Depressive Symptoms in Black and White Volunteers: Six-month Post Deadly Natural Hazard Hurricane: Does Race Identity Matter?

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Abstract

Natural hazards have become increasingly common in the United States, wherein across the nation residents are exposed to floods, hurricanes, tornadoes, and a host of other events that occur due to changes in the climate. Amid providing care for communities that have encountered a natural hazard, the volunteers and rescuers are also exposed to the trauma caused by the natural hazard. The primary focus of the study was to elucidate differences in mental health symptoms of the volunteers by race and to determine if years of experience with previous trauma predicts and has a relationship with the development of mental health symptoms. A total of 182 social work students from 3 public universities that were from areas impacted during Hurricanes Katrina and Rita and volunteered in the aftermath, consisted of our sample. The participants completed surveys regarding demographics, mental health symptoms, various stressors, and the presence of social support. Depression scores among Black participants were significantly higher (M = 17.74) compared to White participants and participants of younger age were more likely to experience depression. A final statistical model revealed negative emotion among Black participants indicated a decreased likelihood of developing depression when compared to White participants. The findings indicate the importance of providing adequate training and mental health resources for volunteers and particularly Black volunteers in an effort to prevent the occurrence of depression, which could potentially decrease their overall mental health after a natural hazard.

Keywords: depression, hurricane katrina-rita, black and white volunteers, past trauma reminded, natural hazard-related stressors, character strengths, optimism

1. Introduction

The occurrence of natural hazards (e.g., hurricanes, tornadoes, flooding, tsunami) has become an anticipated event in the lives of many (Everly et al., 2008). Research indicates an increase in the incidence of severe weather events (Thaler & Seebauer 2019). In the aftermath of a natural hazard, the environment is typically full of potentially traumatic stressors, extreme or severe events that are so powerful, harmful, and threatening that they may demand extraordinary coping efforts (Mao et al., 2022; Meichenbaum, 1997; Nicdao et al., 2013). The literature indicates approximately 80% of residents living in communities have experienced at least one or more traumatic events (Breslau, 2009). Many individuals who have been exposed to traumatic stressors suffer negative psychological consequences ranging from mild anxiety to clinical disorders such as panic disorder, major depression, and substance addiction (Cepeda et al., 2010; Duncan, 1999; Follette et al., 1996; Green et al., 2000). Traumatic events that affect various domains are more likely to generate a negative adaptive spiral than events with more limited effects (Schnurr et al., 1998). To counteract the negative impact of traumatic events, such as natural hazards, rescue teams (professionals) and volunteers (nonprofessionals) are often present to provide essential psychosocial and physical resources to survivors of natural hazards (Aminizade et al., 2017; Marceta & Vrucinic, 2022; Whittaker et al., 2015).

Volunteers and rescuers have an essential role in the after of natural disasters and traumatic events. Due to the vast number of rescuers and volunteers needed during such disastrous events, the interest in the well-being of these groups has increased. These individuals undertake stressful tasks during recovery operations, including evacuation of bodies and body parts that may have been decomposing for days, rescuing persons from rubble where amputation can be the only possibility for rescue. Exposure to a natural hazard setting can have both short- and long-term mental

and physical consequences among professional rescuers (Chang et al., 2003; Fullerton et al., 2004; Morren et al., 2005; Tak et al., 2007; Witteveen et al., 2007). The most commonly reported mental and physical symptoms post-natural hazard were PTSD (Chang et al., 2003; Fullerton et al., 2004; North et al., 2002; Tak et al., 2007), depression (Cardozo et al., 2005; Fullerton et al., 2004; Tak et al., 2007), somatic complaints (Morren et al., 2005; Witteveen et al., 2007), and chronic fatigue (Morren et al., 2005; Spinhoven & Verschuur, 2006; Witteveen et al., 2007). In addition to the large number of rescuers aiding in natural hazard events, a large number of volunteers often aid in the aftermath of the natural hazard, as a result of becoming more unified, cohesive, and altruistic during such events (Quarentelli, 2008). While the literature indicates existence of bonding among rescuers and volunteers, there additionally detrimental effects to their mental health such as, burnout syndrome, projecting unresolved conflicts on the survivors, and indirect and direct traumatization (Marceta & Vrucinic, 2022). However, there is a lack of knowledge in the literature regarding the impact of natural hazards on the mental and/or physical health of volunteers.

1.1 Purpose of the Study

Though some research is available, which investigates mental health symptoms, such as depression and the training of natural hazard volunteers (Marzaleh, Rezaee, & Peyravi, 2021; Lee, Kim, & Kim, 2020) few studies have focused on issues encountered by natural hazard volunteers and even less have investigated demographic differences in the prediction of mental health symptom development or protective factors. Therefore, based on lack of literature we propose two hypotheses for our study which focus on investigating demographic differences in the development of mental health symptoms among natural hazard volunteers (de Vries & Olff, 2009; Duncan 1999; Follette et al., 1996; Frans et al., 2005; Green et al., 2000; Kessler et al., 2017; Olff et al., 2007; Perkonigg et al., 2000). Based on this previous research, we pose the following research questions:

(1) Will there be racial differences that emerge among volunteers regarding the development of mental health symptoms?

(2) Do the volunteers' years of experience with previous trauma predict the attainment of mental health symptoms?

To our knowledge, there have been no studies to-date which explored the potential predictors of mental health outcomes among natural hazard volunteers, specifically focused on social work student volunteers. This study sought to identify potential predictors of depressive symptoms among black and white volunteers, to determine if certain predictors resulted in increased risk for developing these mental health symptoms.

1.2 The Impact of Hurricane Katrina and Rita on Communities

Hurricane Katrina made landfall on August 29, 2005, off the coast of Louisiana in the United States (U.S.) (Gibbens 2019). Due to the mass devastation and loss of life due to the storm, Hurricane Katrina is indicated as one of the worst hurricanes in the history of the U.S. (Gibbens, 2019). Louisiana is considered a southern coastal state and the City of New Orleans, which had the most significant damage, has long been known to have little demographic and economic growth (Elliott & Pais, 2006). There was a total of 971 deaths from Hurricane Katrina and data reveals the Black population had mortality rates 1.7 to 4 times higher than Whites among those 18 and older (Brunkard et al., 2008). Prior to Hurricane Katrina there were several inequalities among the social determinants of health within the Black population, such as poverty, lack of access to health services, racism, discrimination (Elliott & Pais, 2006; Henkel et al., 2006; Smedley et al., 2006) Additionally, several parishes and counties in New Orleans have a history of ranking in the top 3 for the most socially vulnerable in the U.S. (Cutter et al., 2006). The devastation from Hurricane Katrina widened the gap between those in a high socioeconomic status and those living in poverty (Cutter et al., 2006). The availability of affordable housing, which is a key indicator for avoiding homelessness, was severely impacted due to 60% of the housing supply was destroyed (U.S. Department of Commerce, 2006). Overall, several studies indicated the Black population experienced more mental health symptoms compared to those of Whites (Alexander et al., 2017; Ali et al., 2014; Cepeda et al., 2010; Davidson et al., 2013; Mills et al., 2007; Rhodes et al., 2010).

Louisiana was still in the early stages of recovery from Hurricane Katrina when Hurricane Rita made land fall only one month later (Zhang et al., 2007). The combined economic losses from Hurricane Katrina and Rita among those insured and not insured is concerned to be close to $140 billion (Holtz-Eakin, 2005). Approximately 74% of residents could not reside in their homes after Hurricane Rita (Henderson et al., 2015). Flooding as seen with Hurricane Katrina was also evident with Hurricane Rita due to the low lying and flood prone areas in New Orleans (Cutter et al., 2006). Additionally, the flood prone areas were predominately in areas experiencing poverty, which were inhabited primarily by Black residents (Cutter et al., 2006). Despite Hurricane Rita achieving less notoriety

than Hurricane Katrina, there were still detrimental impacts, such as increased mental health symptoms and increased alcohol and marijuana usage (Waddell et al., 2021).

Although Hurricanes Katrina and Rita gained nationwide attention, little to no attention has been given to the preparation of volunteers to engage in natural hazards, specifically based on how previous traumas can negatively impact mental health. This dataset is one of the only sources where large numbers of diverse volunteers were recruited and deployed to help in natural hazard recovery.

1.3 Important Role of Volunteers in Natural Hazards

Volunteers are variably represented, ranging from walk-in volunteers that respond to the declared need to professional volunteers from humanitarian professions like social work or organizations like the Red Cross/Red Crescent, United Nations Children's Fund [UNICEF]. Worldwide volunteers respond to the needs of about 200 million people yearly (International Federation of Red Cross and Red Crescent Societies [IFRC], 2011). Using volunteers for natural hazards cannot be avoided due to the large-scale impact of such events.

Informal and formal volunteer efforts emerge prior to and because of natural hazard events. These volunteers are an integral resource in emergency response situations (Twigg & Mosel, 2017). They vary in demographic characteristics, in duration and intensity of their exposure, knowledge of natural hazards and trauma, and previous training. Demographically, volunteers are usually middle-aged (35 to 54 years) and female. Among the major race and ethnic groups, Whites volunteered at a higher rate (26.4 %) than Blacks (19.3%), Asians (17.9%), and Hispanics (15.5%). Individuals with higher levels of education were more likely to volunteer than were those with less education (U.S. Bureau of Labor Statistics 2015). That said, natural hazard volunteers are largely supplied by university student pools and/or retirees. Natural hazard volunteers are often quickly selected based on an urgent need caused by the natural hazard, which may result in volunteers lacking experience, appropriate preparation, and training. Additionally, these natural hazard volunteers tend to lack structured support networks than those offered to professional and formal volunteer groups such as the police and fire departments. This implies that after the natural hazard work, informal volunteers return to their families, prior workplaces (if they still exist), or their schools where people may not understand their natural hazard experience or worse yet how to respond to their needs. This is noted as structured supports have been shown to be a strong predictor for recovery from traumatic experiences including natural hazards (Brewin et al., 2000; Cook & Bickman, 1990; Flannery, 1990; Ozer et al., 2003).

Additionally, volunteers often are survivors of the natural hazard themselves, as the immediate response of a natural hazard is typically conducted by local community members, (neighbors, family, & friends), and local organizations (Twigg & Mosel, 2017). Many of these individuals engage in search and rescue or body removal, aiding the injured or scared several hours or days before professional help arrives; this is especially common in rural and smaller urban areas where natural hazards can make it difficult for outside professionals to enter or navigate the area (Twigg & Mosel, 2017). They can be engaged in triage as well as distribute food and water to populations under conditions where aid is limited. In addition to the already potentially devastating effects of natural hazard events, the aftermath of these events has been found to be influenced by inequality. Race, class, and gender inequalities before natural hazard events have often resulted in disproportional and unequal aid among these groups (Elliott & Pais, 2006; Marable, 2010).

1.4 Race Differences in Depression

Depression is a disease that exists among every demographic group and social economic status (Bailey et al., 2019). Among an estimated 18 million Americans who have mental health issues approximately 10 million suffer from clinical depression (Bailey et al., 2019). The number of visits for primary care physicians for depressive disorders was 15 million in 2019 and the COVID-19 pandemic seemed to increase the rates of individuals who reported feelings of depression or other mental health symptoms (Santo & Kang, 2019). In fact, rates of depression rose three times higher in the U.S. during the COVID-19 pandemic when compared to before the pandemic (Ettman et al., 2020). The outcomes of depression can lead to disability, exacerbation of other physical health problems, and premature mortality (Dunlop et al., 2003). In examining depression among minorities, it is essential that a multitude of factors must be considered which lead to and influence the development and outcome of depression (Budhwani et al., 2015). Risk factors for depression in the Black community have historically centered on discrimination, socioeconomic position, and stressful life events such as perceived racism, single family households, and communal violence (Bailey et al., 2019). These risk factors are indicative of long-standing disparities which exist in the Black community and cause Black people to be at a higher risk of developing mental health issues such as depression (Davidson et al., 2013).

Hays and Gilreath (2017) conducted a study on the profiles of depression among Black individuals. The results indicated that Black people had lower rates of depression compared to White people. However, when Black people were diagnosed with depression, they were more likely to be diagnosed with severe depression and were more likely to have poorer outcomes due to the diagnosis (Hays & Gilreath, 2017). Additionally, there were many in the Black community that were unable to evacuate the areas with the approach of Hurricane Katrina and Rita due to the lack of funds (Rhodes et al., 2010). Remaining in New Orleans through the Hurricanes caused them to experience the trauma with the loss of their belongs and at times the life of others, which is risk factor for depression (Rhodes et al., 2010). It must be noted that the decreased rates of depression among Black individuals may be explained by lower rates Black individuals who seek and receiving mental health care services when compared to Whites (U.S. Department of Health and Human Services, 2013). Within the literature on mental health among the Black population, there is a lack of data regarding diagnostic and treatment studies on depression for this group (Sohail et al. 2014). The gap in the literature regarding mental health services usage within the Black community can be attributed to the previously mentioned factors of lack of insurance and access, however we would be remiss to not indicate the role of stigma in seeking mental health services. The stigma surrounding the use of mental health services is very evident within the Black community (Alvidrez et al., 2008). Furthermore, research suggests that stigma can prevent individuals from seeking mental health services (Alvidrez et al., 2008). Instead of seeking treatment for mental health symptoms, members of the Black community will often seek the support of family members, religious leaders, and friends (Chatters et al., 2002; Jimenez et al., 2012; Young et al., 2003). While the afore mentioned sources of support can be beneficial for the Black community during times of trauma, the use of medications and cognitive therapies can be more reliable and conducive for providing lasting and positive outcomes for the mental health and overall quality of life.

1.5 The Present Study

In natural hazard situations, especially after Hurricanes Katrina and Rita when the state disaster relief system was temporarily not functioning, local university programs have encouraged students to volunteer. Yet, these student volunteers, unlike typical volunteer pools tend to be younger, have less experience and appropriate support, as well as training to respond effectively in natural hazard situations (Bauwens & Naturale, 2017). Not only are students recruited, they often independently volunteer during natural hazard events, as the personal characteristics that drew them to the profession also tend to draw them to respond to natural-hazard related events (Matthieu et al., 2007). These characteristics include an orientation toward social justice, empathy, social perceptiveness, cultural sensitivity, cooperation, etc. All these circumstances surrounding the engagement of volunteers during natural hazard events mark the potential inexperience and lack of support these individuals may encounter when attempting to deliver aid. Additionally, volunteers may experience the negative effects of engaging in these activities after they have provided aid.

The aim of this study was to investigate the emotional and psychological responses of natural hazard volunteers during a deadly natural hazard. The study explored: a). demographic differences in the acquisition of depressive symptoms among volunteers; b). predictive and protective factors, including volunteer activities and its spirit, altruism, related to this outcome; and c) race differences in depressive symptoms after Hurricane Katrina and Rita.

2. Method

This study was conducted at three public universities in the Gulf Coast area during the 2005 fall semester approximately three months after Hurricanes Katrina and Rita for the first wave survey and six months after Hurricanes Katrina and Rita for the second wave follow-up survey. Researchers at each site distributed a package containing an informed consent letter, the consent form, the survey, and a return envelope. The Human Subjects Review Boards of participating universities approved the documents. The primary investigator of the current study received a master data use agreement from the researchers involved with the original study and obtained Institutional Review approval. Thus, Institutional Review Board approval was obtained to conduct the secondary data analysis. The consent letter (from the original study) emphasized voluntary participation, freedom to withdraw from the study, and confidentiality, which included a description of the additional protections afforded by the Federal Certificate of Confidentiality. Posters, emails, and direct faculty contact were used to encourage participation.

2.1 Participants

Social work student volunteers were recruited from 3 public universities in natural hazard-affected areas comprised the combined sample (N = 182). The majority of the sample was female (91%) and White (57.7%). The mean age was 30.47 years (SD = 9.45). The mean years of higher education schooling were 6.05 (SD = 4.08) indicating that

most of the sample were undergraduate students. Among participants, 11.3% were transferred from institutions in areas directly impacted by Hurricane Katrina and Rita.

2.2 Measures and Covariates

2.2.1 Depression

Depression was measured with the widely used 20-item Center for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977). Using response options ranging from 0 (Rarely or none of the time, < 1 day) to 3 (Most or all of the time, 5-7 days), participants stated how often they had felt or behaved a certain way (e.g., fearful, lonely, happy, depressed) during the previous week. Depression is indicated with a score of 16 or greater (Radloff 1977). Cronbach's alpha for the CES-D was .90.

2.2.2 Optimism

The 8-item Life Orientation Test (LOT) (Scheier & Carver, 1985, 1992) was used to measure optimism. Using a five-level scale (0 = Strongly disagree, 4 = Strongly agree, $\alpha = .75$), participants stated how they felt about each item during the past month (e.g., In uncertain times I usually expect the best, I always look on the bright side of things, Things never work out the way I want them).

2.2.3 Altruism

Altruism was measured with the 20-item Self-Report Altruism Scale (Rushton et al., 1981), assessing the extent to which participants had ever engaged in different types of altruistic behaviors or actions (e.g., giving money to charity, donating blood, volunteering). Participants recorded their response to each statement using a 4-level scale (0 = Never, 4 = Very often, $\alpha = .97$).

2.2.4 Spiritual Support

Spiritual support was measured with the 12-item Spiritual Support Scale (SSS) (Ai et al., 2005), assessing various spiritual relationships (e.g., I have been inspired by my religious or spiritual faith in the face of distress). Participants were permitted to replace the term God with the higher power in their spiritual or religious faith or belief (e.g., the divine, a higher power, Buddha). Response options ranged from 1 (Strongly agree) to 4 (Strongly disagree) concerning each statement during the time following Hurricanes Katrina and Rita. Cronbach's alpha for the SSS was .96.

2.2.5 Strength of Faith

This construct was assessed with selected questions from the Three-Factor Religiosity Scale (Chatters et al., 1992) and used in a prior 9/11 study (Tice et al., 2005; i.e., "How important would you say religion is in your life? How religious would you say you are? How strongly spiritually oriented do you consider yourself to be?"). Participants answered on a 4-level scale (1= Not at all, 4=Very) concerning each item (a=.76, M=9.83, SD=2.00).

2.2.6 Total Volunteer Activities

Volunteer activities were measured with a 16-item checklist developed by the researchers that contained common tasks and activities accomplished by volunteers prior to, during, and following Hurricanes Katrina and Rita. Participants checked the items for which they volunteered any amount of time (e.g., donated money or food, worked in a shelter, counseling victims, rescued victims). A total volunteer activities score was computed by summing the number of activities undertaken by each participant.

2.2.7 Peritraumatic Emotional Responses

Participants' initial emotional reactions to Hurricanes Katrina and Rita were measured with the 12-item Types of Peritraumatic Emotional Responses checklist, originally developed for Ai et al.'s, (2006) 9/11 study, with a contextual modification. Using a 5-level scale (1 = Not at all, 5 = A great deal), participants indicated the extent to which they experienced 12 types of emotional reactions (e.g., horror/shock, anger/hatred, fear/anxiety/worry, sympathy for victims and their families, admiration for the first responders, gratitude for the international support) and an additional "Other" item during the month following Hurricanes Katrina and Rita. As factored in Ai et al.'s, (2005) study, the first five items were summed up as negative emotional responses and the remaining seven constituted positive emotional responses. Cronbach's alpha for both subscales was .82.

2.2.8 Previous Traumatic Experiences

This construct was measured with a 7-item list adapted from Ai et al., (2005). Participants were asked whether Hurricanes Katrina and Rita reminded them of prior tragedies or traumas (e.g., viz., other natural hazards, witnessing

violence, being the victim of a stranger assault, being a war veteran, victimization as a child or adult, previous homelessness). Items checked on the list were summed to create a composite score of previous traumatic experiences.

2.2.9 Peritraumatic Negative Reactions

Participants indicated the negative reactions to the natural hazard they experienced in the month following Hurricanes Katrina and Rita using a 15-item checklist developed by the researchers. Checklist items were based on informal needs analyses conducted by researchers. The checklist included cognitive (e.g., decreased confidence in ability to fulfill commitments, uncertainty about future, worry about family members, worry about schoolwork), emotional (e.g., mood swings, tearfulness, anger about media misinformation, weary of hearing sad stories) and other types (e.g., physical health problems, interpersonal difficulties) of negative reactions. Items checked on the list were summed to create a composite score of negative reactions to Hurricanes Katrina and Rita.

2.2.10 Sociopolitical Reactions

Participants' sociopolitical reactions to Hurricane Katrina ineffectual/problematic response effort were measured with the 10-item Sociopolitical Reactions to Attacks of International Terrorism, originally developed by Ai et al., (2006) with a contextual modification. Using response options ranging from 1 (Not at all) to 5 (A great deal), participants indicated their agreement with statements about factors that contributed to the ineffectual/problematic response to Hurricane Katrina (e.g., poor planning prior to the storm, racism, poverty and social inequality, ineffective leadership). Cronbach's alpha was .78.

2.2.11 Post-hurricane Stressors

Participants indicated the stressors they experienced in the month following Hurricanes Katrina and Rita using an 18-item checklist developed by the researchers, which included common stressors experienced in various domains of living. Stressors ranged from the moderate (e.g., food and gasoline shortages, being an evacuee for less than a week, problems contacting loved ones) to the more severe (e.g., loss of personal property, separation from pets, being an evacuee for a week or more). Items checked on the list were summed to create a composite score of post-hurricane-related stressors.

2.2.12 Demographics and Internship Status

Age, race, gender, and enrollment in field education were considered as potentially important variables. Race, gender, and field were dichotomized (Black = 0, White = 1; Male = 0, Female = 1; No = 0, Yes = 1).

2.3 *Data Analysis*

Descriptive statistics were calculated for participants' demographics and scores on self-report measures. The total sample from the second wave point was entered into iterative regression models wherein additional predictors were entered into model in blocks. Regression modeling was conducted for depression symptoms as the dependent variable. Multicollinearity was assessed as occurring where VIF greater than 5.0 or Tolerance less than .20. Within each block of predictors, those not significant were removed from further iterations of the model ($p > .10$). Block 1 included demographic variables (i.e., race, age, gender, and years of schooling and employment). Block 2 included emotion and stress variables including position and negative emotions, reminding trauma, and an index of stress from Hurricane Katrina. These ineffectual/problematic response to Hurricane Katrina scores were a conceptually important control variable and therefore retained in each model to control for prior experiences. Block 3 included variables related to factors of resiliency and support including measures of optimism, spiritual support, altruism, and volunteerism. Lastly, and to test key hypotheses related to racial differences in response to the events, interaction terms were included in the model with race by variable interactions. Introduction and removal of interaction terms created additional blocks for each model. All predictors were included in blocks and removed manually when p-values exceeded $p < .10$. A priori statistical significance was $p < .05$.

3. Results

Demographic and sample characteristics in the obtained sample are given in Table 1. From the sample of 182, a majority of the sample was white (n = 105, 57.7%), and the mean age of participants was 30.47 years (SD = 9.45). A vast majority of participants were female (n = 181, 91.0%). The mean years of schooling were 6.05 (SD = 4.08) indicating a sample with relatively lower educational attainment. Years of employment were on average 4.34 (SD = 6.34).

Table 1. Descriptive statistics of participants

Sample Characteristics	M (SD)	n (%)
White		105 (57.7%)
Black		77 (42.3%)
Age (years)	30.47 (9.5)	
Years of Schooling	6.05 (4.1)	
Employment in Years	4.34 (6.3)	
Positive emotion score	23.62 (4)	
Negative emotion score	12.71 (4.1)	
Previous Trauma score	.43 (.9)	
Post Hurricane Stressors	39.22 (7.7)	
PTSD score	15.72 (10.9)	
Depression score at baseline	6.05 (4.1)	
Depression score at follow up	4.34 (6.3)	

Table 2 summarizes descriptive data categorized by race. Results of independent t tests demonstrated race-based differential patterns in depression levels, significant stressors, and other control factors. Of interest, Black participants reported statistically significant more experiences with previous traumas (i.e., witness violence, victim of domestic violence, and previous homelessness) and post-hurricane stressors (e.g., additional health care needs, financial problems, loss of electricity, and behavior problems of children) than White participants.

Table 2. Descriptive statistics of participants by race

Variables	Total (n = 182)	Black (n = 77)	European Americans (n = 105)	t
Age (years)	30.47 (9.5)	30.1 (9.6)	29.5 (8.1)	-.7
Female %	88.6	89.6	85.9	-2.3
Employment (years)	4.34 (6.3)	5.3 (7.1)	3.3 (5.0)	3.2**
Schooling (years)	6.1 (4.0)	4.8 (4.1)	7.4 (5.1)	-6.1***
Positive Emotion	23.6 (4.0)	24.0 (4.2)	23.2 (3.9)	-2.3*
Negative Emotion	12.35 (4.0)	12.4 (4.3)	12.3 (3.6)	-.3
Previous Trauma	.42 (.9)	.46 (.9)	.37 (.9)	-1.1
Serious Natural hazard	.13 (.1)	.12 (.3)	.14 (.3)	.4
Witnessed Violence	.10 (.1)	.14 (.3)	.05 (.2)	-3.3**
Stranger Assault	.03 (.1)	.03 (.2)	.03 (.2)	.2
Veteran of War	.02 (.1)	.02 (.1)	.01 (.1)	-.9
Victim of DV	.03 (.2)	.05 (.2)	.01 (.1)	-2.2*
Previous Homelessness	.03 (.2)	.04 (.2)	.01 (.1)	-2.0*
Victim of Child Abuse	.03 (.1)	.02 (.1)	.04 (.2)	1.5
Post Hurricane Stressors	6 (3.5)	5.7 (3.7)	6.2 (2.9)	.9
Additional Health Care	.15 (.4)	.20 (.4)	.09 (.3)	-3.1**
Financial Problems	.36 (.7)	.44 (.8)	.27 (.4)	-2.8*
Being an evacuee (<1wk)	.2 (.4)	.13 (.3)	.26 (.4)	2.8**
Being an evacuee (>1wk)	.3 (.45)	.21 (.4)	.39 (.4)	3.5**
Loss of Electricity	.5 (.05)	.56 (.5)	.44 (.5)	-2.2**
Behavior Problems of children	.06 (.28)	.10 (.3)	.02 (.2)	-2.9**

*p <.05; **p <.01; ***p <.001. (Boldface indicates significant levels.)

3.1 Correlations and Differences by Group

Correlations between all predictors to be entered into the regression models were calculated (Table 3). Correlations ranged from r =-.267 to .403. Correlations between the predictors and outcome scores were calculated (Table 3). Depression scores were significantly and negatively correlated with the participant's age (r = -.163, p = .024) and optimism scores (r =, -.267 p <.001), albeit weak. Black participants (M = 17.74, SD = 11.10) reported significantly higher depression scores (t = 3.07, p = .003, d = 0.47) than White participants (M = 12.58, SD = 10.81). Depression scores did not significantly differ by gender (t = 1.060, p = .290).

Table 3. Correlations between predictors and outcomes at follow up

	Scores at Follow up	
	PTSD Scores	Depression Sores
Age, years	-0.144^{+}	-.163*
Years of Schooling	0.042	-0.099
Employment in Years	-0.127	-0.11
Positive emotion score	0.066	-0.088
Negative emotion score	.403***	.196**
Previous Trauma	.230**	.148*
Post Hurricane Stressors	.284***	0.129
Optimism	-0.143	-.267***
Spiritual support	0.031	0.019
Altruism	0.096	0.03
Volunteer activities	.153*	0.025

*p <.05; **p <.01; ***p <.001

3.2 Regression Models

Depression scores were regressed on the predictions per block in an iterative process (Table 4). In each block, no predictor exceeded the VIF and tolerance score limit which would have indicated excessive multicollinearity. In the first block, race emerged as a significant predictor of reported depression scores (β = 4.596, t = 2.309, p = .022). Age was marginally significant (β = -.234, t = 1.760, p = .081) in the model and was retained in the next model. Gender and each year of school and employment were not significant predictors (p > .187).

Multiple predictors in the second block significantly predicted depression scores. Positive emotion (β = -.653, t = 2.887, p = .005), negative emotion (β = .628, t = 2.481, p = .014), and reminding trauma scores (β = 3.387, t = 2.292, p = .023) each significantly predicted depression.

The third block resulted in only one significant predictor, optimism (β = -.461, t = 2.633, p = .009), which was retained in the final model. Possible interaction terms were added to the model which were race by each negative emotion and reminding trauma. The race by negative emotion interaction term was significant in the model (β = -1.406, t = 3.268, p = .001) as predicting depression. Race by reminding trauma was not a significant predictor in this model (β = 1.523, t = 0.543, p = .588).

The final model (Table 4, Model 6) included six main effects and one interaction term as predicting depression scores (F7, 137 = 8.642, p < .001, r2 = .306, adj. r2 = .271) and explained 30.6% of the variance in this outcome. Controlling for other predictors, the race by negative emotion interaction term (β = -1.372, t = 3.232, p = .002) indicated that when negative emotion was utilized as a coping mechanism among Black participants, it significantly reduced the likelihood of acquiring depression when compared to white participants.

Table 4. Depression total sample, Race as a variable of major interest (n = 162)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
F	2.309	6.905	5.050	7.807	7.560	8.642
(df1, df2)	5, 141	6, 138	9, 134	6, 138	8, 136	7, 137
p	.047	< .001	< .001	< .001	< .001	< .001
r^2	.076	.231	.253	.253	.308	.306
Adj. r^2	.043	.197	.203	.221	.267	.271
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Race (Black)	4.596 (1.983)*	6.960 (1.671)***	6.204 (1.841)**	6.386 (1.656)***	24.291 (5.770)***	24.250 (5.754)***
Age	-.234 (.133)+	-.149 (.091)	-	-	-	
Gender (female)	-4.342 (3.272)	-	-	-	-	
Schooling	-.144 (.260)	-	-	-	-	
Employment	.051 (.194)	-	-	-	-	
Positive emotion		-.653 (.226)**	-.549 (.248)*	-.492 (.231)*	-.484 (.225)*	-.474 (.224)*
Negative emotion		.638 (.257)*	.553 (.262)*	.554 (.256)*	-.084 (.317)	1.291 (.337)***
Previous trauma		3.387 (1.477)*	2.584 (1.502)+	2.947 (1.418)*	3.246 (2.118)	2.377 (1.383)+
Post Hurricane stressor		.128 (.124)	.142 (.123)	.140 (.122)	.202 (.120)+	.202 (.119)+
Optimism			-.461 (.178)*	-.461 (.175)**	-.435 (.170)*	-.431 (.169)*
Spiritual support			.061 (.106)	-	-	
Altruism			-.002 (.076)	-	-	
Volunteer support			.141 (.343)	-	-	
Race*Negative emotion interaction					-1.406 (.430)**	-1.372 (.425)**
Race*Previous trauma interaction					1.523 (2.807)	-

* p < .05 **, p < .01 *** p < .001,+ p < .10

4. Discussion

As natural hazard rates continue to increase, the amount of professional and volunteer rescuers will increase as well. It is imperative that researchers and society recognize volunteer rescuers as a needed resource during every natural hazard as they provide both personnel and skills that are required during the immediate impact of a natural hazard event. In addition, volunteers may be specifically suited to serve underrepresented areas of the population and provide resources more effectively due to their previous training and education. These volunteers can engage in a variety of activities pre- and post-natural hazard events, such as: making sandbags during flood events, emergency management, search, and rescue, reduce recovery costs of professional rescuers, and aid in clean-up to name a few. Due to the vast array of potential activities and the large number of untrained and inexperienced volunteers, it is imperative that researchers aid in the support of their mental health to reduce negative effects during natural hazard relief. Research has only begun to understand the impacts increased experience, preparation, and support may have in increasing positive psychological effects of volunteer personnel. The present findings may enhance our understanding of the impact of natural hazards on volunteers.

While depression scores did not differ by gender, race did prove to be a significant predictor in depression scores with Black volunteers reporting higher depression scores than their White counterparts. These findings answer our study's research question regarding racial difference in mental health symptoms among the volunteers. Additionally, when we explored interaction effects within the results, the relationship between depression, positive emotion, and negative emotion significantly varied by race. In that, the relationship between negative emotion and depression was significantly stronger for black participants when compared to white individuals in the sample. The latter finding supports previous literature displaying that minority populations are more likely to suffer from chronic depression (Bailey et al., 2019). Additionally, a negative relationship was found between age and optimism by depressive symptoms, suggesting that as one's age and level of optimism increases, their likelihood of reporting symptoms of depression decreases. Among the significant findings related to race and various factors examined in the study, we must indicate that race by reminding trauma did not predict depression scores among the participants.

Our findings support the notion that the historical context of many Black communities predispose them to developing depression as a result of experiencing trauma. The historical context of previous trauma experienced by the Black volunteers provides an insight and some support for our final research question regarding previous trauma and depressive symptoms experienced. The literature indicates, survivors of Hurricane Katrina and Rita reported experiences with structural racism and discrimination prior to and after the natural disasters (Bailey et al., 2019; Hankerson et al., 2022; Hays & Gilreath, 2017). Black volunteers may relate to these reports of racism and discrimination, which can also be traumatizing to them as well be potential risk factors for creating or exacerbating mental health symptoms among the volunteers. Data reveals the geographical area of New Orleans is prone to flooding, however those who were living in poverty tended to live in the worst of these areas and could not evacuate duty to lack of funding (Brunkard et al., 2015). The large population of Black residents in New Orleans also encountered several chronic diseases, which were exacerbated by the lack of access to healthcare, which was caused by Hurricanes Katrina and Rita (Mills et al., 2007). The exacerbation of chronic diseases can increase the trauma experienced by those in the Black community along with the volunteers witnessing a decline in the health of those impacted by natural hazards. All these traumas and risk factors can lead to episodes of direct and indirect trauma among the volunteers who may feel helpless when there is no healthcare, social, or financial services available to the survivors of natural hazards. The highly sensitive areas of trauma experienced by the natural hazard survivors and the witnessing and listening by Black volunteers of these accounts of trauma make it essential that we provide the necessary training and support for the volunteers. Nicado et al., (2013) indicates the importance of paying attention to our student volunteers based on the results of a study at five universities in the south that assisted with Hurricane Katrina and Rita. The results indicated that African American student volunteers reported, higher rates of depressive symptoms compared to White students. Furthermore, the African American students experienced disaster related stressors, wherein their White counterparts did not experience these stressors Nicado et al., 2013).

Lastly, our findings show that younger volunteers were more likely to experience depression than older volunteers post natural hazard. While this was not directly explored in our analysis, previous research has shown that younger volunteers may be at increased risk for negative outcomes, probably as a consequence of having limited life experience dealing with natural hazards or traumatic life events (Thormar et al., 2010). This lack of experience places them at increased risk of developing negative mental health symptoms due to not having developed coping mechanisms from stressful life events (also known as post-traumatic growth; Aspinwall and Tedeschi 2010).

5. Implications

Based on the results of this study, it is imperative that more research be conducted to explore how trauma assessments and training prior to natural hazard work could influence the coping of volunteers during and after natural hazard events. Specifically, in our study, we found that most volunteers were young. Therefore, it could be implied that they may be less likely to have had any stressful life events, formal natural hazard response training, situational briefing, or safety protocol training. Potential volunteers are in great need of trauma training as it relates to the effects their own previous traumas can have on their ability to provide effective services to clients dealing with natural hazard related traumas.

Additionally, training and education of volunteers is essential for a safe and effective trauma response environment. Organizations such as the Medical Reserve Corps, Community emergency response team, and the American Red Cross have volunteer pre-training programs such as codes of conduct, incident command, psychological first aid, and scene safety. Specifically, natural hazard relief workers and volunteers should be trained and given support prior to natural hazard catastrophic events in order to maximize their effectiveness in the field and aid in their mental health outcomes during and after these events. Future studies should also focus on the identification of risk or resilience

factors for physical and mental morbidity among volunteers. Obtaining the information assists organizations in identifying volunteers who may require pre-natural hazard interventions and provides the option to assign them to less demanding tasks during natural hazards or be followed up post-natural hazard. Additionally, researchers should work towards understanding more about mental health outcomes of volunteer's post-natural hazard and studying interventions such as the impacts of post-natural hazard training supports on mitigating negative mental-health outcomes.

It is remains unconscionable, that only a small number of volunteer studies with volunteers have explored variables for their predictive power of poorer outcomes in volunteers who regularly work with trauma-affected victims during and post natural hazard. Factors such as previous trauma experiences and post-trauma stressors, neuroticism, hardiness, avoidant coping style, history of prior treatment for psychological disorders, previous self-inflicted physical injury or threat to life, low social support, lower socioeconomic status, gender, lack of experience, and young age are just a few predictors that are in need of further exploration.

Lastly, from a clinical training perspective, education and disaster relief programs should work with organizations that specialize in natural hazard preparedness and resilience in order to better equip their students with these skills to be prepared to volunteer. Scientifically based guidelines and/or protocols on how to select, train, and support natural hazard response volunteers to attend to their health and well-being prior to, during, and after natural hazards are long overdue.

6. Conclusion

As natural hazard rates continue to increase, the amount of professional and volunteer rescuers will increase as well. It is imperative that researchers and society recognize volunteer rescuers as a needed resource during every natural hazard as they provide both personnel and skills that are required during the immediate impact of a natural hazard event. In addition, volunteers trained in social work may be specifically suited to serve historically underserved populations and provide resources more effectively due to their education and training. These volunteers can engage in a variety of activities pre- and post-natural hazard events, such as: making sandbags during flood events, emergency management, search, and rescue, reduce recovery costs of professional rescuers, and aid in clean-up to name a few. Due to the vast array of potential activities and the large number of untrained and inexperienced volunteers, it is imperative that researchers aid in the support of their mental health in order to reduce negative effects during natural hazard relief. Research has only begun to understand the impacts increased experience, preparation, and support may have in improving the positive psychological effects of volunteer personnel.

Data Availability Statement

Some or all data, models, or code generated or used during the study are proprietary or confidential in nature and may only be provided with restrictions (e.g., anonymized data). The de-identified quantitative data may be available with restrictions.

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