Relationship Between Hurricane Exposure and Mental Health Concerns in the Gulf Coast

Introduction

The Gulf Coast region of the United States, which includes states like Texas, Louisiana, Mississippi, Alabama, and Florida, is especially vulnerable to hurricanes due to its warm ocean waters and coastal geography. These areas are routinely impacted by intense storms that bring flooding, property damage, evacuations, and loss of resources (Dodd, 2021). For people who live in these regions, repeated hurricane exposure is common, and the stress that comes with that exposure can have an impact on mental health. While the damage to buildings and infrastructure is usually easy to see, the emotional and psychological effects are not always as visible but can be just as serious. Ongoing disruptions to daily life, financial strain, and uncertainty about future storms can contribute to mental health issues that last long even after the hurricane season ends (Raker et al., 2019).

Hurricane exposure has been linked to increased levels of stress, anxiety, depression, and post-traumatic stress disorder (Goldmann & Galea, 2014). For example, after Hurricane Katrina, researchers found that the rate of serious mental illness among low-income parents in New Orleans doubled, and nearly half of those surveyed showed signs of PTSD (Rhodes et al., 2010). Similar results have been found in other parts of the Gulf. In a study of Florida residents affected by Hurricanes Irma and Michael, people who had repeated exposure to hurricane-related events reported higher levels of anxiety, post-traumatic stress symptoms, and functional impairment (Garfin et al., 2022).

It is important to consider not just how people respond to a single hurricane, but how they are affected by experiencing several hurricanes over time. Repeated exposure to disasters could

increase psychological stress and wear down people's ability to cope. Research has found that even twelve years after Hurricane Katrina, many individuals still reported symptoms of post-traumatic stress (McLaughlin et al., 2019). The most severe mental health effects were seen in people who had gone through multiple types of hardship during the disaster, such as displacement, job loss, or losing a loved one

Not everyone who experiences a hurricane will develop mental health concerns. Many individuals rely on emotional resilience, strong social support, or access to resources that help them recover. For example, support from family or religious communities play a big role in some people's ability to cope. Other might benefit from mental health services or disaster relief programs. Research by Pfefferbaum and colleagues emphasizes the importance of social capital and community-level resilience, showing how trust, connectedness, and community action can protect mental health after a disaster (Pfefferbaum et al., 2017). Studies have also found that interventions focused on improving personal resilience can reduce symptoms of depression and PTSD following hurricanes (Li et al., 2021).

Although existing studies have shown that hurricanes can negatively impact mental health, there is little research on how repeated exposure affects people over time. It is not yet clear whether experiencing more hurricanes directly leads to increased psychological distress, or if certain individuals are more likely to be affected than others. For example, lower-income residents or those without access to mental health care may be more vulnerable to long-term effects.

The goal of this study is to examine the relationship between the number of hurricanes a person has experienced and the presence of mental health concerns in people living in the Gulf Coast. We aim to understand if experiencing more hurricanes increases the likelihood of reporting

mental health symptoms such as stress, anxiety, or depression. We will also consider whether other factors, like support from family and friends or personal coping skills, might be more important in shaping mental health outcomes.

Learning more about this relationship can help improve how we prepare for and respond to hurricanes. For example, if repeated hurricane exposure is shown to contribute to mental health concerns, it would support the need for more targeted interventions and long-term mental health care in storm-prone regions. If resilience plays a stronger role, public health efforts could focus more on building that resilience before the next storm hits.

Understanding the mental health impact of repeated hurricane exposure is important for shaping better support systems in storm-prone areas. Hurricanes can affect people in many ways, not only those who are directly hit but also those who worry about loved ones or face ongoing stress during hurricane season. While some individuals and communities recover with strong social support or personal coping strategies, others may struggle without access to resources. Studying these patterns can help identify who needs support the most and what approaches are most helpful. This could include support groups, educational programs, or creative activities like art, which has been shown in some cases to reduce stress and improve emotional well-being (Havsteen-Franklin et al., 2020). Learning more about these differences can lead to more focused and effective ways to help people recover and prepare for future storms.

Methods:

Data for this study was obtained from the Gulf of Mexico Research Initiative Information & Data Cooperative Repository (GRIIDC | R4.x266.000:0014) which includes survey responses from individuals living in Gulf Coast communities. Population Information given by Dr. Cenko

We examined whether the number of hurricanes a person had experienced (num_hurricanes) could predict their level of mental health concerns (sw5). The num_hurricanes variable measured the self-reported number of hurricanes respondents had lived through. The sw5 variable represented a self-reported measure of mental health concerns. This was an ordinal variable. The higher values indicated more frequent or severe symptoms related to psychological distress.

To assess the relationship between these two variables, an ordinal logistic regression was conducted using R statistical software (R Core Team, 2022), with a significance threshold set at $p < 0.05$. The regression model tested whether hurricane exposure was a statistically significant predictor of mental health levels. Apart from this, a scatter plot was generated to visualize the relationship between the number of hurricanes experienced and reported mental health concerns. A regression line was also done to illustrate any potential trends in the data.

Results:

The regression model produced a coefficient of -0.031 for the number of hurricanes experienced, with a standard error of 0.0602, a t-value of -0.5146, and a p-value of 0.607. The predictor was not statistically significant at the $p < 0.05$ level. Threshold values between levels of mental health concern were also calculated. The threshold was -0.5407 for low to moderate concerns, 0.6453 for moderate to high concerns, and 1.7191 for high to very high concerns. All threshold estimates were statistically significant, with p-values less than 0.001.

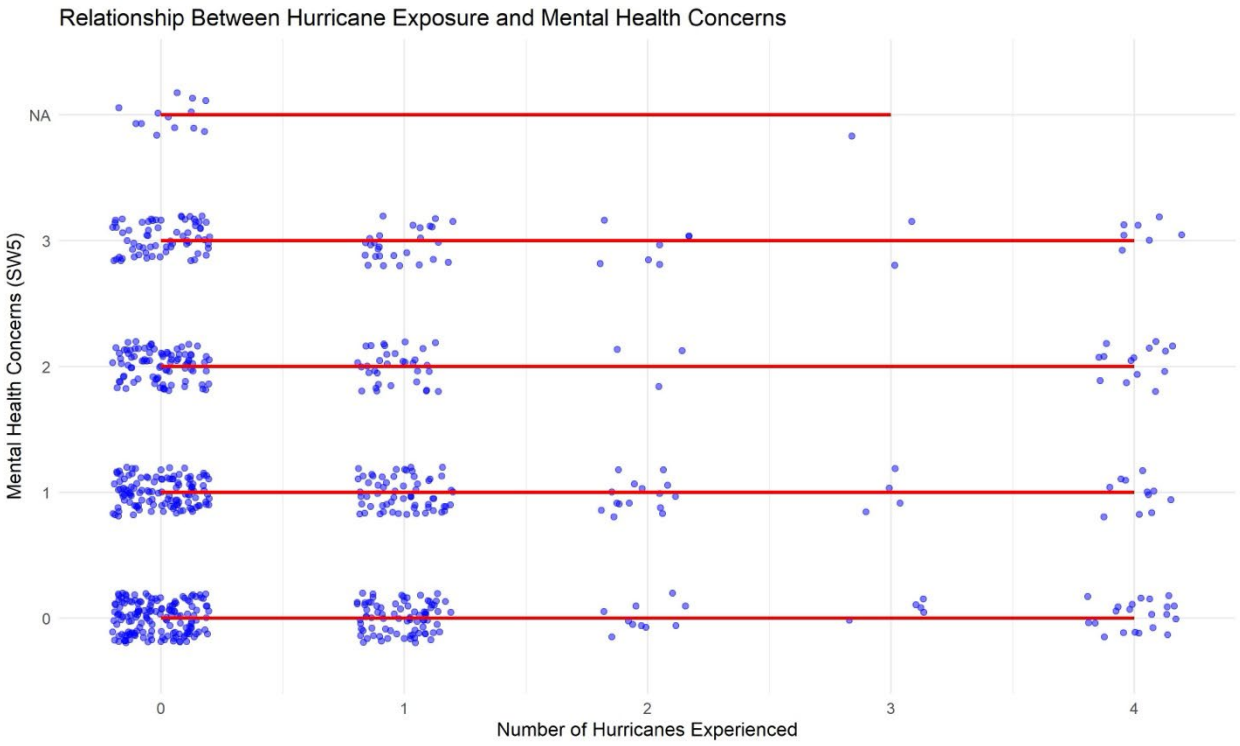

Figure 1. Relationship Between Hurricane Exposure and Mental Health Concerns

Figure 1 shows a scatter plot of individual responses. The x-axis represents the number of hurricanes experienced, and the y-axis shows reported levels of mental health concern (SW5), with higher values indicating greater concern. Each blue dot represents one participant.

Discussion:

This study explored whether there is a relationship between the number of hurricanes experienced and levels of mental health concerns among Gulf Coast residents. Based on our results, there was no significant relationship between hurricane exposure and mental health concerns. The regression coefficient was close to zero and not statistically significant, which

means the number of hurricanes alone did not seem to impact how people responded on the mental health scale. In *Figure 1*, the dots are spread evenly across all exposure levels, which suggests there isn't a clear pattern. While previous studies have suggested that repeated exposure may lead to cumulative stress (Garfin et al., 2022), the findings here suggest that other factors might play a stronger role in determining mental health outcomes.

One possible reason for this difference is the influence of protective factors such as social support and emotional resilience. People who feel supported by family, friends, or their communities may be better equipped to manage the stress that comes with repeated storms (Chan et al., 2015). In some cases, individuals may have also developed coping strategies over time, especially if they have experienced multiple storms in the past. Also, previous research has emphasized the importance of support before the disaster even begins. For example, one study found that individuals with higher levels of perceived support before a hurricane experienced fewer mental health symptoms afterward (Lowe et al., 2010). These findings highlight how conditions prior to the storm can shape recovery more than exposure alone.

Another explanation may relate to timing. Psychological effects do not always occur immediately after a disaster. Mental health symptoms can take time to develop or may fluctuate over months or even years. Long-term studies have also shown that distress related to hurricanes can grow, especially when combined with housing instability, financial loss, or other hardships (Galea et al., 2007). Since this study only looks at one moment in time, it may not capture these longer-term patterns.

This study has several limitations. First, all data was self-reported, which can lead to issues such as misremembering or underreporting. Additionally, hurricane exposure was measured only by the number of events experienced, without considering how severe or personally disruptive those

storms were. Someone could have been through three hurricanes but not been seriously impacted by any of them, while another person might have gone through one devastating storm. Finally, mental health was assessed using a single ordinal variable that does not capture specific diagnoses or the intensity of symptoms.

In the future, it would be helpful to use data that follows people over time. That way, researchers could see how mental health changes after each storm and figure out which effects are short-term and which last longer. It would also be useful to include more information about what people went through during each hurricane, such as whether they had to evacuate, lost their home, or had support from others. Talking to people directly through interviews or open-ended questions could also help capture what they have experienced and how they deal with it. Future studies could also look at programs that help people prepare emotionally for hurricanes or recover afterward, like counseling or support groups, and see how helpful those are in protecting mental health.

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