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Investigating mental health inequalities in the United Kingdom in the context of COVID-19: evidence from the C19PRC study.

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Investigating mental health inequalities in the United Kingdom in the context of COVID-19: evidence from the C19PRC study.

Abstract

Objectives. The aim of this study was to explore mental health inequalities in the United Kingdom in the context of the COVID-19 pandemic, using the data from the COVID-19 Psychological Research Consortium Study. In this study we investigated two main areas: 1) the relationship between income, income inequality, depression and anxiety and 2) the relationship between crime rate, paranoia and trust.

Design. The design of the study was cross sectional, with data taken from the first wave of the COVID-19 Psychological Research Consortium study.

Methods. Participants were 2025 adults aged 18 or older, the sample was representative of the UK population. Participants reported a range of socio-demographic, health characteristics and behaviours, mental health indicators, attitudes and psychological variables. Relevant measures and variables for the present study were extracted and used.

Results. Using regression models, we found that income was a significant predictor of depression and anxiety symptoms ($p < .001$). Crime rate did not make a significant contribution to the prediction of paranoia ($p = 0.783$) or trust judgements ($p = 0.29$); however income did make significant contributions to both ($p < .001$). We extended on this by implementing a structural equation model which also included conspiracist ideations, we observed several significant direct effects but no indirect/mediation effects of the measures of trust.

Conclusions. We found evidence supporting the presence of mental health inequalities in the UK. An individual's income was a significant predictor in the experience of depression, anxiety and paranoia symptoms. We also a propose further evidence for the role of trust in paranoia and new (to our knowledge) evidence regarding beliefs in conspiracist ideations. The findings are important for informing both policy and practice beyond psychology and mental health, though careful interpretation of them is warranted and necessary when considering mental health inequalities.

Contents

Introduction

Since its emergence in early 2020, COVID-19 has caused unprecedented health, societal and economic disruption. Through a series of national and regional lockdowns to social distancing, the pandemic has given rise to dramatic behavioural changes for individuals living in the United Kingdom, fundamentally changing the way in which we live our lives. The UK entered its first national lockdown on the 23rd March 2020 and since then it has been recognised that the effect of this and the COVID-19 pandemic itself would likely lead to a burden of mental health issues in the general population (Holmes et al., 2020), although the scale of this has been challenged (Shevlin et al., 2021). Nevertheless, evidence has shown increases in scores of psychological distress and in individuals meeting clinical levels of mental illness (Pierce et al., 2020; Shanahan et al., 2020, Shevlin et al., 2020), echoing findings from studies of previous epidemics such as SARS (Hawryluck et al., 2004) and H1N1 (Cowling et al,. 2010). Given these findings, it is crucial to understand who may be at greater risk of mental health issues in the wake of the pandemic and what factors may be predicative or indicative of ill mental health. Doing so would allow for targeted psychological interventions and measures to help those most at risk. This would also be extremely valuable to public health bodies and for informing social care policy and practice.

The pandemic has disproportionately impacted upon certain groups within the UK more significantly than others. Individuals in ethnic minorities such as Black and Asian groups; women; those with health conditions such as obesity and diabetes; being an essential worker; and living in poverty have all been linked to greater incidence of cases

and deaths from COVID-19 (Herten-Crabb & Wenham, 2021; Platt & Warwick, 2020; Public Health England, 2020a; Public Health England 2020b; Whitehead & Taylor-Robinson, 2021). These groups are already at risk of worse health and mental health outcomes prior to the outbreak of the pandemic (see Bleich et al., 2012; Carsoon et al., 2021; Exworthy et al., 2003; Grey et al., 2013; Marmot & Bell, 2012; Mattheys, 2015, Robertson & Baker, 2017, for examples). Given these findings there are increasing fears that the pandemic has further exposed inequalities in the United Kingdom.

Health inequalities can be defined as differences in health across a population and between different groups in society (Kawachi et al., 2002). These differences may arise from factors such as age, sex, race, income and economic status, level of deprivation and geographical location (McCartney et al., 2013). These factors can be viewed collectively as an individual's socioeconomic status (Baker, 2014) and reflect ways in which society can be stratified and grouped. There is a large and well-established body of evidence that draws a link between health inequalities and overall health (Adler & Ostrove, 2014) as well as specific physical health conditions such as heart disease (McKinley, 1996) and cancer (Merletti et al., 2011).

Mental health should be considered equally important as physical health as described in publications by Naylor et al. (2016) and the Institute for Public Policy Research (2021), with an individual's mental wellbeing representing a key part of their overall health. This importance is increased further due to the common overlap of physical and mental health issues and their tendency to occur together (Avila et al., 2015). Mental health issues are prominent in the UK, an estimated 1 in 4 people experience

issues each year, and mental illness represents the second-largest source of burden of disease in the UK (Independent Mental Health Taskforce, 2016). Furthermore, these issues can cause significant and widespread personal, societal and economic problems. Therefore, understanding of how inequalities may give rise to mental health issues is of major importance.

Mental health inequalities refer to differences in the frequency and severity of mental health issues in certain populations, as well as differences in the accessibility and quality of health care services available for these populations (Compton & Shim, 2015; Henderson et al., 1998). Examples of such inequalities are: women being more vulnerable to depression (Piccinelli & Wilkinson, 2000) but men being more likely to have suicidal intentions (Freeman et al., 2017); the prevalence of anxiety and depression decreasing with age (Jorm, 2000); living in an urban environment affecting overall mental health (Dalgard & Tambs, 1997); poverty-related stress increasing risk of psychological disorders (Lipman & Boyle, 2008) and those living in deprived neighbourhoods having worse depression and anxiety treatment outcomes and requiring longer interventions (Finegan et al., 2020).

Mental health inequalities have been linked with wider societal differences that impact on the incidence of mental health problems in certain groups and populations, as well as an individual's personal wellbeing and experience of their mental health problems (Allen et al., 2014; Fryers et al., 2003; Murali & Oyebode, 2004; Pickett & Wilkinson, 2010). There has been increasing investigation and interest into how specific factors involved in mental health inequalities are linked to specific mental health difficulties and

disorders. The present study will focus on socio-economic status and deprivation characteristics in the form of income inequality and crime rate.

Income, income inequality, depression and anxiety

Income inequality can be viewed as a specific type of socioeconomic inequality, defined as a measure of how unevenly income is distributed throughout a population (Deininger & Squire, 1996). Income and income inequality is a common measure used to assess an individuals or an areas level of relative deprivation, such as in the Indices of Multiple Deprivation in the UK (Ministry of Housing, Communities & Local Government, 2019). Income inequality is increasing in most regions globally, with the most rapid increases in richer countries over the past several decades (Ortiz & Cummins, 2011). There is a large literature base examining the relationship between income inequality and health, predominantly reaching the conclusion that health tends to be worse in more unequal societies (Lynch et al., 2004; Mackinko et al., 2003; Wagstaff & Van Doorslaer, 2000). Furthermore, there is growing evidence that social outcomes associated with disadvantages in society such as life expectancy, educational attainment and mental illness are more common in societies with greater income differences between the rich and the poor (Pickett & Wilkinson, 2015).

A growing evidence base is now linking an individual's income and income inequality specifically to depression (see Barbalat & Franck, 2020; Choi et al., 2015; Fan et al., 2021; Ladin et al., 2010 and Pickett & Wilkinson, 2010). A range of theoretical explanations have been proposed regarding these inequalities, with the most common explanations offering support to material, behavioural and psychosocial pathways

(Bartley, 2016). The material pathway gives primacy to material conditions, such as income, which can in turn be linked to poverty and deprivation. The behavioural pathway argues health inequalities arise due to personal and psychological characteristics. The psychosocial pathway focuses on how inequality makes individuals feel; such as through insecurity, lack of social cohesion and social support (Atkinson, 2015; Siegrist & Theorell, 2006; Thornicroft, 1991). These factors affect mental health through chronic stress, health related behaviours and individual's self-esteem. This in turn leads to psychosocial stress and an increased risk of mental health issues (DeSilva et al., 2005). A substantial evidence base supports the influence of the psychosocial pathway (see MacLeod & Smith, 2003; Singh-Manoux, 2003; Stansfield & Bell, 2019 for examples) though a review by Moor et al. (2017) suggests that the material pathway also has a strong indirect effect through the behavioural and psychosocial pathways. This lends support to the notion that the named pathways both independently influence inequalities in health and interrelate to one another (Skalická et al., 2009). Such that it is likely that it is the combination and interrelation of these pathways that give rise to mental health issues.

A review by Patel et al. (2018) summarised this area concluding that there was a greater risk of depression in populations with higher income inequality relative to those with lower inequality. Furthermore, the authors proposed an ecological framework for this relationship; arguing that the material, behavioural and psychosocial pathways operate at different levels leading to mental distress. This framework can be supported by studies that have proposed psychosocial mechanisms such as social comparison and social rank, status anxiety, coping, and learned helplessness (Finegan et al., 2020; Fone et

al., 2013; van Deurzen et al., 2015; Wood et al., 2012), as well as some materialistic

explanations that have been offered (Murumatsu, 2003).

There is a less substantial evidence base to draw upon to assess the relationship

between income inequality and anxiety. There are studies that have investigated the link

between income inequality and mental health more generally, many of which include

measures of anxiety such as Layte (2012) and Ribero et al. (2017), with both examples

finding that income inequality negatively affects mental health. However, studies that

have specifically investigated the link between income inequality and anxiety have found

conflicting results. One US based study found no association between local income

inequality and anxiety (Sturm & Greesenz, 2002) and another conducted in Sao Paulo

found that living in high-income inequality areas was not associated with increased risk

of anxiety compared to low-income inequality areas (Chiavegatto-Filho et al., 2013).

Similarly to depression, it is also predicted that an ecological framework may explain a

link between income inequality and anxiety. As such a framework is supported for

disorders such as schizophrenia (Burns et al., 2014) and mental health more generally

(Ribeiro et al., 2017). Linking to this, status anxiety and competition may be partly

responsible. Individuals who live in environments with higher income inequality may

notice the differences in wealth, subsequently leading to stress and anxiety of being left

behind both socially and materially (Delhey & Dragolov, 2014; Delhey et al., 2017;

Marmot, 2005).

Crime rate and paranoia

The crime rate of an area is another common metric used to assess levels of relative deprivation and is also included in the IMD (Ministry of Housing, Communities & Local Government, 2019). There is a literature base that explores the relationship between crime and overall mental health, with findings suggesting that fear of crime is associated with poorer mental health and increased mental distress, accompanied by reduced physical functioning and lower quality of life (Dustmann & Fasani, 2016; Stafford et al., 2007; Whitley & Prince, 2005).

There has also been increasing interest into the relationship between crime and individual's reported feelings of paranoia. The fear of crime is largely agreed to emerge as a social phenomenon (Austin et al., 2002) which then impacts on an individual's life causing paranoia and anxiety on a personal level (Ruijsbroeke et al., 2015). Ross and Jang (2000) found that individuals who live in neighbourhoods characterised by disorder (i.e. crime) report high levels of fear and mistrust. The fear of crime leads to mistrust in others and those around them, thus limiting a person's ability to form social ties (Ross & Mirowsky, 1999). Although, the social ties and connections individuals have with their neighbours can reduce this effect (Ross & Jang, 2000). Furthermore, evidence has suggested that individuals living in areas with greater rates of crime are more likely to report feelings of paranoia and mental distress (Dustmann & Fasani, 2016; Nettle et al., 2014).

Findings suggest that paranoia can be linked to a lack of trust or mistrust (Martinez et al., 2020). Mistrust is a component of the paranoia spectrum present in

subclinical populations (Bebbington et al., 2013) and insecure attachment styles common in paranoid individuals are associated with reduced interpersonal trust (Fett et al., 2016). Paranoia also involves significant disruption in interpersonal functioning (Bentall et al., 2001) and has profound consequences on social behaviour (Combs & Penn, 2004). Paranoia and paranoid thoughts are symptoms of a range of mental disorders, examples include paranoid schizophrenia, delusional disorder and paranoid personality disorder (Bentall et al., 2009; Triebwasser et al., 2013). Finally, evidence also draws a link between paranoia and belief in conspiracy theories (Brotheerton & Eser, 2015; Darwin et al., 2011) presenting an interesting avenue for investigation given the current situation surrounding COVID-19 and conspiracy theories regarding it.

Collectively, evidence suggests that income inequality and crime appear to be linked to overall worse mental health outcomes, as well as specific disorders. Depression, anxiety and paranoia are of large public health concern, as mental health issues represent some of the leading causes of disability globally (World Health Organization, 2013). Therefore, understanding of the many interconnected factors in the aetiology of these disorders and issues is crucial for multiple reasons. First, to increase our overall understanding of the disorders themselves and the factors linked to them. Second, to aid in developing treatments and interventions to alleviate suffering from the disorder or issue on an individual level. Lastly, to reduce the economic and social effects of millions of people suffering from them (Kessler, 2009; Marcus et al., 2012; Wittchen, 2002).

The aim of this study is to explore whether the COVID-19 pandemic has further exposed mental health inequalities in the United Kingdom. It will do so using the data from the COVID-19 Psychological Research Consortium (C19PRC), an ESRC funded

project which has been conducting a longitudinal survey of a large representative sample of the UK population throughout the COVID-19 pandemic.

The study has several hypotheses to explore the relationships between mental health inequality indicators and mental health outcomes in the United Kingdom. The hypotheses come under two areas of interest.

The relationship between income inequality, depression and anxiety:

I.   There will be relationships between level of income and reported feelings of depression and anxiety, such that lower income individuals report more feelings of depression and anxiety. This effect will remain when controlling for population density and crime rate.

The relationship between crime, paranoia and trust judgements:

II.   There will be relationships between reported feelings of paranoia and measures of trust based on the crime rate of the area in which a person lives. Individuals living in areas with higher rates of crime will report more feelings of paranoia and lower levels of trust. These effects will remain when controlling for population density and income.

III.   Measures of trust will mediate the relationship between crime rate, paranoia and conspiracist ideations.

Method

The COVID-19 Psychological Research Consortium (C19PRC) Study

The C19PRC Study is an online longitudinal, multi-country survey designed to study the impact of COVID-19 on the general population (McBride et al., 2020). The survey consists of multiple waves gathered at different time points throughout the pandemic. In the present study only the United Kingdom strand was of interest and only Wave 1 (W1), which was gathered between the 23rd and the 28th of March 2020, was used. The data used is available on the Open Science Framework from the following link: https://osf.io/v2zur/. Inclusion criteria for the study were that the participant be aged 18 or older, be a resident of the UK and be able to read and write in English. Participants were recruited by the survey company Qualtrics. Ethical approval was provided by the University of Sheffield for both the original C19PRC study (ref no. 033759) and the present study (ref no. 038984). All participants provided written informed consent.

A detailed and comprehensive methodological description of the study's fieldwork, sampling, design, quality control and sample characteristics is given in McBride et al. (2020). Briefly, the C19PRC study used quota sampling to gather a sample representative of the UK adult population ($n = 2025$) in terms of age, sex and household income. Additionally, the baseline sample at W1 was also representative in terms of economic activity, ethnicity and household composition. The basic demographic characteristics for the W1 study were as follows, mean age = 45.44 years (S.D. = 15.90, range 18-83); 48.0% were male ($n = 972$), 51.7% were female ($n = 1047$) and 0.3% ($n = 6$) checked the transgender, prefer not to say or other option. In summary, the C19PRC

Study has strong generalisability and potential to enable interdisciplinary research on important public health questions relating to the COVID-19 pandemic.

Measures

A wide range of variables were included in the C19PRC study including mental health, health psychology variables, political attitudes, belief in conspiracy theories about the pandemic, family relations, housing quality, and other psychological and physical variables. Once again a full list of the measures and variables are detailed in the supplementary material of McBride et al. (2020). For the present study the following measures and variables were used.

Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item measure that corresponds to the DSM-IV symptoms for major depressive disorder (American Psychiatric Association, 2000). Respondents were asked how often, over the last two weeks, they had been bothered by each of the depressive symptoms. Response options were "not at all", "several days", "more than half the days", and "nearly every day", scored as 0, 1, 2 and 3, respectively. An example item is "feeling tired or having little energy?" Scores on the PHQ-9 range from 0 to 27; with ≥ 5 representing mild depression, ≥ 10 representing moderate depression and ≥ 15 representing severe depression. In this study, a threshold of ≥ 10 was used to distinguish whether a participant met caseness criteria. The psychometric properties of the PHQ-9 are well documented, with the scale having very high sensitivity, specificity, reliability and validity (Kroenke et al., 2010). The reliability in the present study sample was $\alpha = 0.92$.

Generalized Anxiety Disorder Scale (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006).

The GAD-7 was used to assess experiences of generalised anxiety. Respondents were asked to report on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day), how often in the past 7 days they were bothered by seven common anxiety symptoms. An example item is "worrying too much about different things?" Scores on the GAD-7 range from 0 to 21, with ≥ 5 representing mild anxiety, ≥ 10 representing moderate anxiety and ≥ 15 representing severe anxiety. In this study, a threshold of ≥ 10 was used to distinguish whether a participant met caseness criteria. The GAD-7 has been shown to have high sensitivity and specificity (Spitzer et al., 2006) as well as good reliability and construct validity (Löwe et al., 2008). Evidence has also shown that it is moderately good for screening other common anxiety disorders (Kroenke et al., 2007). The reliability in the present study sample was $\alpha = 0.94$.

Persecution and Deservedness Scale (PaDS) (Melo, Corcoran, Shryane, & Bentall, 2009).

Paranoia was assessed using five items taken from the persecution subscale of the PaDS. Respondents were asked to rate their agreement on a five-point scale from 1 = strongly disagree to 5 = strongly agree on statements such as "I'm often suspicious of other people's intentions towards me" and "people will almost certainly lie to me." Scores range from $5 - 25$, with higher scores indicating greater feelings of paranoia. The scale is designed for use in both clinical and non-clinical populations, it has been validated against questionnaire and clinical measures of paranoia (Elahi, Algorta, Varese, McIntyre,

& Bentall, 2017; Melo et al., 2009) and has high reliability (McIntyre, Wickham, Barr, & Bentall, 2018). The reliability in the present study sample was α = 0.86.

Conspiracy Mentality Questionnaire (CMQ) (Bruder et al., 2013)

The CMQ is a five-item measure used to assess respondents tendency to engage in conspiracist ideations. Respondents were asked to rate their agreement on an eleven-point scale from "1 = Certainly not 0%" to "11 = Certainly 100%" with given conspiracist statements. With examples being "I think that...politicians usually do not tell us the true motives for their decisions" and "I think that... there are secret organizations that greatly influence political decisions." Scores range from 5 – 55, with higher scores reflecting greater tendency to engage in conspiracist ideations. The CMQ has been shown to have strong convergent, discriminant and predictive validity; as well as satisfactory reliability (Bruder et al., 2013). The reliability in the present study sample was α = 0.851.

Facial detection of trust (Martinez et al., 2020).

This task used stimuli obtained from the Princeton Social Perception Lab database (Oosterhof and Todorov, 2008), containing computer generated faces using FaceGen 3.1. From the data set 10 bald Caucasian male computer generated faces were selected randomly using the website random.org. Of these faces, 5 were rated as trustworthy and 5 were rated as untrustworthy. Participants were presented with each face and asked, "do you trust this face?" with simple responses of "yes" or "no". These responses were analysed using a signal detection paradigm. For the present study, bias scores for each participant were calculated into z scores which reflect a person's tendency to respond

"yes" (i.e. trustworthy) vs. "no" (i.e. untrustworthy). Further explanation and detailing as to the paradigm and calculation of these scores can be found in Martinez et al. (2020).

Neighbourhood trust

Neighbourhood trust was measured by summing the responses to two questions taken from the UK Community Living Survey (Harper & Kelly, 2003). (1) "How comfortable would you be with asking a neighbour to keep a set of keys to your home for emergencies" and (2) "How comfortable would you be asking a neighbour to collect a few shopping essentials for you, if you were ill and at home on your own." Both questions were scored on a 4-point scale ranging from 1 'very uncomfortable' to 4 'very comfortable.' Scores range from 2 to 8, with higher scores reflecting high trust levels whereas lower scores reflect mistrust.

Income

Participants were asked to report their approximate gross household income in 2019, including income from partners and other family members living with them and all kinds of earnings including salaries and benefits. Responses were given in categories ranging from 1 = £0 - £300 per week (equals about £0 - £1290 per month or £0 - 15,490 per year) to 5 = £1,112 or more per week (equals about £4,831 or more per month or £57,931 or more per year).

Population density and crime rate

For these measures geolocating was used to determine the area in which the respondent lived based on the longitude and latitude co-ordinates derived from each participants IP

address. All participants provided informed consent for this information to be gathered and used. The geospatial data was linked to several external data resources with the relevant socioeconomic summary data, following which the specific location data was removed from the final dataset. For the present study, data regarding the population density (the number of people per sq. km) and crime rate (based on the Index of Multiple Deprivation crime domain decile for Lower Super Output Areas) were used. To preserve participant anonymity, deciles of the IMD were used as opposed to individual IMD scores, where 1 is the most deprived 10% of areas and 10 is the least deprived 10% of areas. It is important to note that the IMD scores for each country of the UK are unique and therefore cannot be explicitly compared. For example, an individual in the 1st crime decile in England isn't necessarily living in conditions comparable to another individual in the 1st crime decile in Scotland.

Statistical analysis

Analyses were carried out using R version 3.6.2 (R Core Team, 2019), several associated packages and SPSS AMOS version 26. The analysis script used in the present study's analyses can be found on the associated GitHub repository for this study at https://github.com/jarod-wilson/msc-project.

To address hypotheses regarding income inequality, depression and anxiety; hierarchical linear regression models were specified with income as the predictor variable and PHQ-9 and GAD-7 scores as outcome variables, reflecting depression and anxiety respectively. These models tested for effects over and above gender and age, whilst controlling for population density and crime rate.

To address hypotheses regarding crime rate and paranoia two methods were employed. First, hierarchical linear regression models were specified with crime rate as the predictor variable, with PaDS scores and trust judgement response bias as the outcome variables. The models tested for effects over and above gender and age, whilst controlling for population density and income. Second, a structural equation model was implemented. In this model, crime rate was modelled as an independent variable, trust judgement response bias and neighbourhood trust were included as mediator variables and paranoia (PaDS) and conspiracist ideations (CMQ) were the outcome variables. Paranoia and conspiracist ideations were modelled as latent constructs as they were measured through items which tapped into their respective constructs. Crime rate, trust judgement response bias and neighbourhood trust were modelled as observed variables. The model collectively encompasses a range of variables and measures relating to paranoia, trust and subsequent beliefs. The structural equation model can be seen in figure 1.

Results

Associations between variables

Correlational analyses showed significant correlations between all the outcome and mediator variables of interest, shown in table 1. All coefficients were found to be significant at the $p < .001$ level, with the exception of the relationship between neighbourhood trust and conspiracist ideations which was significant at the $p < .05$ level.

Table 1. *Bivariate correlations between outcome and mediator variables with means and standard deviations*

Variables	*M*	*SD*	1.	2.	3.	4.	5.	6.
1. Depression (PHQ-9)	5.38	6.22	/	0.81***	0.49***	-0.17***	-0.17***	0.12***
2. Anxiety (GAD-7)	5.16	5.69		/	0.47***	-0.15***	-0.17***	0.15***
3. Paranoia (PaDS)	12.45	4.97			/	-0.30***	-0.21***	0.19***
4.Trust judgements	0	0.85				/	0.17***	-0.12***
5. Neighbourhood trust	5.38	1.90					/	-0.05*
6. Conspiracist ideations (CMQ)	35.12	9.15						/

Note. $* p < .05$; $** p < .01$; $*** p < .001$.

Regression models

The full regression models for depression ($F(3, 2016) = 18.96$) and anxiety ($F(3, 2016) = 8.52$) were significant over and above the initial models of age and gender ($p < 0.001$). Respectively, the model for depression scores was found to be significant $R^2_{adj} = 0.12$, $F(8, 2016) = 34.74$, $p < .001$. Inspection of the beta weights for the added variables showed that income made a significant contribution to the prediction of depression scores, $\beta = -.16$, $p < .001$. The model for anxiety scores was also found to be significant $R^2_{adj} = 0.11$, $F(8, 2016) = 31.11$, $p < .001$. Inspection of the beta weights showed that income made a significant contribution to the prediction of anxiety scores, $\beta = -.11$, $p < 0.001$.

Again, the full regression models for paranoia ($F(3, 2016) = 26.06$) and trust judgements ($F(3, 2016) = 6.81$) were significant over and above the initial models of age and gender ($p < 0.001$). The model for paranoia was found to be significant $R^2_{adj} = 0.18$, $F(8, 2016) = 57.78$, $p < .001$. Inspection of the beta weights showed that crime rate did not make a significant contribution to the prediction of paranoia as we expected $\beta = -.01$, $p = 0.783$; however income did make a significant contribution, $\beta = -0.62$, $p < .001$. The

model for trust judgements was also found to be significant $R^2_{adj} = 0.04$, $F(8, 2016) = 11.22$, $p < .001$. Inspection of the beta weights showed again that crime rate did not make a significant contribution to the prediction of trust judgements, $\beta = -.02$, $p = 0.29$; however income did make a significant contribution, $\beta = .09$, $p < .001$.

Structural equation model

The model chi-squared test was statistically significant, $\chi^2(60, N = 2025) = 961.92$, $p < .001$, although this can be expected given the large sample size (Kenny, 2019). With regards to other measures of model fit, the SRMR value of .075 is below the recommended .08 (Hu and Bentler, 1999) and the CFI value of .908 is above the .90 cut off detailed by MacCallum, Browne and Sugawara (1996). In contrast, a RMSEA value of .086 is outside of the cut off for mediocre model fit and the TLI value of .880 is below the .90 cut off. However, the use of universal and strict cut offs for model fit evaluation has been argued against and disputed due to variations resulting from sample size, specification of the model and degrees of freedom (Chen et al., 2008; Perry et al., 2014). For the present study it was decided that the model was an acceptable fit for the data with the measures of fit considered collectively.
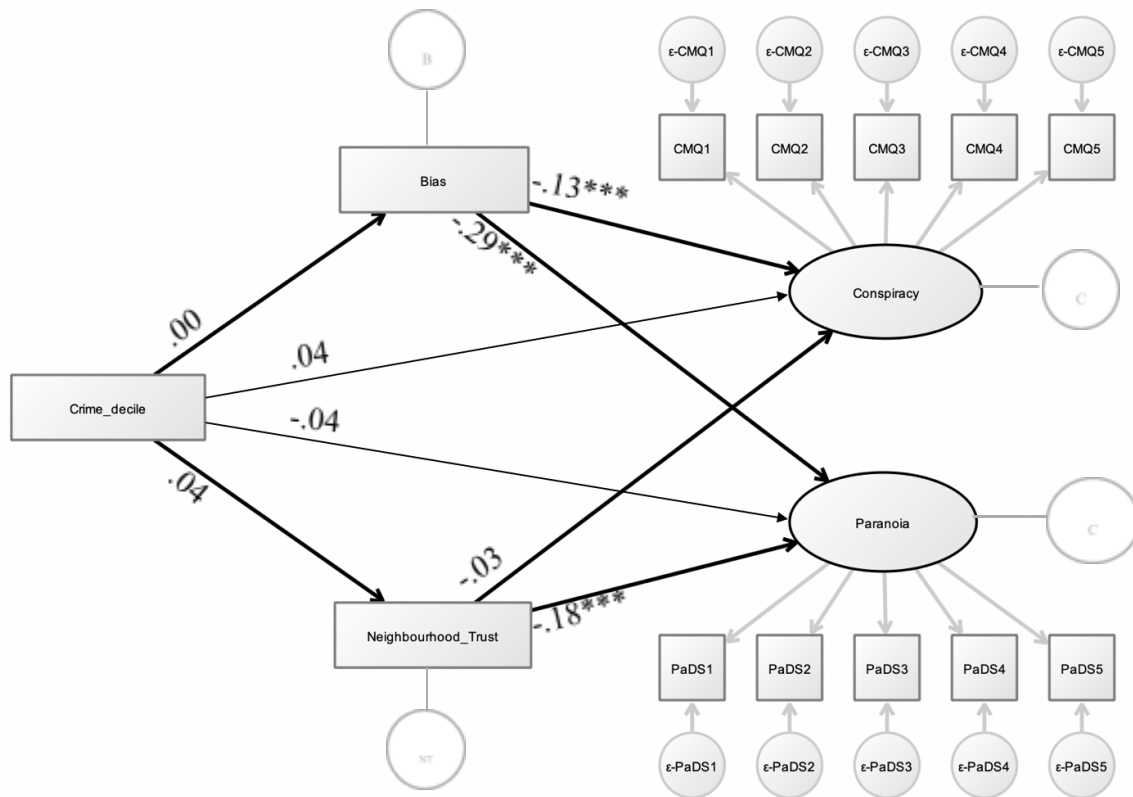
Figure 1. Full multiple mediation model between crime decile, response bias towards mistrust, neighbourhood trust, conspiracist ideations and paranoia traits. All estimates are standardised. Levels of significance: * $p < .05$, ** $p < .01$, *** $p < .001$.

We observed several significant direct effects for the following paths; from trust judgement bias to paranoia $\beta = -.29$, 95% CI $-0.33 - 0.25$, $p < .001$; from bias to conspiracist ideations $\beta = -.13$, CI $-0.17 - -0.08$, $p < .001$ and from neighbourhood trust to paranoia $\beta = -.18$, CI $-0.23 - -0.13$, $p < .001$. We observed no indirect/mediation effects at the $p < .05$ level between crime decile and the outcomes of paranoia and conspiracist ideations through the measures of trust.

<u>Discussion</u>

The present study aimed to investigate whether the COVID-19 pandemic has further exposed mental health inequalities in the United Kingdom by exploring the relationships between mental health inequality indicators and mental health outcomes. Based on previous findings, we hypothesised specific relationships between income inequality, depression and anxiety; and between crime rate and paranoia. Firstly, we found that an individual's income was a significant independent predictor of depression and anxiety scores on their respective scales, such that individuals with higher income scored lower on the PHQ-9 and GAD-7. These findings support a growing evidence base linking income and income inequality to depression (e.g. Barbalat & Franck, 2020; Fan et al., 2021; Ladin et al., 2010) as well as offering some early evidence for a relationship to anxiety. Secondly, we found that the crime rate of the area in which an individual lived was not a significant predictor of paranoia as hypothesised, in opposition to previous findings in this area (Dustmann & Fasani, 2016; Nettle et al., 2014). This may be a result of using crime deciles as our measurement of crime which may not be a suitable measure, a point discussed further later in this section. Unexpectedly, income was a significant predictor of paranoia. There have been investigations into the social context of paranoia (Harper, 2011a) and social inequality in relation to its diagnosis (Harper, 2011b) beyond the effect of crime as discussed earlier in this report. One study found that the Index of Multiple Deprivation as a whole (i.e. including income) predicted paranoia (Wickham et al., 2014), but to the best of our knowledge this is the first study to find a specific relationship between income and paranoia.

We also investigated how measures of trust may be involved in the relationship between crime rate, paranoia and conspiracist ideations. Consistent with findings by Martinez et al. (2020), using the measures from a signal detection analysis we found a direct effect from bias towards mistrust and greater levels of paranoia. Similarly, we found a direct effect between neighbourhood trust and paranoia. Collectively, these findings offer support for the involvement of trust in paranoia and paranoid thinking as has been previously suggested (Baas et al., 2008; Bebbington et al., 2013; Kirk et al., 2013). As detailed by Martinez et al. a bias towards mistrust may be associated with paranoia through initiating a threat related response (e.g. perceiving a trustworthy face as untrustworthy, Haselton & Buss, 2000) which is consistent with findings that high paranoia trait individuals have increased tendency to anticipate social threats (Bentall et al., 2009). Furthermore, neighbourhood trust can be considered a form of interpersonal trust, a common feature of disorders involving paranoia such as psychosis (Fett et al., 2016) and insecure attachment styles (Mikulincer, 1998).

However, we found no direct effect of crime rate on bias towards mistrust or neighbourhood trust, and no mediating/indirect effect of the trust measures in the relationship between crime rate and paranoia. These results were surprising given the literature base supporting a relationship between the crime rate of an area and paranoia. A possible reason for this may be our use of IMD classification deciles which may not be a suitable measure for investigating an individual's experience of crime. Studies have proposed an individuals' fear of crime stems from their perception and experience of crime (Gabriel & Greve, 2003; Scarborough et al., 2010) in conjunction with social and neighbourhood level factors (McCrea et al., 2005). A more suitable measure of crime

may be to combine the IMD classification of an individual's area with a more individual assessment of fear of crime, of which some have been proposed (Jackson, 2005; Williams et al., 2000).

We also observed a direct effect from bias towards mistrust to conspiracist ideations, supporting earlier noted evidence that has suggested a link between paranoia and belief in conspiracy theories (Brotherton & Eser, 2015; Darwin et al., 2011). Both paranoia and belief in conspiracies can be associated with low trust and a lack of control (Imhoff & Lamberty, 2018). Furthermore, individuals who show high levels of paranoia are typically hypervigilant towards signs of hostility directed towards them and have a tendency to interpret social cues as aggressive. These attribution errors may in turn lead to an individual perceiving the existence of a hostile conspiracy directed towards them, their ingroup or people in general (Brotherton & Eser, 2015; Kramer, 1994; Smári et al., 1994). The present study's use of results from a signal detection paradigm can be seen as a strong example of individuals making attributions and would be a good addition to this field of research. The finding also has implications in the context of the COVID-19 pandemic, with findings linking conspiracist ideations to belief in theories regarding its origin and spread (Romer & Jamieson, 2020) and more recently vaccine hesitancy (Chou & Budenz, 2020; Sallam et al., 2021). Since those with a bias towards mistrust may be more likely to believe such theories, targeted actions such as educational programs to dismantle such beliefs may be both important and necessary.

Finally, we wish to draw attention to an important consideration. Whilst this report presents findings that implicate specific mental health indicators in the aetiology of

specific mental health disorders and outcomes, we are not arguing that these are sole root causes. Understanding public mental health is a difficult and complex process with a range of multifaceted causes, and there will be many that were not accounted for in the present study such as ethnicity (Proto et al., 2021) and sexual orientation (Herek & Garnets, 2007). Mental health issues should be considered with a complex systems model in mind which conceptualises poor health and health inequalities as the results of multiple interdependent elements as part of a connected whole (Diez-Roux, 2011). A broad spectrum of methods is necessary to investigate indicators of public health issues; as well as the design, evaluation and implementation of interventions to change the systems with the goal of improving public health (Rutter et al., 2017). These ideas and concepts should be kept in mind when assessing the findings of the present study and the overall research field of health inequalities and mental health issues.

Conclusions

Conclusively, the present study found that mental health inequalities in the UK were present during the COVID-19 pandemic in March 2020. It specifically implicates the role of income in the experience of depression, anxiety and paranoia symptoms; as well as proposing further evidence for the role of trust in paranoia and new (to our knowledge) evidence regarding belief in conspiracist ideations. Careful and cautious interpretation of these findings is necessary as the presence of mental health inequalities are complex, multifaceted and cannot be constrained to a single explanatory factor. Nevertheless, it is vital to consider income, income inequality, crime rate and deprivation as a whole, as important public health problems. Therefore, measures to reduce these, promote equality and social justice are important both in policy and practice. This extends far beyond the

constraints of psychology and mental healthcare, so collaboration and cooperation are of

paramount importance.

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