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# Age and adult attachment style predict psychological distress in the Singapore general population during COVID-19

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## ABSTRACT

To date, there is increasing evidence to suggest that age and adult attachment styles, such as secure, anxious and avoidant attachment are predictive or protective for psychological distress. The study aimed to investigate the extent to which age and adult attachment style, measured by the Attachment Style Questionnaire, predicted psychological distress, measured by the Kessler 10 Psychological Distress Scale, in the Singapore general population during COVID-19. Ninety-nine residents of Singapore (44 females, 52 males, 3 prefer not to state their gender) aged between 18 and 66 completed an online survey, which collected information on age, adult attachment styles and levels of psychological distress. Multiple regression analysis was performed to study the influence of predictive factors on psychological distress. The study identified 20.2%, 13.1% and 14.1% of participants reporting psychological distress at the mild, moderate and severe levels, respectively. The study also reported that age and psychological distress were negatively correlated, and that psychological distress was negatively correlated with both anxious and avoidant attachment styles. It was concluded that age and adult attachment style significantly predicted psychological distress in the Singapore general population during COVID-19. Further studies exploring other variables and risk factors are required to further consolidate these results. At the global level, these findings may help countries predict residents' reactions to future outbreaks and help them prepare strategies and approaches to address these situations.

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## KEYWORDS

COVID-19; Singapore; general population; age; adult attachment style; psychological distress; predictive factors

## Introduction

Societal norms and economic progress have been disrupted by a number of infectious disease outbreaks this century (Sim et al., 2010). These include the Severe Acute Respiratory Syndrome (SARS) outbreak (2003), the influenza A H1N1 pandemic (2009), the Ebola virus epidemic (2014), and the coronavirus disease 19 (COVID-19) pandemic (2020). Studies on communities impacted by these outbreaks have reported varying types of psychological symptoms (Chew et al., 2020). For example, these outbreaks contributed to acute psychological reactions, such as post-traumatic stress,

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depression, anxiety and suicidality amongst both survivors and healthcare workers (Cheng et al., 2004; Greenberg et al., 2015; M. Chong et al., 2004; Matsuishi et al., 2012; McAlonan et al., 2007).

The World Health Organisation declared the COVID-19 outbreak a global pandemic on 11 March 2020 (World Health Organization WHO, 2020). Early cross-sectional studies to assess the psychological impact of COVID-19 identified high levels of psychological distress in 72.0% of study participants in China (C. Wang et al., 2020) and 53.8% of study participants in Spain (Gómez-Salgado et al., 2020), with a high percentage observed in younger individuals. Participants in Italian population studies were found to have high levels of distress (32.4%), anxiety (18.7%) and stress (27.2%) (Mazza et al., 2020), with anxious attachment identified as a risk factor for psychological distress (Moccia et al., 2020). However, a joint study in Singapore and India (Chew et al., 2020) found lower levels of distress (5.3%), anxiety (8.7%), stress (2.2%) and distress (3.8%) in participants from the healthcare population. These early findings suggest age and adult attachment style as risk or protective factors.

Young age was identified as a risk factor for psychological distress during the SARS outbreak (Sim et al., 2010) evaluated by the 28-item General Health Questionnaire (GHQ-28) (Goldberg & Hillier, 1979). During COVID-19, younger individuals in Spain reported higher levels of distress (Gómez-Salgado et al., 2020) evaluated by the GHQ-12 (Goldberg et al., 1997) whilst younger individuals in Italy displayed higher levels of stress (Mazza et al., 2020) evaluated by the Depression, Anxiety and Stress Scale - 21 Items (DASS-21) (Bottesi et al., 2015). These studies attributed their findings to younger individuals being less resilient or less experienced in coping with adversity. Gómez-Salgado et al. (2020) suggested that younger individuals are less able to accept that extreme situations such as outbreaks impact lives suddenly and radically, and are not the result of any one individual's decision. Conversely, older individuals may develop increased resilience after experiencing emergencies or traumatic situations throughout their life (Acierno et al., 2006). Alternatively, studies by Mazza et al. (2020) and Cheng et al. (2004) attribute the association between young age and psychological distress to the ease with which younger individuals access information via social media that leads them to experience heightened stress reactions. Additionally, Xiong et al. (2020) suggested that younger individuals may experience higher levels of distress due to concerns over job security or school closures. In contrast, whilst a study by Qiu et al. (2020) identified associations with younger individuals and psychological distress during COVID-19 evaluated by the COVID-19 Peritraumatic Distress Index (Qiu et al., 2020), it also identified a greater risk of distress amongst individuals above 60 years of age. Studying the United States population during COVID-19, Nikčević et al. (2021) suggested that higher levels of psychological distress in older individuals was to be expected as they are more susceptible to COVID-19 infections due to greater degrees of morbidity and mortality. With conflicting findings on the association between age and psychological distress across a number of studies, Jorm (2000) explained that it continues to be a controversial issue due to a lack of consistent results. It was suggested that these differences could be due to age bias when applying different scales of measurement, or varying levels of exposure to risk factors in the populations studied (Jorm, 2000).

Studies have also reported correlations between attachment styles and psychological distress (Mallinckrodt & Wei, 2005; Marganska et al., 2013; Moccia et al.,

2020). Bowlby's (1988) attachment theory postulates that the attachment system functions as a resource in regulating distress by leading people to seek support from others during stressful events. Later research has also supported this hypothesis that attachment style influences distress regulation (Shaver & Mikulincer, 2007). Mallinckrodt and Wei (2005) reported that anxious and avoidant attachment styles as measured on the Experience in Close Relationships (ECR) Scale (Brennan et al., 1998) were positively correlated with psychological distress and negatively correlated with social support. In a study examining how emotion regulation impacts attachment styles, depression and anxiety, Marganska et al. (2013) reported that avoidant and anxious attachment styles were associated with higher levels of depression – measured by the Beck Depression Inventory, Second Edition (Beck et al., 1996) – and anxiety – measured by the Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV) (Newman et al., 2002) – as they were less able to regulate their emotions. Reviewing studies on attachment-related psychological responses during COVID-19, Rajkumar (2020) inferred that insecure attachment as measured on the ECR – Revised (Fraley et al., 2000) scale was linked to higher levels of health anxiety as measured by the Short Health Anxiety Inventory (Salkovskis et al., 2002), suggesting that this could be a maladaptive response to stigmatization and xenophobic attitudes as well as infection control measures, such as social distancing, self-isolation and lockdowns implemented in some countries. Conversely, individuals with secure attachment styles observed through higher levels of trust in others and community involvement reported less anxiety and stress.

These findings add to the growing body of research associating anxious and avoidant attachment styles with psychological distress. Applying Bowlby's theory to these findings, individuals with anxious and avoidant attachment styles would seek to regulate distress by seeking support from others but would experience distress if they were unable to do so. Shaver and Mikulincer (2007) however, argued that whilst anxiously-attached individuals reacted more negatively to threats, individuals high on avoidant attachment were more likely to employ defensive emotion regulation mechanisms, allowing them to control their emotions and focus on self-reliance. In fact, the study by Moccia et al. (2020) reported findings that secure and avoidant attachment styles were protective against psychological distress during COVID-19, with only anxious attachment associated with higher levels of psychological distress. They suggested that whilst anxiously-attached individuals may have over-reported their perceptions of distress, avoidant attachment was protective for psychological distress in their study as such individuals perceive COVID-19 infection control measures, such as social distancing and self-isolation as less distressing than anxiously-attached individuals.

Whilst there is general consensus that infectious disease outbreaks impact the level of psychological distress experienced, the generalizability of these findings on risks and protective factors for psychological distress are challenged by studies on different population samples such as healthcare workers (Chew et al., 2020) and general resident populations (C. Wang et al., 2020; Gómez-Salgado et al., 2020; Mazza et al., 2020; Moccia et al., 2020). These observations suggest the need for further studies in this field to validate the results. By sampling the Singapore

general population, this study addressed a limitation of an earlier study (Chew et al., 2020) which was conducted only on healthcare workers in Singapore.

## Methods

### Design

A correlational design investigated the extent that age and adult attachment style predicted psychological distress in the Singapore general population during COVID-19. Age and the 5 subscales of the Attachment Style Questionnaire by Feeney et al. (1994) were identified as predictor variables. These subscales are: (i) Confidence (in self and others); (ii) Discomfort with Closeness; (iii) Need for Approval; (iv) Preoccupation with Relationships, and; (v) Relationships as Secondary to Achievement. Psychological distress as measured by the Kessler 10 Psychological Distress Scale (Kessler et al., 2002) was identified as the outcome variable.

### Participants

The study was open to participants who were (i) residing in Singapore at the time of the study; (ii) 18 years of age or older; (iii) able to participate in and complete an online survey, and; (iv) able to provide informed consent. There were no other inclusion or exclusion criteria. Ninety-nine participants residing in Singapore, aged 18 to 66 years ( $M = 38.17$ ,  $SD = 12.06$ ), participated in this study. This sample comprised 44 females (44.4%) and 52 males (52.5%) with three participants (3.1%) preferring not to state their gender. All participants provided informed consent.

An optimal sample size of 99 participants was identified (Green, 1991) as  $>50 + 8p$  (where  $p$  represents 6 - the number of predictors). An a-priori power analysis was carried out to justify the sample size (Lakens, 2022) which suggested at least 97 participants to obtain statistical power at the .8 level and an alpha at .05.

Participants were recruited through the snowball sampling method (Goodman, 1961). An initial set of 10 participants were selected from the first author's personal and professional contacts and were sent recruitment material via social messaging platforms, inviting them to participate in the survey. They were also asked to forward this material on to their network of contacts. Participants continued to be recruited in this manner between 6 December 2020 and 1 January 2021 until data saturation was reached. Consideration was given to ensure that the initial set of participants who received the recruitment material represented various ethnic groups and ages, to support a representative sample of the Singapore population.

### Procedures

The study was conducted via an online survey, which contained 56 items to record participants' informed consent, socio-demographic data, such as age and gender, adult attachment style data and psychological distress data.

This study employed the 40-item Attachment Style Questionnaire (ASQ) by Feeney et al. (1994). The validity of the ASQ is supported by good correlations with other

measures of attachment style (Karantzas et al., 2010). Each item asked participants to self-evaluate against a six-point scale: (1) totally disagree; (2) strongly disagree; (3) slightly disagree; (4) slightly agree; (5) strongly agree, and; (6) totally agree. Scores from 1 to 6 for each item within each subscale were then summed up, with items which required reverse scoring treated accordingly. Total scores for each subscale ranged from 7 to 60 which assessed the strength of each participant's attitudes to: the self (Preoccupation with Relationships and Need for Approval subscales); to others (Discomfort with Closeness and Relationships as Secondary subscales), and; to both self and others (Confidence subscale) (Feeney et al., 1994).

The 10-item Kessler 10 Psychological Distress Scale (K10) by Kessler et al. (2002) is a validated measure of psychological distress (Andrews & Slade, 2001) and assesses perceptions of mild, moderate and severe psychological distress in participants. Participants were asked to self-evaluate against a five-point scale: (1) none of the time; (2) a little of the time; (3) some of the time; (4) most of the time, and; (5) all of the time. Scores from all 10 items were summed to obtain a total score. Scores of 10–19 indicated that the respondent was likely to be well and exhibited no signs of psychological distress. Scores of 20–24 indicated mild psychological distress, 25–29 indicated moderate psychological distress, and scores of 30 and over indicated severe psychological distress (Kessler et al., 2002).

### Statistical methods

IBM SPSS Statistics Version 26.0 was used to perform all statistical analyses. Prior to conducting a regression analysis, assumptions were tested to ensure a multiple regression was a valid means of analysing the data. Assumptions of absence of outliers, multicollinearity, independent errors, homoscedasticity and linearity of data were examined. Items in the ASQ that required reverse scoring were treated accordingly. Scores for the K10 and each of the subscales of the ASQ were then summed up for each participant. The predictor variables were then analysed against the outcome variable using multiple regression.

## Results

### Descriptive statistics and correlations

Mean and standard deviation of age as well as scores of each adult attachment style subscale and psychological distress scores obtained from all 99 participants are provided

**Table 1.** Descriptive Statistics and Correlations for Study Variables.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Age	38.17	12.05	-						
2. Confidence (in self and others)	32.92	5.43	.28*	-					
3. Discomfort with Closeness	39.60	7.47	-.32*	-.57**	-				
4. Need for Approval	23.17	6.52	-.49**	-.55**	.46**	-			
5. Preoccupation with Relationships	27.85	6.41	-.38**	-.52**	.41**	.76**	-		
6. Relationships as Secondary to Achievement	19.56	5.68	-.40**	-.47**	.40**	.61**	.45**	-	
7. Distress	20.71	7.73	-.62**	-.39**	.43**	.64**	.63**	.58**	-

Note. \* indicates  $p < .05$ ; \*\* indicates  $p < .001$ .



in Table 1. Psychological distress scores ranged from 10 to 46 ( $M = 20.71$ ,  $SD = 7.73$ ) indicating a range of mild, moderate and severe psychological distress in participants. 47 participants (47.4%) reported psychological distress, of which 20 participants (20.2%) reported mild psychological distress, 13 participants (13.1%) reported moderate psychological distress and 14 participants (14.1%) reported severe psychological distress. Consequently, it can be claimed that the study's sample displayed a range of psychological distress symptomology including mild, moderate and severe distress levels.

Pearson correlations were computed to determine the relationships between each variable. As can be seen in Table 1, there were strong, negative correlations between age and psychological distress ( $r(97) = -.62$ ,  $p < .001$ ) and 'Confidence (in self and others)' and psychological distress ( $r(97) = -.39$ ,  $p < .001$ ). There were strong, positive correlations between 'Discomfort with Closeness' and psychological distress ( $r(97) = .43$ ,  $p < .001$ ), 'Need for Approval' and psychological distress ( $r(97) = .64$ ,  $p < .001$ ), 'Preoccupation with Relationships' and psychological distress ( $r(97) = .63$ ,  $p < .001$ ) and 'Relationships as Secondary to Achievement' and psychological distress ( $r(97) = .58$ ,  $p < .001$ ).

### Regression analysis

Prior to conducting a regression analysis, assumptions of absence of outliers, multicollinearity, independent errors, homoscedasticity and linearity of data were tested. The analysis of standard residuals showed that the data contained no outliers (Std. Residual Min =  $-1.75$ , Std. Residual Max =  $2.85$ ). Collinearity tests indicated that the data met the assumption of no multicollinearity (Age, Tolerance =  $.73$ , VIF =  $1.37$ ; Confidence (in self and others), Tolerance =  $.54$ , VIF =  $1.86$ ; Discomfort with Closeness, Tolerance =  $.63$ , VIF =  $1.58$ ; Need for Approval, Tolerance =  $.31$ , VIF =  $3.21$ ; Preoccupation with Relationships, Tolerance =  $.41$ , VIF =  $2.44$ ; Relationships as Secondary to Achievement, Tolerance =  $.58$ , VIF =  $1.72$ ). The data met the assumption of independent errors (Durbin-Watson =  $2.31$ ). Finally, the scatterplot of standardised residuals indicated that the data met the assumptions of linearity and homoscedasticity.

Multiple regression analysis was performed to investigate the extent to which the variables age, 'Confidence (in self and others)', 'Discomfort with Closeness', 'Need for Approval', 'Preoccupation with Relationships' and 'Relationships as Secondary to Achievement' were predictive of psychological distress. Using the 'enter' method, a significant model emerged,  $F(6,92) = 25.31$ ,  $p < .001$ . The relationship between the

**Table 2.** Regression Coefficients for the Predictor Variables Entered into the Model.

Variable	B	95% CI	SE	$\beta$ (beta score)	T	Sig. (p)
Constant	-.27					
Age	-.22	[-.32, -.13]	.05	-.34**	-4.59	<.001
Confidence (in self and others)	.15	[-.10, .40]	.12	.11	1.21	.228
Discomfort with Closeness	.11	[-.06, .28]	.08	.11	1.32	.192
Need for Approval	.09	[-.18, .36]	.14	.08	.67	.504
Preoccupation with Relationships	.40	[.16, .64]	.12	.34*	3.34	.001
Relationships as Secondary to Achievement	.34	[.12, .57]	.11	.25*	3.01	.003

Note:  $R^2 = .60$ . CI = confidence interval for B.

Note. \* indicates  $p < .05$ ; \*\* indicates  $p < .001$ .



variables was strong ( $R = .79$ ) and the model could explain approximately 59.8% (adjusted  $R^2 = .60$ ) of the variance in psychological distress scores. The contribution of each predictor variable in accounting for the variance in the psychological distress scores is shown in Table 2.

The variables age ( $\beta = -.34$ ,  $t(92) = -4.59$ ,  $p < .001$ ), 'Preoccupation with Relationships' ( $\beta = .34$ ,  $t(92) = 3.34$ ,  $p = .001$ ) and 'Relationships as Secondary to Achievement' ( $\beta = .25$ ,  $t(92) = 3.01$ ,  $p = .003$ ) were significant predictors of psychological distress.

When holding the other variables constant, a decrease in age of one unit predicts a change in psychological distress scores by 0.22 ( $t(92) = -4.59$ ,  $p < .001$ ). An increase in 'Preoccupation with Relationships' of one unit predicts a change in psychological distress scores by 0.40 ( $t(92) = 3.34$ ,  $p = .001$ ) and an increase in 'Relationships as Secondary to Achievement' of one unit predicts a change in psychological distress scores by 0.34 ( $t(92) = 3.01$ ,  $p = .003$ ).

## Discussion

This study was the first to investigate the extent that age and adult attachment styles predict psychological distress in the Singapore general population during COVID-19.

### *Age as a predictor of psychological distress*

The results from this present study found that age was negatively correlated with psychological distress and represents a significant predictor of psychological distress in the Singapore general population during COVID-19. This indicated that younger individuals were at risk of suffering from higher levels of psychological distress during the COVID-19 pandemic. This finding was consistent with findings from the studies conducted in other countries during COVID-19, such as China (Y. Wang et al., 2020), Italy (Mazza et al., 2020) and Spain (Gómez-Salgado et al., 2020) as well as studies carried out during the SARS outbreak (Sim et al., 2010) and also during a natural disaster (Acierno et al., 2006). It has been suggested that younger individuals may have less resilience to extreme situations as they have less experience with adversity (Gómez-Salgado et al., 2020), are more influenced by heightened stress reactions via social media (Cheng et al., 2004; Mazza et al., 2020), or are concerned about job security (Xiong et al., 2020). The results obtained validated the association between age and psychological distress and investigated the extent that age predicts psychological distress in the Singapore general population during COVID-19. However, further research into the nature of distress in younger individuals may be required to better understand these findings. For example, restrictions on social gatherings and closures of public venues (Gov.sg, 2020) as well as home-based learning arrangements (Ang, 2020) may have played a contributory role. A 2010 population-based study by S. A. Chong et al. (2012) on mental disorders in Singapore suggested that age was associated with major depressive disorder, with the highest rates found in the youngest age group of 18 to 34 years. This was also observed in those with bipolar disorder (S. A. Chong et al., 2012). A later study in 2016 also found an increase in general anxiety disorder in the same age group of 18 to 34 years compared with the results in 2010 (Chang et al., 2019). These findings also suggest that other

explanations may contribute to these results, such as under-reporting amongst older adults and better acceptance and recognition of mental disorders amongst the young (Subramaniam et al., 2020).

### ***Adult attachment style as a predictor of psychological distress***

The results from this present study found that the 'Preoccupation with Relationships' subscale, which identifies the need to address dependency by reaching out to others – indicating an anxious attachment style (Feeney et al., 1994) – and the 'Relationships as Secondary' subscale, which identifies a dismissive style that protects the individual against hurt and vulnerability by displaying achievement and independence – indicating an avoidant attachment style – were strong predictors of psychological distress.

These results identified anxious and avoidant adult attachment styles as significant predictors for the risk of psychological distress in the Singapore general population during COVID-19. The findings from this present study were consistent with the findings by Mallinckrodt and Wei (2005) and Marganska et al. (2013) which suggested that anxious and avoidant attachment styles were predictive for psychological distress during non-pandemic situations.

Applying attachment theories and research to the findings of this study, it is suggested that individuals with anxious and avoidant adult attachment styles presented a higher risk of psychological burden as they perceived stressful events as threats, leading to self-doubt towards their coping abilities, distorted views of themselves and the world, and elevated levels of distress (Mikulincer & Florian, 2000). Bowlby's (1969) theory suggesting that illness can trigger behaviour also links anxious and avoidant attachment styles to elevated levels of anxiety. Conversely, individuals with secure attachment styles reported lower levels of distress (Rajkumar, 2020).

However, these findings only partially support the findings by Moccia et al. (2020) which reported that anxious attachment was predictive but avoidant attachment was protective for psychological distress during COVID-19. The differences in the findings around avoidant attachment style and psychological distress between the study by Moccia et al. (2020) and the present study could be a result of these studies being carried out in different countries which experienced the COVID-19 situation differently. Gómez-Salgado et al. (2020) observed that the level of infection control measures across study populations varied and suggested that in-country measures such as lockdown or self-isolation requirements influence levels of psychological distress differently. Whilst all studies were conducted before a vaccine was made available, the study by Moccia et al. (2020) was carried out on the Italian general population at an early stage of the outbreak, when infection levels in Italy were high and residents were required to observe self-isolation and social distancing measures. In contrast, this study on the Singapore general population was carried out at a later stage in the evolution of the pandemic, when infection levels in Singapore were low, although residents were also required to stay home and observe social distancing measures. Many residents of Singapore however, had prior experience with infection control measures, having been exposed to the SARS outbreak in 2003 (Sim et al., 2010). Alternatively, Ozkan et al. (2021) found a positive correlation between the level of individualism and COVID-19 mortality rates across 110 countries, suggesting that COVID-19 mortality rates are higher in countries considered

as having higher levels of individualism (Hofstede, 2001) such as France, Italy, the United Kingdom and Belgium compared to mortality rates in countries considered as having lower levels of individualism such as Singapore, the United Arab Emirates and Columbia. They suggest that the success of collectivist cultures towards infection control such as those observed in Asia, Latin America and the Middle East is related to the ability that these countries have in imposing tracking and social monitoring programs on their citizens, supported by a culture which tolerates such surveillance (Ozkan et al., 2021). Conversely, they suggest that individualist cultures such as those observed in the United States and Western Europe may be less tolerant towards social distancing, mask-wearing and frequent hand-washing requirements, as they may be less concerned about the impact of these measures on others.

This study validated the association between anxious and avoidant attachment styles and psychological distress, and investigated the extent that adult attachment styles predict psychological distress in the Singapore general population during COVID-19. However, future research into in-country factors surrounding studies on attachment style and psychological distress may be required to better consolidate these findings.

As an initial indication of at-risk groups, these results can support the design of effective strategies to address psychological distress and improve psychological resilience during crises. These results will benefit from replication and extension in larger samples across various geographies and situations.

### ***Limitations and future studies***

Whilst studies on the mental health of the Singapore general population prior to COVID-19 suggested that younger age was correlated with major depressive disorders (S. A. Chong et al., 2012) and that the prevalence of general anxiety disorder in younger age groups increased from 2010 to 2016 (Chang et al., 2019), they did not measure adult attachment styles or psychological distress. However, an analysis across 11 longitudinal studies on the UK general population before and during the pandemic suggested that mental health had deteriorated since the onset of the pandemic (Patel et al., 2022). A longitudinal study on the US general population across the evolution of the pandemic also suggested that during the pandemic, levels of serious psychological distress exceeded levels that would be expected in the absence of the pandemic (Breslau et al., 2021). Future studies into age or attachment styles within general populations across time periods can be conducted to validate the findings of this study.

Another limitation of this study was sample size. The sample size was adequate for the analyses employed in this study, however a larger sample size could have increased the confidence in our estimate, decreased uncertainty and provided greater precision to the results (Asiamah et al., 2017). Additionally, as the study was conducted during the COVID-19 pandemic, Singapore had imposed infection control measures such as social distancing and prohibiting face-to-face interaction (Yip et al., 2021). Hence, participants were recruited through snowball sampling, involving participants sharing the link to the online survey with personal contacts. Whilst this is a recognized recruitment method allowing participants not easily accessible or known to the researcher to participate (Leighton et al., 2021), it is acknowledged that this non-random method of sampling has limitations that can affect the generalizability of the findings. For example,

respondents may be more likely to forward the recruitment material to contacts who share similar characteristics or who are in similar situations (Etikan, 2016). Similarly, the online nature of the survey may have excluded or discouraged certain individuals (e.g. those without internet access or those less comfortable with technology) from participating in the study (Andrade, 2020), possibly introducing sampling bias by over-representing specific groups within the population. It is important to note, however, that this sampling method was the most feasible to use for this study given the government restrictions on mobility, face-to-face contact, and social interactions that were in place at the time of data collection.

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