

Exploring Factors that Influence Mental Health Outcomes of Hurricane Helene

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Abstract

The psychological effects of natural disasters are often overlooked despite their increasing frequency and severity. According to the National Oceanic and Atmospheric Administration (NOAA), the United States experienced 28 disasters in 2023, surpassing the previous record of 22 events in 2020. Moreover, the Substance Abuse and Mental Health Services Administration (SAMHSA) discusses the impact of disasters on mental health and how they are often under-recognized and under-addressed through their report, “Disaster Behavioral Health and Approaches to Community Response and Recovery”. On September 27, 2024, Hurricane Helene greatly impacted lives and towns throughout Western North Carolina. As streets were flooded, homes destroyed, and lives lost, numerous factors potentially played a significant role in shaping individuals' mental health experiences following Hurricane Helene. This study aims to investigate how the degree of hurricane-related loss, adverse childhood experiences, and socioeconomic status (SES) influence mental health following Hurricane Helene in Western North Carolina. Participants were recruited through flyers distributed throughout Western North Carolina, online posts through social media platforms, and handed out through community resource centers. Data collection involves a two-phase approach: quantitative data obtained through electronic surveys, and qualitative data gathered through optional Zoom interviews for participants who consent to further engage. This study seeks to contribute to a better understanding of how individual factors influence the psychological outcomes of communities impacted by natural disasters, ultimately improving treatment interventions and promoting advocacy.

1. Introduction

1.1 Natural Disasters, Mental Health, and Demographics

On September 27, 2024, Hurricane Helene made landfall, leaving a devastating impact on the cities, homes, and lives of residents living in Western North Carolina (WNC). Natural disasters, large-scale catastrophic events, are not only increasing in frequency and severity, but have also been found to have a considerable impact on mental health. Preexisting research suggests a relationship between the event of a natural disaster and higher rates of depression and post-traumatic stress disorder, a mental health condition that develops after exposure to a traumatic event (APA, 2013). Extensive research explores natural disasters having a potential impact on mental health. Mental health impacts of natural disasters have been examined in myriad ways, including a study done by Fullerton et. al (2013) investigating the relationship between PTSD, depression, and increased alcohol and/or tobacco use following the 2004 Florida hurricanes (Fullerton, et al, as cited by Morganstein & Ursano, 2020). Moreover, a strong correlation was found between high hurricane exposure and work demand with increased high-risk behaviors and mental health effects (Morganstein & Ursano, 2020). These studies suggest people face increased mental and behavioral health barriers to recovery when having high rates of hurricane exposure.

Not only do catastrophic events seem to influence mental health, but other factors, including socioeconomic status (SES), adverse childhood experiences (ACEs), and demographics like gender and being a first responder, influence the degree of mental health outcomes. Evidence from the 2008 Wenchuan earthquake shows an association between sleep disturbances following the events and increased rates of depression and posttraumatic stress disorder (PTSD; Morganstein & Ursano, 2020). Research further indicates that the influence of disaster exposure on social, environmental, and daily life-related factors could potentially heighten negative psychological effects (Heanoy & Brown, 2014). Additional studies explored the role of demographic factors in disaster-related outcomes, indicating that gender differences and lower socioeconomic status also impacted the negative effects that individuals experienced in their mental health following a natural disaster.

1.2 Individual Factors Influencing Mental Health Outcomes

Individual factors present barriers to recovery when faced with a natural disaster. Research has found determinants such as income, preceding experiences of trauma, and being a first responder may create difficulty accessing care after experiencing a traumatic event.

Socioeconomic status (SES) represents another important individual factor that has been found to impact mental health following a natural disaster. Socioeconomic status can be defined in the context of the combination of an individual's access to resources imperative for material income, education, and social networks and connections (Peverill et al., 2021). Prior evidence suggests socioeconomic status as a factor that impacts the development of mental disorders (Peverill et al., 2021). Additionally, research shows that lower SES is often associated with worse outcomes following disasters. People of lower SES showed increased vulnerability to mental health consequences, behavioral harm, and death (Morganstein & Ursano, 2020). Research implying a relationship between low SES and higher rates of negative mental health outcomes succeeding a natural disaster proposes the exploration of how other demographics impact the mental health outcomes in the context of a natural disaster.

Demographics like gender, Adverse Childhood Experiences (ACEs), and occupation have also been found to have a substantial influence on mental health outcomes following a natural disaster. Researchers have found an increased risk in women for adverse psychological outcomes following disaster (Viswanath et al., 2013, as cited by Morganstein & Ursano, 2020). Not only do gender differences and lower SES play a potential role in shaping mental health in the event of a catastrophic event, research also implies that ACEs may have a significant impact as well. ACEs have been defined in previous research as traumatic events experienced within childhood that have been shown to negatively impact individuals' future health outcomes (Wu et al., 2024). Existing research emphasizes that individuals who experienced more than two ACEs reported feelings of fear and distress at a higher rate after Hurricane Sandy than individuals who did not report any ACEs (Wilson-Genderson et al., 2022). Furthermore, researchers have found a relationship between first responders and higher rates of mental health problems in response to a traumatic event. A study exploring the effects of trauma on disaster workers following the events of September 11, 2001, found a correlation between exposed disaster workers and increased rates of acute stress disorder, PTSD, and depression (Fullerton et al, 2004). Moreover, a relationship between ACEs and trauma in first responders following a natural disaster has been found. A study investigating Hurricane Katrina in 2005, found that first responders involved in relief efforts and who experienced early physical victimization reported higher symptoms of PTSD, peritraumatic dissociation, depression, and sleep problems (Komarovskaya et al, 2014). These results suggest early victimization may be an indicator of mental health problems in first responders post natural disaster. The extensive amount of pre-existing research examining the relationship between specific demographics and mental health outcomes following a natural disaster poses the need for further exploration.

1.3 Proposed Research Study

The goal of this study is to come to a better understanding of how SES, gender, ACEs, and degree of loss impact mental health following a natural disaster. Specifically, the present study investigates the following research questions: (1) Is there a relationship between household income and rates of depression and PTSD symptoms post-Helene? (2) Is there a relationship between gender and depression and PTSD symptoms post-Helene? (3) Is there a correlation between being a first responder and rates of depression and PTSD symptoms post-Helene? (4) Is there a relationship between experiences of adverse childhood experiences and rates of depression and PTSD symptoms post-Helene? (5) Is there a relationship between the amount of loss someone experienced as a result of Hurricane Helene and levels of depression and PTSD symptoms post-Helene?

The researchers hypothesize that demographic factors such as gender, SES, being a first responder, ACEs, and degree of loss following Hurricane Helene, play a role in influencing depression and PTSD in the lives of people living in WNC succeeding the storm. With consideration of the research stated above, this study explores factors that shape mental health outcomes following the natural disaster, Hurricane Helene. Through this research, the researchers gained insight into the lived experiences of

WNC in hopes of promoting advocacy, fostering emotional health, and building resilience to natural disaster trauma.

2. Methods

2.1 Participants

Participants included individuals who were residents of a WNC county at the time Hurricane Helene impacted the area. A total of 113 participants, ranging from 18 years old to over 72 years of age, completed part or all of the survey. Due to the nature of recruitment, the response rates were unclear.

2.2 Materials

The present study used a mixed-methods design, which included both self-report surveys and virtual interviews. For the survey, the study utilized the questionnaires below to assess the relationship between demographics, ACEs, degree of loss, and levels of depression and trauma following Hurricane Helene. Pearson correlations were used to determine relationships between a natural disaster and individuals' scores on PHQ-9 and PCL-5.

2.2.1 Demographic Questionnaire

A demographics questionnaire, developed uniquely for this study, was administered. This questionnaire consisted of age, sex, gender, race/ ethnicity, relationship status, socioeconomic status, employment status, housing status, housing location, and time if evacuation was necessary.

2.2.2 Adverse Childhood Experiences Questionnaire for Adults

The ACEs Questionnaire for adults was used to assess the 10 categories of ACEs (childhood emotional, physical, and sexual abuse, emotional and physical neglect, household substance abuse, mentally ill household members, criminal household members, family violence, and parental separation or divorce) that may be contributing factors to the mental health outcomes of Hurricane Helene (ACEs; Felitti et al., 1998). This questionnaire assessed the ACE exposure by assigning one point to each category ("yes"=1 or "no"=0). When computed, the score provides participants with an overall ACE score that ranges from 0 to 10. Higher scores signify greater exposure to ACEs, lower scores indicate minimal exposure to ACEs, and a score of 0 indicates that an individual has not been exposed to ACEs.

2.2.3 Loss Questionnaire

To assess the degree of loss by means of Hurricane Helene, the researchers used an adapted version of the Hurricane-Related Stressors questionnaire (HRQ; Galea et al., 2007). The HRQ explored an individual's challenges following the storm in order to examine any stressors caused by Hurricane Katrina. The stressors included in the HRQ considered traumatic stressors, victimization, physical illness or injury, extreme physical and psychological adversity, major property and income loss, and difficulties associated with housing. This study's altered Hurricane Loss questionnaire examines

the degree of loss individuals experience after experiencing a hurricane using a Likert scale (not at all, slightly, moderately, very much, extremely).

2.2.4 Patient Health Questionnaire (PHQ-9)

To measure the mental health impacts of Hurricane Helene on depression, the researchers used the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001). The 9-item PHQ-9 was used to determine participants' depression symptoms. This type of self-report survey is rated on a 4-point likert-type scale, (0-not at all, 1- several days, 2- more than half the days, 3- nearly every day), for the participants to place in one of the five depression severity groups (minimal, mild, moderate, moderately severe, and severe) based on their total score.

2.2.5 Post Traumatic Stress Disorder Checklist (PCL-5)

To gain insight into the mental health impacts of Hurricane Helene on experiences of posttraumatic stress, we administered the Post Traumatic Stress Disorder Checklist (PCL-5; Weathers et al., 2013). This 20-item questionnaire measures the 20 criteria for PTSD stated in the DSM-5. This self-report survey is rated on a 4-point Likert-type scale (0-not at all, 1- several days, 2- more than half the days, 3- nearly every day). Each item corresponds to one of the four symptom clusters (1) re-experiencing, (2) avoidance, (3) negative alterations in cognitive mood, and (4) increased arousal and reactivity.

2.2.6 Interview Protocol

At the end of the survey, participants had the opportunity to sign up for optional interviews conducted either in person or virtually to further discuss their experiences of the hurricane. The interviews consisted of 11 qualitative questions to better understand the individual's story and experiences. Examples of these questions included: *"Can you tell us how you have been handling (for better or worse) the emotional impact of this experience?"* And *"What has been most impactful to you during this entire experience?"*

2.3 Procedures

After gaining approval from the Institutional Review Board, participants were recruited through convenience and snowball sampling by using flyers distributed throughout Western North Carolina, online posts through social media platforms, and by handing out flyers through community resource centers. Through a QR code on the flyer, participants were prompted to fill out an electronic questionnaire on Qualtrics, which took approximately 10-15 minutes to complete. At the end of the questionnaire, participants were given the opportunity to sign up for an optional interview that was conducted over Zoom to further discuss their experiences of the storm. Depending on how much information each participant wanted to share, the optional interviews required approximately 20-30 minutes to complete. At the end of the interview, the researchers provided mental health resources, which were also presented at the end of the initial survey. Transcripts were created from the interview and all personal identifiable information was removed to ensure anonymity. After data collection, researchers performed statistical data analysis using SPSS to obtain results and used qualitative data to further contextualize findings from the survey.

3. Results

3.1 Demographics

A total of 113 participants participated in some portion of the survey. However, only 98 completed all assessments. Out of all respondents, 22 (21%) were between the ages of 18-24, 13 (12%) were between the ages of 25-29, 8 (8%) were between the ages of 30-36, 16 were between the ages 37-43, 16 (15%) were between the ages 44-50, 10 (10%) were between ages 51 and 57, 7 (7%) were between the ages 58 and 64, 5 (5%) were between the ages 65 and 71, 7 (7%) were 72 or older, and 1 (1%) individuals preferred not to answer. When asked about income, each income bracket was represented, however, most participants (20%) had incomes that fell within the \$50,000 to \$74,999 range (see figure 1). When asked to identify their gender, 71 individuals identified as female, 25 identified as male, 6 identified as non binary, 1 individual identified as transgender, 1 identified as transwoman, and 1 identified as transfluid (see Figure 2). When asked if they identified as a first responder, 94 (90%) individuals said no, and 10 (10%) said yes (see Figure 3). When asked to identify their ethnicity, 97 (92%) participants identified as white, and 8 (8%) identified as Black or African American (see Figure 4).

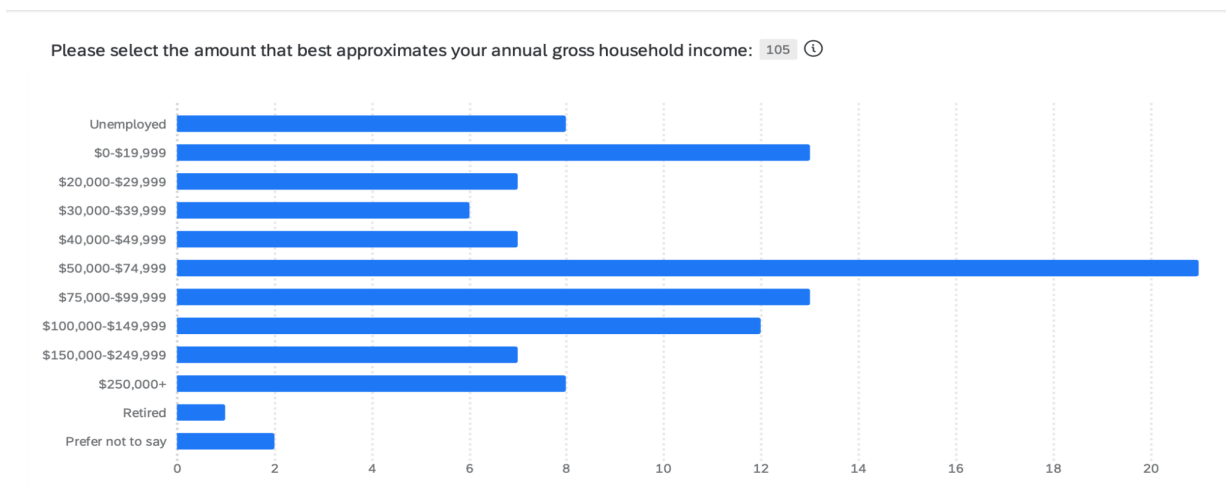


Figure 1: Participant's annual gross household income.

Gender 105 ⓘ

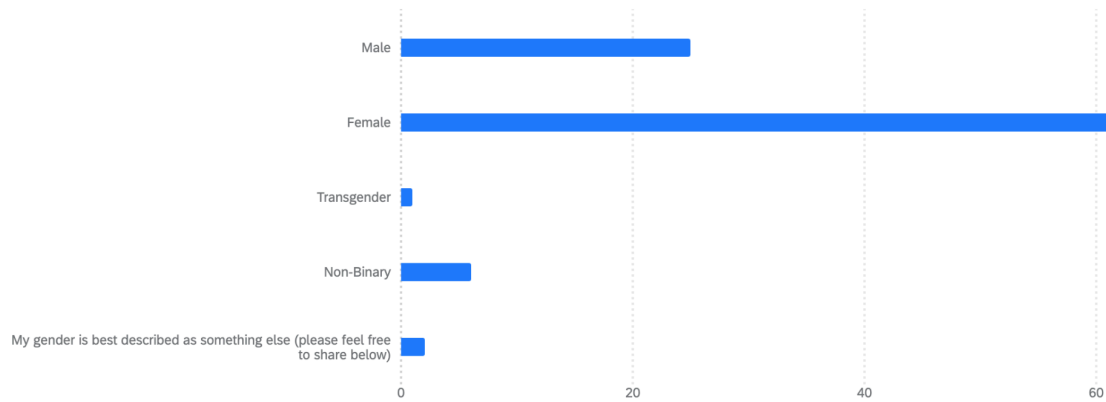


Figure 2: Participant's identified genders.

Do you work as a first responder (e.g., firefighter, police officer, EMT/paramedic, or national guard) that serviced a Western North Carolina community impacted by Hurricane Helene? 104 ⓘ

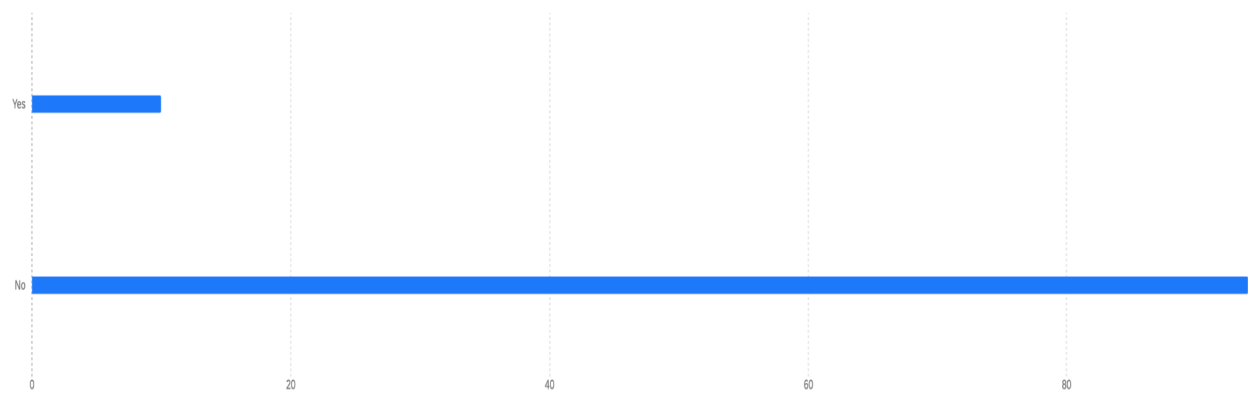


Figure 3: Participants identified as first responders.

Race/ Ethnicity (check all that apply) 105 ⓘ

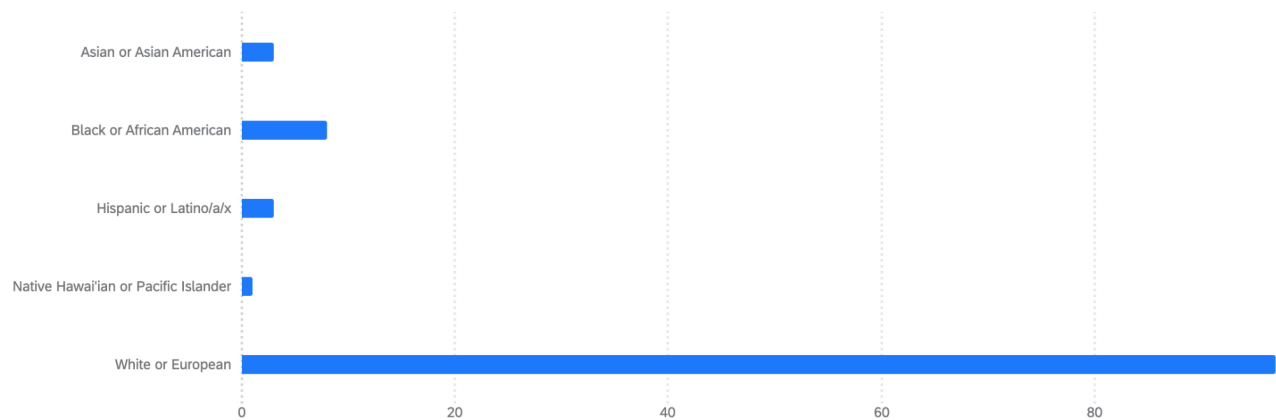


Figure 4: Participant's identified race/ethnicities.

3.2 Means and Standard Deviations for all Primary Variables

The average of the PHQ-9 was 7.69 (M=7.69, SD= 6.49). The Average of the PCL-5 was 19.35 (M=19.35, SD=16.474). The average of the ACEs questionnaire was 2.88 (M=2.88, 2.18). The average of the loss questionnaire was 19.278 (M= 19.278, SD= 5.67).

	Minimum	Maximum	Mean	Std. Deviation
PHQ_Total	0.00	27.00	7.69	6.49
PCL_Total	0.00	72.00	19.35	16.474
ACES_Total	0.00	9.00	2.88	2.18
Loss_Total	11.00	38.00	19.278	5.67

Table 1: Means and Standard Deviation for the 6 subscales used. Categories are divided by Gender, Income, ACEs total, and Loss.

3.2.1 Income and Mental Health Outcomes

Results from the present study indicate that income is related to scores on the PHQ-9, PCL-5 total, and every subscale of the PCL-5.

Variable	PHQ-9	PCL-5 total	PCL-5 (RE)	PCL-5 (A)	PCL-5 (NA)	PCL-5 (HA)
Income	r= -.389** p= .001	r= -.411** p= .001	r= -.374** p= .001	r= -.330** p=.002	r= -.422** p= .001	r= -.366** p= .001

Table 2: Income and Mental Health Outcomes**3.2.2 Gender and Mental Health Outcomes**

Gender is related to higher scores on the PHQ-9 ($r=.244$, $p=.022$). There is a significant correlation between PHQ-9 and gender (coded as 1=male, 2=female, 3=transgender, 4=non-binary). Therefore, identifying as female, transgender, and non-binary is related to higher scores on the PHQ-9. None of the PCL-5 symptom clusters were found to be significant.

Variable	PHQ-9	PCL-5 total	PCL-5 (RE)	PCL-5 (A)	PCL-5 (NA)	PCL-5 (HA)
Gender	$r=.244^*$ $p=.022$	$r=.167$ $p=.130$	$r=.084$ $p=.439$	$r=.173$ $p=.111$	$r=.174$ $p=.109$	$r=.201$ $p=.066$

Table 3: Gender and Mental Health Outcomes**3.2.3 First Responder and Mental Health Outcomes**

Being a first responder is related to higher scores on the PCL-5 ($r=-.216$, $p=.049$). There is a significant negative correlation between the PCL-5 total score and first responder (coded as 1 = yes, 2 = no). None of the PCL-5 symptom clusters were found to be significant, nor was being a first responder significantly associated with PHQ-9.

Variable	PHQ-9	PCL-5 total	PCL-5 (RE)	PCL-5 (A)	PCL-5 (NA)	PCL-5 (HA)
First Responder	$r=-.126$ $p=.247$	$r=-.216^*$ $p=.049$	$r=.127$ $p=.85$	$r=-.128$ $p=.242$	$r=-.155$ $p=.156$	$r=-.184$ $p=.096$

Table 4: First Responder and Mental Health Outcomes**3.2.4 ACEs and Mental Health Outcomes**

Adverse Childhood Experiences were not found to be significantly related to PCL-5 or PHQ-9 scores within our study. Researchers did not find a significant correlation between PCL-5, PHQ-9, and ACEs.

Variable	PHQ-9	PCL-5 total	PCL-5 (RE)	PCL-5 (A)	PCL-5 (NA)	PCL-5 (HA)
ACEs	$r=.165$ $p=.130$	$r=.115$ $p=.296$	$r=-.024$ $p=.828$	$r=.091$ $p=.407$	$r=.210$ $p=.054$	$r=.107$ $p=.332$

Table 5: ACEs and Mental Health Outcomes

3.2.5 Loss and Mental Health Outcomes

Amount of loss is related to higher scores on the PHQ-9, PCL-5 total, and every subscale of the PCL-5.

Variable	PHQ-9	PCL-5 total	PCL-5 (RE)	PCL-5 (A)	PCL-5 (NA)	PCL-5 (HA)
Loss	r= .465** p= .001	r=.563** p= .001	r=.579** p= .001	r= .520** p=.001	r= .438** p= .001	r=.546** p= .001

Table 6: Loss and Mental Health Outcomes

4. Discussion

Data was used to assess if income, gender, ACEs, loss, and being a first responder influence the mental health outcomes of PTSD and depression within individuals living in WNC following the storm. Researchers hypothesized that individuals with higher scores on ACEs and Loss Questionnaires would have higher amounts of depression and PTSD symptoms. Prior evidence suggests an association between demographics such as gender, SES, degree of loss, and being a first responder with higher levels of depression and PTSD. This study supports preexisting research and the researcher's hypothesis; there is a relationship between demographics and loss and mental health outcomes, specifically depression and PTSD, among individuals impacted by Hurricane Helene. However, a correlation between ACEs and mental health outcomes post-natural disaster was not found. These findings provide additional conclusions supporting the influence of individual factors on mental health impacts following a natural disaster, with an exception to ACEs. These findings will contribute to a better understanding of how individual factors influence the psychological outcomes of communities impacted by natural disasters, ultimately bettering treatment interventions and promoting advocacy. This research study identified populations that have been disproportionately affected by previous trauma and would benefit from an increase in funding, resources, and services to promote resilience and natural disaster mental health recovery. In addition, we hope these results will increase advocacy efforts for the marginalized populations impacted by Hurricane Helene and enhance policy change that provides equitable resources for natural disaster resilience.

4.1 Demographics

4.1.1 Income and Mental Health Outcomes

Researchers found a correlation between income and each mental health outcome tested for. This suggests that people of lower income may experience higher levels of depression symptoms and PTSD succeeding a natural disaster. These findings may suggest that people of lower SES lack equal access to mental health resources, services, and education. Pre-existing research found that people of lower-income individuals are more likely than people of higher income to report barriers to accessing care (Steele et al, 2007). These findings suggest a relationship between socioeconomic status and barriers to mental health services.

4.1.2 Gender and Mental Health Outcomes

Researchers found a relationship between gender and the PHQ-9, implying females, transgender, and non-binary individuals may experience higher rates of depression post-natural disaster. This parallel is difficult to explain due to the many possible explanations for this finding, such as cultural, biological, or social reasons.

4.1.3 First Responders and Mental Health Outcomes

A correlation between first responders and the PCL total score was found. This finding proposes that self-identified first responders may have higher levels of PTSD following a natural disaster compared to non-first responders. This relationship may be explained by this community experiencing increased risk of trauma exposure in their occupations (Griffith et al, 2022). In addition, this community historically experiences PTSD from past trauma at a higher rate (Cheng et al, 2023). Furthermore, given the small sample size for first responders, it may be difficult to generalize.

4.2 Adverse Childhood Experiences and Mental Health Outcomes

No significant relationship was found between ACEs and mental health outcomes following Hurricane Helene. Previous research has suggested that individuals who experienced ACEs may potentially become desensitized from past trauma, which could possibly explain the lack of relationship in this study. Studies exploring cortisol as an anti-stress hormone have shown that people with a history of ACEs may experience lower levels of cortisol in response to a traumatic event than those who did not report any ACEs (Van der kolk, et al,. 2000). This research suggests ACEs as a possible indicator for reduced responses to subsequent trauma. These results might also pertain to this study's small sample size.

4.3 Degree of Loss and Mental Health Outcomes

Researchers found a relationship between the degree of loss and each mental health outcome explored in this study. Individuals may be presenting depression and PTSD criteria as they lost more from Helene.

4.4 Qualitative Interviews

Researchers are in the process of scheduling and conducting interviews for those who opted in to further discuss their experiences of the storm. At this point in time, only one qualitative interview has been conducted. The participant made key points about the storm being *"enormously painful"*, relating to previous research concerning the relationship between a natural disaster and mental health problems. The participant discussed their experiences of loss, *"very little damage happened to me or to our family...emotionally, I handle this by, and you know a lot of times I'm like, well, nothing happened to me"*. This dialogue reinforces the researcher's hypothesis that experiencing higher levels of loss may result in higher rates of mental health outcomes as a result of a natural disaster. This statement may also illustrate feelings of survivor's guilt: the disregard of one's struggle in the face of a traumatic event, in consideration of those who may have struggled more.

5. Implications

5.1. Research Implications

Findings from the present research study raise important future research questions. Foremost, it would be beneficial to take a deeper look into how intersecting identities such as low SES and LGBTQ+ individuals further influence mental health outcomes. Moreover, in the context of disaster recovery, it will be important to inquire if there are unique risk or protective factors for specific demographic populations. It would also be valuable to examine the influence of SES in comparison to other factors, such as health care and education accessibility, on the expected outcomes. As there are 22 out of every 10,000 individuals living unhoused in the city of Asheville, North Carolina alone, with that number rapidly growing, future researchers should examine the mental health outcomes of Helene specifically within the unhoused community (Wadley, 2021). Furthermore, and in consideration of long-term effects, looking at how ACEs and disaster-related loss evolve to impact mental health is essential, especially across a wide range of diverse populations. Along with this, surveying which types of mental health interventions are most effective for individuals with higher ACE and disaster-related loss scores would build on the findings of this study. As well as how these mediations can be accommodated to meet the needs of specific demographic groups, such as historically marginalized communities, who are affected by ACEs, SES, or demographics in the context of a natural disaster. Further studies should examine if gender, being a first responder, or loss following hurricane Helene have a causal relationship. Lastly, it is necessary to further study how advocacy efforts and disaster recovery programs establish the severe mental health needs of individuals suffering the negative consequences of ACEs, SES, and other life-related factors following a natural disaster.

5.2 Policy Implications

This study presents findings suggesting that specific demographics face mental health effects of natural disasters at a disproportionate rate. Women, first responders, individuals with a higher degree of loss, and individuals living within low SES are more likely to face mental health struggles after Hurricane Helene. These findings show a substantial need for policies within Western North Carolina that will address the impacts of social determinants of mental health on mental health outcomes of Hurricane Helene. Policy makers should educate the general public and mental health professionals on these research findings. In addition, community mental health centers and private practices could be required to provide services on a sliding scale for individuals within these populations. These community mental health centers and private practices should have increased funding to ensure they have the monetary resources for providing support. As individuals with greater loss are experiencing more depression and PTSD following Helene, there should be funding provided to the communities that experienced the greatest amount of loss to compensate for their losses.

5.3 Clinical Mental Health Implications

Findings from this study suggest that there is a relationship between gender and depression symptoms, and the relationship between being a first responder and higher PTSD total symptoms after Hurricane Helene. These findings show that women, transgender, non-binary, and first responders may need more mental health support following the natural disaster. In addition, having a lower SES or experiencing a higher degree of loss is also related to higher PTSD and depression symptoms after Helene. As such, it is necessary that these individuals also receive accessible and equitable mental health support, education, and services to obtain optimal mental health. To increase access to mental health resources, mental health professionals could provide peer support and trauma therapy to individuals specifically within these populations. Local mental health professionals could provide mental health education on topics such as PTSD, stress management, and biofeedback to all fire departments, police departments, and EMS. In the future, it is important for mental health professionals to treat and assess co-occurring depression and PTSD symptoms within low SES and/or are experiencing a high degree of loss from Hurricane Helene. Within these mental health education sessions, mental health professionals could empower individuals to seek therapy, reduce mental health stigma, and provide local mental health resources. Over the next year, community mental health centers could be provided with financial resources to provide telehealth and in-person group therapy services that focus on healing from Hurricane Helene. As previous research states that cognitive behavioral therapy is an effective therapeutic intervention for reducing PTSD, therapists should include this approach in providing mental health care to first responders (Alshahrani, 2022).

6. Limitations

Although this study had multiple strengths, there are limitations that impacted the results and possible generalizations that could be drawn from the results. With this study being the first to use the altered Hurricane-Related Stressors questionnaire, this may have influenced its reliability. Moreover, feedback from the one participant interview suggests that there is the possibility that experiencing survivor's guilt may be influencing how individuals respond, as it may lead them to reevaluate the depth of their experiences when filling out the self-reported survey. Therefore, the researchers believe that there may have been biases in the method of self-reported data collection. As researchers did not find a relationship between ACEs and mental health outcomes of Hurricane Helene, our sample size and range in diversity may not have been wide enough to show a relationship. Moreover, the lack of racial and ethnic diversity of the sample size—being a 92% white/European population—impacts generalizability as it may not accurately reflect the broader population. There may have been unmeasured protective and cultural beliefs or factors impacting the effects of preexisting trauma. These factors may include social support, resource availability, coping mechanisms, community resilience, etc. In addition, the mental health effects being presented as depression and PTSD could potentially develop later than the study's allotted timeline, but could also interact with other future stressors, providing different results. There have also been intersectionalities that require a closer examination, such as low SES and specific gender identities, which could have possibly affected the outcome. Lastly, as

this study was cross-sectional, there is no way to indicate if the relationships between gender, ACEs, identifying as a first responder, and degree of loss may or may not have had a relationship with depression and PTSD symptoms.

7. Conclusion

The results of this study contribute to ongoing research concerning natural disaster trauma and mental health outcomes. However, a relationship between ACEs and mental health outcomes following a natural disaster was not found. Further research should examine ACEs and mental health outcomes within Western North Carolina individuals, as our current findings may not be generalizable to the entire population. This research contributed to the understanding of the lived experiences and mental health outcomes of the residents of WNC during Hurricane Helene. Pre-existing research suggests an association between ACEs, demographics, degree of loss, and SES with higher rates of depression and PTSD. Although the results of this study reflect current research findings, researchers found no relationship between ACEs and mental health outcomes following the storm. These findings will contribute to a better understanding of how individual factors influence the psychological outcomes of communities impacted by natural disasters, ultimately bettering treatment interventions and promoting advocacy. This research study identified populations that have been disproportionately affected by previous trauma and would benefit from an increase in funding, resources, and services to promote resilience and natural disaster mental health recovery. Considering the results of this study, it is necessary to dive deeper into the intersectionality of the individual factors tested for, as well as risk and protective factors for specific demographic populations. This data needs to be further examined, specifically in terms of race/ethnicity and gender, as there were not enough respondents to evaluate their experiences to their full extent. We hope these results will increase advocacy efforts for the marginalized populations impacted by Hurricane Helene and enhance policy change that provides equitable resources for natural disaster resilience.

8. Acknowledgments

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