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Facing new fears during the COVID-19 pandemic: The State of America's mental health

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ABSTRACT

Objective: COVID-19 is rearranging our society with fear and worry about the novel coronavirus impacting the mental health of Americans. The current study examines the intersection of COVID-19 fear, worries and perceived threat with social vulnerabilities and mental health consequences, namely anxiety and depressive symptomatology.

Methods: Using an online platform, a national sample (n = 10, 368) of U.S. adults was surveyed during the week of March 23, 2020. The sample was post-strata weighted to ensure adequate representation of the U.S. population based on population estimates for gender, race/ethnicity, income, age, and geography.

Results: Fear and worry are not distributed equally across the country; rather they are concentrated in places where the largest number of confirmed COVID-19 cases is found. Additionally, data highlight significant differences in the subjective perception of distress across groups with varying social vulnerabilities. Women, Hispanics, Asians, families with children under 18, and foreign-born respondents reported higher levels of subjective fear and worry compared to their counterparts. Finally, even after controlling for social vulnerability, subjective assessments of distress were positive, and significantly related to anxiety and depressive symptomatology; prior mental health research from China and Europe confirm what others have begun to document in the United States.

Conclusions: This preliminary work provides practitioners with a glimpse of what lies ahead, which individuals and communities may be the most vulnerable, and what types of strategic interventions might help to address a wide range of mental health consequences for Americans in the months and years ahead.

1. Introduction

The state of America's mental health is clearly at risk amidst the spread of the novel coronavirus (COVID-19). Since the first U.S. confirmed case in January 2020, the COVID-19 pandemic is and will continue to create both individual and systemic challenges requiring significant mental health intervention. Clinicians and practitioners will need insights into how individuals respond to fear, anxiety, and stress in a way that informs what they should be preparing for in the weeks, months, and years ahead. General population-based research, primarily out of China and Europe, first established a baseline of point prevalence for mental health symptoms, as well as a catalog of social and psychological factors associated with a wide range of mental health consequences (i.e. depression, anxiety, posttraumatic stress, panic disorder, etc.) (De Girolamo, Cerveri, & Clerici, 2020; Huang & Zhao, 2020; Extebarria, Santamaria, Picaza-Gorrochategui, & NahiaIdoiaga-Mondragon, 2020; Mazza et al., 2020; Mertens et al., 2020; Pollara Strategic Insights, 2020; Qui et al., 2020; Wang, Pan, Wan, & Tan, 2020; Wang, Di, Ye, & Wenbin, 2020; Zhang, Lu, & Zeng, 2020).

More recently, studies using data from Canadian and American non-clinical samples of adults identify significant pandemic-related stressors that are interconnected and identified as the domains of COVID Stress Syndrome (Taylor et al., 2020a, 2020b). As such, this developing work provides a pathway for additional studies attempting to understand the complicated nexus of fear, worry, and mental health consequences in the middle of the COVID-19 pandemic. Broadly, this work highlights the burgeoning concern among mental health researchers that large numbers of persons, both pre and/or post-COVID, are at significant risk for mental health complications (Asmundson et al., 2020; Fitzpatrick et al., 2020; Lee, 2020; Mertens et al., 2020). As such, it is the intent of the current paper to further contribute to the growing number of studies examining Americans' fear and worry surrounding the COVID-19 pandemic. Specifically, we examine the distribution of fear, worry, and perceived threat across geographic space, between different social

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groups, and their relationships to mental health outcomes (anxiety and depressive symptomatology).

Fear is deeply rooted in the history of the U.S. (Bader, Baker, Edward Day, & Gordon, 2020; Brader, 2005; Wojick, 1997); however, most Americans would likely not have been able to articulate the specifics of their fear of a pandemic or epidemic until now. The COVID-19 pandemic has forced a reevaluation of social and behavioral responses. For instance, hoarding and panic buying have created divisiveness and put an unnecessary strain on the supply chain of food and household goods in America. Like many of the maladaptive behaviors that people engage in during crises, this type of overreaction may be compounding levels of anxiety and fear (e.g. Asmundson, 2020; Mertens et al., 2020).

As such, it is not surprising that data from a sampling of opinion polls around the world during the early months of the pandemic revealed significant levels of COVID-19 worry and fear. One Canadian poll reported over one-third of adults interviewed (n = 1,354), were worried about the coronavirus (Angus Reid Institute, 2020), while a general population survey in China (n = 1,210) found nearly 30 percent of those interviewed reported moderate to severe anxiety symptoms (Wang, Pan et al., 2020, Wang, Di et al., 2020). Early polls in the United States revealed elevated worry and concern before a pandemic was even declared, including a poll by NPR in early February 2020 (n = 808) that found nearly two-thirds of respondents saw COVID-19 as a real threat and a majority of respondents (56 percent) said they were concerned about the coronavirus spreading in the United States (National Public Radio, 2020). Similar findings emerged from an early April Gallup poll with nearly 60 percent of U.S. respondents (n = 2,448) expressing worry about the coronavirus, including greater worry about the illness than any subsequent financial hardship as a result of the spreading virus (Gallup Opinion Poll [March], 2020). Indeed, over the course of just one month (early March to early April), the percentage of respondents saying they felt threatened by the virus more than doubled from 34 percent to 71 percent (USA TODAY, 2020). Finally, a multi-country survey (n = 10,000) revealed approximately 40 percent of U.S. respondents reporting they were worried about the increasing risk posed by the virus to both themselves and their families (Ipsos, 2020a).

With early indicators of concern, worry, and fear among U.S. residents, greater attention is needed on the specific implications of COVID-19 fear on mental health outcomes. Asmundson and Taylor (2020), in a recent editorial on COVID-19, underscored the importance of identifying particular individual factors to help better understand vulnerability to poor mental health outcomes, as well as susceptibility to uncertainty, elevated fear and stress, and maladaptation to the unknown. They go on to outline, "*a call to action for psychosocial researchers and practitioners*" encouraging researchers to forge full steam ahead toward understanding what will likely be historic levels of psychosocial fallout related to the COVID-19 public health crisis. It is precisely this call to action to which we are responding.

1.1. How fearful are we?

While often a response to a very specific stimulus, fear can also be a reaction to a feeling, a sense of something being wrong that creates a general malaise that is hard to pinpoint or even quantify. For example, where fear of heights is generally a discrete reaction to a very measurable circumstance/outcome, fear of terrorism, bio-ecological disaster, public health disaster, or a natural disaster may be more nebulous and difficult to clinically manage. Implicit in these latter fears, including the current COVID-19 pandemic, is the idea that individual reactions are triggered by the perception of some direct threat. Yet, individuals vary greatly in information, knowledge, and perceived susceptibility relative to any type of threat (Pakpour & Griffiths, 2020).

Therefore, despite the particular fear being assessed, it is important to examine variability across different groups in terms of vulnerability, sensitivity, and reaction to fear. In order to design effective education and prevention programming and treatment, we need to know which groups to target, where to target them, for how long, and with which specific programs or interventions (Pakpour & Griffiths, 2020). Unfortunately, all of these decisions are complicated by that fact that we know very little about certain specific fears, including fear of COVID-19. The dearth of research underscores the need to learn more about the extent to which individuals fear the virus, why they do so, and the multiphasic consequences for both individual and community mental health reactions (Asmundson & Taylor, 2020; Manderson & Levine, 2020; Mertens et al., 2020). Doing so can help circumvent the potentially devastating outcomes of uncoordinated reactions and exaggerated responses at the individual- and system-levels. This necessitates examining fear in detail across subgroups and places.

In the comprehensive work on the psychology of pandemics, Taylor (2019) provides important background for the ongoing work related to the current COVID-19 pandemic. This work provides a detailed assessment and review of previous pandemics that have impacted the underlying social and psychological fabric of social systems. A wide number of social and psychological factors are inextricably linked to the mental and physical health fallout experienced during these public health crises (Taylor, 2019). As Taylor and others (e.g. Asmundson et al., 2020; Mertens et al., 2020; Taylor et al., 2020a) have documented, the role of fear, its variability and consequences in the context of a pandemic, establishes a line of inquiry providing the foundation upon which the current study builds.

1.2. Research questions

Prior research focusing on fear and risk as it relates to epidemics and pandemics provides a roadmap for examining the current COVID-19 crisis in the context of fear, worry, threat, and their mental health consequences (Cowan, 2020; Mertens et al., 2020; Qui et al., 2020; Sibley, Greaves, Satherley, & Wilson, 2020; Sonderskov, Dinesen, Santini, & Ostergaard, 2020; Taylor, 2019; Taylor et al., 2020a; Wang, Pan et al., 2020, Wang, Di et al., 2020; Zhang et al., 2020). Specifically, we explore three interrelated questions: 1) How is fear, threat, and worry about COVID-19 distributed across space—are these subjective perceptions distributed equally across regions and if not, are there specific social, economic, and cultural factors that might help explain that unequal distribution?; 2) How is fear, threat, and worry about COVID-19 distributed across social groups? Are their significant differences in these perceptions and are they mostly determined by social vulnerability (i.e. low-income, unmarried, racial/ethnic minorities, etc.)?; and 3) Does fear, threat and worry about COVID-19 directly impact specific mental health outcomes (i.e. depressive symptoms and generalized anxiety) even after controlling for specific vulnerabilities?

The analysis that follows is largely exploratory. As such, we look to add to the growing prevalence data on COVID-19 fear, worry, and threat as it relationship to mental health consequences for American respondents living in the midst of a pandemic. Additionally, we are interested in positioning our results from our sample of U.S. adults, with some of the other European and Canadian samples and their results reporting fear and mental health consequences (e.g. Asmundson et al., 2020; Mertens et al., 2020; Taylor et al., 2020a).

2. Data and methods

A weighted sample of 10,368 adults (ages 18 and over) provides the data for the current analysis. An online survey was released on March 23, 2020 through Qualtrics Inc. to a national panel of U.S. residents who participated in the IRB approved survey. After acquiring consent, respondents were asked a series of questions ranging from subjective assessments of their general fear, worry, and anxiety related to COVID-19 to social and behavioral health changes, and physical/mental health assessments. The final sample of 10,368 was post-stratification weighted across gender, age, race, income, and geography (state) to ensure the equitable contribution to our estimates of respondents across their

individual demographic and geographic strata relative to their representation in the overall population of the United States. This 20-minute questionnaire required respondents to answer every question with no missing data.

2.1. Measurement

In order to address the first question regarding spatial variation in COVID-19 fear, threat, and worry, we examine the distribution of responses across the United States disaggregated by the regions in which respondents live. To address our second question, we explore how specific individual-level characteristics are related to fear, worry, and threat related to COVID-19. Specifically, we examine subgroup distributions and the statistical significance of any observed differences by gender, race/ethnicity, work status, marital status, nativity, and family status. Finally, third, we explore how subjective assessments of fear, worry, and threat about COVID-19 correlate with specific mental health outcomes, including depressive symptoms and generalized anxiety. We are particularly interested in examining differences in the intersection of social vulnerability, measures of COVID-19 fear, threat, and worry, and the two mental health outcomes. The analysis and measurements of key items are presented across each of the three research questions/areas.

2.2. Spatial variation of fear

The data used to examine spatial variation in fear, threat, and worry includes individual-level responses for each individual (n = 10,368) nested into their residential region (n = 4). Each person provided geographic identifiers (latitude/longitude and zip code) during data collection (U.S. Bureau of Census, 2020). Those geographic identifiers are then used to identify the county, state, and Census region within which each respondent resides, allowing us to address whether measures of fear, worry and threat of COVID-19 vary across the four primary Census regions of the country: Northeast, South, Midwest, and West (U.S. Bureau of Census, 2020).

Throughout the analyses that follow, we employ a group of subjective assessments regarding fear, worry, and threat of the COVID-19 pandemic. The first is an assessment of subjective fear of COVID-19. While there are a number of strategies used to assess generalized fear and anxiety in individuals, (Kogan & Edelstein, 2004; Tzeng & Yin, 2008) some strategies utilize single items to measure fear that could be a useful screening tool to further examine what is at the root of the fear and its manifestations. In the current study, we ask respondents to numerically rank on a sliding scale of 0−10 "How would you currently rate your fear of COVID-19 where 0 = not at all fearful to 10 = very fearful? More comprehensive measures of fear and anxiety specifically related to COVID-19 (Taylor et al., 2020a, 2020b), are available for use but were not available to us at the time the survey was launched.

Second, we examine respondents' *subjective worry* about COVID-19 relative to contracting the virus. We asked the following question: "How worried are you that you or your family will contract coronavirus/COVID-19?" and their responses were scored on a 5-item Likert scale ranging from 1 = not at all worried, to 5 = very worried. Our third and final measure relates to each respondent's personal assessment of the *subjective threat* of COVID-19. Individuals were asked: "How threatened do you/family feel with regards to coronavirus/COVID-19?" Responses were scored on a five-item Likert scale ranging from 1 = very low threat, to 5 = very high threat. Single-item responses like the ones we use here for the current analysis are similar to those used in some earlier U.S. polling examining a variety of issues related to COVID-19 and, specifically, assessing level of concern among American residents regarding coronavirus (AP-NORC Survey, 2020; American Perspectives Survey, 2020; Gallup Opinion Poll [April], 2020).

2.3. Social vulnerability and variation in fear

The most socially vulnerable often are the most impacted by natural and public health disasters (Fitzpatrick & Spialek, 2020; Klinenberg, 2002; Masozera, Bailey, & Kerchner, 2007; Ueland & Warf, 2006). In order to test hypotheses related to vulnerability, we examine fear, worry, and threat about COVID-19 measures and their differences across socially vulnerable subgroups. Those specific subgroups include: *gender* (female = 1); a series of race dummies including (*Blacks* = 1; *Asians* = 1; *Native Americans* = 1; *other races* = 1); *Hispanic status* (Hispanic = 1); *marital status* (unmarried = 1); *work status* (unemployed/laid off = 1); *nativity* (foreign born = 1); and *families with children* (1 = children present).

2.4. Fear, social vulnerability, and mental health consequences

The key mental health outcomes for the current study are two scales assessing depressive and generalized anxiety symptoms. *Depressive symptoms* is measured with a shortened version of the 20-item Center for Epidemiological Studies for Depression (CES-D) Scale (Radloff, 1977) and has been used extensively to measure depressive symptoms (Fitzpatrick, 2017; Fitzpatrick et al., 2020; Willis & Fitzpatrick, 2018). For our purposes, eleven items from the CES-D scale were used to assess a subset of symptomatologies in our sample. The weighted scale was reliable $\alpha = 0.94$. Survivors are asked how often over the past couple weeks they felt sad, lonely, worrisome, or had trouble sleeping, getting up in the morning, etc. Possible responses range from 0 (Less than one day) to 3 (five to seven days) for each item. The shortened CES-D scale used here is weighted by 1.8 (the number of items in the original measure divided by the number of items in our shortened measure) in order for us to be able to make comparisons with other studies in disaster/-public health crises, as well as the general population using the full 20-item questionnaire.

Anxiety symptoms is measured using the GAD-7 item scale that assesses the frequency of symptoms over the previous two weeks from the time the instrument is administered in early March 2020 (Lowe et al., 2008; Spitzer, Kroenke, Williams, & Lowe, 2006). The responses are scored on a 4-point Likert scale ranging from 0 = never to 3 = nearly every day. Total score when summed ranges from zero to 21 with an overall scale reliability of $\alpha = 0.94$.

3. Results

Table 1 presents the descriptives (percentages, means and standard deviations) for all the variables used in the current analysis. The average response to the questions of how much fear, worry, or threat individuals perceive of the coronavirus/COVID-19 is surprising. Respondents report an overall fear level of 7 out of 10, while the average level of worry is also high (at 3.4 out of a possible 5), though threat scores are lower (3.1 out of a maximum 5).

As a snapshot of America, it is important to describe this representative sample of U.S. adults. The largest concentration of respondents in our national sample comes from the South Census region, which includes states as far north as Delaware, as far west as Oklahoma and Texas, and down into Florida. The sample is nearly an equal split in terms of gender, and contained about 77 percent of respondents who are white, 18 percent Hispanic, and 10 percent foreign-born. These gender and racial/ethnic characteristics closely mirror the national portrait of diversity given our post-strata weighting. In addition, families with children comprise about 25 percent of our sample, with approximately 55 reporting being unmarried (never married, separated, divorced, widowed), and nearly 20 percent indicating they are unemployed, furloughed, or laid off during the last week of March 2020.

Focusing specifically on our mental health outcomes, symptomatology suggests elevated levels of depression. The average respondent scores nearly one point higher than the often-cited clinical caseness cut-

Table 1
Descriptive Statistics for Model Variables (n = 10,368).

	%	Mean	S.D.
Fear, Worry and Threat Measures			
Subjective Fear (0–10)	–	6.6	2.8
Worry (1–5)	–	3.4	1.2
Threat (1–5)	–	3.1	1.1
Region Measures			
Region (U.S. 4 Regions)			
Northeast	16.9 %	–	–
South	38.4 %	–	–
Midwest	20.7 %	–	–
West	24.5 %	–	–
Social Vulnerability Measures			
Gender (Female)	51.0 %	–	–
Race		–	–
(Black)	12.4 %	–	–
(Asian)	5.5 %	–	–
(Native American)	1.0 %	–	–
(Other Races)	2.5 %	–	–
Hispanic Status (Yes)	18.2 %	–	–
Nativity (Foreign Born)	10.6 %	–	–
Families w/Children (Yes)	25.0 %	–	–
Marital Status (Unmarried)	54.7 %	–	–
Work Status (Not Working)	19.6 %	–	–
Mental Health Measures			
CES-D Symptomatology (0–60)	–	16.7	15.6
Generalized Anxiety (0–21)	–	6.1	6.4

off score (16) for the CES-D. Additionally, the distribution of CES-D scores (not shown here) indicates more than 25 percent of the population scoring higher than 25, which in most cases would meet the criteria for a clinical diagnosis of depression. On the other hand, anxiety scores are not as elevated. The mean score of 6.1 is considered to be in the mild category, though more than 12 percent of respondents scored 15 or above, which is categorized as severe and, in many cases, would warrant active treatment.

Table 2 presents a series of bivariate relationships between measures of fear, worry, and threat by region of the country, social vulnerabilities, and the mental health outcomes. An initial test for regional variation utilized one-way ANOVA results and in all three cases there are significant regional differences in the average fear among respondents from across the different regions. For the subjective assessment of fear, there are significant differences observed between respondents living in the Northeast region as compared to the other three regions ($p < .001$). For the worry variable, differences re observed between respondents living in the Northeast versus Midwest, and Northeast versus South ($p < .01$). Finally, there are significant differences in the threat variable observed between those living in the Northeast versus Midwest and the Northeast versus West ($p < .01$). Overall, this regional pattern suggests that fear, worry, and perceived threat are highest in the Northeast, followed by the other three regions all expressing similar levels to each other. This distribution likely reflects the timing of the survey (between March 23 and 30th, 2020), when the Northeast region experienced some of the fastest increases in confirmed COVID-19 cases in the nation.

The next set of bivariate relationships consists of a series of difference-in-means test between the social vulnerability groups for each of the three COVID-19 variables (fear, worry, and threat). The pattern across the three variables is similar, yet with some important differences. Females report higher levels of fear and worry compared to males, but no significant difference between females and males in terms of threat. There is only one difference between blacks and non-blacks ($p < .002$), which was for the worry variable. Meanwhile, Asians report being more fearful and worried than their non-Asian counterparts ($p < .001$). There is no significant difference in the perception of threat of COVID-19 between Asians and non-Asians. Interestingly, for both Native

Table 2
Subjective COVID-19 Fear, Worry, and Threat Bivariate Measures with Region, Social Vulnerabilities, and Mental Health Measures (n = 10,368).

	Mean Fear	p[a]	Mean Worry	p[a]	Mean Threat	p[a]
Region Measures						
Region ((U.S. 4 Regions)						
Northeast	6.9	.001[b]	3.5	.01[c]	3.2	.01[d]
South	6.5		3.3		3.1	
Midwest	6.4		3.3		3.0	
West	6.5		3.4		3.0	
Social Vulnerabilities						
Gender (1 = Female)	6.8	.001	3.4	.001	3.1	.301
(0 = Male)	6.3		3.3		3.1	
Race (1 = Black)	6.5	.250	3.3	.002	3.1	.243
(0 = Non-black)	6.6		3.4		3.1	
(1 = Asian)	7.3	.001	3.5	.001	3.1	.940
(0 = Non-Asian)	6.5		3.4		3.1	
(1 = Native American)	5.4	.001	2.9	.001	2.7	.006
(0 = Non-Native American)	6.6		3.4		3.1	
(1 = Other Races)	5.1	.001	2.8	.001	2.7	.001
(0 = Non-Other Races)	6.6		3.4		3.1	
Hispanic Status (1 = Hispanic)	6.8	.001	3.6	.001	3.2	.001
(0 = Non-Hispanic)	6.5		3.3		3.1	
Nativity (1 = Foreign Born)	7.0	.001	3.6	.001	3.1	.159
(0 = Non-Foreign Born)	6.5		3.4		3.1	
Families w/Children (1 = Yes)	6.9	.001	3.5	.001	3.2	.001
(0 = No)	6.5		3.3		3.1	
Marital Status (1 = Unmarried)	6.4	.001	3.3	.001	3.0	.001
(0 = Married)	6.8		3.5		3.2	
Work Status (1 = Not Working)	6.6	.220	3.4	.015	3.1	.567
(0 = Working)	6.6		3.3		3.1	
Mental Health Measures[e]						
CES-D Symptomatology	0.20	.001	0.25	.001	0.23	.001
Generalized Anxiety	0.31	.001	0.35	.001	0.31	.001

[a] X^2 analysis was used to test for differences between categorical variables and measures of fear, worry, and threat.
[b] Significant differences between Northeast and all other regions; no significant differences between the other regions.
[c] Significant differences between Northeast-Midwest; Northeast-South.
[d] Significant differences between Northeast-Midwest; Northeast-West.
[e] Pearson two-tailed correlations between mental health scales and measures of fear, worry and threat.

Americans and other race respondents, both are significant ($p < .001$) but in the opposite direction than the other races, with Native Americans and other races actually reporting less fear, worry, and feeling less threat than their non-Native American and non-other race respondents. Significant differences are observed between Hispanic and non-Hispanic respondents ($p < .001$) and, in all cases, Hispanics report being more fearful, worried, and felt more threatened by COVID-19 than their non-Hispanic counterparts. Likewise, foreign-born respondents are more fearful and worried ($p < .001$) than their native-born counterparts; no significant difference is observed for the threat variable.

Moving beyond race, ethnicity, and nativity, there are significant differences between respondents who have children present versus those that do not have children ($p < .001$) in the case of fear, worry, and threat. In all cases, married persons exhibit statistically significant differences across all three variables compared to unmarried persons ($p < .001$), as well. There is only one significant difference across any of the subjective assessments as it related to work status with those not working reporting higher levels of worry about the virus ($p < .05$).

The last set of relationships between the fear, worry, and threat variables are with the two mental health outcomes being considered—depressive and anxiety symptoms. In all cases, there are significant positive relationships between the subjective assessments and mental health measures ($p < .001$). Respondents reporting more fear, worry, and who see COVID-19 as a threat to themselves or family's health are more likely to report depressive and anxiety symptoms than their counterparts.

Table 3 extends the bivariate analysis and examines whether subjective assessments of fear, worry or threat, could partially explain the mental health outcomes after controlling for social vulnerabilities. There are two models presented for each of the mental health outcomes. The first model for both outcomes includes only the social vulnerability variables. The second model controls for vulnerabilities while also introducing the subjective assessments of fear, worry, and threat.

Females consistently report more depressive and anxiety symptoms than males ($p < .01$), net of other covariates. There are also some racial differences, but they are not particularly consistent. For example, respondents in the other races category report lower depressive and anxiety symptoms than whites; the only other racial difference is for black respondents who report less anxiety than whites, as well ($p < .05$). Hispanic respondents consistently report more depressive and anxiety symptoms than whites ($p < .01$). As far as the social vulnerability variables, even after fear, worry, and threat variables are added into the model, families with children, unmarried, and unemployed persons all report more depressive and anxiety symptoms than those persons without children, married, or employed. Finally, as predicted, all of the subjective assessment variables (fear, worry, and threat) are positive and statistically significant in both the depression and anxiety models ($p < .01$).

4. Discussion

As originally hypothesized, fear worry, and threat are not equitably distributed across the country. In the case of all the measures used to assess subjective distress (fear, worry, and threat) as it relates to COVID-19, we discovered important regional distinctions. The highest concentrations of fear and worry were mostly confined to the Northeast. This region of the country, as we know, included (at the time) the largest concentration of confirmed cases and unquestionably the largest number of deaths related to COVID-19. By the end of the survey period, March 30th, according to the John Hopkins University dashboard, New York City itself had 37,453 of the 155,097 (24.15 percent) confirmed cases that could be directly coded to specific counties in the United States (Dong, Du, & Gardner, 2020). As we originally suspected, proximity to specific geographic disease hotspots may be influencing how individuals experience and report specific feelings related to fear and anxiety. For example, we found that the Northeast was consistently highest in subjective perceived threat scores and, while not always statistically significant, there were particularly noticeable differences between the Northeast and the Midwest, the latter of which has seen a smaller number of COVID-19 cases reported (particularly at the time of our survey). In some cases, there were important differences between the Northeast and respondents living in both the South and West regions, despite large population centers in places like Florida, Texas and California.

Like region, the personal assessments of fear, worry, and threat were not evenly distributed across categories of the socially vulnerable. Women appeared to be particularly sensitive to fear, worry, and threat compared to men. While there were some differences across racial categories, they did not follow what might typically be expected. Surprisingly, black respondents did not report higher levels of fear, worry, or threat compared to their non-black counterparts. Despite the fact that many communities of color have been hit particularly hard by the coronavirus, these subjective assessments were not statistically different, and in some cases, were actually reporting lower levels of fear and worry. Similar results were found in earlier work assessing differences in fear and mental health consequences of adults during the COVID-19 pandemic (e.g. Asmundson et al., 2020; Ipsos, 2020b; Mertens et al., 2020).

Table 3
Depressive and Anxiety Symptomatology Multiple Regressions (n = 10,368).

Model Variables	Depression Model 1 b (B)	Depression Model 2 b (B)	Anxiety Model 1 b (B)	Anxiety Model 2 b (B)
Social Vulnerabilities				
Gender (1 = Female)	1.3 (.04)***	.94 (.03)*****	.87 (.07)*****	.63 (.05)**
Race (1 = Black)	−.63 (−.01)	−.65 (−.01)	−.45 (−.02)*	−.47 (−.02)*
Race (1 = Asian)	−.16 (−.01)	−.54 (−.01)	−.08 (−.01)	−.38 (−.01)
Race (1 = Native American)	1.7 (.01)	3.2 (.01)	−.03 (−.00)	.87 (.01)
Race (1 = Other Races)	−3.7 (−.04)**	−1.8 (-.02)	−2.0 (−.05)**	−.82 (−.02)*
Hispanic Status (1 = Hispanic)	3.6 (.09)*****	3.0 (.07)**	1.2 (.07)**	.87 (.05)**
Nativity (1 = Foreign Born)	−.37 (-.01)	−.64 (-.01)	−.39 (.01)**	−.12 (−.01)
Families w/Children (1 = Yes)	4.6 (.15)**	4.6 (.13)**	2.1 (.15)**	1.9 (.13)**
Marital Status (1 = Unmarried)	5.0 (.14)**	5.1 (.16)**	1.0 (.08)**	1.3 (.10)**
Work Status (1 = Unemployed)	4.3 (.11)**	4.1 (.10)**	2.1 (.13)**	2.0 (.12)**
Fear, Worry and Threat Measures				
Subjective Fear		.19 (.03)*		.28 (.12)**
Subjective Worry		2.0 (.15)**		.96 (.17)**
Subjective Threat		1.5 (.11)**		.67 (.12)**
		–	–	dffddd..ppp27,2
Constant	11.24	−1.24	4.06	−2.95
Adjusted R^2	0.07***	0.14***	0.07***	0.19***

One-tailed t-tests p<.05*, p < .01**; R^2 Change p<.001***.

Other measures that tap into the social vulnerability of the sampled population (Hispanic origin, foreign-born, families with children), confirmed what we expected earlier that more socially vulnerable report higher sensitivity to subjective assessments of fear, worry, and threat. In the majority of cases, higher subjective scores reflected a deeper concern that transcends the virus and most likely is a reflection of the deep divide in this country across racial/ethnic and family lines. During the current social and political climate in this country, it is no surprise that these individuals feel more threatened and concerned about their health and safety related to COVID-19. Certainly, many of these racial and ethnic groups are the population subgroups that have been discriminated against most prominently over the last several years in the U.S.

The multivariate results confirmed much of what we anticipated earlier: that subjective assessments of fear, threat, and worry would be associated with mental health outcomes, specifically depressive and anxiety symptomatology. Fear can certainly manifest itself into feelings of anxiousness, loneliness, uncertainty, and even panic. We provided evidence of these relationships with representative sample data of U.S. adults experiencing life amidst the beginning of COVID-19 pandemic. Even after introducing the social vulnerability measures, fear, worry, and threat were significant predictors of both depressive and anxiety symptomatology. For both mental health outcomes, these subjective measures of respondent's feelings about COVID-19 more than doubled the explanatory power of the model. This finding adds an important dimension to our understanding of mental health and how it is being impacted by the current public health crisis. Not surprisingly, much of the empirical work related to past epidemics and pandemics, and even more recently the early COVID-19 outbreaks in China, Europe, and Canada, confirm our findings. In doing so, they also underscore the importance of readiness and preparedness in the case of health crises like the current one – as well as those that we will likely face in the future (Asmundson et al., 2020; Ipsos, 2020b; Liu, Kakade, Fuller, & Fan, 2012; Mak, Chu, Pan, M.G., & Chan, 2009; McCloskey & Heymann, 2020; Mertens et al., 2020; Qui et al., 2020; Taylor et al., 2020a, 2020b; Tzeng & Yin, 2008; Wang, Pan et al., 2020, Wang, Di et al., 2020; Zhang et al., 2020). Many of these studies find what others (e.g., Taylor, 2019) have highlighted as emergent factors in the understanding of social and psychological aspects of pandemics – that certain groups are at higher risk for negative mental health outcomes than others.

4.1. Study limitations

While our findings are important to a growing literature explicating the relationships between subjective distress, social vulnerability, and mental health outcomes among persons living in the United States during the COVID-19 pandemic, we note several important limitations to consider in the context of interpreting and generalizing this work. First, ours is a cross-sectional study that prevents us from causal modeling using longitudinal data to sort out how change in fear is translated into mental health symptomatology over time. It is important to note that our data were collected during an early phase on the pandemic in the United States. Nearly three months of exposure to risk, media conversations, social media hype, fear and worry means something different today than March of 2020, particularly as deaths in the U.S. continue to increase and now exceed 150,000. Likewise, we would anticipate that as the curve begins to flatten, businesses open, and pandemic restrictions eased, fear, worry, and threat would gradually decline.

Additionally, there are alternative approaches that could be used to measure fear, worry, and threat. We realize our measures may lack breadth and/or depth; however, to get into the field as quickly as possible during the early stages of the U.S. COVID-19 pandemic meant that we had to make some sacrifices regarding the inclusion of specific variables and or indices/scales (there were under 50,000 confirmed cases in the United States when the survey was released). While the scales used here have been externally validated and shown to be reliable, there are still questions that arise around utility and additional strategies for measurement. Finally, we recognize that online surveys are biased in their selection and likely systematically eliminate respondents with limited access to smart technology hardware and/or Internet connectivity. Thus, our data are probably over-representing computer users living in urban areas, and underrepresenting low-income, rural residents.

4.2. Conclusions

Despite these and other limitations, we believe that our findings are important for several reasons. Capturing a period a little more than two months into the pandemic, individuals reported elevated symptomatology in response to the coronavirus/COVID-19 outbreak. Feelings of fear and worry were evident, with some specific population subgroups expressing more fear, anxiety and depressive symptomatology. As the COVID-19 pandemic continued, fear and worry about what can happen to individuals, their families, businesses, places of worship, and entire communities has continued to have a compromising effect on the mental health of Americans. Understanding the circumstances of these feelings, and how they manifest themselves differently across spatial and social boundaries will be important for developing psychologically-strategic intervention and support for care moving forward in the weeks and months ahead. Additionally, these findings have both important clinical and policy implications. Identifying who is at risk and how best to serve them is a critical step in developing strategic plans to address the immediate, as well as the future, risks of public health crises like the COVID-19 pandemic.

Disclosures

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