, reliability and construct validity in a large sample of adolescents and adults in the UK.

Second, given the evidence that the risk of serious illness and death from COVID-19 is not evenly distributed across the population (Ofiice for National Statistics, 2020), our second aim is to explore the impact of demographic and health factors on pandemic-specific anxieties. Demographic factors include age, gender and household income. We also investigate whether the chronic physical health conditions (which increase vulnerability to COVID-19) are associated with increased risk of anxieties.

# Methods

## *Participants*

Participants were recruited as part of a UK based longitudinal study investigating the mental health and wellbeing of parents/carers and children (aged 4-16 years) during the COVID-19 lockdown ([Co-Space: Supporting Parents, Adolescents and Children during Epidemics](#)). An opportunity sample of parents/carers and young people were recruited, with the study advertised widely through various media formats and networks. The survey was completed online via Qualtrics. Following the parent-completed section, a further sub-survey was presented for adolescents to report on themselves (if aged between 11 and 16 years; 1 child per family). Informed consent was sought from the parents for their portion of the survey, and from both parents and adolescents for their sub-section. Parents and adolescents completed a baseline survey between the 30th of March and the 29th of April 2020 (between 1 and 6 weeks into lockdown in the UK). Ethical approval for the study was granted by the central university research ethics committee at the University of Oxford (reference: R69060).

Our analysed sample consisted of 4,793 adults (mean age = 42.62 years; range= 18-71; SD= 1.75; 93% female) and 698 adolescents (mean age = 13.42 years; 11-17, SD= 6.25; 50% female). In total 94% of parents/carers reported their ethnicity as white (British, Irish, other) and 59% reported they had an undergraduate degree equivalent or above.

## *Measures*

*Pandemic Anxiety Scale (PAS).* In order to capture the specific aspects of the pandemic which result in worry, we developed a preliminary questionnaire. First preliminary items were developed by a panel of psychologists with expertise in population mental health and psychometrics. Items were designed to be short, easy-to-read and encompass worries related to the disease itself (e.g. 'I'm worried that I will catch COVID-19') and concerns about the consequences of the pandemic and lockdown (e.g. I'm worried about the long-term impact this will have on my job prospects and the economy?). After the initial item pool was developed, members of a local community group (formed to assist vulnerable individuals during the pandemic) provided feedback on the content (relevance and breadth) and readability of the preliminary version of the scale. The version administered in the present study consisted of 9 self-report items, each of which was rated on a 5-point Likert scale

ranging from 0 ('Strongly disagree') to 4 ('Strongly agree'). Total scores range between 0 and 36.

*Psychological distress.* Common symptoms of psychological distress were assessed using two self-report measures: a subset of 9 items from the Depression Anxiety Stress Scales (DASS-21)[1] (Antony, Bieling, Cox, Enns, & Swinson, 1998) in the parent sample and the Kessler Psychological Distress Scale (K6) (Kessler et al., 2002) in the adolescent sample.

*Demographic and health factors*. Demographic factors included respondent age and gender (male/female/other). Parents were asked to report total annual household income in five categories ranging from less than £16,000 to greater than £120,000 (see Table S2), and this information was included as an ordinal variable in our analyses. With regards to chronic physical health problems, parents were asked a series of questions about whether they, their children, or other members of the household were diagnosed with any chronic conditions (e.g. high blood pressure, cancer, heart disease, lung disease, other). From these questions, we derived three binary variables in the parent sample (parent has condition, child has condition, other household resident has condition). In the adolescent sample, we derived a similar binary variable reflecting the presence of a chronic physical health condition in the adolescent.

## Analysis

*Psychometric properties of the PAS.* First we inspected the distribution of scores on the initial PAS items to identify potential floor or ceiling effects. Next we examined the latent structure of the PAS using exploratory factor analysis (EFA), which was conducted on half of the adult sample selected at random (N= 2,366). We then confirmed the structure using categorical confirmatory factor analysis in the second half of the adult sample (N=2,426), and the full sample of adolescents (N=697). Item characteristic curves (ICCs) illustrate the distribution of responses across different levels of the latent trait, and the precision of measurement was assessed by plotting total information functions. Finally, concurrent validity was tested by exploring correlations with the DASS and K6 scores.

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[1] Items 2, 3, 4, 6, 8, 10, 17, 18, 20. Unidimensional factor model fit: RMSEA = 0.077; CFI = 0.973

*Demographic and health predictors of pandemic anxiety.* The associations between demographic and health predictors and pandemic anxiety were investigated using structural equation modelling (SEM). Measures of psychological distress (DASS and K6) were included as covariates in our models, to ensure that the PAS was not simply capturing general state anxiety/psychological distress. All models were estimated in Mplus version 8.3 (Muthén & Muthén, 2017) using the weighted least squares estimator (WLSMV) estimator, relying on established guidelines to judge model fit (Hooper, Coughlan, & Mullen, 2008).

# Results

Descriptive statistics for all of the study variables are presented in the online supplement (Tables S1-S2).

*Psychometric properties of the PAS*

Inspection of the distributions of the preliminary items (Figure S1) revealed a strong ceiling effect for item 1 ('I think that COVID-19 is a very serious issue'), therefore it was removed from the scale. The EFA using the first half of the adult sample identified a 2-factor solution (Figure S2). Concerns about catching and transmitting the virus loaded onto the first factor (labelled 'Disease-anxiety'), whereas the second factor tapped into worries about the consequences of the pandemic (named 'Consequence- anxiety'). The factor loadings were all in the acceptable range, with the exception of item 6 ('I'm worried we won't have enough food and other essential items') which demonstrated high cross-loadings and was removed from the final scale (Table S3). The 2-factor structure was cross-validated using CFA in the remaining adult participants and the full adolescent sample, with excellent fit and strong factor loadings (Tables S4-S5). Internal consistency values for the subscales were acceptable given the low number items (Table S1). The correlation between the latent factors was only moderate (0.36; Table S6). Convergent validity was supported by positive and moderate correlations with the subscales of the DASS and K6 (Table S6). ICCs (Fig S3) supported the use of the 5-point Likert scoring system, and total information functions (Figure S4) indicated that the subscales were most precise at average to moderate levels of the latent trait (+/- 1.5 SDs from the mean). The final 7-item version of the questionnaire accompanies this manuscript (S1), and is free to use.

*Demographic and health predictors of pandemic anxiety*

SEMs exploring the associations between demographic and health factors and the latent dimensions of the PAS are presented in Figures 1 and 2. Models were estimated separately for adults and adolescents, and both models demonstrated acceptable fit (RMSEA = 0.06/0.08; CFI = 0.94/0.92). In the adult sample, females scored higher on both dimensions of the PAS than males. Age was not associated with either form of pandemic anxiety in this age group. Lower household income was positively associated with both domains of the PAS.

Finally, chronic physical health problems (either in relation to the reporter, their children, or other household members) were positively associated with disease-related anxiety itself.

In the adolescent sample, females and older adolescents were more likely to worry about the consequence of the pandemic, whereas those with chronic conditions were more likely to be worried about the disease itself.

# Discussion

The present study aimed to profile different forms of anxiety experienced during the COVID-19 pandemic. First, in order to adequately capture such anxieties we developed a new questionnaire: the Pandemic Anxiety Scale (PAS). It is a brief 7-item measure suitable for administration in large-scale survey studies, and our initial validation work suggests strong psychometric properties in both adult and adolescent samples. This scale captures two forms of pandemic-related anxiety: disease-anxiety, and consequence-anxiety. Given the modest correlation between these factors, and the specificity observed in their relations with demographic and health factors, it appears that these forms of pandemic anxiety are relatively distinct.

With regards to demographic and health factors, self-reported income was associated with both forms of anxiety, whereas physical ill-health (for both participants and other household residents) predicted disease-anxiety, rather than a fear of the consequences. These patterns are likely the result of the unequal distribution of the physical and economic risks in the population (McKibbin & Fernando, 2020; Ofiice for National Statistics, 2020). For instance, given individuals with underlying health conditions are at greater risk of hospitalization and/or death due to COVID-19, it is unsurprising that they would be more concerned about contracting the disease that those without health problems. Furthermore, people with less financial security (e.g. lower levels of income) may stand to suffer more in terms of short and long-term economic disruption (McKibbin & Fernando, 2020), therefore worries about the consequences of the pandemic are understandable. Together these findings provide initial evidence that the mental health impact of COVID-19, much like the physical health impact, may be more concentrated in certain sub-groups within the wider population (Ofiice for National Statistics, 2020).

In addition to the above effects, we found that females scored significantly higher than males on disease-anxiety in the parent sample, however this finding should be interpreted with some caution given the vast majority of participants were female. However, in the adolescent sample, which had an even gender ratio, females scored significantly higher than males on consequence-anxiety. In this sample, age was also positively associated with consequence-anxiety, which may indicate that the pandemic is a source of particular anxiety amongst older

adolescents who now face considerable uncertainties in terms of their educational and economic prospects. Although age did not affect either form of anxiety in the parent sample, this is likely a result of the narrow age range of participants, with very few in the 'high-risk' age group for poor physical health outcomes (Ofiice for National Statistics, 2020). As such, further research into the pandemic anxieties across different age groups, and other demographic factors not captured in our current data, is required.

The present study has both strengths and limitations to consider. Strengths include a large, multi-generation sample, and the use of a comprehensive range of psychometric techniques to validate our new measure. However, it must be noted that our opportunity sample of parents is predominantly female, affluent, and within a limited age range, which may impact the generalizability of our results. Despite this limitation, our findings have clear implications. First, anxieties arising due to the COVID-19 pandemic are multifaceted, and the PAS is a short, reliable and valid measure of these concerns. Second, these anxieties are likely to be differentially associated with demographic, social and health factors in both adolescents and adults. It is therefore important to consider such group-differences when developing strategies to mitigate the mental health impact of the COVID-19 pandemic (Holmes et al., 2020).
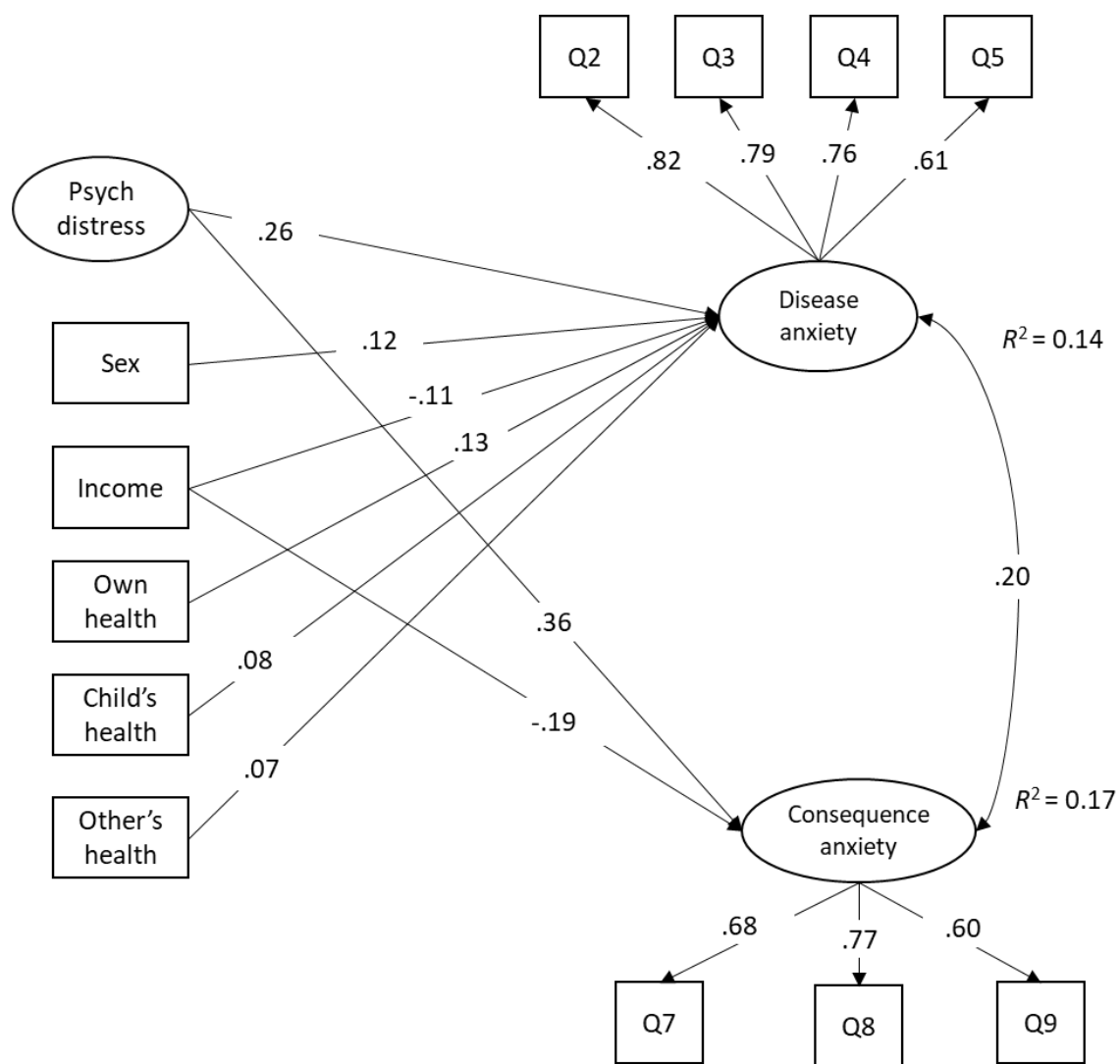
Figure 1. Standardised path coefficients using the full adult sample (N= 4,320). Health = study parent chronic health condition. 'Male' treated as reference category for sex variable. 'No chronic condition' treated as reference category for health variables.
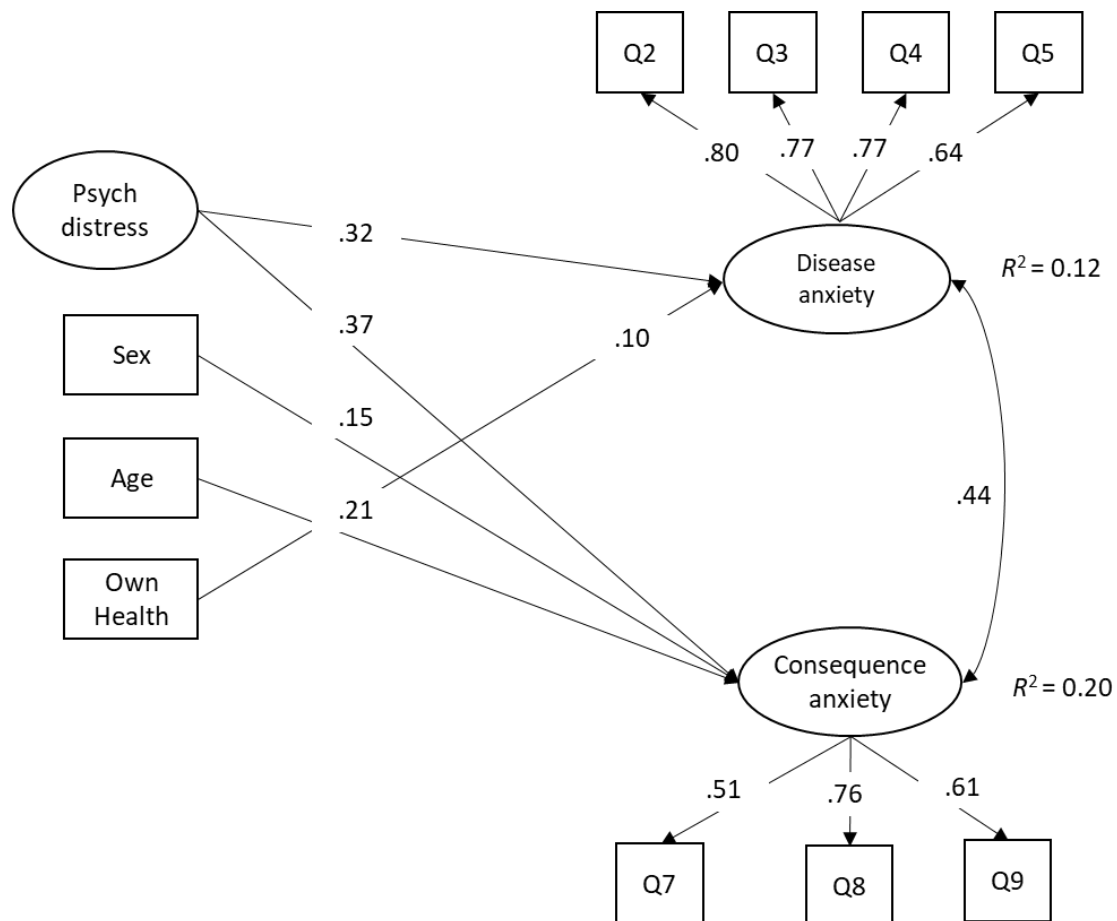
Figure 2. Standardised path coefficients using the full adolescent sample (N= 667). 'Male' treated as reference category for sex variable. 'No chronic condition' treated as reference category for health variable.

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