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The Effects of Past Hurricane Events on Mental Health During the COVID-19 Pandemic

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The Effects of Past Hurricane Events on Mental Health During the COVID-19 Pandemic

A Senior Honors Thesis

Presented to

the Department of Psychology
of the University of New Orleans

In Partial Fulfillment

of the Requirements for the Degree of
Bachelor of Science, with University Honors
and Honors in Psychology

by

Martin Tallent

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Abstract

Research has shown that both post-traumatic stress symptoms (PTSS) and depressive symptoms occur at high rates after traumatic events. Traumatic events can include a localized natural disaster, for instance, a hurricane, or a more global event, such as a pandemic, where stressors experienced during the events may trigger either of the symptomologies. This study focused on the association between hurricanes and current mental health during the COVID-19 pandemic. Specifically, I hypothesized that PTSS related to past hurricane exposure would be positively associated with depressive symptoms during the COVID-19 pandemic when controlling for known covariates of depressive symptoms. These covariates include income loss, age, minority status, and sex. Data were collected at the University of New Orleans through online self-report surveys between April and May of 2020. Participants were primarily Gulf Coast residents, over the age of 18 ($M = 35.6$, $SD = 4.5$), mostly male (68.1%), and with at least one minor child, who self-reported retrospective and current psychopathology symptoms. Regression analyses showed that both hurricane-related PTSS and sex were associated with higher depression symptom scores at the beginning of COVID-19. Income loss during COVID-19, minority status, and age were not significantly associated with either PTSS from a past hurricane or depressive symptoms during the COVID-19 pandemic. The results suggest that men may face more risk for future depressive symptoms during the COVID-19 pandemic after suffering from PTSS due to a past hurricane. These findings could be the result of a shared vulnerability or stress sensitization due to past psychopathology and/or differences in risk for particular traumatic events between men and women.

Keywords: post-traumatic stress symptoms, post-traumatic stress disorder, depressive symptoms, depression, natural disasters, hurricanes, COVID-19 pandemic

Introduction

The COVID-19 pandemic has had extensive consequences since the first cases were reported in December of 2019. The outbreak led countries to institute varying levels of quarantine, which have impacted the daily routines of many globally. Although COVID-19 is of international concern, the pandemic also shares some features (Bridgland et al., 2021; Ćosić et al., 2020; Liu et al., 2020; Raker et al., 2020) with smaller, more regionally focused natural disasters like hurricanes (Galea et al., 2008; Garfin & Silver, 2016; Nillni et al., 2013; Raker et al., 2019; Tang et al., 2014; Tracy et al., 2011) which can include financial loss, an inability to access resources (i.e. medical care), disruption of daily routines, low social support, and isolation. These similar features have been correlated with higher levels of negative mental health outcomes, such as post-traumatic stress symptoms (PTSS) and/or depressive symptoms after hurricanes and during the COVID-19 pandemic (Bridgland et al., 2021; Ćosić et al., 2020; Galea et al., 2008; Garfin & Silver, 2016; Liu et al., 2020; Nillni, 2013; Radell et al., 2020; Tang, et al., 2014; Tracy et al., 2011). Trauma and symptomologies stemming from a past hurricane may prove to impact how survivors react to reexperiencing these features during the current COVID-19 pandemic.

The stress brought on by a traumatic disaster can result in a plethora of negative mental health outcomes, including PTSS and/or depressive symptoms (Galea et al., 2008; Garfin & Silver, 2016; Gruebner et al., 2016; Jin et al., 2018; Nillni et al., 2013; Raker et al., 2019; Sharma et al., 2021, Tang et al., 2014; Tracy et al., 2011). If left untreated, such symptoms could develop into post-traumatic stress disorder (PTSD) or major depressive disorder (MDD), respectively. Post-traumatic stress is the result of exposure to one or

more traumatic events (APA, 2013; Garfin & Silver, 2016). Symptoms include reexperiencing the event, avoidance, hyperarousal, and negative cognitions and emotions. A diagnosis of PTSD is given if these symptoms persist for more than 30 days (APA, 2013; Sparks, 2018). Depressive symptoms are characterized by sadness and/or lack of interest in activities (APA, 2013). They can manifest as depressed mood, sleep disturbances, and/or diminished cognitive abilities. A diagnosis of major depressive disorder (MDD) may be warranted if symptoms last more than two weeks.

PTSS and depressive symptoms could be the result of common stressors associated with both natural disasters and the COVID-19 pandemic. The stressor I looked at in this study is financial loss (Galea et al., 2008; Liang et al., 2015; Lowe et al., 2013; Nillni et al., 2013; Tracy et al., 2011). Studies vary as to the effects financial loss has on mental health following a natural disaster. Some have shown that economic instability due to a natural disaster can lead to either PTSD, MDD, or comorbidity between the two psychopathologies (Galea et al., 2008; Nillni et al., 2013; Tracy et al., 2011). Liang et al. (2015) found that after Hurricane Katrina, financial loss and depressive symptoms were significantly correlated. Researchers suggested that financial loss is a good gauge for mental health after a natural disaster as people look at money as a protective factor, thus the loss or lack of it may add more risk for instability possibly leading to more depressive symptoms. Another study on survivors of Hurricane Ike suggested that financial loss likely contributed to more PTSS and depressive symptoms, adding that this could influence the long-term experience of both symptomologies (Lowe et al., 2013). Financial loss may especially impact many residing in the Gulf Coast area during the current pandemic. For example, by the end of the first half of 2020 alone, Louisiana

residents lost twice as many jobs as were lost during the entirety of Hurricane Katrina (Daigle, 2020).

Demographics may also play a role in who is at greater risk for PTSS or depressive symptoms after a natural disaster. Many studies have observed higher symptomologies of either disorder in female rather than male survivors after a natural disaster (Galea et al., 2008; Garfin & Silver, 2016; Jin et al., 2018; Tang et al., 2014). The impact of a natural disaster has also been shown to impact survivors differently depending on their race or ethnicity (Gruebner et al., 2016; Lê et al., 2013; Raker et al., 2019). Multiple studies covering the effects of trauma from a hurricane found that non-Hispanic white participants faced the least risk for PTSS or depressive symptoms compared to all other races and ethnicities (Gruebner et al., 2016; Lê et al., 2013; Raker et al., 2019). One other demographic factor that may affect survivors' mental health after a natural disaster is their age (Garfin & Silver, 2016; Gruebner et al., 2016; Lê et al., 2013). Studies vary as to what age brackets are at the most risk of PTSS or depressive symptoms. Some have posited that middle-aged adults face more daily stress which may put them at higher risk relative to younger or older persons (Garfin & Silver, 2016). Other studies have observed that either younger or older participants reported higher symptomologies than other age groups (Gruebner et al., 2016; Lê et al., 2013).

While most survivors of natural disasters recover from their negative mental health outcomes in a relatively short amount of time, some are still affected many years later (Galea et al., 2008; Garfin & Silver, 2016; Jin et al., 2018; Nillni et al., 2013; Raker et al., 2019, Sharma et al., 2021). This persistence of symptoms was observed in a longitudinal study on adult survivors of Hurricane Katrina (Raker et al., 2019). Not only

did PTSS initially affect 43.8% of participants but 16.7% still showed symptoms twelve years later. In another study on survivors of an earthquake 4 years after the event, Sharma et al., (2021) found that 43.2% of their sample reported depressive symptoms while 19.2% reported PTSS. Some researchers have suggested that events that occur after a natural disaster, rather than the disaster itself, may have an impact on how long symptoms last (Nillni et al., 2013). Stress sensitization may play a role in this, as continued or repeated trauma exposures can increase one's sensitivity to future traumas (Stroud, Davila, et al., 2011; Stroud, 2018).

Given traumatic events' effect on PTSS and depressive symptoms, it is perhaps not surprising that some who experience trauma will eventually suffer from comorbid PTSS and depressive symptoms or comorbid PTSD and MDD (Jin et al., 2018; Nillni et al., 2013; O'Donnell et al., 2004; Radell et al., 2020). Some studies on natural disasters, such as earthquakes and hurricanes, have found small portions of their samples may suffer from such comorbidity (Jin et al., 2018, Nillni et al., 2013). In one study, it was shown that negative life events played a critical role in PTSS and depressive symptom comorbidity. The study found that those exhibiting more severe PTSS after an earthquake experienced more negative life events following the natural disaster while also reporting more depressive symptoms than others 3 years later (Jin et al., 2018). Researchers have noted that MDD is one of the most common psychopathologies that is found to be comorbid with PTSD after a natural disaster (Nillni et al., 2013; O'Donnell et al., 2004). This may be due to a shared vulnerability in which comorbid PTSD and depression develop in response to the same stress, thus leading to overlapping symptoms between the two disorders (O'Donnell et al., 2004; Radell et al., 2020).

Although some studies have looked at the presence of PTSS and/or depressive symptoms after natural disasters, not many have looked at the connection between PTSS and depressive symptoms over long periods. There is also little to no information on the relationship between the two psychopathologies when considering past hurricanes and the COVID-19 pandemic. The current study aimed to explore whether PTSS related to a past natural disaster (hurricane) were correlated with depressive symptoms measured during the COVID-19 pandemic. By highlighting this possible risk, earlier detection of PTSS and depressive symptoms may stave off worse negative mental health outcomes, such as PTSD or MDD, and cut down on the length of time that one suffers after a traumatic event such as a hurricane or a global pandemic.

Hypothesis

In this study, I looked at the association between PTSS from a prior hurricane in relation to depressive symptoms during the current COVID-19 pandemic while controlling for covariates including financial loss, race, sex, and age. The study used a sample of adults who primarily resided in the Gulf Coast area of the Southeastern United States, and who experienced a past hurricane. Self-reported retrospective data and current psychopathology symptoms were used to assess past PTSS symptoms and current depressive symptoms, respectively. I hypothesize that PTSS resulting from a past hurricane exposure will be positively associated with depressive symptoms during the COVID-19 pandemic above and beyond the relationship between known covariates of depressive symptoms.

Methods

The current study used data from the Psychological Effects of Living in COVID-19 Affected NOLA study (PELICAN) collected at the University of New Orleans (UNO) between April and May of 2020. All data collection procedures were approved by the UNO Institutional Review Board (IRB). Data were gathered by online self-report surveys which were completed by participants over the age of 18, who mainly resided in the Gulf Coast area of the Southeastern US, with at least one minor child. The PELICAN study included a sample population of 1,299 respondents, but as this study only focused on participants over the age of 18 who had experienced a prior hurricane, the sample population was 491 people. Most of the participants were white, non-Hispanic (88%), and male (68.1%) with an average age of 36 [(M = 35.6, SD = 4.5) (Table 1)]. Both incomes before and after the onset of the COVID-19 pandemic and race were broken into dichotomous variables. This was done in all analyses due to a relative lack of diversity in either variable since a substantial majority of the participants reported less income than before the pandemic (83%) and identified as non-Hispanic and white (88%). Thus, there was not enough variability in the data to make a meaningful comparison between different income loss brackets or each racial identity. Income was divided between those who maintained the same income or saw an increase in income and those who saw a loss in income during the current pandemic. Race was divided into the dichotomous variables of non-minority status (white and non-Hispanic) and minority status (any person who identified as any race other than white and non-Hispanic).

Measures

Demographics: Participants reported their birth date, sex, race, and income before and after the onset of the pandemic. Participants reported on their experiences with hurricanes from 2005 until 2012, including hurricanes Katrina (2005), Rita (2005), Gustav (2008), Ike (2008), and Isaac (2012). If they indicated exposure to multiple hurricanes, participants were also asked to rate which hurricane was most impactful.

Post-Traumatic Stress Symptoms: PTSS were assessed via the expanded version of the Short Post-Traumatic Stress Disorder Rating Interview (SPRINT-E; Norris et al., 2006). The SPRINT-E is a 12-item survey that focuses on core PTSS such as intrusion, avoidance, numbing, and arousal. In the present study, only 11 items were included. The final item, which rates the risk of suicide was omitted due to the anonymous nature of data collection (as participants indicating suicidal ideation could not be contacted for follow-up assessment). Participants provided retrospective ratings of how they were feeling one year after the most impactful hurricane they had experienced while living in the Gulf Coast area. This included items like: “How down or depressed were you because of what happened?” and “Was your ability to handle other stressful events or situations harmed?” A 5-point Likert scale was employed with answer scores ranging from 0 (not at all) to 4 (very much). This study used a summed score to analyze levels of PTSS with larger scores representing more PTSS and lower scores representing fewer PTSS.

Depressive Symptoms: Depressive symptoms were assessed via the short form of the Mood and Feelings Questionnaire for adults (MFQ-A; Angold et al., 1995). This survey instructed participants to self-report how they were feeling at the time of data collection, which was about 6 weeks after quarantine procedures had begun. It includes 13 items

with statements such as: “I felt miserable or unhappy” and “I didn’t enjoy anything at all.” The survey uses a 3-point Likert scale ranging from 1 (not true) to 3 (true). Scores were summed to assess levels of depressive symptoms, with lower scores representing lower levels of depressive symptoms and higher scores indicating higher levels of depressive symptoms.

Data Analysis Plan

This study used the Statistical Package for the Social Sciences (SPSS; IBM, 2017) software to analyze the connection between PTSS and depressive symptoms. I described demographic information, PTSS prevalence from a past hurricane, and depressive symptoms during the COVID-19 pandemic using descriptive statistics. The covariates in this study were: sex (male or female), race (split into a dichotomous variable of non-minority status and minority status), income (split into a dichotomous variable of no change or more income than before COVID-19 and less income than before COVID-19), and age. Next, bivariate correlations between the covariates, PTSS, and depressive symptoms were analyzed. Finally, a multiple regression was run to assess the relationship between PTSS and depressive symptoms while accounting for the covariates.

Results

Results of bivariate correlations (Table 2) reveal that PTSS were positively associated with depressive symptoms. Sex was associated with both PTSS and depressive symptoms, such that males showed both higher PTSS and depressive symptoms. Income loss was also associated with depressive symptoms. Neither minority status nor age were related to either PTSS or depressive symptoms.

Results from multiple regression analyses (Table 3) found that both PTSS and sex (male) predicted depressive symptoms during COVID-19. PTSS were positively associated with depressive symptoms, such that more PTSS were associated with more depressive symptoms ($\beta = 0.381$, 95% CI: 0.204, 0.316, $p = 0.000$). Additionally, females reported fewer depressive symptoms than males ($\beta = -0.153$, 95% CI: -2.706, -0.684, $p = 0.001$). Financial loss only marginally predicted depressive symptoms while minority status and age were not found to predict depressive symptoms.

Discussion

This study assessed the effects of PTSS from a prior natural disaster on depressive symptoms during the COVID-19 pandemic years later. As the results showed, PTSS from past hurricane exposure were associated with higher depressive symptoms during the COVID-19 pandemic. This finding supports previous literature that observed a relationship between the two symptomologies after a natural disaster (Jin et al., 2018; Nillni et al., 2013; Sharma et al., 2021). It also highlighted one way past traumas may impact adults' moods during the COVID-19 pandemic.

This association between PTSS from a past traumatic event and depressive symptoms during a later traumatic event may be related to either stress sensitivity (Stroud, Davila, et al., 2011; Stroud, 2018) or shared vulnerability (O'Donnell et al., 2004; Radell et al., 2020). The shared vulnerability model states that comorbidity between PTSD and depression develops in response to the same stressor. This can lead to overlapping symptoms between the two disorders including negative changes in cognition and intrusive thoughts such as reexperiencing the event or ruminating about the event (Radell et al., 2020). Some researchers have noted that after 3-12 months, the line

between PTSD and depression can become less defined, thus generating comorbidity between the two disorders (O'Donnell et al., 2004). In the current study, the stressors common between hurricanes and the COVID-19 pandemic may lead some to experience symptoms common to both PTSS and depressive symptoms due to their exposure to both events.

The stress sensitization model may also explain the association between PTSS and depressive symptoms in this study. Stress sensitization theory posits that continued or repeated trauma exposures can have a compounding effect, increasing sensitivity to future traumas (Stroud, Davila, et al., 2011; Stroud, 2018). This may lower a person's capacity to handle stress over sequential events and increase the potential for developing maladaptive behavioral responses (such as those typical in depression) in the face of future stressful stimuli. Consistent with this theory, Stroud, Davila, et al. (2011) found that participants exposed to a traumatic disaster were more likely to have major depressive episodes following later stressful events of varying strength. Further support comes from a study on earthquake survivors three years after the event (Jin et al., 2018). This study found that negative life events experienced by participants after the natural disaster mediated a positive, indirect relationship between disaster-related PTSS and later depressive symptoms (Jin et al., 2018). In the current study, those who experienced PTSS from a previous hurricane may have been sensitized to stressors they experienced during this event. As participants dealt with the stress brought on by the COVID-19 pandemic years later, with some stressors possibly mirroring past hurricane-related stressors, they may have experienced a sensitizing effect to new stress leading to greater amounts of depressive symptoms.

An unexpected finding from my study was that men reported higher levels of both PTSS and depressive symptoms than women. This was surprising as many studies have found that women typically report higher rates of both PTSS and depressive symptoms after a traumatic event compared to men (Galea et al., 2008; Garfin & Silver, 2016; Jin et al., 2018; Tang et al., 2014; Radell et al., 2020). Future studies focusing on natural disasters and/or the COVID-19 pandemic, especially in the Gulf Coast area, should consider what impacts these traumatic events may have on either sex.

One other finding from the current study was that financial loss was only marginally associated with depressive symptoms during the COVID-19 pandemic. Multiple studies found a relationship between economic problems and depression after a natural disaster (Galea et al., 2008; Liang et al., 2015; Lowe et al., 2013; Nillni et al., 2013; Tang et al., 2014). With these studies in mind and the fact that 83% of participants in the current study reported income losses, it was expected that financial loss would exhibit an impact on depressive symptoms during the COVID-19 pandemic.

It is possible that since the study took place early on in the pandemic when quarantine measures were just starting to be put into place, many hadn't felt the full effect of these losses at the time. One difference between natural disasters and the COVID-19 pandemic is that natural disasters are rapid and acute while a pandemic is creeping and slow-moving (Raker et al, 2020). Therefore, survivors of natural disasters and people during the pandemic may experience the effects of these traumatic events differently due to temporal factors. Neither age nor minority status exhibited associations with depressive symptoms during the COVID-19 pandemic.

Although this study found a significant association between PTSS and depressive symptoms, there were some limitations. For one, the study used a cross-sectional sample which may not capture information about the development of psychopathology (Radell et al., 2020). Multiple studies have shown that pre-existing symptomologies before a natural disaster may influence not only the development of PTSS/PTSD but also depressive symptoms/MDD (Garfin & Silver, 2016; Nillni et al., 2013; Radell et al., 2020; Raker et al., 2019; Smid et al., 2011). Another limitation was the use of retrospective surveys on PTSS from a past hurricane. This can be problematic as some participants may be influenced by present symptoms or memories of the event, which could alter their appraisal of the event as their outlook changes over time, thus leading to an underreporting or overreporting of PTSS or depressive symptoms. (Garfin & Silver, 2016; Nillni et al., 2013; Radell et al., 2020; Smid et al., 2011).

Utilizing a longitudinal design may reduce the inflation or deflation of reported symptoms due to cross-sectional and retrospective limitations by observing the etiology of psychopathologies as they arise in the participants' lives (Smid et al., 2011). It would also be beneficial for future studies to look at the levels of exposure a person experiences during a natural disaster or a pandemic. This could include direct exposure such as seeing dead bodies or dealing with sickness or injury (Galea et al., 2008; Garfin & Silver, 2016; Liu et al., 2020; Nillni et al., 2013; Raker et al., 2019). One study during the COVID-19 pandemic also found that indirect exposure may also be as traumatic as direct exposure due to the advent of social media and constant access to news stories (Bridgland et al., 2021).

Since the completion of the present study, the COVID-19 pandemic has fluctuated in severity due to new variants including the Delta and Omicron strains (CDC, 2020). Adding to an already difficult time, the Gulf Coast area was heavily impacted by Hurricane Ida in 2021 (Plaisance, 2021). It is imperative to assess the risk of psychopathologies following multiple large-scale traumatic events to better inform clinicians on how to help those suffering from PTSS and/or depressive symptoms. Through extended knowledge of this situation, future survivors can be made aware of the dangers of untreated symptoms and be offered the resources required to fend off worse mental health outcomes, such as PTSD and/or depression.

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Appendix

Table 1

Descriptive Statistics of Study Variables: Participant reported demographic information, PTSS and depressive symptoms.

Variable	N(%)	(M)	(SD)	Range
Sex				
Male	341 (68.1)			
Female	160 (31.9)			
Race				

Non-minority status	441 (88.0)			
Minority status	60 (12.0)			
Income loss				
No change or more income than pre-COVID -19	84 (16.8)			
Income less than pre-Covid-19	416 (83.0)			
PTSS	491	12.2	5.1	[0, 26]
Depressive Symptoms	499	21.3	7.6	[0, 43]
Age	501	35.6	4.5	[22, 58]

Table 2

Bivariate Correlations Between Study Variables: Relationships between depressive symptoms, PTSS, and covariates.

Variable	1	2	3	4	5
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1. Depressive symptoms	-				
2. PTSS	0.430*	-			
3. Sex ^a	-0.288*	-0.265*	-		
4. Income loss ^b	0.175*	0.137*	-0.336*	-	
5. Minority status ^c	-0.066	-0.05	0.235*	-0.015	-
6. Age	-0.043	0.028	0.193*	-0.02	-0.092*

* $p < .05$

^aMale = 0, Female = 1

^bIncome Gain/No Income Loss = 0, Income Loss = 1

^cNon-Minority Status = 0, Minority Status = 1

Table 3

Regression Analysis: Prediction of depressive symptoms by PTSS, sex, income loss, minority status, and age.

Variable	<i>B</i>	<i>SE</i>	β	<i>p</i>	CI
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PTSS	0.260	0.028	0.381	0.000	[0.204, 0.316]
Sex ^a	-1.695	0.514	-0.153	0.001	[-2.706, -0.684]
Income Loss ^b	1.035	0.590	0.075	0.080	[-0.123, 2.194]
Minority Status ^c	-0.090	0.668	-0.006	0.893	[-1.403, 1.223]
Age	-0.026	0.048	-0.022	0.590	[-0.119, 0.068]

^aMale = 0, Female = 1

^bIncome Gain/No Income Loss = 0, Income Loss = 1

^cNon-Minority Status = 0, Minority Status = 1