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Journal of Affective Disorders 277 (2020) 94–98

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Reactions to COVID-19: Differential predictors of distress, avoidance, and disregard for social distancing

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ARTICLE INFO

Keywords:
Coronavirus
COVID-19
Pandemic
Distress
Avoidance
Social distancing

ABSTRACT

Background: : Recent psychological research into the effects of COVID-19 has focused largely on understanding excessive fear reactions ("over-responses"). Equally important, but neglected phenomena concern "under-responses", in which people downplay the significance of COVID-19. People who do not take the pandemic seriously may be less likely to adhere to social distancing policies. The present study is, to our knowledge, the first to investigate the differential predictors of over- and under-responses to COVID-19.

Methods: : A large community sample from the United States and Canada (N = 6,854) completed measures of beliefs associated with over- and under-responses, along with measures of distress, excessive avoidance, and nonadherence to social distancing. Over-response beliefs were assessed by scales measuring beliefs about the dangerousness of COVID-19 (personal health and socio-economic threats) and COVID-19-related xenophobia (beliefs that foreigners are spreading the virus). Under-response beliefs were assessed by scales measuring beliefs that the threat of COVID-19 has been exaggerated, and beliefs that one is sufficiently healthy to be robust against the effects of COVID-19.

Results: : In regression analyses, medium or large effects were obtained whereby over-response beliefs predicted distress (including distress associated with self-isolation) and excessive avoidance during the pandemic, whereas under-response beliefs predicted the disregard for social distancing.

Limitations: : This study relied on self-reported cross-sectional data and focused on extreme forms of disregard for social distancing guidelines,

Conclusion: : It is important to understand under-responses to COVID-19 and how these relate to distress, excessive avoidance, and nonadherence to social distancing. Implications for addressing the problems of over- and under-response are discussed.

1. Introduction

Research on past epidemics and pandemics has shown that anxiety, or the lack thereof, is an important driver of behavior (Taylor, 2019). People with too little anxiety about a viral outbreak are less likely to engage in hygiene behaviors (e.g., handwashing), less likely to adhere to social distancing mandates, and are less likely to get vaccinated if a vaccine is available (Taylor, 2019). On the other hand, people with excessive anxiety are more likely to engage in socially disruptive behaviors (e.g., panic buying), may engage in excessive avoidance, and may even become housebound for fear of contamination (Asmundson and Taylor, 2020; Taylor, 2019; Taylor and Asmundson, 2020). Given the role that too little or too much anxiety plays in shaping behavioral responses to viral outbreaks—both behaviors that can mitigate as well as those that can facilitate the spread of infection—it is critical that public health decision-makers, health officials, and health care providers understand the nature and degree of adverse psychological responses to the current COVID-19 crisis.

Cognitive-behavioral models of health anxiety (Taylor, 2019; Taylor and Asmundson, 2004) propose that beliefs are important determinants of emotion and health-related behaviors. The purpose of the present study is to conduct a secondary analysis of data collected by Taylor et al. (2020) in order to extend current understanding of the role of beliefs associated with "over-responses" and "under-responses" to COVID-19. Previous research into the effects of COVID-19 has focused largely on understanding the nature of excessive fear or anxiety reactions (i.e., over-responses; Ahorsu et al., 2020; Jungmann and

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https://doi.org/10.1016/j.jad.2020.08.002
Received 27 May 2020; Received in revised form 30 July 2020; Accepted 3 August 2020
Available online 07 August 2020
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Witthoft, 2020; McKay et al., 2020; Tang et al., 2020). An equally important but largely neglected phenomena concerns under-responses to COVID-19, in which people downplay the significance of the pandemic. The present study is, to our knowledge, the first to investigate the differential predictors of over- and under-responses to COVID-19. Over-responses, by definition, are associated with beliefs that COVID-19 is highly threatening, whereas under-responses are associated with beliefs that COVID-19 does not pose a personal threat and that the dangers of the novel coronavirus have been exaggerated.

In the present study, over- and under-response beliefs were assessed by scales from the recently validated COVID Stress Scales (Taylor et al., 2020). Over-response beliefs were assessed by scales measuring beliefs (worries) about the dangerousness of COVID-19 (personal health and socio-economic threats) and COVID-19-related xenophobia (beliefs that foreigners are spreading the virus). Under-response beliefs were assessed by scales measuring beliefs that the threat of COVID-19 has been exaggerated, and beliefs that one is sufficiently healthy to be robust against the effects of COVID-19. Regression analyses were conducted to test predictions that over-response beliefs are associated with (1) general distress (i.e., current anxiety and depression) during COVID-19, (2) distress specifically associated with the stressors of coping with self-isolation, and (3) excessive avoidance (i.e., avoidance of places where people could legitimately travel, such as grocery stores). Regression analyses were also conducted to test the prediction that under-response beliefs predict the tendency to disregard social distancing. These analyses were conducted by controlling for demographic and health-related variables such as sex, unemployment status, working in a job that increases one's risk of exposure to COVID-19, and pre-existing general medical and mental health conditions. These variables are correlated with distress and avoidance (Lai et al., 2020) and, therefore, were controlled for in order to conduct a more rigorous test of the predictive power of beliefs in relation to distress, avoidance, and disregard for social distancing.

2. Method

2.1. Sample and data collection procedures

Data were collected from Canada and the United States using an internet-based self-report survey delivered in English by Qualtrics, a commercial survey sampling and administration company, in the early stages of the pandemic in North America between March 21 and April 1, 2020. Participation was solicited by Qualtrics using sampling of web-panels to meet quotas based on age, sex, ethnicity, socioeconomic status, and geographic region within each country in order to obtain a population representative sample. Filters were used to eliminate data from careless or incomplete responders. All respondents provided informed consent. The sample comprised 6854 adults aged 18–94 years. Sample characteristics are presented in Table 1. Given the low proportion, the diagnosis of COVID-19 was not included as a variable in the regression analysis.

2.2. Measures

Participants completed a battery of measures. Those relevant to the present study are reported here. Further details are reported elsewhere (Taylor et al., 2020). Demographics were assessed with a short questionnaire, which included an assessment of whether participants were in an occupation that increased their risk of exposure to the coronavirus (e.g., healthcare worker, grocery store employee). Beliefs (worries) specific to current pandemic were assessed with the previously validated COVID Stress Scales (Taylor et al., 2020). The scales have moderate-to-large correlations with one another (*r*s 0.29 - 0.49; Taylor et al., 2020), and so the scales measuring beliefs (worries) about COVID-19 were summed into a single measure assessing beliefs about the dangers of COVID-19. The scale measured four domains: Worries about the dangerousness of the coronavirus (i.e., beliefs that SARSCoV2 is a dangerous virus), worries about coming into contact with surfaces that might be contaminated with the virus, worries about the socio-economic consequences of COVID-19, and worries that foreigners were spreading the infection.

Table 1
Sample characteristics.

	M (SD) or %
Age (years)	50 (16)
Female	47
Employed full-time or part-time	52
Full or partial college education	79
Only high school education	18
Did not graduate from high school	3
Caucasian	68
Asian	10
African American/Black	9
Latino/Hispanic	6
Native American/Indigenous	1
Other ethnic background	3
Occupational risk of exposure to COVID-19 (e.g., healthcare worker, grocery store clerk)	18
Diagnosed with COVID-19	2
Pre-existing medical condition	40
Pre-existing (past year) mental health condition	19

Belief that the dangerousness of COVID-19 had been exaggerated was assessed by a 3-item scale in which respondents were asked to rate their strength of agreement with statements such as “The dangerousness of COVID-19 has been exaggerated by the media,” and “I believe that COVID-19 is no more dangerous than the flu.” The belief in one's robust physical health in the face of COVID-19 was assessed by three items. Respondents were asked to rate their strength of agreement with statements such as “If I was infected, I would experience only mild symptoms,” and “If I was infected, I would make a quick recovery.”

Current distress (anxiety and depression) during the pandemic was assessed by the Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009). Excessive avoidance was assessed by a 3-item scale measuring the extent of avoidance of services or places that were readily available and essential services (i.e., not closed) to participants at the time of the study (e.g., going to grocery stores, traveling on public transport). Disregard for social distancing was measured by a 3-item scale in which participants were asked to rate their strength of agreement with statements about the personal need for social distancing (e.g., “If I was infected, I wouldn't bother to go into self-isolation,” “If I was infected, it would be no big deal if I went out and socialized with friends”). Note that this scale measured extreme disregard for social distancing; that is, disregard even if the person was infected with the coronavirus. Participants in self-isolation at the time of the study (n = 3312) completed a 7-item scale assessing the severity of aversive reactions to self-isolation (e.g., anxiety, depression, irritability).

2.3. Statistical procedures

Multiple regressions were conducted in which demographic and belief variables were used to predict general distress, distress specific to self-isolation, excessive avoidance, and disregard for social distancing. In the regression analyses, demographic variables were coded as follows: Female sex (vs. other; 99.97% males), United States resident (vs. Canadian), Asian ancestry (vs. other), unemployed (vs. other), college education (full or partial vs. less than college education), and occupational risk exposure to COVID-19 (vs. no or minimal exposure).

Sex was stratified as female versus other, which for all practical purposes was female versus male, because the overwhelming majority of participants (99.97%) identified as either female or male. Country was coded as either the United States or Canada because these were the only countries for which participants were recruited. Ancestry was coded as Asian versus other because Asian people have been subjected

to COVID-19-related racism. Employment status was coded as unemployed versus other in order to specifically examine the effects of unemployment as a stressor. Education was classified as college versus other because these were the largest educational categories. Most respondents (79%; Table 1) had completed at least full or partial college education and there were too few respondents in the remaining educational categories (i.e., less than college education) to assess for differences. Occupational risk of COVID-19 exposure was classified dichotomously (risk of exposure versus no or minimal risk) because, to our knowledge, there are no, currently available psychometrically sound instruments for a more fine-grained assessment of the degree of occupational exposure to COVID-19.

Tolerance values were calculated to test for multicollinearity among predictors. Tolerance values < 0.10 are considered to be problematic, indicating multicollinearity among predictors (Tabachnick and Fidell, 2019), although values as high as 0.40 can be cause for concern (Allison, 1999). Given the number of analyses reported in this article, the alpha level was set at 0.01 instead of 0.05. This adjustment corrects for inflated Type I error without unduly inflating Type II error with a more stringent correction, such as a Bonferroni correction. Given the large sample size, substantively trivial effect sizes would be statistically significant (e.g., for $r = 0.05$, $p < .001$). Accordingly, to facilitate the interpretation of correlations, we used Cohen's (1988) criteria to classify effect sizes as small, medium, or large. For each regression equation, the overall effect size (magnitude of R^2) was interpreted by converting it to f^2, defined as $R^2/(1\text{-}R^2)$ (Cohen, 1988). For each predictor variable, the effect size was $f_{B/A}{}^2$. This was defined as $(R_{AB}{}^2 - R_A{}^2)/(1 - R_{AB}{}^2)$, which assesses the incremental effect in the regression equation when a given predictor (variable B) is added to a group of predictors (a group of A variables; Cohen, 1988; Selya et al., 2012). The magnitude of f^2 and $f_{B/A}{}^2$ values has been classified as follows: Small 0.02, medium 0.15, large 0.35 (Cohen, 1988; Selya et al., 2012). To give precision to these classifications for values falling between the numbers, we classified f^2 and $f_{B/A}{}^2$ in terms of ranges, using the midpoint between 0.02 and 0.15, and midpoint between 0.15 and 0.35, so as to distinguish among small, medium, and large effects; that is, small 0.020–0.085, medium 0.086–0.250, and large > 0.250. Values below 0.02 were considered to be substantively trivial.

3. Results

The reliability as internal consistency (coefficient alpha) for the multi-item scales were as follows: Belief about the dangers of COVID-19 (0.95), belief that the COVID-19 threat is exaggerated (0.74), belief in robust personal health (0.83), distress during self-isolation (0.89), general distress (0.90), and disregard for social distancing (0.79). Even though some of the scales were short (e.g., three items), the results show that all of the alphas were > 0.70 (i.e., good internal consistency for research scales) and almost all were in the vicinity of 0.80 or greater (i.e., excellent internal consistency; Nunnally and Bernstein, 1994).

A matrix of correlations among all variables in this study appears in a table of supplementary materials. The results for the overall regression equations were as follows: General distress: $F(12, 6828) = 330.58$, $p < .001$, $R^2 = 0.37$, $f^2 = 0.59$; distress during self-isolation: $F(12, 3295) = 165.60$, $p < .001$, $R^2 = 0.38$, $f^2 = 0.61$; avoidance: $F(12, 6{,}7508) = 173.99$, $p < .001$, $R^2 = 0.24$, $f^2 = 0.32$; and, disregard for social distancing: $F(12, 6828) = 416.25$, $p < .001$, $R^2 = 0.42$, $f^2 = 0.72$. Each of the values of f^2 represented large effects, as defined by Cohen (1988).

Tables 2–5 show the results for the specific predictors in each equation. For each of these analyses, tolerance values were all > 0.40, thereby revealing no evidence of multicollinearity. Given the large sample size, even substantively small beta weights were statistically significant. Accordingly, in interpreting the results we gave greatest emphasis to statistically significant predictors that also had medium or large effects. Predictors with small effects were also considered to complete the interpretation of the analyses. For general distress (Table 2), the strongest predictor was beliefs about the dangerousness of COVID-19 (medium effect), followed by age and pre-existing mental health condition (small effects). For distress during self-isolation (Table 3), the strongest predictor was beliefs about the dangerousness of COVID-19 (large effect), followed by age and pre-existing mental health condition (small effects). For excessive avoidance (Table 4), the strongest predictor was beliefs about the dangerousness of COVID-19 (medium effect). For disregard for social distancing (Table 5), the strongest predictor was belief in robust personal health (large effect). Disregard for social distancing was also predicted by the belief that the COVID-19 threat has been exaggerated and beliefs about the dangerousness of COVID-19 (small effects). However, these effect sizes were small.

Table 2
Regression analysis predicting general distress from demographic, health-related, and belief variables.

Predictor	Tolerance	Beta	f^2
Age	.72	−0.21***	.05[a]
Female sex	.89	0.04***	.00
United States (vs. Canadian) resident	.95	−0.05***	.00
Asian ancestry	.96	−0.03***	.00
Unemployed	.94	0.03**	.00
College education	.95	0.01	.00
Occupational risk of exposure to COVID-19	.97	0.00	.00
Beliefs about the dangers of COVID-19	.92	0.41***	.24[b]
Belief that COVID-19 threat is exaggerated	.68	−0.01	.00
Belief in robust personal health	.66	−0.03*	.00
Pre-existing general medical condition	.81	0.04***	.00
Pre-existing mental health condition	.87	0.24***	.08[a]

Note. *a* = small effect, *b* = medium effect, *c* = large effect.
*$p < .01$, **$p < .005$, ***$p < .001$.

Table 3
Regression analysis predicting distress during self-isolation from demographic, health-related, and belief variables.

Predictor	Tolerance	Beta	f^2
Age	.67	−0.25***	.07[a]
Female sex	.86	−0.01	.00
United States (vs. Canadian) resident	.93	−0.02	.00
Asian ancestry	.96	−0.02	.00
Unemployed	.94	0.00	.00
College education	.96	0.01	.00
Occupational risk of exposure to COVID-19	.97	0.02	.00
Beliefs about the dangers of COVID-19	.92	0.44***	.29[c]
Belief that COVID-19 threat is exaggerated	.68	0.07***	.00
Belief in robust personal health	.66	0.03	.00
Pre-existing general medical condition	.79	0.04	.00
Pre-existing mental health condition	.85	0.15***	.03[a]

Note. *a* = small effect, *b* = medium effect, *c* = large effect.
*$p < .01$, **$p < .005$, ***$p < .001$.

Table 4
Regression analysis predicting excessive avoidance from demographic, health-related, and belief variables.

Predictor	Tolerance	Beta	f^2
Age	.72	−0.12***	.01
Female sex	.89	0.08***	.01
United States (vs. Canadian) resident	.95	−0.10***	.01
Asian ancestry	.96	−0.03**	.00
Unemployed	.94	−0.02	.00
College education	.95	0.05***	.00
Occupational risk of exposure to COVID-19	.97	−0.05***	.00
Beliefs about the dangers of COVID-19	.91	0.37***	.16[b]
Belief that COVID-19 threat is exaggerated	.69	−0.13***	.01
Belief in robust personal health	.66	−0.06***	.00
Pre-existing general medical condition	.81	0.00	.00
Pre-existing mental health condition	.87	0.04***	.00

Note: *a* = small effect, *b* = medium effect, *c* = large effect.
*$p < .01$, **$p < .005$, *** $p < .001$.

Table 5
Regression analysis predicting the disregard for social distancing from demographic, health-related, and belief variables.

Predictor	Tolerance	Beta	f^2
Age	.72	−0.03	.00
Female sex	.89	−0.07***	.01
United States (vs. Canadian) resident	.95	0.04***	.00
Asian ancestry	.96	0.06***	.00
Unemployed	.94	−0.01	.00
College education	.95	−0.02	.00
Occupational risk of exposure to COVID-19	.97	−0.05***	.00
Beliefs about the dangers of COVID-19	.92	0.21***	.07[a]
Belief that COVID-19 threat is exaggerated	.68	0.20***	.05[a]
Belief in robust personal health	.66	0.49***	.27[c]
Pre-existing general medical condition	.81	0.05***	.00
Pre-existing mental health condition	.87	−0.04***	.00

Note. a = small effect, b = medium effect, c = large effect.
*$p < .01$, **$p < .005$, ***$p < .001$.

4. Discussion

Emerging research into the psychological effects of COVID-19 has focused primarily on understanding excessive fear or anxiety reactions. An equally important, but largely neglected phenomena, concerns the relative absence of fear and anxiety in the face of COVID-19; indeed, people with too little anxiety about an infectious outbreak are less likely to adhere to public health recommendations (e.g., social distancing mandates; Taylor, 2019). The purpose of the present study was to investigate the differential predictors of over-responses (i.e., high fear) and under-responses (i.e., low fear) to COVID-19. Findings were largely consistent with predictions, wherein over-response beliefs predicted general distress, distress associated with self-isolation, and excessive avoidance during the pandemic, whereas under-response beliefs predicted disregard for social distancing.

The strongest predictor of current general distress, as assessed with the PHQ-4, was beliefs about the dangerousness of COVID-19 (medium effect) followed by age (small effect) and past year mental health condition (small effect). Likewise, the strongest predictor of distress during self-isolation was beliefs about the dangerousness of COVID-19 (strong effect) followed by age (small effect) and past year mental health condition (small effect). It is plausible that those who feel COVID-19 poses the greatest threat to themselves and their loved ones (i.e., over-responders) are generally anxious in the face of the many unknowns associated with the pandemic, worry that things are out of their control, and are specifically distressed by the process of self-isolation. Along these lines, over-response beliefs were also the strongest predictor of excessive avoidance behavior, including avoidance of grocery stores and other public places where chances of exposure to the virus may be elevated. Research from outbreaks of SARS, pandemic influenza, and Ebola virus disease (Bish and Michie, 2010; Blakey and Abramowitz, 2017; Wheaton et al., 2012), as well as from home-quarantined university students in China during the COVID-19 pandemic (Tang et al., 2020), has likewise shown that those who overestimate threat are more likely to respond with fear and anxiety. Collectively, these findings provide robust evidence that over-response beliefs are predictive of both general and pandemic-specific distress and related avoidance behavior.

The strongest predictor of the tendency to disregard social distancing was belief in robust personal health (large effect). The association between disregard for social distancing and perceptions of robust personal health is consistent with research from prior pandemics indicating that people who view themselves as having low risk of infection are more likely to disregard instruction to wash their hands (Gilles et al., 2011) and that those with an unrealistic over-optimism bias view themselves as impervious to infection, underestimate risk, and tend to neglect preventive health behaviors (Ji et al., 2004). Interestingly, the present results indicate a seemingly paradoxical finding in that both belief that the COVID-19 threat has been exaggerated and beliefs about the dangerousness of COVID-19 were linked to the disregard for social distancing, albeit with small effects.

Having a pre-existing (past year) mental health condition predicted general distress and distress experienced during social isolation (small effects) but not extreme avoidance or disregard for social distancing. These findings, consistent with prior reports that mental disorders can be exacerbated by pandemic-related stressors (Gardner and Moallef, 2015), suggest that those who have a pre-existing mental health condition are more likely to experience elevated general and COVID-19-specific distress during the outbreak and while in isolation. Although it may be anticipated that those with a pre-existing mental health condition would be much more likely to engage in extreme avoidance during a pandemic, it is possible that increases in pandemic-related avoidance over and above avoidance behaviors associated with a mental health condition is minimal. More research is needed to understand the cumulative effects of pandemic-related stressors on those with pre-existing mental health conditions and how these differ between various diagnostic classes (e.g., mood disorders, anxiety disorders, stress and trauma-related disorders, obsessive compulsive spectrum disorders). As shown in Table 2-5, age had small or very small effects in predicting outcomes, with greater distress associated with younger age. But given that these effects were small, they are unlikely to be of practical significance.

The findings of this study need to be interpreted in the context of several limitations, including reliance on self-reported cross-sectional data, self-reported general medical and mental health conditions, and focus on extreme forms of disregard for social distancing guidelines. Notwithstanding, there are several important clinical implications that emerge. First, given that people who are fearful of COVID-19 are more likely to experience anxiety and depression during the pandemic and while in self-isolation, and are more likely to engage in extreme avoidance behavior, there is a need for tailored assessments and interventions to help people acquire realistic beliefs about the disease. Second, and of critical importance to efforts to further mitigate viral spread and mortality, it will be essential to develop strategies to encourage adherence to public health recommendations, particularly public health recommendations regarding hygiene and proper social distancing. To summarize, an understanding of the manner in which over- and under-responses to COVID-19 are related to measures of distress, excessive avoidance, and nonadherence to social distancing creates a framework by which to inform health care or government officials and health care providers of critical considerations for the development of effective public messaging and evidence-based intervention strategies.

Author statement

Funding and disclosure

This research was supported by funding from the Canadian Institutes of Health Research and the University of Regina. Dr. Taylor receives financial support through royalties from various book publishers and from editorial duties as Associate Editor of the Journal of Obsessive-Compulsive and Related Disorders. Dr. Asmundson is the Editor-in-Chief of the Journal of Anxiety Disorders and Development Editor of Clinical Psychology Review. He receives financial support through payments for his editorial work on the aforementioned journals and royalties from various book publishers.

CRediT authorship contribution statement

Steven Taylor: Conceptualization, Visualization, Funding acquisition, Writing - original draft, Formal analysis. **Caeleigh A. Landry:** Data curation, Writing - original draft. **Michelle M. Paluszek:** Data

curation, Writing - original draft. **Gordon J.G. Asmundson:** Conceptualization, Visualization, Funding acquisition, Writing - original draft.

Conflict of interest

The authors declare that they have no conflicts of interest.

Acknowledgments

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.08.002.

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