

**Self-Compassion Reduces Posttraumatic Stress Symptom Severity in Hurricane Survivors
via Perceived Social Support**

Ashley Batts Allen¹

Heather Littleton²

Steve Bistricky^{2,3}

Kayla Benson⁴

Tyler Cox⁵

Charles C. Benight^{2,3}

¹Department of Psychology, University of North Carolina at Pembroke

²Lyda Hill Institute for Human Resilience, University of Colorado Colorado Springs

³Department of Psychology, University of Colorado Colorado Springs

⁴Department of Psychology, Oakland University

⁵School of Medicine, University of South Carolina

Author Note

The authors declare that there were no conflicts of interest with respect to the authorship or the publication of this article.

This work was supported by the National Science Foundation under RAPID Grant 1916676

Data for this study can be found in an open data repository on the Open Science

Framework: <https://osf.io/jk8x5/>

Correspondence should be addressed to: Ashley Batts Allen, College of Arts and Sciences, One University Dr. Pembroke, NC, 28372. Email: ashley.allen@uncp.edu

Abstract

Objective: Following disasters such as hurricanes, self-compassion (e.g., being understanding and showing care towards oneself) can be a valuable personal resource that facilitates social support and reduces posttraumatic symptoms. As a result of their increased connection to other people and interpersonal competence, self-compassionate people may perceive more social support following a traumatic event, which in turn reduces posttraumatic stress symptoms (PTSS). The present study is the first to utilize a longitudinal design and latent variable modeling to test this mediation hypothesis. **Method:** A three-wave longitudinal design was utilized to assess hurricane exposure, self-compassion, perceived social support and PTSS in hurricane survivors at baseline (T1), 3-month (T2), and 6-month (T3) follow-up. Participants at T1 included 261 hurricane survivors (88.5% women) who were racially diverse and particularly vulnerable to loss of resources (53.2% with an income of less than \$30,000). Participants were recruited using online, print, and face-to-face methods, and all survey responses were completed online. **Results:** Participants reported high hurricane stressor exposure ($M = 9.14$ serious stressors out of a possible 24). Controlling for hurricane exposure, self-compassion at T1 predicted PTSS at T3, and this was mediated by perceived social support at T2. **Conclusions:** Following hurricane exposure, self-compassionate people experience less PTSS over time because they perceive their social support resources to be more robust. Implementation of self-compassion education and training following a disaster could improve perceived social support networks that provide an additional protective factor against PTSS.

Keywords: self-compassion, posttraumatic stress, social support, hurricane, disaster

Clinical Impact Statement

This study investigated the impact of self-compassion on posttraumatic stress symptoms via increased perceptions of social support in a study of hurricane survivors. Findings suggest that integrating self-compassion education into existing post-disaster relief support efforts could reduce PTSS and promote greater perceptions of social support.

Self-compassion Reduces Posttraumatic Stress Symptom Severity in Hurricane Survivors via Perceived Social Support

In 2021, there were 21 named tropical storms, exhausting the list of names for only the third time in recorded history. This devastating hurricane season cost the U.S. billions in damages and killed more than 100 people (Reimann, 2021). Hurricanes and associated flooding devastate lives, leaving communities with years of rebuilding challenges. Those who are affected by these disasters are potentially traumatized due to storm-related distressing experiences and subsequent loss of physical, emotional, mental, and social resources. For a subset of individuals, these traumatic events can trigger posttraumatic stress symptoms (PTSS) (Pietrzak et al., 2012). Yet not all people who experience a disaster develop persistent PTSS. A meta-analysis synthesizing the prevalence of posttraumatic stress disorder (PTSD) following hurricanes and typhoons has shown that the majority of survivors demonstrate resilience, with a small percentage reporting PTSD (e.g., 17.8%) (Wang et al., 2019). Protective factors such as coping self-efficacy, strong support networks and certain personality characteristics, such as self-compassion, may lessen the likelihood of developing PTSS (Benight & Bandura, 2004; Kaniasty, 2012; Winders et al., 2020). The focus of this research is on evaluating the degree to which self-compassion is associated with PTSS over time following disaster and evaluate perceived social support as a possible mechanism via which self-compassion may reduce PTSS.

Self-Compassion

Self-compassion is one's expressed compassion towards oneself in times of suffering (Neff, 2003b). A growing literature suggests that individuals who tend to act with self-compassion are less likely to develop persistent PTSS following a traumatic event (see Winders et al., 2020 for review). Practicing self-compassion entails showing oneself the same genuine

concern, kindness, and understanding one might provide a friend who is suffering or experiencing loss. Self-compassion is conceptualized as a composite of three overlapping concepts with positive and negative components—self-kindness/self-judgment, common humanity/isolation, and mindfulness/overidentification (Neff, 2003b). Thus, self-compassionate individuals express kindness towards themselves without becoming judgmental, appreciate that suffering is part of the common human experience, and maintain their emotions in balanced awareness as opposed to becoming carried away with them. Some people may fear self-compassion because they equate it with laziness, self-indulgence or even self-pity (Robinson et al., 2016). Yet, research shows self-compassionate individuals are more self-motivated following personal failures (Breines & Chen, 2012) and ruminate less on their own misfortunes (Raes, 2010). Self-compassionate people also experience improved well-being, less psychopathology, and more resilience (MacBeth & Gumley, 2012; Trompetter et al., 2017; Zessin et al., 2015).

Self-compassion and PTSS

Self-compassion can also protect against the development of persistent negative reactions to some of life's most painful experiences, including traumatic events (Garcia, et al., 2021). A meta-analysis of 35 studies indicated that self-compassion and PTSS were negatively related, and that this relation could be potentially explained by a variety of mediators, such as reduced self-blame attributions, less reliance on avoidant and maladaptive coping, and less emotional dysregulation (Winders et al., 2020). However, roughly two-thirds of these studies were cross-sectional, and the remaining third involved self-compassion interventions primarily in small samples. Thus, the extent to which causal inferences can be drawn regarding self-compassion's role in facilitating trauma recovery via the proposed mechanistic pathways has been limited.

One possible underexplored mechanism that could help explain the relation between self-compassion and PTSS is perceived social support. Perceived social support is one of the most robust longitudinal predictors of PTSS. Numerous studies have shown that people who perceive more social support have reduced PTSS over time (Wang et al., 2021). Yet, with the onset of disaster, perceptions of social support may decline as people experience disconnection from their community networks resulting in reduced adjustment, recovery, and well-being (Kaniasty & Norris, 1993; Kaniasty, 2012; Kaniasty, 2020, Lowe, et al., 2010).

Research has indicated that self-compassionate people perceive more social support in times of need (Lavin et al, 2020). This perception could be explained in two ways. First, they may perceive greater social support because they actually receive greater support, or they may have deeper or more numerous social connections from whom they can draw support (Kaniasty, 2020; Littleton et al., 2022; Platt et al., 2014). Indeed, self-compassionate individuals tend to have higher than average extraversion and agreeableness; thus, they more effectively build and maintain such connections (Neff et al., 2007). Second, self-compassionate individuals could perceive greater social support because their thought patterns are less negatively focused than those with lower self-compassion in part because they can positively reframe select aspects of negative events (Allen & Leary, 2010; Allen & Leary, 2014; Leary et al., 2007). For example, Lavin and colleagues (2020) found that self-compassionate young adults were less likely to make hostile attributions for the actions of others, which in turn led to greater perceived support.

In addition to reconstructing their personal narratives, research shows self-compassionate people may also interpret the world around them, including others, as being generally more benevolent. Thus, self-compassionate people may perceive more support regardless of whether they actually receive it (Dunkley et al., 2003). Their tendency to believe others are available for

support and their mindful awareness of their present emotional needs and ways to meet them (Inwood & Ferrari, 2018) may result in a self-fulfilling prophecy where self-compassionate people engage in more relationship-building endeavors and need-focused support-seeking that result in more actual received social support. In turn, research has indicated that received support longitudinally predicts perceived support (Kaniasty, 2012). In this way, self-compassion may mitigate resource loss and PTSS directly *and* indirectly via activation of both actual and perceived social support.

Despite the identified patterns among self-compassion, perceived social support, and PTSS, the relations have only been examined in one prior study to our knowledge. Specifically, Maheux and Price (2016) examined self-compassion as a mediator of the association between perceived social support and posttrauma psychopathology in adults who indicated experiencing or witnessing at least 1 of 16 presented traumatic events in their lifetime. They showed that self-compassion mediated the relation between perceived social support and PTSD. However, findings of this study were limited by its cross-sectional design as well as the unknown and varied time since participants' traumatic events. Further, given that self-compassion is presumed to be a trait like characteristic (Neff, 2022), it is likely that self-compassion has a stronger effect on perceived support than the converse; though a bidirectional relation between the two is plausible.

The Present Study

The present study examined temporal relationships among self-compassion, perceived social support, and PTSS in a sample of rural NC residents exposed to Hurricane Florence. Making landfall at Wrightsville Beach, North Carolina, Hurricane Florence brought 105 mile-an-hour winds and moved slowly, pouring up to 36 inches of rain in the rural Sandhills region of

North Carolina. The historic flooding in this region resulted in significant trauma exposure for those living in the area. Of note, counties in the Sandhills region of NC are some of the most financially disadvantaged in the state (Eanes, 2022). Further, the same area suffered catastrophic damage two years earlier following Hurricane Matthew, with many residents still navigating the long-term impacts of this hurricane when Florence hit. Given the association between trauma exposure and PTSS post-disaster, level of hurricane exposure was included in the model as a predictor of PTSS to control for the impact of trauma exposure on PTSS. A three-wave longitudinal design and latent variable modeling was employed to assess temporal relations among variables of interest and test the previously described conceptually supported mediation model. It was hypothesized that self-compassion would prospectively predict PTSS and post-disaster perceived support. Further, perceived support was hypothesized to mediate the relation between self-compassion and PTSS.

Method

Participants

Following the U.S. landfall of Hurricane Florence, 261 participants living in four rural North Carolina counties agreed to participate in a study of individuals who “experienced high levels of hurricane-related stress”. Participants were recruited between 5 and 8.5 months after the hurricane occurred. Participants were primarily women (88.5%, $n = 231$) with ages ranging from 19 to 81 ($M = 44.0$ years, $SD = 12.8$). The sample was relatively diverse with 52.5% ($n = 137$) identifying as White, 25.3% ($n = 66$) as Black/African American, and 17.2% ($n = 45$) as Lumbee Indian or another Native American tribe. Fewer identified as Asian American (0.4%, $n = 1$), multi-ethnic/multiracial (1.1%, $n = 3$), Hispanic/Latinx (2.3%, $n = 6$), or other (3.4%, $n = 9$). A majority of the participants were caregivers with 61.3% ($n = 160$) reporting dependent children

living in their home. Notably, 53.2% ($n = 139$) had an annual household income of \$30,000 or less. Regarding educational attainment, 6.9% ($n = 18$) did not complete high school, 21.5% ($n = 56$) completed high school or earned their GED, 32.2% ($n = 84$) obtained some post-secondary education, and 39.5% ($n = 103$) graduated from college.

Procedures

Recruitment efforts utilized various strategies such as door-to-door recruitment, social media ads, local media stories, online local newspaper ads, and tabling at community events. Eligibility criteria required that participants be over the age of 18, own a smartphone with a data plan, and be residing in one of the four study recruitment counties. In addition, individuals had to self-report that they were exposed to high levels of hurricane-related stress (e.g., flood damage, loss of employment) and were still experiencing the negative effects of Hurricane Florence in their daily life.

Using a Qualtrics baseline/eligibility survey, 426 individuals agreed to participate electronically. Before answering the baseline survey measures, individuals responded to yes/no questions to assess their eligibility to participate. Of the 426 individuals who consented, 11.5% ($n = 49$) were ineligible because they denied experiencing daily impacts from the hurricane, 4.0% ($n = 17$) denied experiencing high levels of hurricane-related stress, less than 1% ($n = 2$) were under 18, 1.2% ($n = 5$) did not live in target recruitment counties during Hurricane Florence, and 1.2% ($n = 5$) did not own a data-connected smartphone. Also, 19.5% ($n = 83$) of individuals did not complete the T1 survey, and fewer than 1% ($n = 4$) asked to be removed from the study after completing the T1 survey. In total, 261 (61.3%) individuals who initiated the baseline/eligibility survey were eligible and enrolled.

Three months after completing the baseline survey, all participants were contacted via text message to complete the T2 survey and received up to four weekly text reminders. Likewise, six months after completing the baseline survey, all participants were contacted via text message to complete the T3 survey and received up to four weekly text reminders. Participants received a \$10 gift card for completing the baseline survey (T1), and a \$25 gift card for completing each of the T2 and T3 surveys. The study was reviewed and approved by the East Carolina University IRB. All participants received a list of local hurricane-related resources at the end of each of survey.

A total of 69.7% ($n = 182$) of participants completed the T2 survey, and 60.5% ($n = 158$) completed the T3 survey. There were no significant differences in any demographic variables between individuals who completed the T2 survey and those who did not, as well as those who completed the T3 survey and those who did not. However, individuals who completed T2 (11.0%, $n = 20$) were significantly less likely to report they lost their job as a result of Hurricane Florence compared to those who did not (21.5%, $n = 17$), $\chi^2(1, N = 261) = 5.02, p = .025$. Individuals who completed T3 (5.7%, $n = 9$) were significantly less likely to report their spouse or partner lost their job as a result of Hurricane Florence compared to those who did not (13.6%, $n = 14$), $\chi^2(1, N = 261) = 4.84, p = .028$.

Measures

Hurricane Stressor Exposure. At T1, participants were administered 24 researcher-created yes-no items regarding exposure to hurricane stressors. These items assessed property damage/losses (e.g., home damage, loss of possessions), exposure to contaminants (e.g., mold in the home, contaminated water), loss of employment, displacement, financial losses, and development/worsening of physical and mental health conditions. Items assessed personal

exposure to stressors, as well as stressors experienced by the participant's spouse/partner and dependent children. All "yes" responses were added to form a composite score representing total hurricane stressor exposure.

Hurricane-Related PTSS. At all three time points, the PTSD-Checklist for DSM-5 (PCL-5) was administered to assess hurricane-related PTSS (Weathers et al., 2013). The PCL-5 contains 20 items, designed to correspond with DSM-5 PTSD criteria. Items were modified such that participants were asked to indicate how much they had been bothered by each symptom over the past month in connection to the hurricane on a 5-point rating scale bounded by 0 (*not at all*) and 4 (*extremely*). A sample item is: "Feeling very upset when something reminded you of the hurricane?" Scores are summed and can range from 0 to 80 with a cutoff score of 33 for probable PTSD (Bovin et al., 2016). The PCL-5 demonstrated sound psychometrics in a sample of emerging adults, including strong internal consistency ($\alpha = .94$), one-week test-retest reliability ($r = .82$), discriminant validity with mania, depression, and antisocial personality constructs ($r_s = .31$ to $.60$), and convergent validity with other PTSD measures ($r_s = .74$ to $.85$; Blevins et al., 2015). In the current study, internal consistency of the subscales of the PCL-5 across assessments was acceptable: re-experiencing ($\alpha_s = .90$ -.90), avoidance ($\alpha_s = .75$ -.87), negative alterations in cognitions and mood ($\alpha_s = .90$ -.92), hyperarousal ($\alpha_s = .85$ -.88).

Perceived social support. At all three time points, the 12-item Multidimensional Scale of Perceived Social Support (MSPSS) was administered to assess perceived social support (Zimet et al., 1988). The measure includes three subscales assessing perceptions of social support from family ("I can talk about my problems with my family"), friends ("My friends really try to help me"), and a significant other ("There is a special person in my life"). For each item,

individuals indicate their level of (dis)agreement with each statement on a 7-point Likert scale, bound by 1 (*very strongly disagree*) and 7 (*very strongly agree*).

Psychometric evaluation of the MSPSS with college students supports the measure's internal consistency ($r_s = .85-.91$) and test-retest reliability ($r_s = .72-.85$). Supporting construct validity, scores were negatively correlated with scores on self-report measures of anxiety and depression (Zimet et al., 1988). Good internal consistency of total and subscale scores was found among three additional samples (pregnant women, medical residents, and adolescents; Zimet et al., 1990). In the current study, internal consistency of the subscales across assessments was excellent: significant other ($\alpha_s = .92-.95$), family ($\alpha_s = .93-.95$), friends ($\alpha_s = .95-.96$).

Self-Compassion. At all three time points, the 26-item Self-Compassion Scale (SCS) was administered to assess self-compassion (Neff, 2003a). The SCS asks participants to respond to each item on a 5-point scale bounded by 1 (*almost never*) and 5 (*almost always*). The measure includes six subscales, three of which assess self-compassion utilizing positively valenced items: self-kindness ("I try to be loving towards myself when I'm feeling emotional pain"), common humanity ("I try to see my failings as part of the human condition"), and mindfulness ("When something upsets me, I try to keep my emotions in balance"). Mean subscale scores are calculated. Prior research with college samples supports the internal consistency of these three subscales ($\alpha_s = .78-.86$) as well as their 3-week test-retest reliability ($r_s = .80-.88$; Neff, 2003a). Supporting the measure's validity, overall scores correlated in the expected direction with self-report measures of depression, anxiety, life satisfaction, and self-esteem (Neff, 2003a). Research supports that the negative components of self-compassion show some redundancy with psychopathology (Muris et al., 2018). Further, recent confirmatory factor analysis research supports that the items comprising the three positively valenced subscales of the SCS contribute

more to the protective nature of self-compassion than items from the negatively valenced subscales (Montero-Marín et al., 2018). In the current study, the three positively valenced subscales demonstrated acceptable internal consistency across assessments: self-kindness ($\alpha_s = .84-.87$), common humanity ($\alpha_s = .71-.79$), and mindfulness ($\alpha_s = .79-.82$).

Analysis Plan

Mediation analyses with latent variables were conducted using mPlus version 8.0 (Muthén & Muthén, 1998-2017). Specifically, T2 perceived support was evaluated as a mediator of the relation between T1 self-compassion and T3 PTSS in bootstrap analyses (Preacher & Hayes, 2004). A total of 5,000 draws were used for the bootstrap analyses to estimate upper and lower bounds of the confidence intervals (Edwards & Lambert, 2007). In addition, bias-corrected bootstrap values were estimated, which adjust for differences between the product from the full sample and the median of the products estimated from the bootstrap sample (Edwards & Lambert, 2007). Hurricane stressor exposure (indicated by total number of hurricane stressors participants were exposed to) was included in the mediation model as a predictor of PTSS.

Prior to conducting mediation analyses, a measurement model including the three latent variables (perceived support, self-compassion, PTSS) was evaluated. Specifically, the three subscales of the MSPSS at T2 (family, friends, significant other) were included as indicators of a perceived support latent variable, the four subscales of the PCL-5 at T3 (re-experiencing, avoidance, negative alterations in thought and mood, avoidance) were included as indicators of a PTSS latent variable, and the three positively valenced subscales of the SCS at T1 (self-kindness, common humanity, mindfulness) were included as indicators of a self-compassion latent variable. To assess fit of this measurement model, we examined four fit indices: RMSEA ($< .06$), CFI ($> .95$), TLI ($> .95$), and SRMR ($< .10$; Hu & Bentler, 1999; Kline, 2005).

Results

Hurricane Exposure, PTSS, Self-Compassion, and Perceived Support

Participants reported overall high levels of exposure to hurricane-related stressors, endorsing exposure to an average of 9.14 ($SD = 4.30$) of the 24 possible stressors. Of these stressors, the most frequently endorsed included experiencing mold damage to one's home (72.8%, $n = 190$), flooding of one's home (52.1%, $n = 136$), damage/loss of one's possessions (62.5%, $n = 163$), and being displaced from one's home (44.1%, $n = 115$). Other frequently endorsed stressors included exposure to contamination (66.3%, $n = 173$), having unsafe drinking water (57.5%, $n = 150$), loss of employment (45.6%, $n = 119$), and development of a new or worsened mental health condition as a result of the hurricane (66.7%, $n = 174$).

Descriptive statistics of study variables are summarized in Table 1; correlations among variables are summarized in Table 2. This was a relatively distressed sample, with 29.3% of participants scoring above the clinical cut-off for probable PTSS at T3 based on their total PCL-5 score ($M = 23.16$, $SD = 17.50$). On average, participants reported moderately high perceived social support at T2 and moderate self-compassion at T1.

Mediation Analyses

Analysis of the measurement model suggested that the model had adequate fit, $\chi^2(32) = 54.88$, $p = .01$, CFI = .98, TLI = .97, RMSEA = .05, 90% CI [.03,.08], SRMR = .04. As such, the mediation analyses were conducted as planned. Results supported mediation, as the indirect model path from T1 self-compassion to T3 PTSS through T2 perceived support was statistically significant. The bootstrap estimates and 95% confidence intervals of the bootstrap estimates for the mediation model are summarized in Table 3.

Discussion

Using a three-wave longitudinal design and latent variable modeling, this study found that perceived social support mediated the relation between self-compassion and PTSS, as hypothesized. Although the literature establishes both self-compassion and perceived social support as being related to less PTSS following traumatic experiences (Luo et al., 2021; Zalta et al., 2021), this is the first study to assess these relations in a longitudinal mediation model. Findings from this model suggest that perceiving more social support is one of the explanations for why self-compassionate people experience reduced PTSS following a traumatic experience.

As stated earlier, the common humanity component of self-compassion may positively bias self-compassionate people to perceive others as being supportive. Amid suffering, feeling a stronger connection to shared human experience may lead to the perception that others are closer or more available. In fact, laboratory research has shown that loving kindness meditation practice can increase participants' feelings of connection, suggesting that perceived social support can be self-generated (Hutcherson et al., 2008). Self-compassionate individuals are also more aware of their emotional needs, more socially skilled, and may create social environments that are in fact more supportive (Bistricky et al., 2017; Inwood & Ferrari, 2018). In this case, perceptions of available support would be realistically aligned with actual available support. This ability to facilitate more supportive social environments increases resilience and further enhances one's available resources (Hobfoll et al., 1990).

It is also important to note that the discussed relations among self-compassion, perceived social support, and PTSS were found while simultaneously accounting for hurricane-related stressors. As expected, and consistent with the literature (e.g., Rhodes et al., 2010), level of hurricane-related stressors exerted direct effects on level of PTSS six months after the baseline assessment. Those with greater exposure had greater persisting symptoms over time. Notably,

study participation required that participants still be experiencing negative hurricane-related effects 5 to 8.5 months after the hurricane occurred. This study's assessment timeframe and eligibility criteria ensured that the study included those who were still experiencing high levels of hurricane related stress a half-year later, likely in part due to exposure to notable levels of hurricane stressors.

Another strength of the sample was the nature of the participants. As briefly mentioned, our participants lived in some of the most disadvantaged counties in the state where they were the least prepared to cope with a disaster of this magnitude. Further, for many participants this was the second catastrophic hurricane in a period of two years, thus many were reliving a nightmare they had experienced only two years prior. While many studies have investigated the impact of self-compassion on PTSS, our study surveyed a uniquely disadvantaged sample and found that self-compassion leads to reduced PTSS via perceived social support (Winders et al., 2020).

Limitations

The present study has important limitations to consider. First, our sample was relatively restricted, although racially diverse, with over half of the sample reporting a household income of less than \$30,000. Our sample also identified as predominantly women, limiting generalizability to cisgender men as well as gender minority individuals. Although most residents of the study recruitment counties were English speaking (Tippett, 2021), our study materials were only offered in English, which prevented inclusion of non-English speaking hurricane survivors. Further, the fact that online survey completion required an Internet service-connected device may have reduced the ability of some individuals to participate. However, very few participants were not eligible due to not owning a smartphone, likely in part due to the

Lifeline program that provides low-income individuals with a smartphone with a data plan for a substantially reduced fee (Federal Communications Commission, n.d.). Another limitation was the 5-to-8.5-month delay between when Hurricane Florence made landfall and study enrollment. To understand relations among self-compassion, perceived social support, and PTSS in the initial aftermath of the hurricane and flooding, baseline measures ideally would have been assessed soon after the disaster onset. However, as discussed above, our study timeline engaged participants whose significant hurricane exposure was still impactful after several months. Given that social support dissipates for many as time recedes from a disaster, it is particularly useful to learn what can sustain social support and reduce PTSS in populations experiencing protracted strain. In our study, 29.3% of participants scored above the clinical cut-off for probable PTSD at Time 3 (11 to 14.5-months post hurricane), suggesting that negative emotional, mental, and physical ramifications of the hurricane were long-lasting and pervasive.

Strengths and Future Directions

The study's longitudinal design allowed us to test and find support for the causal relations we hypothesized. This finding meaningfully advances the literature beyond studies investigating the protective impact of either self-compassion or social support on the development of PTSS, many of which were limited by cross-sectional designs. Although our study focused on perceived social support as a single mediator, latent variable modeling could be extended to investigate multiple mediators of the relation between self-compassion and PTSS such as coping self-efficacy and psychological flexibility. Additional longitudinal design studies could help inform our understanding of the varying emotional and cognitive processes that occur as self-compassionate individuals cope with traumatic experiences.

Self-compassionate people perceive more social support, but this relation could be explained by their interpersonal competence, their positive mental reconstructions of social relationships, as well as their heightened connection to other people. More research is needed to thoroughly understand whether the influence of self-compassion is limited to perceptions of support or if their support networks are truly more robust. It may also be the case that the protective nature of self-compassion and perceptions of social support change over a longer period of time, so future studies should extend longitudinal investigations to measure PTSS multiple years after the traumatic experience. Although more ambitious, self-compassion training could also be implemented in advance of a hurricane with the expectation that those who received the training would be less likely to experience persistent PTSS.

Studies employing self-compassion induction paradigms are increasing our understanding of what happens when people shift from a neutral or self-critical mindset to a more self-compassionate mindset in the short-term (Fernando et al., 2017; Himmerich & Orcutt, 2021; Lindsay & Creswell, 2014) and as an enduring habit (Ferrari et al., 2019). Based on findings from our study and others, we would expect that training hurricane survivors to be more self-compassionate would increase their personal resilience resources and affect their social resources positively. Health systems, relief agencies, and leaders that serve communities most vulnerable to weather-related disasters would ideally be prepared to implement self-compassion support groups and pre-packaged informational interventions broadly following a disaster (cf. Lennard et al., 2020; Steinmetz et al., 2012). Of course, these types of support trainings should only be a supplement to the needed external support and enhanced infrastructure that are so desperately needed in these communities which are frequently overlooked in the aftermath of disasters.

References

- Allen, A. B., & Leary, M. R. (2010). Self-Compassion, stress, and coping. *Social and Personality Psychology Compass*, 4(2), 107-118. <https://doi.org/10.1111/j.1751-9004.2009.00246.x>
- Allen, A. B., & Leary, M. R. (2014). Self-compassionate responses to aging. *The Gerontologist*, 54(2), 190-200. <https://doi.org/10.1093/geront/gns204>
- Bistricky, S.L., Gallagher, M.W., Roberts, C.M., Ferris, L., Gonzalez, A.J., & Wetterneck, C.T. (2017). Frequency of interpersonal trauma types, avoidant attachment, self-compassion, and interpersonal competence: A model of persisting posttraumatic symptoms, *Journal of Aggression, Maltreatment & Trauma*, 26, 608-625. <https://doi.org/10.1080/10926771.2017.1322657>
- Blevins, C. A., Weathers, F. A., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, 28(6), 489-498. <https://doi.org/10.1002/jts.22059>
- Bovin, M. J., Marx, B. P., Weathers, F. W., Gallagher, M. W., Rodriguez, P., Schnurr, P. P., & Keane, T. M. (2016). Psychometric properties of the PTSD checklist for diagnostic and statistical manual of mental disorders—Fifth edition (PCL-5) in veterans. *Psychological Assessment*, 28(11), 1379–1391. <https://doi.org/10.1037/pas0000254>
- Breines, J. G., & Chen, S. (2012). Self-compassion increases self-improvement motivation. *Personality and Social Psychology Bulletin*, 38(9), 1133-1143. <https://doi.org/10.1080/15298868.2018.1508494>

- Dunkley, D.M., Zuroff, D.C., & Blankenstein, K.R. (2003). Self-critical perfectionism and daily affect: Dispositional and situational influences on stress and coping. *Journal of Personality and Social Psychology*, 84(1), 234-254. <https://doi.org/10.1037/0022-3514.84.1.234>.
- Eanes, Z. (2022, May 3). *Mapping North Carolina's poverty rate by county*. Axios Raleigh. <https://www.axios.com/local/raleigh/2022/05/03/north-carolinas-county-poverty-rate>
- Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods*, 12(1), 1–22. <https://doi.org/10.1037/1082-989X.12.1.1>
- Federal Communications Commission (n.d.) Lifeline program for low-income consumers. <https://www.fcc.gov/general/lifeline-program-low-income-consumers>
- Fernando, A.T., Skinner, K., & Consedine, N.S. (2017). Increasing compassion in medical decision-making: Can a brief mindfulness intervention help? *Mindfulness*, 8, 276-285. <https://doi.org/10.1007/s12671-016-0598-5>
- Ferrari, M., Hunt, C., Harrysunker, A., Abbott, M.J., Beath, A.P., & Einstein, D. (2019). Self-compassion interventions and psychosocial outcomes: A meta-analysis of RCTs. *Mindfulness* 10, 1455–1473. <https://doi.org/10.1007/s12671-019-01134-6>
- Garcia, A. C. M., Silva, B. D., da Silva, L. C. O., & Mills, J. (2021). Self-compassion in hospice and palliative care: A systematic integrative review. *Journal of Hospice & Palliative Nursing*, 23(2), 145-154. <https://doi.org/10.1097/NJH.0000000000000727>
- Himmerich, S. J., & Orcutt, H. K. (2021). Examining a brief self-compassion intervention for emotion regulation in individuals with exposure to trauma. *Psychological Trauma*:

Theory, Research, Practice, and Policy, 13(8), 907–910.

<http://dx.doi.org/10.1037/tra0001110>

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.
<https://doi.org/10.1080/10705519909540118>

Inwood, E., & Ferrari, M. (2018) Mechanisms of change in the relationship between self-compassion, emotion regulation, and mental health: A systemic review. *Applied Psychology: Health and Well-Being*, 10(2), 215-235. <https://doi.org/10.1111/aphw.12127>
Kaniasty, K. (2012). Predicting social psychological well-being following trauma: The role of postdisaster social support. *Psychological Trauma: Theory, Research, Practice, and Policy*, 4(1), 22–33. <https://doi.org/10.1037/a0021412>.

Kaniasty, K. (2020). Social support, interpersonal, and community dynamics following disasters caused by natural hazards. *Current Opinion in Psychology*, 32, 105-109.
<https://doi.org/10.1016/j.copsyc.2019.07.026>

Kaniasty, K., & Norris, F. H. (1993). A test of the social support deterioration model in the context of natural disaster. *Journal of Personality and Social Psychology*, 64(3), 395.
DOI: [10.1037/0022-3514.64.3.395](https://doi.org/10.1037/0022-3514.64.3.395)

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). Guilford.

Lavin, K., Goeke-Morey, M. C., & Degnan, K. A. (2020). The role of self-compassion in college students' perceived social support. *Journal of Positive Psychology and Wellbeing*, 4(1), 41-48.

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself

- kindly. *Journal of Personality and Social Psychology*, 92(5), 887–904. <https://doi.org/10.1037/0022-3514.92.5.887>
- Lennard, G.R., Mitchell, A.E., & Whittingham, K. (2020). Randomized controlled trial of a brief online self-compassion intervention for mothers of infants: Effects on mental health outcomes. *Journal of Clinical Psychology*, 77, 473-487. <https://doi.org/10.1002/jclp.23068>
- Lindsay, E. K., & Creswell, J. D. (2014). Helping the self help others: Self-affirmation increases self-compassion and pro-social behaviors. *Frontiers in Psychology*, 5, 421. <https://doi.org/10.3389/fpsyg.2014.00421>
- Littleton, H. (2023, March 3). Recovery and Adjustment in the Community after Hurricane Florence (the REACH study). <https://osf.io/jk8x5/>
- Littleton, H., Haney, L., Schoemann, A., Allen, A., & Benight, C. (2022). Received support in the aftermath of Hurricane Florence: reciprocal relations among perceived support, community solidarity, and PTSD, *Anxiety, Stress, & Coping*, 35(3), 270-283, <https://doi.org/10.1080/10615806.2021.1956480>
- Lowe, S. R., Chan, C. S., & Rhodes, J. E. (2010). Pre-hurricane perceived social support protects against psychological distress: A longitudinal analysis of low-income mothers. *Journal of Consulting and Clinical Psychology*, 78(4), 551–560. <https://doi.org/10.1037/a0018317>
- Luo, X., Che, X., Lei, Y., & Li, H. (2021) Investigating the influence of self-compassion-focused interventions on posttraumatic stress: A systematic review and meta-analysis. *Mindfulness*, 12(12) 2865–2876. <https://doi.org/10.1007/s12671-021-01732-3>

- MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review, 32*, 545-552. <https://doi.org/10.1016/j.cpr.2012.06.003>
- Maheux, A., & Price, M. (2016). The indirect effect of social support on post-trauma psychopathology via self-compassion. *Personality and Individual Differences, 88*, 102-107. <https://doi.org/10.1016/j.paid.2015.08.051>
- Montero-Marin, J., Kuyken, W., Crane, C., Gu, J., Baer, R., Al-Awamleh, A. A., Akutsu, S., Araya-Véliz, C., Ghorbani, N., Job Chen, Z., Min-Sun, K., Mantzios, M., Rolim dos Santos, D. N., Serrano López, L. C., Teleb, A. A., Watson, P. J., Yamaguchi, A., Yang, E., & García-Campayo, J. (2018). Self-compassion and cultural values: A cross-cultural study of self-compassion using a multitrait-multimethod (MTMM) analytical procedure. *Frontiers in Psychology, 9*. <https://doi.org/10.3389/fpsyg.2018.02638>
- Muris, P., van den Broek, M., Otgaar, H., Oudenhoven, I., & Lennartz, J. (2018). Good and bad sides of self-compassion: A face validity check of the Self-Compassion Scale and an investigation of its relations to coping and emotional symptoms in non-clinical adolescents. *Journal of Child and Family Studies, 27*(8), 2411-2421. <https://doi.org/10.1007/s10826-018-1099-z>
- Muthén, L. K., Muthén, B. O. (1998–2017). Mplus user's guide (8th ed.). https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf
- Neff, K. D. (2003a). Development and validation of a scale to measure self-compassion. *Self and Identity, 2*(3), 223-250. <https://doi.org/10.1080/15298860309027>
- Neff, K. (2003b). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and identity, 2*(2), 85-101. <https://doi.org/10.1080/15298860309032>

- Neff, K. D. (2022). Self-Compassion: Theory, Method, Research, and Intervention. *Annual Review of Psychology*, 74, <https://doi.org/10.1146/annurev-psych-032420-031047>
- Neff, K. D., Kirkpatrick, K. L., & Rude, S. S. (2007). Self-compassion and adaptive psychological functioning. *Journal of Research in Personality*, 41, 139–154. <https://doi.org/10.1016/j.jrp.2006.03.004>
- Pietrzak R. H., Tracy M., Galea S., Kilpatrick D. G., Ruggiero K. J., et al. (2012) Resilience in the face of disaster: Prevalence and longitudinal course of mental disorders following Hurricane Ike. PLoS ONE 7(6): e38964. <https://doi.org/10.1371/journal.pone.0038964>
- Platt, J., Keyes, K.M., & Koenen, K.C. (2014). Size of the social network versus quality of social support: Which is more protective against PTSD? *Social Psychiatry and Psychiatric Epidemiology*, 49, 1279–1286. <https://doi.org/10.1007/s00127-013-0798-4>
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36(4), 717–731. <https://doi.org/10.3758/bf03206553>
- Raes, F. (2010). Rumination and worry as mediators of the relationship between self-compassion and depression and anxiety. *Personality and Individual Differences*, 48(6), 757-761. <https://doi.org/10.1016/j.paid.2010.01.023>
- Reimann, N. (2021, November 30). Devastating 2021 hurricane season ends—Here’s the toll it took. *Forbes*. <https://www.forbes.com/sites/nicholasreimann/2021/11/30/devastating-2021-hurricane-season-ends-heres-the-toll-it-took/?sh=61a8d4705316>
- Rhodes, J., Chan, C., Paxson, C., Rouse, C.E., Waters, M., & Fussell, E. (2010). The impact of Hurricane Katrina on the mental and physical health of low-income parents in New

- Orleans. *American Journal of Orthopsychiatry*, 80, 237. <https://doi.org/10.1111/j.1939-0025.2010.01027.x>
- Robinson, K. J., Mayer, S., Allen, A. B., Terry, M., Chilton, A., & Leary, M. R. (2016). Resisting self-compassion: Why are some people opposed to being kind to themselves? *Self and Identity*, 15(5), 505-524.
<https://doi.org/10.1080/15298868.2016.1160952>
- Steinmetz, S.E., Benight, C.C., Bishop, S.L., & James, L.E. (2012). *My Disaster Recovery: A randomized controlled trial of an internet intervention. Anxiety, Stress, & Coping*, 25(5), 593-600. <https://doi.org/10.1080/10615806.2011.604869>
- Tippett, R. (2021). North Carolina's Hispanic Community: 2021 Snapshot. *Carolina Demography*, Retrieved from <https://www.ncdemography.org/2021/10/18/north-carolinas-hispanic-community-2021-snapshot/>.
- Trompetter, H.R., de Kleine, E., & Bohlmeijer, E.T. (2017). Why does positive mental health buffer against psychopathology? An exploratory study of self-compassion as a resilience mechanism and adaptive emotion regulation strategy. *Cognitive Therapy and Research*, 41, 459-468. <https://doi.org/10.1007/s10608-016-9774-0>
- Wang, Y., Chung, M.C., Wang, N., Yu, X., & Kenardy, J. (2021). Social support and posttraumatic stress disorder: A meta-analysis of longitudinal studies. *Clinical Psychology Review*, 85, <https://doi.org/10.1016/j.cpr.2021.101998>
- Wang, Z., Wu, X., Dai, W., Kaminga, A. C., Wu, X., Pan, X., Liu, Z., Wen, S., & Liu, A. (2019). The prevalence of posttraumatic stress disorder among survivors after a typhoon or hurricane: a systematic review and meta-analysis. *Disaster Medicine and Public Health Preparedness*, 13(5-6), 1065-1073. <http://doi.org/10.1017/dmp/2019.26>

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013).

The PTSD Checklist for DSM-5 (PCL-5). <http://www.ptsd.va.gov>.

Winders, S. J., Murphy, O., Looney, K., & O'Reilly, G. (2020). Self-compassion, trauma, and posttraumatic stress disorder: A systematic review. *Clinical Psychology &*

Psychotherapy, 27(3), 300-329. <https://doi.org/10.1002/cpp.2429>

Zalta, A. K., Tirone, V., Orlowska, D., Blais, R. K., Lofgreen, A., Klassen, B., Held, P., Stevens, N. R., Adkins, E., Dent, A. L. (2021). Examining moderators of the relationship between social support and self-reported PTSD symptoms: A meta-analysis. *Psychological Bulletin*, 147(1), 33. <https://doi.org/10.1037/bul0000316>.

Zessin, U., Dickhäuser, O., & Garbade, S. (2015). The relationship between self-compassion and well-being: A meta-analysis. *Applied Psychology: Health and Well-Being*, 7(3), 340–364. <https://doi.org/10.1111/aphw.12051>

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, 52(1), 31-41. https://doi.org/10.1207/s15327752jpa5201_2

Zimet, G. D., Powell, S. S., Farley, G. K., Werkman, S., & Berkoff, K. A. (1990). Psychometric characteristics of the multidimensional scale of perceived social Support. *Journal of Personality Assessment*, 55(3-4), 610–617. https://doi.org/10.1207/s15327752jpa5503&4_17

Table 1

Descriptive Statistics of Study Variables

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Range	Skew	Kurtosis
T1 Self-kindness	259	2.76	0.95	1-5	0.46	0.01
T1 Common humanity	259	2.98	0.88	1-5	0.24	-0.07
T1 Mindfulness	260	3.04	0.92	1-5	0.16	0.05
T2 Friend support	181	4.43	1.63	1-7	-0.57	-0.42
T2 Family support	182	4.60	1.72	1-7	-0.49	-0.73
T2 Significant other support	182	4.77	1.78	1-7	-0.62	-0.54
T3 Re-experiencing	157	5.43	4.75	0-20	1.00	0.82
T3 Avoidance	157	2.52	2.03	0-8	0.68	0.22
T3 Negative alterations thought/mood	157	7.44	6.79	0-26	0.75	-0.25
T3 Hyperarousal	157	7.76	6.01	0-24	0.44	-0.58

Table 2

Correlations among Study Variables

	2	3	4	5	6	7	8	9	10
1. T1 Self-kindness	.51*	.76*	.38*	.39*	.35*	-.23*	-.24*	-.36*	.04
2. T1 Common humanity	—	.64*	.18*	.20*	.21*	-.20*	-.15	-.26*	.10
3. T1 Mindfulness	—	—	.29*	.33*	.32*	-.37*	-.26*	-.37*	.07
4. T2 Friend support	—	—	—	.73*	.72*	-.32*	-.32*	-.41*	-.08
5. T2 Family support	—	—	—	—	.78*	-.29*	-.29*	-.50*	-.07
6. T2 Significant other support	—	—	—	—	—	-.27*	-.33*	-.39*	-.10
7. T3 Re-experiencing	—	—	—	—	—	—	.52*	.72*	.73*
8. T3 Avoidance	—	—	—	—	—	—	—	.57*	.50*
9. T3 Negative alterations thought/mood	—	—	—	—	—	—	—	—	.87*
10. T3 Hyperarousal	—	—	—	—	—	—	—	—	—

* $p < .05$.

Table 3

Bias-Corrected Bootstrap Estimates and 95% Confidence Intervals of the Estimates for the Latent Variable Mediation Model

	Estimate	95% CI
Measurement Portion of the Model		
<i>Self-Compassion</i>		
T1 Self kindness	1.00	-----
T1 Common humanity	0.78	[0.63, 0.95]
T1 Mindfulness	1.17	[1.00, 1.40]
<i>Perceived Support</i>		
T2 Friend support	1.00	-----
T2 Family support	1.16	[1.02, 1.34]
T2 Significant other support	1.17	[1.03, 1.33]
<i>PTSS</i>		
T3 Re-experiencing	1.00	----
T3 Avoidance	0.33	[0.22, 0.45]
T3 Negative alterations in thought and mood	1.73	[1.47, 2.09]
T3 Hyperarousal	1.50	[1.29, 1.79]
Structural Portion of the Model		
<i>Self-Compassion</i> → <i>Perceived Support</i>	0.85	[0.56, 1.17]
<i>Perceived Support</i> → <i>PTSS</i>	-0.77	[-1.21, -0.34]
<i>Self-Compassion</i> → <i>PTSS (Direct)</i>	-1.24	[-2.18, -0.47]
<i>Self-Compassion</i> → <i>PTSS (Indirect)</i>	-0.66	[-1.19, -0.31]
Hurricane stressors → <i>PTSS</i>	0.29	[0.17, 0.44]

Note: 95% CI = 95% confidence interval. Latent variables are indicated by italics. Significant model paths are indicated by bold.

Appendix

The data reported in this manuscript have been previously published and/or were collected as part of a larger data collection (at one or more points in time). Findings from the data collection have been reported in separate manuscripts. Littleton et al. (2022) examines reciprocal relations among perceived support, received support, and PTSD symptoms over time. Littleton et al. (in press) utilizes daily survey data to identify adjustment trajectories among survivors, including changes over time in PTSS, coping self-efficacy, social support, and coping behaviors. MS 3 (the current manuscript) focuses on self-compassion, perceived social support, and PTSS.

Littleton H., Haney L., Schoemann A., Allen A. B., Benight C. (2022). Received support in the aftermath of Hurricane Florence: reciprocal relations among perceived support, community solidarity, and PTSD. *Anxiety Stress Coping*, 35(3), 270-283.
<https://doi.org/10.1080/10615806.2021.1956480>

Littleton, H., Ricca, B., Allen, A. B., & Benight C. C. (in press). Recovery and adjustment trajectories among hurricane Florence survivors: Analysis utilizing nonlinear dynamic system modeling, *Journal of Traumatic Stress*.