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Fall 2019

Contexts of Recovery and Displacement: Investigating the Impact of the 2015 South Carolina Floods Across Communities

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CONTEXTS OF RECOVERY AND DISPLACEMENT: INVESTIGATING THE IMPACT
OF THE 2015 SOUTH CAROLINA FLOODS ACROSS COMMUNITIES

by

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Bachelor of Arts
Georgia State University, 2015

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Master of Arts in

Clinical-Community Psychology

College of Arts and Sciences

University of South Carolina

2019

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DEDICATION

This thesis is dedicated to my parents, without whom I would not be where I am today due to their many sacrifices, unwavering love, and endless support.

To my sister, for whom I constantly strive to be the best I can be, a paragon in which she can look up to and be proud of.

To my fiancée, without whom I would not be able to be the best I can be due to her own sacrifices and years of encouragement.

And lastly, to any other relatives, friends, mentors, and classmates with whom I have confided in, shared intimate moments with, and inspired me along the way – thank you, this would not have been possible without all of you.

ACKNOWLEDGEMENTS

ABSTRACT

In October 2015, South Carolina was devastated by weather complications related to hurricane Joaquin that lead to historic amounts of rainfall and flash floods that destroyed local communities and infrastructure, ultimately displacing over 400,000 people. Natural disasters are destructive and have shown to be correlated with a variety of negative outcomes, including high levels of stress and hopelessness. These effects can be even more pronounced when compounded with displacement as these victims not only have to deal with the usual consequences in the aftermath of a natural disaster, but also the stress of integrating themselves into a different community and potential disruption of their social support network. The present study is a pilot study that investigates the relationship between neighborhood experiences, as measured by neighbor relations and neighborhood social climate, and well-being, as measured by perceived stress and hope, with interpersonal support as a potential mediator for those that were displaced due to the floods (Group 1) and a potential moderator for those that were not, divided into two groups based on damage incurred from the floods (Groups 2 & 3). Results showed significant differences in means between Groups 1 and 2 in hope and Groups 2 and 3 in neighbor relations and interpersonal support. Neighbor relations, neighborhood social climate, and interpersonal support were shown to be correlated with perceived stress and hope, supporting a social ecological approach when it comes to post-disaster recovery. Future research should continue building theory, generating potential frameworks, and refining research questions using the theoretical foundations presented by this study.

PREFACE

The basis for this research originally stemmed from insight gathered from engaging in community-based participatory research through a Photovoice project developed to accompany the original South Carolina Floods Context of Recovery study. As time continues moving ever forward and the 2015 South Carolina Floods fades into memory, it is important to remember that there are those today that are still very much affected by traumas associated with the floods and may be for the remainder of their lives. Natural disasters do not discriminate – no matter your background, you may be impacted all the same.

As such, I would like to extend my dedication and acknowledgements to the participants of the 2015 South Carolina Floods Photovoice study, without whom the theoretical foundations of this thesis would not have been developed and this thesis may not have come to fruition.

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LIST OF SYMBOLS

M   Mean

SD   Standard deviation

N   Total number of participants

n   Participants for a specific sample

CI   Confidence interval

t   t -statistic is used to determine if there is a significant difference between the
          means of two groups

df   Degrees of freedom

p   p-value is used to determine significance

B   Unstandardized coefficients Beta

SE B   Unstandardized coefficients standard error

β   Standardized coefficients Beta

t   t -statistic used to determine if there is a significant difference between the means
          of two groups

LIST OF ABBREVIATIONS

AHS .... Adult Hope Scale

ASD .... Acute Stress Disorder

CBPR .... Community-Based Participatory Research

CRED .... Centre for Research on the Epidemiology of Disasters

HES .... Housing Environment Scale

HES-NS .... Housing Environment Scale – Neighbor Scale

HES-NSC .... Housing Environment Scale – Neighborhood Social Climate

IRB .... Institutional Review Board

ISEL .... Interpersonal Support Evaluation List

P-P .... Predicted-Probability

PSS .... Perceived Stress Scale

PTSD .... Posttraumatic Stress Disorder

SC .... South Carolina

VIF .... Variance Inflation Factor

CHAPTER 1 INTRODUCTION

Natural disasters are devastating events that stem from natural and geologic processes of the Earth, varying in typology (e.g., floods, hurricanes, tornadoes, volcanic eruptions, forest fires, earthquakes, tsunamis, etc.) and severity. According to the Centre for Research on the Epidemiology of Disasters (CRED), between the years of 1994 and 2013, there were 6,873 recorded natural disasters, claiming an astounding 1.35 million lives or about 68,000 lives per year. Even beyond loss of life, an estimated 218 million people per year were affected by natural disasters, whether that be by injury, displacement, homelessness, or any other condition in which they required immediate assistance. There was also an estimated 2.6 trillion dollars' worth of economic damage worldwide in that same time frame. Natural disasters are even increasing in frequency given the rise of climate-related disasters such as storms and floods (CRED, 2015).

Natural disasters can impact multiple dimensions of health even beyond physical and economic damage, such as one's mental, emotional, and social well-being. Natural disasters have been linked with suicidal ideation, posttraumatic stress, anxiety, and other negative mental health outcomes (Lequertier, Simcock, Cobham, Kildea, & King, 2019; Shah et al., 2019; Zuromski et al., 2019). In the aftermath of a natural disaster, victims may be at risk for developing Acute Stress Disorder (ACS) or, in more extreme cases, posttraumatic stress disorder (PTSD; Lavenda, Grossman, Ben-Ezra, & Hoffman, 2017). Despite natural disasters being fairly brief, the consequences of natural disasters have been shown to have potentially long-term and life-changing consequences. Natural

disasters have even been linked with higher rates of prenatal maternal stress, potentially altering the lives and development of children even before they are born (Lequertier, Simcock, Cobham, Kildea, & King, 2019; Nomura et al., 2019; St-Pierre et al., 2018).

Displacement

Along with natural disasters comes property damage, displacement, and homelessness. Displacement, when following natural disasters, often makes its effects even more pronounced as these victims not only have to deal with the usual consequences in the aftermath of a natural disaster, but also the stress of integrating themselves into a different community and potential disruption of their social support network (Fussell & Lowe, 2014; Mort, Walker, Lloyd Williams, & Bingley, 2018; Peek et al., 2014). Previous research on displacement often investigates victims of Hurricane Katrina due to its widespread devastation and the sheer number of people displaced (Fussell & Harris, 2014; Graif, 2016; McGuire et al., 2018). Studies that have examined displacement and its resulting consequences have investigated four dimensions of displacement: geographic distance from one's original house and community, number of post-disaster moves, time spent in temporary housing, and type of post-disaster housing (Fussell & Lowe, 2014).

Generally, those that have been displaced suffer greater distress, anxiety, and, in extreme cases, symptoms consistent with severe mental illness (Fussell & Lowe, 2014; Hori & Shafer, 2010). Adults and children alike experience distress, anxiety, and disillusionment with societal responses after suffering loss of agency, social networks, and familiar space (Mort, Walker, Lloyd Williams, & Bingley, 2018; Scannell, Cox, & Fletcher, 2017). One study even coined the term "chronic disaster syndrome," which is defined as "living with long-term stress related to loss of family, community, jobs, and

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social security as well as the continuous struggle for a decent life in unsettled circumstances (Adams, Van Hattum, & English, 2009)." Chronic disaster syndrome emerges from three phenomena related to displacement: the long-term effects of personal trauma, social arrangements post-disaster, and the permanent displacement of vulnerable populations from the social landscape (Adams, Van Hattum, & English, 2009). The negative consequences associated with displacement also appear to be similar across natural disaster type (e.g., tsunami, earthquake) and countries, such as Japan, China, and India (Cao et al., 2014; Tsuchiya et al., 2017; Viswanath et al., 2013).

Stress

Both natural disasters and displacement are commonly linked with stress, including psychological distress, posttraumatic stress, and perceived stress (Fussell & Lowe, 2014; Mort, Walker, Lloyd Williams, & Bingley, 2018; McGuire et al., 2018). In fact, those that have been displaced or those that have been unstably housed due to natural disasters have shown significantly higher psychological and perceived stress (Fussell & Lowe, 2014). Perceived stress is often correlated with psychological distress, as well as other outcomes such as suicidal ideation and even negative changes in executive functioning (Hirsch, Rabon, Reynolds, Barton, & Chang, 2019; Kechter et al., 2019; Valikhani, Ahmadnia, Karimi, & Mills, 2019). Perceived stress has also been linked with chronic stress (García-León, Pérez-Mármol, Gonzalez-Pérez, García-Ríos, & Peralta-Ramírez, 2019).

Natural disasters may also exacerbate negative health outcomes for at-risk and vulnerable populations, such as those with high perceived stress or those previously diagnosed with PTSD (Brown, Fernandez, Kohn, Saldivia, & Vicente, 2018; Sloand et

al., 2017; St-Pierre et al., 2018). The effects of stress can be seen across different age groups and cultures (Cao et al., 2014; Kechter et al., 2019; Mort, Walker, Lloyd Williams, & Bingley, 2018). These effects have been shown to amplify over long periods of time and are more impactful for those with lower social support and those that lack other resources (Adams, Van Hattum, & English, 2009; Maden & O'Mullan, 2016).

Social Resilience

While natural disasters can certainly be devastating, its severity is not solely limited to its level of destruction. In fact, natural disasters are classified as natural hazards until there is loss of life or at least 100 people affected (CRED, 2015). As such, the severity of a natural disaster also depends on the affected population's vulnerability and resilience (Bankoff, Frerks, & Hilhort, 2003). Resilience is a broad concept that is commonly studied in psychological literature, yet does not appear to have a standard, universal definition and its uses and measures appear to be varied (McCleary & Figley, 2017). Resilience is often defined as one's ability to "bounce back" in the face of adverse life experiences, but this definition does not fully acknowledge the scope of factors (i.e., biological, psychological, social, cultural, etc.) that can shape or define one's resilience (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014).

Regarding natural disasters, social factors such as social connectedness and belongingness are often studied as natural disasters usually have community-level impacts. Generally, those with higher social support and connectedness had decreased risk of distress, depression, anxiety, and other negative mental health outcomes associated with natural disasters (McGuire et al., 2018). As such, displacement resulting in the loss of these social supports can make affected populations even more vulnerable.

Despite this, high social capital has been found to be an effective buffer against some of the negative effects of displacement (Maden & O'Mullan, 2016; Tsuchiya et al., 2017). This may be because those with higher social capital have more social networks, so there could still be a significant amount of social and interpersonal support present post-disaster, even after displacement. Those that have lower social capital could be limited in their number of social networks and these networks could be tied to their local neighborhoods and communities. As such, natural disasters that destroy communities of those with lower social capital could throw their entire social support system into disarray (Maden & O'Mullan, 2016; Tsuchiya et al., 2017).

Hope

Social resilience has often been studied with individual-level factors of well-being. Generally, those with high individual-level character strengths such as self-esteem, optimism, and hope had decreased risk of distress, posttraumatic stress, and other negative mental health outcomes (Cherry et al., 2017; Zhou, Wu, & Zhen, 2018). Hope itself, specifically hope for the future, has been found to be an effective buffer against negative health outcomes for victims of hurricane Katrina (Hamilton-Mason et al., 2012; Owens, Schieffler, & Kahn, 2011). Hope has also been found to be an effective buffer against the psychological impact of chronic environmental adversity (Stain et al., 2011). Hope has been used to investigate family resiliency and was found to be related to family coping post-disaster, as well as coping for social service providers following a natural disaster (Hackbarth, Pavkov, Wetchler, & Flannery, 2012; Powell, Wegmann, & Shin, 2019). Additionally, hope is often shown to be correlated with faith and faith healing, which has often been found to aid in the recovery of natural disasters as well as a variety

of other adverse events (Davis et al., 2018; Halligan, 2007; Owens, Schieffler, & Kahn, 2011). These positive associations have been noted for a variety of populations, ranging in age and ethnicity, but also across natural disaster type (Hamilton-Mason et al., 2012, Zhou, Wu, & Zhen, 2018).

2015 South Carolina Floods

In October 2015, South Carolina was devastated by weather complications related to hurricane Joaquin that lead to historic amounts of rainfall and flash floods that destroyed local communities and infrastructure, ultimately resulting in 19 fatalities and displacing over 400,000 people. There was over $1 billion in damages and approximately 410 roads and bridges were closed. In Columbia, over 20 inches of rain fell over the course of five days, overwhelming multiple dams with excess runoff and causing widespread flood damage to roadways, businesses, residences, and infrastructure (NWS, 2016). In fact, the sheer amount of rainfall broke multiple records in South Carolina: greatest 24-hour total rainfall, greatest five-day total rainfall, and more rainfall than any other natural disaster in South Carolina's history (Wiltgen, 2015). The amount of rainfall was enough for 1.2 million gallons of water for every person in the state and enough to give every person in both North Carolina and California an Olympic-sized swimming pool (Ferris, 2015). Columbia had not experienced this magnitude of flooding in over 75 years and some areas of the state saw rainfall equivalent to a 1-in-1000-year event, fitting its title of being a "1000-year flood (Conlon & Valencia, 2015)." The sudden onset and unique nature of the 2015 floods opened opportunities for research not previously seen in natural disaster literature as the impact of the 2015 floods and experiences with relief

efforts may vary between neighborhoods and even individuals within those neighborhoods (NWS, 2016).

The SC Floods Contexts of Recovery Study was developed in the interest of investigating how neighborhood experiences and community support can assist people in recovery after such disasters. The study delves into neighborhood and community experiences, as well as interpersonal support, well-being, and lifestyle changes as a result of the floods. In support of the Contexts of Recovery Study, a photovoice project was developed in order to further examine the experiences of victims well after the floods as these individuals were reportedly suffering years later. In fact, the photovoice participants were all displaced due to the floods, despite differences in location and socioeconomic status. The photovoice group also provided the participants with a support group of sorts, as the participants connected over shared loss and trauma, as well as having worked together to develop and present the project with hopes of improving natural disaster response across socio-ecological levels (Phan et al., 2018).

The Present Study: Theories and Empirical Frameworks

The present study was based upon a socio-ecological framework developed for the purposes of investigating housing environments, which is broken down into dimensions of one's social environment (e.g., social climate, safety), physical environment (e.g., physical quality, neighborhood quality), and specific interpersonal relationships (e.g., neighbor, roommate, landlord; Kloos & Shah, 2009). This framework is based off of social ecology theory, which distinguishes features of a social ecology approach to health research, which (1) includes the physical and social environment as well as their interaction, (2) focuses on the individual's perception and experience of the

environment, (3) emphasizes adjustment, growth, and adaptive functioning, (4) looks for environmental impact on adjustment, adaptation, and coping, (5) considers different conceptualizations of how environments can affect functioning, and (6) is explicit with its values (Moos, 1976). Bronfenbrenner (2009) also provides an ecological systems framework that investigates the individual's relationships within different levels of physical and social systems (e.g., individual, microsystem, mesosystem, exosystem, and macrosystem). Regarding these frameworks and theories, the present study intended to investigate how one's environment, specifically one's social environment and interpersonal relationships, is related to one's adjustment, adaptation, and coping post-disaster, which is further influenced by whether they have been displaced.

Social ecological theory and related frameworks have been rarely applied to post-disaster communities and displaced individuals, though when it has, it has been within the context of recovery and resilience. One study found that a vibrant arts and crafts movement following an earthquake facilitated the recovery process through creating opportunities for social support, giving to others, and developing vision and hope for the future (Tudor, Maidment, Campbell, & Whittaker, 2015). Another found that community forestry post-Katrina increased collective efficacy and enhanced individual, social, and environmental well-being (Tidball, Krasny, Svendsen, Campbell, & Helphand, 2010). Few studies have applied social ecological theory to displaced individuals. One study determined that social disruption post-Katrina led to distrust, uncertainty, and confusion for individuals dealing with social abandonment and discriminatory rebuilding policies (Harvey, 2016).

One population that has the potential to be compared with displaced individuals due to similarities in certain respects are recently immigrated populations and refugees. While they do have to deal more with acculturative stress and other related processes, both populations are similar in that they have faced potential social disruption and the stress of integrating themselves into a new environment. One study found that Latina women who had high levels of attachment to their social network reported substantially less distress, as well as those that have spent more time in the United States (Dillon et al., 2019). Another study found that higher social capital and more ethnic networks of social relations improved child and family well-being for Latino/a populations (Johnson, 2007). Again, while direct comparisons to displaced populations cannot be made, given the importance of social support and other community-level factors in social ecological theory, it could be assumed that the loss of social supports could be potentially devastating for displaced individuals, especially without any other sources of support to alleviate the stressors of integrating into a new environment.

The present study's conceptualization of resources in relation to the social dimensions of resilience was based upon the concept of resource change which is central to Hobfoll's (2002) theory of conservation of resources. The concept of resource change notes that a loss or gain of resources results in a loss or gain of stress, assuming there was a presence of that resource to begin with. The concept of resource change has been mainly used regarding traumatic events, such as the passing of a family member (Hobfoll, 2002). It has been used a handful of times in natural disaster and displacement literature, though for the few times it has been used to focus on socio-contextual resources, it has shown similar effects when compared to other traumatic disasters

(Wadsworth, Santiago, & Einhorn, 2009). One study found that resource loss and stress in the wake of hurricane Hugo were better predictors of psychological distress than sense of coherence and anxiety (Kaiser, Sattler, Bellack, and Dersin, 1996). Another study found that relationships and problems in relationships, along with other classes of resources, predicts subjective well-being (Hamama-Raz, Palgi, Leshem, Ben-Ezra, & Lavenda, 2017). As such, changes in interpersonal resources such as the perceived availability of social support could result in more stress for the individual and could be especially devastating for displaced individuals.

The Present Study: Hypotheses

The present study was intended to be a pilot study in order to help build theory, generate potential frameworks, and refine future research questions when studying victims of natural disasters, particularly those that have been displaced. While there has been some research on displaced individuals post-disaster, few have intentionally applied theory or developed frameworks, and there are innate limits when it comes to expanding the literature as natural disasters cannot be produced or reproduced. Additionally, the participants in this study were unique in that they were not geographically far from their original location and, despite the devastation of the record-setting rainfall and flooding, the damage that was done varied depending on neighborhood and even individuals within those neighborhoods, which is much different than the widespread devastation and impact of natural disasters like hurricane Katrina. These qualities allow the present study to offer additional insights not seen in previous literature into displacement and the potential impact of neighborhood experiences and other sources of social support on well-being post-disaster. Having a better understanding of the nuances associated with

displacement in the aftermath of natural disasters can better prepare us and perhaps improve natural disaster response.

The present study investigated the contexts of recovery for those that were displaced by the floods (**Group One**; n=17) compared to those that were not. Those that were not displaced will be further broken into two additional groups based on post-flood experience: those that were living in a home as it was being repaired from flooding damage at the time of the interview (**Group Two**: n=22) and those that were living in a home that received minimal damage and was already repaired (**Group Three**; n=45). These groupings were developed in the hopes of providing additional insight into the effects of neighborhood experiences for those that have been displaced and those that have not, as social factors such as neighborhood connectedness and social climate could impact one's well-being post-disaster, per social ecological theory. Additionally, interpersonal support, an additional social factor, could mediate this relationship for those that were displaced. Regarding resource change, displaced individuals may have experienced a complete loss of neighborhood supports and find it difficult to integrate into a novel neighborhood, thus generating more stress. As such, the present study assumes that any effect of neighborhood experience on well-being is better explained by other perceived sources of interpersonal support for displaced individuals. Other sources of support not only act as an effective buffer against the stressors of integration and the potential loss of neighborhood supports; it could be a sign of high social capital and one could assume that those that have been displaced, yet remained local, have maintained and made use of these social resources in order to aid in their recovery.

For those that were not displaced, their neighborhood supports may have been maintained, though having additional interpersonal supports could still strengthen the effect of neighborhood experiences on well-being as those with higher social capital and higher perceived global sources of support could have more resources to buffer against the negative outcomes of natural disasters, thus acting as more of a moderator. For the purposes of this study, well-being will be measured by perceived stress, given its connection with various negative health outcomes, as well as hope, given its role in recovery. For each group, the present study examined the relationship between neighborhood experiences, as measured by neighborhood connectedness and social climate, and well-being, as measured by perceived stress and hope, with interpersonal support as a potential mediator for group one (i.e., those that have been displaced) and a moderator for groups two (i.e., those that were living in a house as it was being repaired during the time of the interview) and three (i.e., those that received minimal damage or were living in a house that was already repaired).

The hypotheses are, as follows:

H1: In a hierarchical linear regression model predicting perceived stress scores (i.e., PSS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be negatively correlated with stress for group one (i.e., those who were displaced) and perceived interpersonal support (i.e., ISEL) will mediate this relationship.

H2: In a hierarchical linear regression model predicting hope scores (i.e., AHS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be positively correlated with hope for group one (i.e., those who were displaced) and perceived interpersonal support (i.e., ISEL) will mediate this relationship.

H3: In a multiple linear regression model predicting perceived stress scores (i.e., PSS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be negatively correlated with stress for groups two (i.e., living in home as it was being repaired at the time of the interview) and three (i.e., minimal or already repaired damage). Interpersonal support (i.e., ISEL) will act as a moderator for this relationship for both groups.

H4: In a multiple linear regression model predicting hope scores (i.e., AHS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be positively correlated with hope for groups two (i.e., living in home as it was being repaired at the time of the interview) and three (i.e., minimal or already repaired damage). Interpersonal support (i.e., ISEL) will act as a moderator for this relationship for both groups.

H5: Participants with a higher perception of neighborhood experiences (i.e., HES-NS & HES-NSC) will experience less perceived stress (i.e., PSS) and more hope (i.e., AHS) for all three groups.

CHAPTER 2 METHODS

Participants

Participants in this pilot study were adults (ages 18+) affected by the October 2015 SC floods. 84 participants were recruited through outreach to local social service organizations providing emergency relief services during the flood as well as post-flood relief (e.g., United Way of the Midlands, Hearts & Hands Disaster Recovery, St. Bernard Project, South Beltline – Gills Creek Community Relief Foundation, and Society of St. Vincent de Paul), community reconstruction meetings, local churches, and online postings in community support groups.

Participants ranged from 18 to 80 years in age with an average age of 33 and a majority of the sample identified as female (n=54, 64%). In terms of race, 44% (n=37) of the participants identified as Black, 42% (n=35) identified as White, 7% (n=6) identified as Asian, 4% (n=3) identified as Latino/a, and 4% (n=3) identified as Other. Groups were determined based off of housing demographics that were collected, such as prior addresses, reasons for moving, whether or not they were currently living in a home that was being repaired during the time of the interview, as well as estimates on the amount of damage resulting from the floods.

Measures

Neighborhood and Community Experiences

Housing Environment Scale

The Housing Environment Scale (HES) is an instrument that is usually delivered through a structured interview and considers social, interpersonal, and physical factors inherent in a local community setting (Kloos & Shah, 2009). The HES is divided into 10 subscales, each measuring different constructs related to the three factors (i.e., physical, social, and interpersonal), such as relations with neighbors, perceived neighborhood safety, and perceived neighborhood quality.

The *Neighbor Scale (HES-NS)* is a subscale from the HES. This subscale is a self-report measure that measures dyadic supports within a community, specifically for local neighbors. The HES-NS contains 14 items and is measured on a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." Sample items include: "I can count on a neighbor for help when I need it" and "There is no one in my neighborhood with whom I'm close." Internal consistency for this subscale is .77 and test-rest reliability is .75 (Kloos & Shah, 2009).

The *Neighborhood Social Climate (HES-NSC)* is another subscale from the HES. This subscale is a self-report measure that measures perceived social climate within a community, specifically for the local neighborhood. The HES-NSC contains 11 items and is measured on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." Sample items from the scale include "I feel safe in my neighborhood" and "Sometimes I feel unwelcome in my neighborhood because of my ethnicity and my

cultural background." Internal consistency for this subscale is .82 and test-retest reliability is .71 (Kloos & Shah, 2009). Additionally, three items were added that specifically addresses one's experience of the floods (e.g., "Some people in my neighborhood give me a hard time because of the Flooding experience").

Interpersonal Support

Interpersonal Support Evaluation List

The *Interpersonal Support Evaluation List (ISEL)* is a self-report measure that measures an individual's perceived global sources of social support (Bauman et al., 2012). The ISEL contains 12 items and is measured on a 4-point Likert scale, ranging from "Definitely False" to "Definitely True." Sample items include "I feel that there is no one I can share my most private worries and fears with" and "If I were sick, I could easily find someone to help me with my daily chores." The six negative items in the ISEL are reverse coded. Test-retest reliability for the measure was found to range from .70 to .81. Reliability of the scale has been shown to range from .80 to .91 (Bauman et al., 2012).

Well-Being

Perceived Stress Scale

The *Perceived Stress Scale (PSS)* is a self-report measure that measures one's perception of stress and the degree to which situations in one's life is considered stressful over the course of the last month (Cohen, Kamarck, & Mermelstein, 1983). The PSS contains 10 items and is measured on a 5-point Likert scale ranging from "Never" to "Very Often." Sample items include, "[In the past month how often have you…]" "Been upset because of something that happened unexpectedly" and "Felt confident about your

ability to handle your personal problems." The four positive items in the PSS are reverse coded. Previous research has found that the reliability for the PSS is .90 (Taylor, 2015).

Hope

Adult Hope Scale

The *Adult Hope Scale (AHS)* is a self-report measure that measures Snyder's cognitive model of hope, which suggests that hope is related to two components: (a) agency, which is the perception that one can initiate sustained action towards achieving goals, and (b) pathways, which is the perception that one can make plans towards achieving goals (Snyder et al., 1991). The AHS used in this study has been adapted from the Children's Hope Scale (CHS). This version of the AHS contains six items – three that measures agency thinking and three that measures pathways thinking – and is measured on a 6-point Likert scale ranging from "None of the time" to "All of the time (Snyder et al., 1997)." Sample items include, "I think I am doing pretty well" and "I can think of many ways to get to the things that are most important to me." Internal consistency for the AHS ranges from .72 to .86 with a median alpha of .77 and test-retest reliability is .73 (Snyder et al., 1997).

Design

The participants engaged in either a semi-structured interview or an online survey which consisted of 193 questions and took 30 to 60 minutes to complete. Online surveys were delivered using a unique link for each survey. Participants were screened for eligibility by confirming their address during the October 2015 flooding. Interviews were performed in-person at local restaurants, libraries, and community centers, and questions

were read aloud to participants from a trained undergraduate or graduate research assistant. The interviews consisted of self-report scales measuring housing demographics, neighborhood and community experiences, interpersonal support and personal well-bring. These measures included open-ended qualitative questions that ask for information, such as reasons for moving into this neighborhood, advantages and disadvantages of living in the neighborhood, and an assessment of how their daily activities have been affected by the flood. Participants were compensated $20 for the completion of the interview. Informed consent was given describing the aims of the study, types of questions asked in the interview, and a commitment to confidentially. The study received IRB approval through the University of South Carolina IRB.

Analyses

Mean differences between groups were first tested using independent samples t-tests. Bivariate correlations were run to test zero-order correlations among all study variables. Hierarchical linear regressions were run for group one (i.e., those that were displaced by the floods) in order to test the first and second hypotheses: one with hope (i.e., AHS) as the dependent variable and one with perceived stress (i.e., PSS) as the dependent variable, both along with the proposed mediator, interpersonal support (i.e., ISEL). Multiple linear regressions were run for groups two (i.e., those that were living in a home as it was being repaired from flood damage during the time of the interview) and three (i.e., those that received minimal damage or damage that was already repaired) in order to test the third and fourth hypotheses: one with hope (i.e., AHS) as the dependent variable and one with perceived stress (i.e., PSS) as the dependent variable, both along with the proposed moderator, interpersonal support (i.e., ISEL). The fifth hypothesis was

tested by all analyses. All assumptions were tested, and all analyses were run using SPSS

and the PROCESS macro.

CHAPTER 3 RESULTS

Independent Samples T-Tests

Results of the independent samples t-test showed that hope differed between group one and group two at the .05 level of significance (*refer to Table 3.1, below*). On average, group one tends to have less hope than group two. Neighbor relations and interpersonal support between group two and group three differed at the .05 level of significance (*refer to Table 3.3, below)*. On average, group two tends to have higher neighbor relations and interpersonal support than group three.

Table 3.1
Summary of t-tests and Descriptive Statistics for Groups One and Two

Measure	Group							
	One			Two				
	M	SD	n	M	SD	n	t	df
HES-NS	3.43	1.04	17	3.96	0.95	21	-1.64	36
HES-NSC	2.90	0.25	12	2.90	0.41	17	-1.61	27
ISEL	3.17	0.66	16	3.36	0.63	22	-0.87	36
PSS	2.62	0.87	16	2.10	0.79	22	1.93	36
HOPE	3.79	1.23	14	4.60	0.90	22	-2.29*	34

* $p < .05$.

Table 3.2
Summary of t-tests and Descriptive Statistics for Groups One and Three

Measure	Group							
	One			Three				
	M	SD	n	M	SD	n	t	df
HES-NS	3.43	1.04	17	3.33	0.82	43	0.39	58
HES-NSC	2.90	0.25	12	2.89	0.39	23	-1.36	33
ISEL	3.17	0.66	16	3.05	0.53	44	0.73	58
PSS	2.62	0.87	16	2.31	0.61	42	1.53	56
HOPE	3.79	1.23	14	4.20	1.05	43	-1.22	55

* $p < .05$.

Table 3.3
Summary of t-tests and Descriptive Statistics for Groups Two and Three

Measure	Two			Three				
	M	SD	n	M	SD	n	t	df
HES-NS	3.96	0.95	21	3.33	0.82	43	2.74*	62
HES-NSC	2.90	0.41	17	2.89	0.39	23	0.37	38
ISEL	3.36	0.63	22	3.05	0.53	44	2.05*	64
PSS	2.10	0.79	22	2.31	0.61	42	-1.20	62
HOPE	4.60	0.90	22	4.20	1.05	43	1.52	63

* $p < .05$.

Assumptions for the independent samples t-test were met. The first assumption of independent observations was met as each case represented a different person. The second assumption of normality was tested for all variables in groups one and two. It was assumed that group three followed a normal distribution as the group had more than 25 observations. For groups one and two, the Shapiro-Wilk test was used to determine normality as both groups number around 20 observations (17 and 22, respectively). None of the results were significant, thus the alternative hypothesis was rejected, and it was concluded that the data comes from a normal distribution (*see Table 3.4, below*). The third assumption of homogeneity was tested for all variables in all groups using Levene's test. None of the results were significant, thus the alternative hypothesis was rejected, and it was concluded that the data does not violate the homogeneity of variance assumption (*see Table 3.5, below*).

Table 3.4
Summary of Shaprio-Wilk tests for Normality

Measure	One		Two		Three	
	Stat	p	Stat	p	Stat	p
HES-NS	0.91	0.34	0.92	0.16	0.96	0.55
HES-NSC	0.96	0.83	0.97	0.78	0.95	0.42
ISEL	0.91	0.25	0.92	0.20	0.95	0.47
PSS	0.91	0.29	0.96	0.62	0.97	0.84
HOPE	0.91	0.28	0.95	0.44	0.97	0.77

Table 3.5
Summary of Levene's test for Homogeneity of Variance
  Measure

	Levine	df1	df2	p
HES-NS	1.41	2	78	0.25
HES-NSC	1.55	2	49	0.22
ISEL	1.55	2	79	0.22
PSS	1.68	2	77	0.19
HOPE	0.97	2	76	0.50

Hierarchical Regression Analyses

Results of the hierarchical regression analyses showed that both neighbor relations and neighborhood social climate were significantly correlated with perceived stress at the .05 level of significance, though only for their second models (*see Table 3.6, below*). Neighborhood social climate and interpersonal support were only significantly correlated with hope at the .05 level of significance for the second model (*see Table 3.7, below*).

Table 3.6
Summary of Hierarchical Regression Analyses for Variables Predicting PSS (Group 1)

Variable	Model					
	One			Two		
	B	SE B	t	B	SE B	t
HES-NS	0.28	0.16	1.76	-0.79*	0.12	-6.54
ISEL				0.09	0.18	0.51
HES-NSC	-0.82	0.69	-1.20	-2.85*	0.75	-3.79
ISEL				-0.50	0.34	-1.47

*$p < .05$.

Multiple Regression Analyses

Results of the multiple regression analyses showed that neighbor relations, interpersonal support, and their interaction were all significantly correlated with hope at the .05 level of significance for group three (*see Table 3.8, below*). Neighborhood social

climate, interpersonal support, and their interaction were all significantly correlated with

hope at the .05 level of significance for group two (*see Table 3.9, below*).

Table 3.7
Summary of Hierarchical Regression Analyses for Variables Predicting HOPE (Group 1)

Variable	Model					
	One			Two		
	B	SE B	t	B	SE B	t
HES-NS	0.23	0.18	1.23	0.60	0.29	2.08
ISEL				0.73	0.42	1.72
HES-NSC	-0.70	0.70	-0.10	3.24*	1.04	3.11
ISEL				1.49*	0.50	2.99

*p < .05.

Table 3.8
Summary of Multiple Regression Analyses for Variables Predicting PSS (Groups 2 & 3)

Variable	Group					
	Two			Three		
	B	SE B	t	B	SE B	t
HES-NS	-0.61	1.44	-0.42	0.50	0.70	0.72
ISEL	-1.41	1.68	-0.84	0.38	0.81	0.47
NS x ISEL	0.20	0.41	0.48	-0.19	0.23	-0.84
HES-NSC	-1.75	2.25	1.41	1.36	2.33	0.58
ISEL	-2.56	2.19	-1.17	0.99	2.03	0.49
NSC x ISEL	0.68	0.76	0.89	-0.48	0.74	-0.65

*p < .05.

Table 3.9
Summary of Multiple Regression Analyses for Variables Predicting HOPE (Groups 2 & 3)

Variable	Group					
	Two			Three		
	B	SE B	t	B	SE B	t
HES-NS	-1.71	1.60	-1.07	2.65*	1.16	2.28
ISEL	-1.37	1.86	-0.73	3.34*	1.38	2.43
NS x ISEL	0.46	0.46	1.01	-0.77*	0.37	-2.06
HES-NSC	6.12*	2.42	2.53	-3.01	4.45	-0.68
ISEL	6.11*	2.35	2.60	-1.64	3.89	-0.42
NSC x ISEL	-1.95*	0.81	-2.40	0.75	1.36	0.55

*p < .05.

Assumptions for linear regression were all met. The first assumption of normality

was determined by examining Predicted Probability (P-P) plots in order to infer whether

the residuals were normally distributed for each regression run. All P-P plots appeared to conform to the diagonal normality line indicated in the plot. One of the P-P plots is shown below in Figure 3.2. The second assumption of homoscedasticity was determined by examining scatterplots plotted with predicted values and residuals for each regression run. All scatterplots appeared to show homoscedasticity as the plotted point appeared to be random and equally distributed. One of the scatterplots is shown below in Figure 3.2. The third assumption of linearity is assumed as the residuals appeared to be normally distributed and homoscedastic. The fourth assumption of the absence of multicollinearity was determined by checking variance inflation factor (VIF) values. All of the values were below 10.00, meaning that the values were not highly correlated.
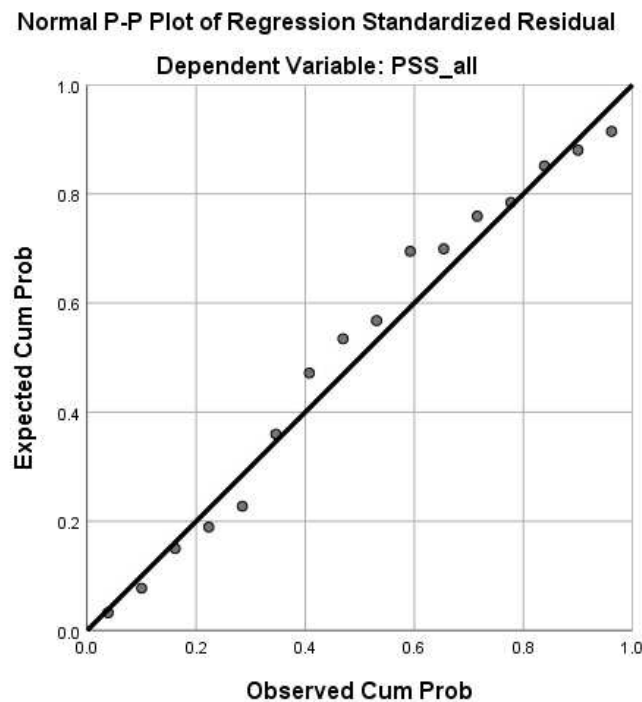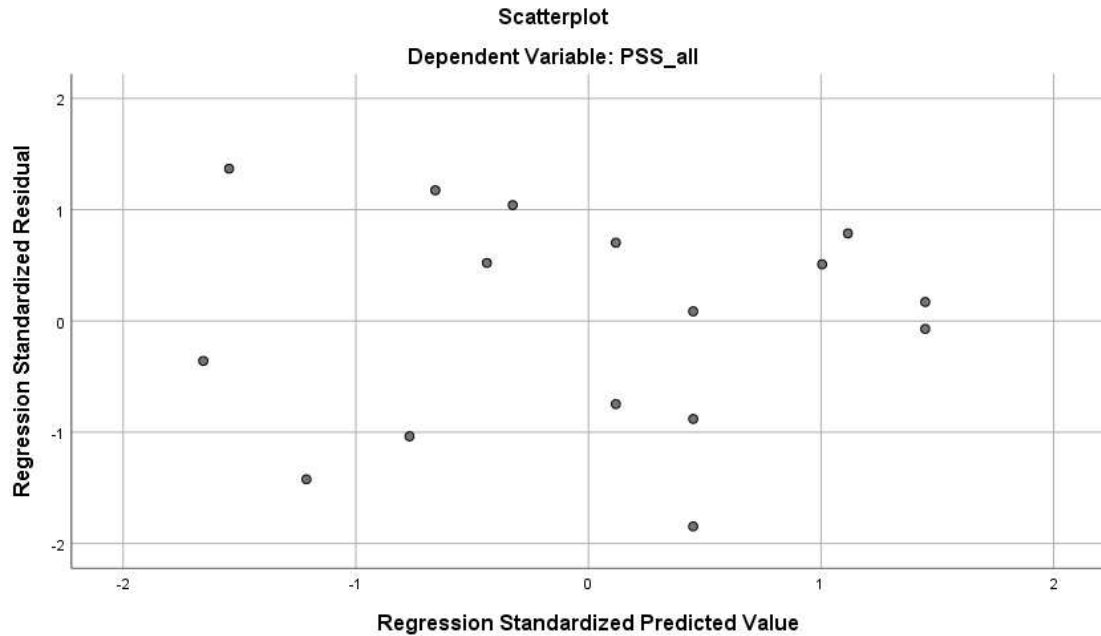

Figure 3.1. P-P Plot Sample.
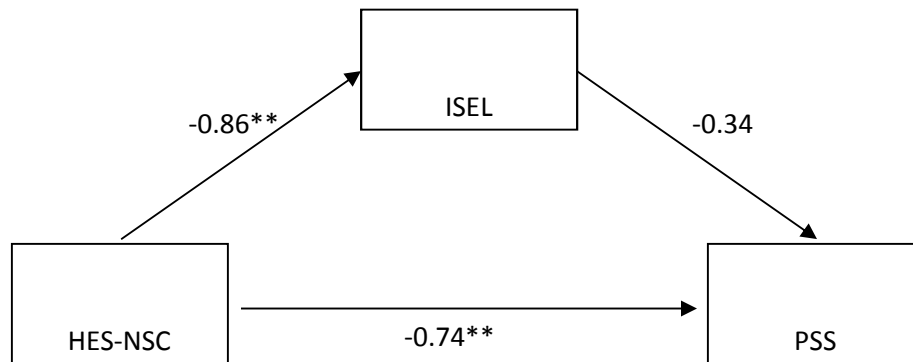
Figure 3.2. Scatterplot Sample.

Hypotheses Testing

H1: *In a hierarchical linear regression model predicting perceived stress scores (i.e., PSS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be negatively correlated with stress for group one (i.e., those who were displaced) and perceived interpersonal support (i.e., ISEL) will mediate this relationship.* Neighbor relations and neighborhood social climate were only significantly correlated with perceived stress once interpersonal support was added as a mediator into the second model, though interpersonal support was not significantly correlated itself and did not act as a mediator for this model (*see Figures 3.3 and 3.4, below*). This hypothesis was not supported.
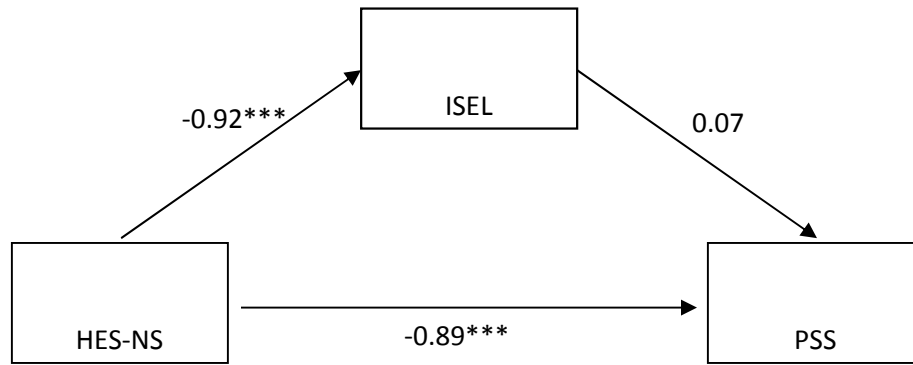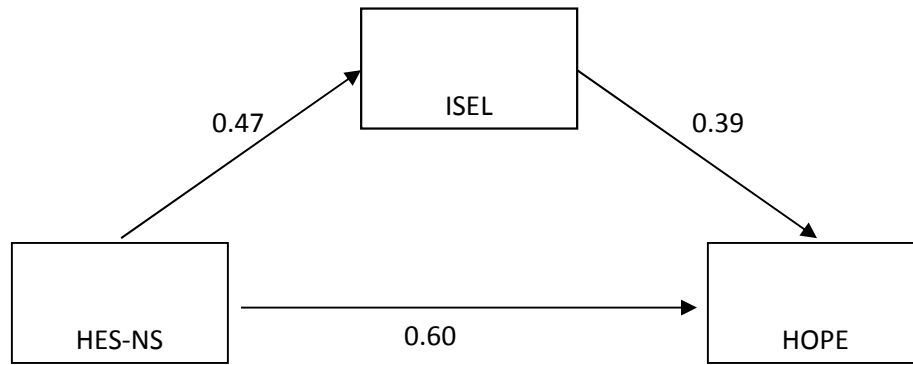
Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.3. Mediation Model for HES-NS and PSS.

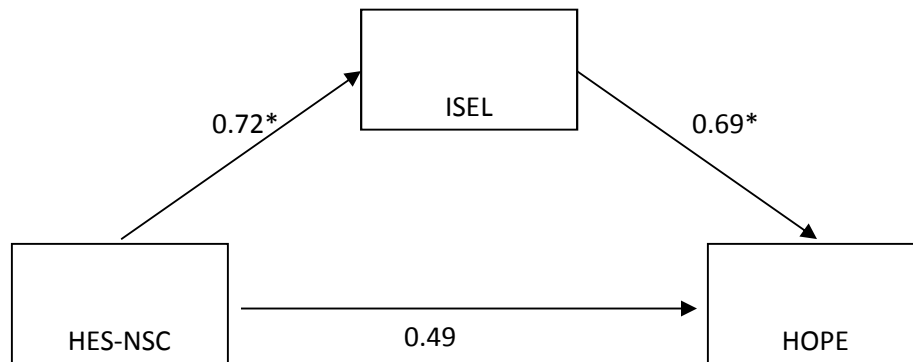Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.4. Mediation Model for HES-NSC and PSS.

H2: *In a hierarchical linear regression model predicting hope scores (i.e., AHS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be positively correlated with hope for group one (i.e., those who were displaced) and perceived interpersonal support (i.e., ISEL) will mediate this relationship.* Neighborhood social climate was only significantly correlated with hope once interpersonal support was added as a mediator in the second model; though interpersonal support was also significantly correlated with hope, it does not act as a mediator in this relationship (*see Figures 3.5 and 3.6, below*). This hypothesis was not supported.
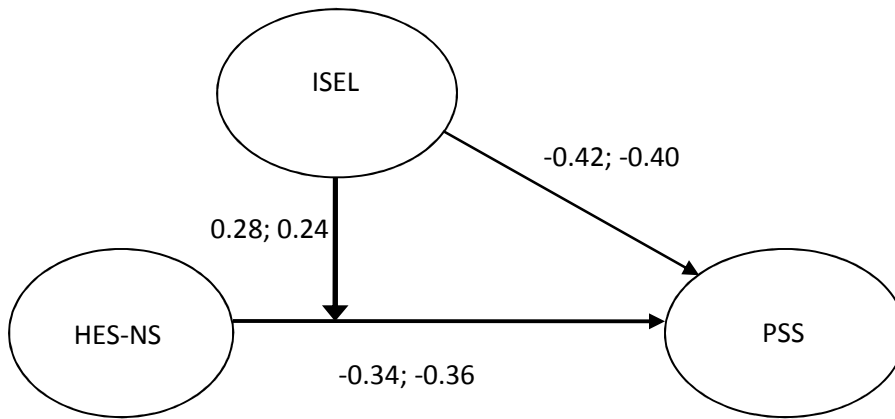
Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.5. Mediation Model for HES-NS and HOPE.

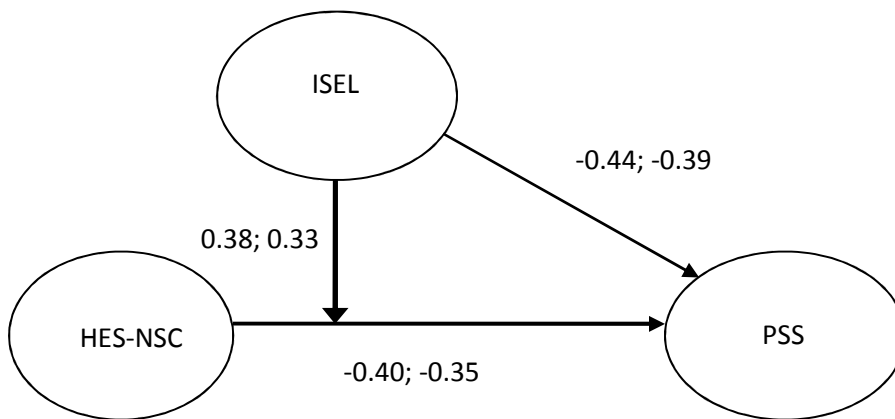Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.6. Mediation Model for HES-NSC and HOPE.

H3: *In a multiple linear regression model predicting perceived stress scores (i.e., PSS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be negatively correlated with stress for groups two (i.e., living in home as it was being repaired at the time of the interview) and three (i.e., minimal or already repaired damage). Interpersonal support (i.e., ISEL) will act as a moderator for this relationship for both groups.* This hypothesis was not supported as neither neighbor relations nor neighborhood social climate were significantly correlated with perceived stress (*see Figures 3.7 and 3.8, below*).

Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.7. Moderation Model for HES-NS and PSS.

Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.8. Moderation Model for HES-NSC and PSS.

H4: *In a multiple linear regression model predicting hope scores (i.e., AHS), neighborhood experiences (i.e., HES-NS & HES-NSC) will be positively correlated with hope for groups two (i.e., living in home as it was being repaired at the time of the interview) and three (i.e., minimal or already repaired damage). Interpersonal support (i.e., ISEL) will act as a moderator for this relationship for both groups.* Neighbor relations was significantly correlated with hope for group three and interpersonal support

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acted as a moderator in this relationship (*see Figure 3.9, below*). Neighborhood social climate was significantly correlated with hope for group two and interpersonal support acted as a moderator in this relationship (*see Figure 3.10, below*). This hypothesis was partly supported.
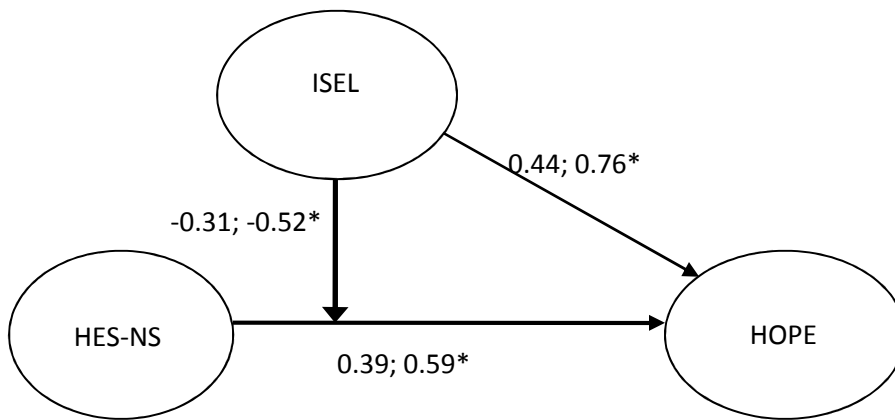
Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.9. Moderation Model for HES-NS and HOPE.
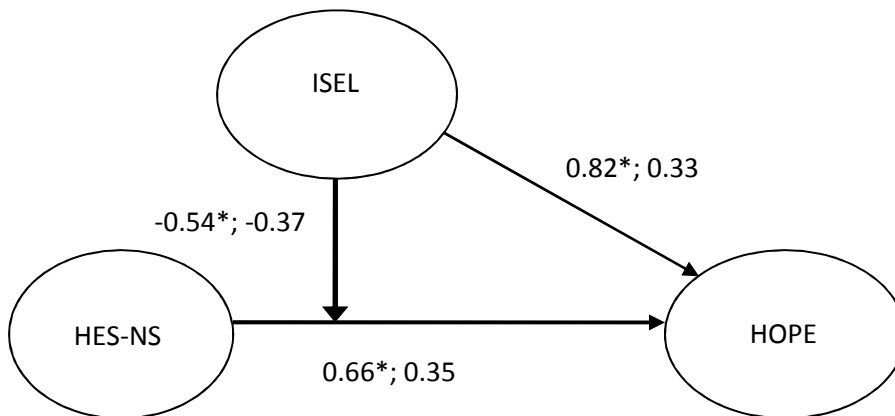
Note. * *p* < .05 ** p < .01, *** p < .001

Figure 3.10. Moderation Model for HES-NSC and HOPE.

H5: *Participants with a higher perception of neighborhood experiences (i.e., HES-NS & HES-NSC) will experience less perceived stress (i.e., PSS) and more hope (i.e., AHS) for all three groups.* Neighbor relations for group three and neighborhood social climate for group two were significant correlated with more hope (*see Figures 3.3 and 3.4, above*). This hypothesis was only partly supported.

CHAPTER 4 DISCUSSION

The results of the present study provide valuable insight into the nuances of recovery post-disaster for displaced and non-displaced individuals. There were clear differences between the groups regarding hope, neighbor relations, and interpersonal support. Group one (i.e., those that were displaced) displayed lower levels of hope than group two (i.e., those that were living in a home as it was being repaired at the time of the interview) as expected; however, group two displayed higher levels of neighbor relations and interpersonal support than group three (i.e., those with minimal or already repaired damage). This could be because those in group two either had to make more use of their social resources due to the extent of their damage compared to those in group three or there was naturally more community response for those that received more damage, leading to higher levels of perceived support. Further, these results are interesting as there were significant differences between groups one and two, as well as groups two and three, but none between one and three. It was originally assumed that group one would be significantly different than both groups two and three given that those in group one were displaced and those in groups two and three were not, but it seems as though there were more significant differences for group two in comparison to groups one and three.

While the hypotheses were either partly supported or not supported, important insights can be drawn from the relationships that were significant. First, interpersonal support is clearly impactful for displaced individuals as the addition of interpersonal support made both neighbor relations and neighborhood social climate significantly

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related to perceived stress and hope. While interpersonal support did not act as a mediator in these models, it is considered a suppressor variable, meaning that it is correlated with both neighbor relations and neighborhood social climate and controls additional variance in the models, thus increasing the correlation between neighbor relations and neighborhood social climate with perceived stress and hope (i.e., **H1 & H2**). Additionally, interpersonal support did act as a moderator for group two in its relationship between neighborhood social climate and hope and for group three in its relationship between neighbor relations and hope (i.e., **H4**). These results are interesting given the difference in means accounted for earlier between groups two and three regarding neighbor relations and interpersonal support. This relationship for group three could be significant for a variety of reasons. We hypothesize that this could be due to those in group three having received minimal or already repaired damage, thus putting specific interpersonal relationships at the forefront rather than having to focus on one's more local, social environment. Those in group two could have focused more on one's local, social environment as they had repairs themselves and, while they still did make use of their social resources, perhaps the effects of that on their well-being were not as strong. There was no relationship between neighborhood experiences and perceived stress for groups two and three (i.e., **H3**). This could be due to the fact the measure used for perceived stress is a general measure of stress and not necessarily related to stress or trauma in the aftermath of the flood. Additionally, only neighbor relations for group three and neighborhood social climate for group two were significantly correlated with more hope (i.e., **H5**), contrary to previous literature highlighting the importance of having a positive neighborhood experience.

Implications

The present study looked to examine the relationship between neighborhood experiences, interpersonal support, and well-being for those that have been displaced due to natural disaster and those that were not. Informed by social ecological theories, social resilience, and conservation of resources theory, the present study intended to investigate how one's environment, specifically one's social environment and interpersonal relationships, is related to one's adjustment, adaptation, and coping post-disaster. Given the lack of literature on the topic at hand, the present study was intended to be a pilot study in order to help build theory, generate potential frameworks, and refine future research questions when studying victims of natural disasters and displaced individuals.

The results of this study have implications into how to conceptualize displacement and how to better respond to natural disasters whether one is displaced. Neighbor relations, neighborhood social climate, and interpersonal support, the three social factors used in this study, were shown to be correlated with one another and were also correlated with perceived stress and hope, the measures of well-being, supporting a social ecological approach when it comes to post-disaster recovery. The differences between groups were also fairly counter-intuitive as there were more differences between group two (i.e., those that were living in a home as it was being repaired at the time of the interview) with groups one (i.e., those that were displaced) and three (i.e., those with minimal or already repaired damage), highlighting the differences in post-disaster experience for victims of the floods. While the negative effects of displacement are well-established in the literature, perhaps it would be worth investigating other factors that may impact the well-being of post-disaster victims, such as the impact of chronic

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environmental adversity and the use of social resources. While the nuances of the groups and resource change require additional investigation, social resilience and social capital are commonly referred to in the literature, once again highlighting areas in which we can intervene when it comes to post-disaster recovery. For example, perhaps interventions that facilitate the recovery process and creates opportunities for social support could increase individual and social well-being, like engaging in a community garden or creating a support group (Tidball, Krasny, Svendsen, Campbell, & Helphand, 2010; Tudor, Maidment, Campbell, & Whittaker, 2015). Also, while these approaches could be helpful to most disaster victims, it is still important to note there are many different experiences of recovery post-disaster, so being able to investigate the different pathways of recovery may inform additional intervention avenues. Additionally, it is important to keep in mind the reciprocal nature of ecological systems. While the individual is certainly influenced by one's social and physical environment, the environment and overall community is also impacted by the individual (Bronfenbrenner, 2009). As such, individuals that are positively impacted by their social environment may, in turn, positively impact the social environment for others, inadvertently improving their own well-being.

Limitations

The present study has several limitations. All the data was previously collected and the sample size (N=84) may not have been large enough to allow for adequate insight into the different groups, resulting in some groups being underpowered. There was no baseline measurement of well-being before the events of the flood, so levels of perceived stress and hope could have been impacted by pre-flood stress levels. This could have

been particularly relevant for those the flood did not impact as strongly. As such, conducting a study with at least a pre- and post-test that allows for better fit regarding measures and group definitions would be ideal; although, given these limitations, the fact that the assumptions for the analyses were met is a testament to the strong design of the original study.

Lastly, the unique nature of the 2015 SC floods may decrease the external validity of the study and, again, is not able to be reproduced. As stated previously, given the sudden onset of the floods due to weather complications and multiple structural failures with dams, the 2015 SC floods is different than large scale disasters like hurricane Katrina where entire communities were evacuated. Additionally, displaced participants were not relocated far, as they still needed to be local in order to participate in the original study. Again, while this does open more opportunities for analysis into the nuances of displacement, results may not be as applicable to standard victims of natural disasters. Natural disasters themselves vary in typology, so while there may be similar loss of life or property across natural disaster type, one should be careful in drawing conclusive connections. For example, mold is unique to certain natural disasters (e.g., hurricanes, floods, tsunamis, etc.) and has potential long-lasting impacts well after the disaster event.

Future Considerations

We hope that the present study offers a solid theoretical foundation in which future research can build upon. Future research should continue refining research questions and measures. Getting pre- and post-disaster data or conducting a longitudinal study in the event of a major natural disaster with the potential to displace a great deal of

people could prove valuable. Also, qualitative research, such as conducting focus groups or engaging in community-based participatory research (CBPR), could provide additional insights into what victims of natural disasters and displacement struggle with during their recovery. If possible, extending ecological theory with resource change and conservation of resources theory relating to social supports in the wake of natural disasters could be a good direction for future research to consider investigating given the connection between displacement and social disruption. Given the mass devastation of natural disasters and their consistent increase in frequency year-by-year, it is important to continue this research and having this conversation, building upon theory in order to better understand and inform interventions and improve recovery efforts.

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