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NATURAL DISASTER PREPAREDNESS IN COLLEGE STUDENTS:  
IMPLICATIONS FOR INSTITUTIONS OF HIGHER LEARNING

A Thesis  
presented in partial fulfillment of requirements  
in the Department of Psychology  
for the degree of Master of Arts  
The University of Mississippi

by

MATHEW A. TKACHUCK

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## ABSTRACT

There is a growing interest in conducting research at the university level as a means of evaluating the effectiveness of disaster preparedness programs and/or procedures. Additional studies have examined student preparedness, although further research is needed to develop a better understanding of factors related to preparedness. It was hypothesized that students who are older will be more prepared, that students who perceive a natural disaster as more of a threat will be more prepared, and that those who have experienced a natural disaster will be more prepared. The current study also examined whether a student's confidence in university preparedness is related to how concerned they are about a natural disaster occurring and, in turn, if students' concern is related to how prepared they are. Finally, the study aimed to determine whether there are group differences in disaster preparedness considering various student demographic variables, as well as to further explore the relationships between potential disaster preparedness factors. The final sample size was comprised of 806 student participants who were administered an online survey that included questions regarding disaster preparedness and their experiences with disasters. The majority of the sample was female, White/non-Hispanic, freshman, lived off campus, and was an average of 23 years old. Differences in disaster preparedness-related variables were found in gender and the residential status of students. Age was not found to be a significant predictor of preparedness while Total Experience was found to be a significant predictor of both Actual and Perceived Preparedness. Mixed results were found regarding the relationship

between perceived threat and preparedness. Post-hoc exploratory analyses suggest that student confidence in UM's ability to prepare for disasters was a significant predictor of Total Concern, that variables measured in the current study were more related to perceived preparedness versus actual preparedness, and that Total Experience remained a significant predictor of both. Primary limitations of the current investigation include the exploratory and cross-sectional nature of the study design. In addition to utilizing alternative methodologies, suggested future research includes incorporating existing theoretical frameworks and elaboration of the assessment of demographic and population characteristics. At a more global level, the findings highlight the necessity for a critical phase of developing a research program to increase disaster preparedness at an academic institution that involves a more broad assessment and evaluation of the proximal environment in relation to natural disaster preparedness. Locally, moving forward, the institution and researchers can use the foundation of knowledge resulting from the current findings to continue to work together to incorporate a strong evidenced-based framework for further research. Specific recommendations for future research and practical applications are provided.

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# NATURAL DISASTER PREPAREDNESS IN COLLEGE STUDENTS: IMPLICATIONS FOR INSTITUTIONAL LEARNING

## **Background**

In the United States, natural disasters cause over \$10 billion in damages and over 300 fatalities per year (National Weather Service [NWS], 2014a; National Oceanic and Atmospheric Administration [NOAA], n.d.; PreventionWeb, n.d.). A natural disaster is a phenomenon of nature that causes damage or loss of life, having an impact on the environment or community (Halpern & Tramontin, 2007). Examples of natural disasters include tornadoes, hurricanes, and earthquakes, to name a few. Natural disasters can affect a large region of land and last for days, or can impact a single community and last only minutes. For example, in 2011, a tornado producing wind speeds of up to 200 mph touched down in Joplin, Missouri. The tornado traveled approximately 22 miles in 38 minutes, causing an estimated 158 fatalities (NOAA, 2012a; Paul & Stimers, 2012). In contrast, Hurricane Katrina, which struck the Gulf Coast in 2005, lasted approximately five days, moving across the region from Florida to Louisiana, causing over 1,000 fatalities (NOAA, 2012b).

In addition to the physical impact, the damage caused by natural disasters can also have a negative impact on individuals' mental health. In the aftermath of Hurricane Katrina, the American Red Cross and Salvation Army provided disaster mental health services for more than 28,000 people at shelters in North Central Texas and

approximately 2.5 million people over various regions affected by the tropical storm (Eikenberry & Cooper, 2012). After experiencing a disaster, individuals may undergo a significant amount of distress in both the short and long-term. Distress may result from such circumstances as losing property or loved ones, having to rebuild homes, and being displaced or having to relocate (Norris & Wind, 2009). The importance of disaster mental health has gained increasing support following research findings exposing the negative psychological impacts of both natural and manmade disasters (Drescher, Schulenberg, & Smith, 2014; Raphael & Maguire, 2009; Schulenberg et al., 2008), and is an indication of how harmful natural disasters can be.

While response and recovery efforts are extremely important following a disaster, determining how to more effectively prepare for such an event is just as critical. In the field of disaster mental health, for example, preparation is regarded as essential to mitigating the physical and emotional toll of disasters. For instance, Paul and Stimers (2012), in their survey of survivors of the Joplin, Missouri tornado, found that the area where the tornado touched down lacked proper shelter. Moreover, up to 23% of participants neither received nor complied with tornado warnings. Failing levees in New Orleans during Hurricane Katrina caused a large amount of damage throughout the region (Wang & Castay, 2012). After the storm struck, several reports and reviews were published exposing specific flaws in the infrastructure and communication of the organizations involved in preparing regions affected by the tropical storm (Crowther, Haimes, & Taub, 2007; Parker, Stern, Paglia, & Brown, 2009). More specifically, Parker et al. (2009) detailed the existence of several organizational breakdowns of preparedness such as an overvaluation of preparedness by officials and policy makers, competing



priorities leading to neglect of adequate preparedness measures, and decreased attentiveness to warnings caused by frequent false alarms. Determining factors that increase disaster preparedness is imperative.

Around the same time Hurricane Katrina struck the Gulf Coast, the World Health Organization (WHO) adopted a resolution reemphasizing the need for more emergency preparedness measures (WHO, 2014). The Federal Emergency Management Agency (FEMA), whose mission is to support the nation in mitigating the impact of all hazards (e.g., natural disasters, disease pandemics, chemical spills and other manmade hazards, terrorist attacks, and cyber attacks), provides an infrastructure, or “*National Preparedness System*”, for a disaster preparedness plan. This plan includes risk assessment, estimating capability requirements for those risks, sustaining the capabilities, planning to deliver the capabilities, validating the capabilities, and the reviewing and updating of the plan (FEMA, 2014). Disaster preparedness is defined as the action taken by an individual, community, or jurisdiction which increases the ability to effectively respond to a disaster (McEntire & Myers, 2004) and therefore, by definition, is an essential component in mitigating the negative impact of natural disasters. The current study initiates a research-based approach to further inform what factors are related to disaster preparedness, the first step being an investigation of the perceptions and attitudes of students enrolled at The University of Mississippi (UM) in regards to disaster preparedness.

## **Research on Institutions and Disaster Preparedness**

Understanding the effectiveness of disaster preparedness programs of larger organizations and institutions is extremely important. Within college campuses in particular, developing comprehensive safety plans, communicating quickly among students, faculty, and administration, and maintaining students' sense of safety often prove to be difficult tasks (Baer, Zarger, Ruiz, Noble, & Weller, 2014; Fillmore et al., 2011). In an investigation of university and college disaster preparedness, Mitroff, Diamond, and Alpaslan (2006) found the institutions surveyed did not have well-established crisis-management programs in place. In addition, they were only prepared for events they had previously experienced. In order to decrease vulnerability to specific natural disasters, an institution must assess which disasters they are most vulnerable to, determine which preparedness methods fit the academic environment, and sufficiently implement those plans or programs (Bruxvoort, 2012).

According to Chachkes et al. (2007), for an institution to have a safe environment, various agencies or employees within the institution must be able to communicate with one another and their families and must have proper leadership training. Furthermore, all departments of a university need to be involved in the development of the plan to ensure the inclusion of essential and applicable components for all faculty, staff, and students, regardless of the environment they are in when a natural disaster occurs.

In another study of disaster preparedness, conducted by Kapucu and Khosa (2013), emergency management plans were reviewed and administrators from several federal agencies and educational institutions were surveyed. The results suggested that disaster response and recovery efforts were more successful for programs that conducted exercises and training, developed all-hazards (i.e., accounts for a range of both man-made

and natural disasters) preparedness plans, and strengthened partnerships within the community. Thus, they concluded that programs with a more comprehensive approach may be the most effective. Understanding what makes an organization or institution's preparedness plan more effective would clearly aid in mitigating the damage and loss caused by a natural disaster. However, in regards to academic institutions specifically, while students make up the majority of the population of most college campuses, there is a paucity of research evaluating disaster preparedness from a student's perspective.

### **Research on Students and Disaster Preparedness**

Student perspectives regarding natural disasters and disaster preparedness provide critical insight into how effective their universities' current preparedness plans are, as well as offer insight into potential improvements that would benefit specific planning. At a Midwestern university, Lovekamp and McMahon (2011) found that, despite being aware of the risks, students reported taking little action to better prepare for a disaster. Students listed materials they had, which were mostly common household items such as a flashlight, water, and a first aid kit. Furthermore, they were unable to identify how prepared their university would be, should a disaster occur. It is important to note that Lovekamp and McMahon also found participants in their study reported having limited experience with disasters. Alternatively, in a study conducted by Simms, Kusenbach, and Graham (2013) information was collected from undergraduate students at the University of South Florida in Tampa in which 80% indicated having experienced a hurricane. However, regardless of their experience, the majority of participants inaccurately identified when hurricane season occurs (56-60%) or where storm shelters were located

(54%). The majority of students also reported not having an evacuation plan (71%) or necessary supplies (< 30%). The information generated from student self-reports on disaster knowledge and preparedness is crucial for the creation of effective university preparedness plans.

More studies have begun to incorporate student reports to gain insight into the improvement of particular disaster preparedness methods. Both Piotrowski (2015) and Senkbeil and Schneider (2010) found that students do not feel competent in properly preparing for a natural disaster. Watson, Loffredo, and McKee (2011) surveyed students at a Texas university following a hurricane and found not only did students think they could have been better prepared, but they provided specific suggestions for becoming better prepared, such as the incorporation of discussions about natural disasters at the university's orientation and the creation of a checklist to help them prepare. In a study using text-messages to simulate natural disaster warnings to students, participants reported that the messages' lack of detail created uncertainty and confusion as to how they should react (McGee & Gow, 2012). While more comprehensive programs may be time-consuming and expensive to implement, there is also evidence that simpler methods, such as having students watch an emergency preparedness video, are effective as well (Sattler, Kirsch, Shipley, Cocke, & Stegmeier, 2014; Tanner & Doberstein, 2015).

In addition to how well received a university's preparedness efforts are by students, identifying student characteristics that affect student preparedness, or perceived preparedness, provides useful information to aid in the development of preparedness programs. For example, Sattler, Kaiser, and Hittner (2000) administered questionnaires to students while they were under a hurricane warning on two separate occasions (i.e.,

during two different hurricanes). The results indicated that participants who were significantly more prepared for a hurricane were older, made more money, felt they had control over their experiences (i.e., locus of control), and perceived the disaster as more of a threat. Furthermore, the authors also found that while previous experience of a disaster affected how prepared participants were, the effect of the experience faded over time. Surveying an institution's student body provides crucial information in determining what motivates students to prepare for disasters.

Students are the majority of a university's population, and as such, their responses to preparedness methods employed by a university and their own knowledge and attitudes are essential in determining what works and what does not. While acquiring a complete understanding of students' perspective and level of preparedness regarding natural disasters can be complicated, it is key in determining how universities can best prepare for the occurrence of a disaster. The question is not *if* a disaster will occur, but *when* it will occur (Schulenberg et al., 2008). With proper training, students are capable of not only providing useful information but can make a positive impact on both the dissemination and implementation processes related to disaster preparedness and response. Therefore, determining what students know and think about disaster preparedness is imperative to improving future preparedness efforts. Additional research studies are needed, specifically those which employ large samples, in order to systematically investigate college students' perspectives of disaster preparedness at their universities.

The purpose of this study, conducted with the UM student body, is to serve as a starting point as a means of developing increasingly standardized methodologies with the

goal of promoting research to benefit any institution of higher learning. Given that Mississippi is located in a region where natural disaster preparedness is a highly relevant topic, UM's Incident Response Team (IRT) began to emphasize the systematic gathering of basic knowledge of student preparedness attitudes and behaviors. The idea behind this emphasis was to generate research-informed methods of improving preparedness efforts campus wide. Before studying student disaster preparedness at UM, it was necessary to develop an understanding of specific risks in the region, and of the structure of the University's natural disaster preparedness plan. Subsequently, information from students enrolled at the University was collected and examined related to their experiences with natural disasters, including their impressions and opinions regarding their own preparedness and that of the University itself.

### **Region-Specific Risks**

The infrastructure provided by FEMA is also followed at the state level in order to provide aid to communities, smaller organizations and institutions in which disaster preparedness plans are vital. One example of FEMA's delegation is the Mississippi Emergency Management Agency (MEMA), whose mission "is to coordinate activities that will save lives, protect property and reduce suffering of Mississippi's citizens and their communities impacted by disasters through a comprehensive and integrated program of disaster preparedness, response, recovery and mitigation initiatives" (MEMA, 2015). UM is a prime example of an institution which has taken the initiative to follow MEMA's lead in order to increase the safety of employees and the student body, as

evidenced by their Natural Hazard Mitigation Plan (NHMP; Swann & Mullen, 2014), which has been in place for over 8 years and which was recently revised.

The state of Mississippi lies in a region vulnerable to an array of natural disasters, such as hurricanes, severe thunderstorms, and floods (Emrich & Cutter, 2011; Petersen et al., 2014), with tornadoes being one of the more prominent natural disasters to occur. Mississippi is ranked 12<sup>th</sup> in the nation for total number of tornadoes reported per year (Sherman-Morris, Wax, & Brown, 2012). According to the NWS (2014b), tornadoes caused 47 fatalities in the state of Mississippi from 2010 through 2013. They also reported that, from 2000 to 2009, Mississippi experienced an average of 48.7 tornadoes a year. To exemplify the unpredictability of tornado occurrences, in a 10-year period, tornado occurrences ranged from 27 to 109 per year in 2000 and 2008, respectively. In 2007, just prior to a year in which 109 tornadoes were reported, Mississippi recorded only 33 tornadoes.

Tornadoes are not the only type of weather-related disaster to affect the state of Mississippi. From 2003 to 2009, there was at least one recorded death related to floods (five people), heat (six people), cold weather (two people), and thunderstorms and high winds (12 people). Hurricane Katrina alone caused 181 fatalities in the state of Mississippi (NWS, 2014a). In the same time period, the NWS reported costs from damages in the state ranging from \$53 million to \$26 billion.

Earthquakes, in particular, are also a threat to the state of Mississippi. In the last 14 years, the United States Geological Survey (USGS; USGS, 2014) recorded six earthquakes in the state of Mississippi. Two of these earthquakes were over 3.0 in magnitude and accounted for minimal physical damage. The largest earthquake recorded

in Mississippi was in 1931 with a magnitude of 4.6, where the shock was felt over 65,000 square miles and several buildings were damaged (USGS, 2014). While earthquakes in Mississippi are rare, and no recent seismic activity has proved strong enough to necessitate a disaster declaration according to FEMA (2014), the risk of a major earthquake occurring still exists. Moreover, one of the most active seismic zones in the United States is just north of the Mississippi border. The New Madrid Seismic Zone, spanning beneath southeastern Missouri, northeastern Arkansas, western Tennessee, western Kentucky, and southern Illinois, is responsible for an infamous cluster of major earthquakes in the region during 1811-1812. The New Madrid Seismic Zone has resulted in major damage and continues to pose a high risk to the region (Frankel, Applegate, Tuttle, & Williams, 2009). The irregularity of major earthquakes in Mississippi, in addition to the potential damage caused by earthquakes like those that occurred in 1811-1812, warrants the need to understand how individuals and institutions prepare for such disasters. Natural disasters have had devastating effects in the state of Mississippi and the consistency in which they occur can make preparing for them even more of a challenge.

In addition to being located in a region of the U.S. susceptible to natural disasters, the state of Mississippi is also one of the poorest states, with residents earning an average annual wage of \$36,070 in 2013 (annual median = \$28,240; United States Department of Labor, 2014). Limited economic resources place the state at great risk in terms of vulnerability to the major negative impacts of natural disasters. Not only do limited resources make it difficult to adequately put preparedness measures in place but they can make justifying the allotment of resources to certain needs difficult as well (Teasley, 2012). For example, since 2004, the growth rate of student enrollment at UM was



approximately 59.7% (UM, 2014). If a university is growing at an excessive rate and parking issues start to arise, allotting resources to improve parking may be easier to justify than to improving disaster preparedness measures for a hypothetical earthquake. Furthermore, previous studies indicate that individuals of lower socioeconomic status are at an increased risk of experiencing greater levels of psychological distress after being impacted by a disaster (Drescher, Schulenberg, & Smith, 2014; Norris et al., 2002). Taken together, the complicated nature of properly preparing for natural disasters further emphasizes the importance of having an effective disaster preparedness plan in place.

### **The University's Disaster Plan**

The state of Mississippi experiences a wide range of natural disasters and thus, UM is also at risk. There were over 16,500 students enrolled at UM for the 2014-2015 school year, which almost doubles the population of the surrounding community (UM, 2014). In other words, if students alone were spread evenly across the 3.38 square miles of campus, the population density would equal approximately 4,882 students per square mile. Given UM is aware of these facts, the administration has gone to great lengths to create a detailed and comprehensive mitigation plan that includes a risk assessment, information about hazards of concern to the University, an assessment of vulnerabilities, options for natural hazard mitigation, details of the prioritization and implementation projects, and finally, hazard plan maintenance (Swann & Mullen, 2014). The University's NHMP has been in place since 2006 and was recently revised. The plan is outlined below.

**Risk Assessment and Hazards of Concern.** The NHMP first identifies hazards that are relevant to UM and determines the level of risk each pose given the infrastructure and

environmental characteristics of the campus in relation to the characteristics of the hazard.

From the evaluation there were 10 hazards identified, including their likelihood of occurrence (O) and mitigation priority (P) levels. Those hazards were: earthquake (O: Medium, P: High), tornado (O: Medium, P: High), dam failure (O: Low, P: Low), extreme temperature/drought (O: Low, P: Low), flood (O: Low, P: Low), hailstorm (O: Medium, P: Medium), severe winter storm (O: Medium, P: Medium), wildfire (O: Low, P: Medium), lightning (O: Low, P: Medium), and wind (O: Medium, P: Medium).

Detailed information for each natural hazard is provided in the report. While specific hazards relevant to UM were listed in the NHMP, the current study is not discounting those that were not listed considering hazard relevance is region specific and we cannot assume all students were from the region where UM is located. For example, according to UM (2014), approximately 39% of students are non-residents of Mississippi. Furthermore, even students within the state may experience different natural disasters, in that students who are from the Mississippi Coast are more likely to have experiences with hurricanes than those from northern regions of the state.

**Vulnerabilities.** This section of UM's NHMP provides an evaluation of the University's vulnerability to natural hazards in relation to building structures, the structures' importance to UM, and the contents within them. Damage costs are estimated and insurance coverage is explained. Vulnerabilities are evaluated in relation to each of the hazards identified as a concern to UM in the previous section. A summary of UM's vulnerability to natural hazards indicates that earthquakes, tornadoes, and straight-line winds are the top three hazards that UM is most vulnerable to in relation to potential loss.

**Options for Mitigation and Projects.** This section provides an overview of the mitigation strategy, including the review of mitigation projects posed in the 2006 NHMP report in order to either remove completed projects or to retain those projects that have not been finished. Newly suggested mitigation actions/projects are also described, including how goals and objectives are developed for those projects, a review of potential benefits from the projects, and how projects are prioritized for implementation. There are 16 new projects detailed in the 2014 version of UM's NHMP. Examples include conducting annual emergency management exercises for faculty and staff, devising mitigation for high-value documents, conducting emergency mental health training classes, and constructing a safe room to protect students, staff, and faculty during a tornado. Potential benefits gained from the projects are evaluated in four categories: 1) avoidance of casualties, 2) avoidance of loss-of-function, 3) avoidance of physical damage, and 4) avoidance of emergency management costs. During the implementation process, UM receives assistance from MEMA. MEMA aids UM in the prioritization of each project based on their estimated costs and benefits, as well as seeing the projects through to their implementation and completion.

**Maintenance.** The final section of the NHMP details how projects will be maintained and further evaluated. The plan indicates that UM's advisory committee will meet bi-annually to evaluate progress and discuss whether any changes need to be made. The public will be given an opportunity to participate in the evaluation process, and both MEMA and FEMA will be informed of any major changes to the plan.

While UM's NHMP is detailed and thorough, the committee acknowledges the amount budgeted for the recovery cost is insufficient compared to the estimated costs of

any one natural disaster (Swann & Mullen, 2014). Expending resources for disaster preparedness is much more difficult to justify when natural disasters are perceived as improbable, regardless of how devastating the consequences could be (i.e., low probability, high cost events), especially in areas which struggle economically. Therefore, determining increasingly effective and efficient methods of disaster preparedness are paramount to reduce the physical, financial, and psychological costs that accompany the wake of natural disasters.

Throughout the year, the UM campus is a high traffic area where students, faculty, and staff have many regular daily tasks to be concerned about, such as curriculum, grades, and social affairs. Therefore, monitoring the perceived preparedness of those individuals aids in the understanding of how disaster preparedness is being prioritized amidst their busy schedules, also providing insight into how well University preparedness measures are being received.

### **The Current Study**

There is no better informant regarding what motivates students to prepare for natural disasters than the students themselves. The purpose of this study was to gain student insight on the matter of disaster preparedness. An understanding of students' perceptions of their own preparedness and the University's preparedness not only informs the development of a university preparedness plan, but informs more generalizable methods of measuring preparedness.

Considering previous findings, the current study further investigated what emergency supplies students have, what type of natural disasters students have

experienced, and how confident students are in the University's preparedness. It was hypothesized that students who are older would be more prepared, that students who perceive a natural disaster as more of a threat would be more prepared, and that those who have experienced a natural disaster would be more prepared. The current study also explored whether a student's confidence in the University's preparedness is related to how concerned they are about a natural disaster occurring and, in turn, if the student's concern is related to how prepared they are. Finally, the study aimed to determine whether there are group differences in disaster preparedness considering various student demographic variables. Examples of variables included gender, international student status, whether they are living on or off campus, and whether they are in a fraternity/sorority.

## **Methods**

### **Participants**

Participants were undergraduate and graduate students at The University of Mississippi. All participant data were de-identified. Sample characteristics are provided below.

### **Procedure**

An online survey was developed and administered to students enrolled at UM. An email, which included a brief explanation of the study and link to the survey via the Qualtrics software program, was sent out via UM's email notification system to all students enrolled in classes at the University. Once participants clicked on the link, they were directed to the online survey where they were provided written informed consent prior to proceeding with the questionnaire. Students did not receive compensation for their

participation, but rather were encouraged to participate on the basis of the importance of the issue to the University community. The Institutional Review Board of UM approved study procedures and the study was conducted with the approval of the University's Incident Response Team (IRT).

## **Survey**

The survey administered was adapted from previously collected pilot survey and focus group data. The pilot survey was administered to a small sample of University of Mississippi undergraduate psychology students exploring the relationship of disaster preparedness with other variables (Baczowski et al., 2013). Following the pilot survey, four focus groups were conducted to achieve a more comprehensive understanding of the quantitative findings of the study. Participants were asked questions to solicit feedback related to the pilot survey as well as questions regarding their perceptions and attitudes of natural disasters as a UM student.

The survey administered in the current study was part of a large-scale effort to collect information relevant to various disaster themes, such as vulnerability, emergency experiences, and access to information, in the context of pandemic- and violence-related disasters as well as natural disasters. The survey was comprised of 30 questions including nine demographic questions and two open-ended general feedback questions (see Appendix A). Examples of questions included, "How confident are you that [the University of Mississippi] is prepared to deal with an emergency situation related to weather?", "How likely would you be to follow instructions provided by the following people?", "How do you primarily receive information about bad weather occurring in Oxford (e.g., tornado warnings, flood watches)?", and "Which of the following

emergency supplies do you have in your campus dorm room/apartment/house?”. The time to complete the entire survey was approximately 10 minutes.

From the complete survey administered in the larger study, the current investigation focused only on those questions relevant to natural disasters. Specifically, five natural disaster-related domains were measured within the larger questionnaire. Three of those domains were rated on a 7-point scale and included: perceived likelihood of an occurrence (*Disaster Likelihood*; 1 [*Not at all likely*] to 7 [*Extremely likely*]), concern about an occurrence (*Disaster Concern*; 1 [*Not at all concerned*] to 7 [*Extremely concerned*]), and certainty of knowing what to do in the event of an occurrence (*Perceived Preparedness*; 1 [*I have no idea what to do*] to 7 [*I have a very good idea what to do*]). The other two domains, disasters experienced (*Disaster Experience*) and emergency supplies in the residence (*Materials*), allowed participants to check all applicable answer choices from a list of alternatives.

## **Data Analysis**

Statistical analyses were conducted using SPSS. First, descriptive statistics are reported for the *Materials*, *Disaster Experience*, *Confidence in University Preparedness*, *Disaster Likelihood*, *Disaster Concern*, and *Perceived Preparedness* variables.

Five new variables were computed: *Total Likelihood*, *Total Concern*, *Total Perceived Preparedness*, *Actual Preparedness*, and *Total Experience*. For *Total Likelihood*, *Total Concern*, and *Total Perceived Preparedness*, which were rated on a 7-point scale, total scores were created by averaging scores of each individual disaster within the domains. Internal consistencies for the Total Likelihood ( $\alpha = .74$ ), Total

Concern ( $\alpha = .87$ ), and Total Perceived Preparedness ( $\alpha = .88$ ) scales ranged from respectable to very good (DeVellis, 2012). Actual Preparedness and Total Experience were computed as the sum of all materials and the sum of all natural disasters experienced, respectively.

A multivariate analysis of variance was conducted to test for significant mean differences in Total Likelihood, Total Concern, Total Perceived Preparedness, Actual Preparedness, and Total Experience considering gender, international student status, whether students live on or off campus, and whether students are members of a fraternity/sorority.

A linear regression analysis was conducted using “students’ confidence in the University’s preparedness” as the predictor variable and Total Concern as the dependent variable. Two linear regression analyses were conducted to predict both Actual Preparedness and Total Perceived Preparedness with age, Total Experience, Total Concern, and Total Likelihood as the predictor variables.

Finally, several linear regression analyses were conducted to further explore the relationships between potential factors in disaster preparedness such as 2- and 3-way interactions between Total Concern, Total Likelihood, Total Perceived Preparedness, Actual Preparedness, and Total Experience.

## **Results**

Data from 222 of the total 1065 respondents were dropped due to a failure to follow instructions. The majority of those dropped ( $n = 219$ ) completed less than 20% of the questionnaire items and the rest ( $n = 3$ ) were dropped for providing inappropriate or untruthful responses. In addition, several participants ( $n = 31$ ) indicated an academic



classification of “Other”. Due to the ambiguous nature of this classification (e.g., may be taking classes online, therefore the relationship between them and the university may include several confounds that cannot be accounted for), these participants were also removed from subsequent analyses. Of the remaining sample, standardized scores and Mahalanobis distance were used to check for univariate and multivariate outliers, respectively. Nine participants were found to be multivariate outliers ( $p < .001$ ), three of which were the only univariate outliers identified (i.e., more than three standard deviations from the mean). A review of the individual scores of all nine outliers revealed that responses from three of the cases (not including any of the univariate outliers) were within the normal range of responses. In other words, while the responses of these individuals were extreme, they were not outside of the realm of possibility. Therefore, only six of the nine outliers were removed from subsequent analyses (Kline, 2010).

The final sample size was comprised of 806 student participants. Of the 806 sample participants, 65.0% ( $n = 524$ ) were female and 34.9% ( $n = 281$ ) were male. One participant did not provide a response to this item. Out of 500 participants who disclosed their age, the ages ranged from 18 to 60 ( $M_{\text{age}} = 23.13$ ;  $SD_{\text{age}} = 7.64$ ). The majority of the sample reported being White/non-Hispanic ( $n = 627$ ; 77.8%). The second largest racial/ethnic group was African-Americans ( $n = 100$ ; 12.4%), followed by Asians ( $n = 34$ ; 4.2%), Hispanics/Latinos ( $n = 15$ ; 1.9%), Native American Indians ( $n = 3$ ; 0.4%), Pacific Islanders ( $n = 1$ ; 0.1%), and Alaskan Natives ( $n = 1$ ; 0.1%). The remainder of the sample reported as multi-racial ( $n = 12$ ; 1.5%) or as “Other” ( $n = 10$ ; 1.2%). Three participants did not disclose their race/ethnicity.

In terms of academic classification, the sample was comprised of freshmen ( $n = 214$ ; 26.6%), sophomores ( $n = 92$ ; 11.4%), juniors ( $n = 145$ ; 18.0%), seniors ( $n = 184$ ; 22.8%), and graduate students ( $n = 171$ ; 21.2%). Out of the students who completed the survey, 35.9% ( $n = 289$ ) reported living on campus, 63.8% ( $n = 514$ ) reported living off campus, and there were three participants who did not respond to the question. International students made up 4.6% ( $n = 37$ ) of the participants and 14.1% ( $n = 114$ ) of participants reported membership to a social fraternity or sorority. Furthermore, the majority of the sample reported being “fairly confident” to “very confident” that UM is prepared to deal with an emergency situation related to weather ( $n = 611$ ; 75.8%) and reported UM as “fairly capable” to “very capable” in educating students on the proper procedures relating to campus emergencies ( $n = 658$ ; 81.6%).

Descriptive statistics were analyzed for the five natural disaster-related domains (see Appendix B, Table 1). In addition, most of the participants ( $n = 765$ ) reported experiencing at least one of the listed disasters. In regards to emergency supplies, most participants reported having a flashlight (75.2%), followed by a first aid kit (67.5%), a 3-day supply of food (61.3%), spare batteries (57.6%), a 3-day supply of prescription medications (55.8%), a list of emergency phone numbers (49.1%), a 3-day supply of clean drinking water (41.4%), an emergency weather radio (18.9%), or something other than what was listed (7.9%; e.g., fire extinguisher, candles, generator, etc.). All variables included in the analyses were normally distributed according to the Shapiro-Wilk normality analyses ( $W > .90$ ) with the exception of age. However, while there were only slightly fewer undergraduate students who were 25 or older in this sample (6%) than reported by the university (11%), overall the distribution of age in the current study ( $W$

= .68;  $p < .001$ ; skewness = 2.44,  $S.E. = .12$ ; kurtosis = 6.21,  $S.E. = .21$ ) is representative of the UM student body (D. McNally, personal communication, June 17, 2015).

Due to substantially unequal group sizes between international and non-international students, a four-way between-subjects MANOVA was conducted, using Total Likelihood, Total Concern, Total Perceived Preparedness, Actual Preparedness, and Total Experience as the dependent variables and gender, ethnicity, whether students live on or off campus, and whether students are members of a fraternity/sorority as the independent variables, on both international students and non-international students independently to determine if a substantial difference existed in the results. Descriptive comparisons of the two MANOVAs indicated substantial differences between the groups. When compared to non-international students, international students reported natural disasters as less likely to occur and were more concerned about them occurring on campus, they had less experience with natural disasters, they perceived themselves as less prepared and reported having fewer emergency supplies than non-international students. Therefore, international students ( $n = 37$ ), plus four participants that did not disclose whether they were international students or not, were excluded from further analyses. See Appendix B, Table 2 for descriptive comparisons between the international and non-international students.

To test for demographic differences between the primary variables, the same four-way between-subjects MANOVA was conducted on only non-international students ( $N = 765$ ). A Bonferroni correction for multiple comparisons ( $p = .05/5 = .01$ ) was employed. Box's test ( $M = 134.73$ ;  $F[105, 9322.32] = 1.18$ ,  $p = .104$ ) indicated that the covariance

matrices of the dependent variables were not significantly different across levels of the independent variables; therefore, Wilks' Lambda was reported.

Using Wilks' Lambda as the criterion, a statistically significant multivariate interaction effect of gender X campus resident status ( $F[5, 724] = 3.57, p = .003$ , Wilk's  $\lambda = .98, \eta^2 = .24$ ) was found indicating that a unique joint effect of these two variables accounted for a significant portion of the variance in the model. No other significant multivariate interaction effects ( $ps > .01$ ) were found. The only statistically significant multivariate main effects found were the individual main effects of both gender ( $F[5, 724] = 8.88, p < .001$ , Wilk's  $\lambda = .94, \eta^2 = .06$ ) and campus resident status ( $F[5, 724] = 4.82, p < .001$ , Wilk's  $\lambda = .97, \eta^2 = .03$ ). However, given the significance of their multivariate interaction, the corresponding univariate interactions were examined first.

Univariate ANOVAs were conducted on each dependent measure separately to determine the locus of the statistically significant multivariate interaction effect of gender X campus resident status using a Bonferroni correction ( $p = .01$ ), given the five dependent variables in the analysis. However, based on the results of the Levene Test, the Actual Preparedness variable violated homogeneity of variance,  $F(7, 728) = 2.46, p = .017$ ; thus statistical significance was evaluated for that variable against a more stringent alpha level of .001. Between-subjects analysis indicated that there was no significant univariate gender X campus resident status interaction effect ( $ps > .001$ ); therefore, the individual univariate ANOVAs for the main effects of gender and campus resident status were further examined.

Between-subjects analysis indicated a significant main effect of gender for Total Likelihood ( $F[1, 728] = 8.98, p = .003, \eta^2 = .01$ ), Total Concern ( $F[1, 728] = 8.36, p$

= .004,  $\eta^2 = .01$ ), Total Experience ( $F[1, 728] = 9.32, p = .002, \eta^2 = .01$ ), and Total Perceived Preparedness ( $F[1, 728] = 11.66, p = .001, \eta^2 = .02$ ). An examination of the means for each dependent variable indicated that on average across disasters: (a) females ( $M = 3.60, SD = .90$ ) reported natural disasters as more likely to occur than males ( $M = 3.31, SD = .96$ ), (b) females ( $M = 3.18, SD = 1.31$ ) reported being more concerned about a natural disaster occurring than males ( $M = 2.53, SD = 1.17$ ), (c) females ( $M = 3.47, SD = 1.50$ ) reported having experienced fewer natural disasters than males ( $M = 4.02, SD = 1.59$ ), and (d) females ( $M = 4.54, SD = 1.56$ ) perceived themselves as less prepared for natural disasters than males ( $M = 5.25, SD = 1.41$ ).

The locus of statistically significant multivariate main effect of campus resident status was a function of Total Likelihood ( $F[1, 728] = 8.86, p = .003, \eta^2 = .01$ ) and Actual Preparedness ( $F[1, 728] = 13.50, p < .001, \eta^2 = .02$ ). Examination of the relevant means indicated that students living off campus ( $M = 3.58, SD = .89$ ) reported natural disasters as more likely to occur than students living on campus ( $M = 3.35, SD = .97$ ), and students living off campus ( $M = 4.80, SD = 2.18$ ) reported having more supplies (i.e., a higher Actual Preparedness rate) than students living on campus ( $M = 4.12, SD = 1.89$ ). Caution should be exercised in interpreting these results because of the small amount of variance accounted for with the present independent variable and due to the defining properties of natural disaster *experience* as indicative of experiencing a more *diverse array* of natural disasters (i.e., from either no disasters experienced to experiencing one of each type) as opposed to the *total frequency* of disasters experienced per student.

A primary aim of the current study was to gain a better understanding of the relationships between common factors that influence students' preparedness. See

Appendix B, 3 for correlations, means, and standard deviations of the primary variables. There were several noteworthy correlations. For example, Total Concern was correlated negatively with both Total Perceived Preparedness ( $r = -.15, p < .01$ ) and students' confidence in UM in dealing with an emergency-related situation ( $r = -.08, p < .05$ ). Although these correlations suggest weak associations, their significance and the negative direction of the association justify further discussion. Another notable relationship found was the significant positive correlation between Total Perceived and Actual Preparedness ( $r = .28, p < .01$ ). This moderate correlation suggests that these variables are related yet are distinct. While the data were analyzed as proposed, ambiguities in the temporal relationships between these variables in particular are further considered in conjunction with the post-hoc exploratory analyses in the discussion section below.

To assess the relationship between age, Total Experience, Total Concern, Total Likelihood, and students' preparedness, we conducted two linear regression analyses with Total Perceived Preparedness and Actual Preparedness as the dependent variables. Because there is little known about these relationships, there was no correction made for the number of predictors in the model. A conventional  $p$ -value of .05 was used to gauge significance, however exact  $p$ -values are reported to allow for a more objective interpretation. For each linear regression model, age, Total Experience, Total Concern, and Total Likelihood were entered simultaneously in step one. These analyses showed that Total Experience ( $\beta = .36; p < .001$ ) and Total Concern ( $\beta = -.24; p < .001$ ) were significant predictors of Total Perceived Preparedness with the full model explaining 16.8% of the variance in Total Perceived Preparedness.

Furthermore, Total Experience ( $\beta = .34$ ;  $p < .001$ ), Total Concern ( $\beta = -.17$ ;  $p = .047$ ), and Total Likelihood ( $\beta = .33$ ;  $p = .012$ ) were all significant predictors of Actual Preparedness with the full model explaining 9.1% of the variance in Actual Preparedness. Interestingly, while the binary correlation between Total Concern and Actual Preparedness did not prove significant, the results from the regression model indicate a negatively correlated relationship, warranting further investigation. Furthermore, Total Experience appeared to be a strong predictor for both Actual and Total Perceived Preparedness, in that, the more natural disasters students experienced, the more prepared they were, and perceived themselves to be. There were no significant effects found between age and students' preparedness for natural disasters (i.e., actual or perceived).

To assess students' concern about the occurrence of a natural disaster at the university in relation to their perceptions of the preparedness of the university, we conducted a simple linear regression using "students' confidence in the University's preparedness" as the predictor variable and Total Concern as the dependent variable. The results indicated that students' confidence in the University's preparedness was a significant predictor of their concern about a natural disaster occurring at UM ( $\beta = -.09$ ;  $p = .022$ ). These results, coupled with the findings that students' concern was significantly related to their Actual and Total Perceived Preparedness, indicated a possible connection between students' confidence in the University and their preparedness and therefore, was considered in the exploratory model.

To explore the relationships between variables in the current study, a series of regression models were tested in addition to an analyses probing for interactions between the variables. The first two regressions were similar to those conducted previously, with

both Total Perceived and Actual Preparedness as dependent variables with the addition of two more variables: (a) the “students’ confidence in UM” variable and (b) the opposite preparedness variable (i.e., in the model where Actual Preparedness is the dependent variable, Total Perceived Preparedness was included as an independent variable and vice versa). The rationale for conducting the analyses in this way was due to the fact that, given the statistically significant positive correlation between Perceived and Actual Preparedness and the cross-sectional nature of the current study, students’ perception most likely includes their knowledge of how actually prepared they are. Also, descriptive comparisons of the two models were made that included the two additional variables.

For the following two analyses, all variables were mean-centered and entered simultaneously in the first step in order to see how much variance was uniquely accounted for by each individual variable. Results indicated, using the *adjusted R<sup>2</sup>*, that the model with Total Perceived Preparedness as the dependent variable explained 22.2% of the variance while the model with Actual Preparedness as the dependent variable explained 10.9% of the variance (see Appendix B, Table 4). Notably, in the model with Total Perceived Preparedness, confidence in UM, Total Concern, Total Experience, and Actual Preparedness were all robust predictors of Total Perceived Preparedness, while in the Actual Preparedness model, only Total Experience and Total Perceived Preparedness resulted in an equally robust level of significance ( $ps < .001$ ).

Finally, given that Total Perceived Preparedness as the main outcome seemed to be the more robust model, the final analyses included investigating the presence of any interactions between the variables in that model. Using an analysis of simple slopes to examine the simple effects of the possible interactions (Aiken & West, 1991), results



suggested that the relationship between students' confidence in UM and Actual Preparedness is conditional on values of Total Experience with natural disasters. The interaction is illustrated in AppendixB, Figure 1.

According to the results, there was a significant effect of students' confidence in UM in preparing for a natural disaster on their Actual Preparedness only for those students that have experienced a less than average number of natural disasters relative to the current sample. On average, the current sample reported experiencing 3.66 different types of natural disasters. For students that experienced approximately three different natural disasters or less ( $N = 351$ ), their confidence in UM to prepare for a natural disaster significantly predicted how actually prepared they were. Furthermore, the relationship was positive. No relationship was found between students' confidence and Actual Preparedness for students that experienced more than three different types of natural disasters ( $N = 414$ ). Taken together, every primary variable explored (i.e., Confidence in UM, Total Concern, Experience, and Actual Preparedness) minus Total Likelihood predicted Total *Perceived* Preparedness, while *Actual* Preparedness was only predicted by Experience. Confidence in UM was also found to be predictive of Actual Preparedness but its predictive power was moderated by Experience. For a complete proposed conceptual diagram illustrating the relationships between the primary variables, see Appendix B, Figure 2.

## **Discussion**

The present study examined students' perspectives and attitudes related to natural disaster preparedness. Specifically, in order to gain a better understanding of natural disaster preparedness itself, how prepared students perceived themselves to be, how

actually prepared they are, and their confidence in UM preparedness was examined in relation to their reported likelihood of a natural disaster occurring and how concerned they were about a natural disaster occurring at the University in the following year. Students were also asked about the types of natural disasters they had experienced. Overall, the results partially supported the current study's hypotheses.

### **Age as a Predictor of Preparedness**

An overarching aim of the current study was to examine relationships between disaster preparedness variables. The current study hypothesized that older students would be more prepared. No statistically significant relationship was found between age and Actual or Perceived Preparedness, which is inconsistent with previous findings indicating that older students were more prepared (Sattler et al., 2000). However, continued research is warranted given that the lack of statistically significant findings may be related to the current study's narrow age range. Although ages ranged from 18 to 60, the sample's mean age was 23, the median age was 20, and the majority of the sample was 18 to 21 years old. In other words, the positively skewed distribution of age makes it difficult to detect statistically significant differences from one age to the next if the majority of the sample only differs by a maximum of three years. In regards to the current study, these findings would only be problematic if the sample was not representative of the actual student population, which it is. However, student populations differ from university to university and therefore, age should continue to be accounted for in future research. Even if age is ultimately determined to be a non-factor in relation to disaster preparedness, finding discrepancies in age distributions between data collected and actual populations is

methodologically informative (e.g., may be indicative of potential methodological weaknesses such as in the data collection process itself).

### **Perceived Threat as a Predictor of Preparedness**

Interestingly, there were mixed results related to students' perceived threat of a natural disaster occurring on campus, measured by the likelihood of a natural disaster occurring (Total Likelihood) and how concerned they were about one occurring (Total Concern). While Total Concern significantly predicted students' Total Perceived Preparedness and Actual Preparedness, it did not predict their preparedness in the direction hypothesized. The results suggest that the *less* concerned students were, the *more* prepared they perceived themselves to be and actually were. These results are inconsistent with the Sattler et al. (2000) study, which found a natural disaster perceived as a higher threat predicted more preparedness. However, several differences may play a role in the contradicting results such as, in the Sattler study, items related to both likelihood and concern were combined to create a *threat* variable. Additionally, students were administered the questionnaire during a hurricane threat as opposed to a time of no threat. There were no similar direct threats present at the time these data were collected. Given the current study's cross-sectional design, it is likely that their perceptions about being more prepared are causing less concern and not the other way around.

Furthermore, Total Likelihood did not significantly predict how prepared students perceived themselves to be but was a statistically significant predictor of how actually prepared they were. In other words, students who thought that the university was significantly more likely to be affected by natural disasters were found to have more

emergency supplies at their residence. Aside from the combining of both concern and likelihood related items, this finding was more consistent with the Sattler et al. (2000) results, which also asked about “preparation activities” in order to measure preparedness. Considering these findings, one question that demands attention is *how* students are gauging *likelihood*. The perception of how likely a natural disaster is to occur could be informed or influenced by a student’s knowledge of natural disasters, the area they live in or grew up in, or how much time they spend looking at weather forecasts, for example. These factors should be considered in future research.

### **Experience as a Predictor of Preparedness**

In support of the current study’s hypotheses, the results suggest that the more experience students have with natural disasters the more prepared they perceived themselves to be and the more actually prepared they were. These results are similar to findings from the study conducted by Lovekamp and McMahon (2011), in which case participants had little experience with natural disasters and reported not being well prepared. Alternatively, Simms, Kusenbach, and Graham (2013) found that, while many students had experienced a hurricane, few knew what to do if one were to occur. Interestingly, the Sattler et al. (2000) study did find that more experience positively influenced preparedness. However, preparedness decreased since the time the natural disaster was experienced. The inconsistent findings related to experience are not surprising given the varied, and in some cases unclear, methods used to measure experience. This emphasizes the importance to not only conduct more research but also to better improve *how* research on natural disaster preparedness is conducted.

## **Group Differences**

One aim of the current study was to determine the presence of any existing group differences in natural disaster preparedness variables. Significant differences in gender were found across the primary variables. Compared to male students, female students reported that the university was significantly more likely to be affected by natural disasters and reported being significantly more concerned about a natural disaster occurring in the next year. Female students also reported experiencing a significantly less diverse array of natural disasters and perceived themselves as less prepared in comparison to male students. Past research has found gender differences relating to disaster preparedness and risk but results differed depending on other variables such as socioeconomic status, child responsibilities, or other gender role specific factors (Fothergrill, 1996). In a recent nationwide survey including participants 50 years of age or older, Al-rousan, Rubenstein, and Wallace (2014) did not find significant gender differences on several indicators of disaster preparedness. There is a possibility that gender differences may not be seen with populations that are particularly less prepared, or generally vulnerable, overall. The collective findings regarding gender and disaster preparedness emphasize the importance of considering potential gender differences when conducting disaster preparedness research. On the other hand, gender differences may only be of concern if factors related to gender influence a student's ability to prepare for a disaster.

Significant differences were also found between those who lived on campus and those who lived off campus. Students who lived off campus reported believing that the

university was significantly more likely to be affected by natural disasters than students who lived on campus. Perhaps these results are indicative of the “bad things will never happen to me” mentality otherwise known as *unrealistic optimism* (Shepperd, Waters, Weinstein, & Klein, 2015), where students living on campus feel it is less probable that they will be affected (i.e., their outcome will be more favorable) versus students that spend much less time on campus, who are realistically less likely to be affected considering the focus of the questionnaire is related to *on campus* occurrences.

Interestingly, students who lived off campus also reported having significantly more emergency supplies (i.e., reported more *Actual Preparedness*) than students who lived on campus, suggesting that perhaps their belief about the probability of a natural disaster impacting the university may be influenced by their perception about the occurrence of natural disasters in general. Alternatively, on campus students may simply assume that the university will take care of them. A body of research exists stemming from a study conducted by Darley and Latañe (1968) suggesting the presence of a *diffusion of responsibility*, in which people feel less responsible when the responsibility is shared amongst a larger group. Students living on campus may assume a shared responsibility with not only fellow dorm residents but also campus staff. However, while this may explain differences between living on campus and students renting or owning houses off campus, this may not fully explain students that live in dorms off campus.

Additionally, given that there is university regulated student housing that is located off of campus in addition to students who independently buy or rent homes off of campus, more research needs to be done to determine why students living off campus have more access to supplies that could aid in the event of a natural disaster. For example,

students living off campus may have more space to store emergency supplies or property where a shelter could be built. Students living off campus may also be more responsible. Within the group of students living off campus, differences may be influenced by whether the students are living in a house versus an apartment complex. There were no significant differences found between students who were in a fraternity or sorority and those who were not.

### **Relational Exploration of Disaster Preparedness Factors**

Relationships of common factors of natural disaster preparedness were also explored in more depth in order to inform future research. Correlational analyses suggest that the less concerned students are about a natural disaster occurring, the more prepared they perceive themselves to be and the more confidence they have in the university in dealing with an emergency-related situation. With that said, although the correlations between students' Total Concern and both Total Perceived Preparedness and students' confidence in UM were statistically significant, the magnitude of the relationships were weak. While we are also not implying a specific cause and effect relationship based on these simple correlations, the results raise questions as to the temporal relationship between these variables. For example, in regards to the negative relationship specifically, one must ask if it would make more sense for either students' lack of concern about a disaster occurring to be a product of the heightened perception of their preparedness, or that their perceived level of heightened preparedness is resulting in less concern. Similarly, is it more likely that an individual's confidence in UM is a product of low levels of concern or that a lack of concern results in increased confidence in UM?

A significant but moderate positive correlation was found between Total Perceived Preparedness and Actual Preparedness suggesting that these are related but distinct concepts. Furthermore, while the relationship is moderate, the temporal nature of the relationship is left to speculation. Is students' increased Actual Preparedness leading to their perception that they are more prepared, or is their perception of their preparedness influencing to what extent they actually prepare? These questions were considered while conducting the exploratory analyses but should also be further investigated when developing research studies in the future.

Results of the regression analyses testing the Total Perceived Preparedness and Actual Preparedness models individually found that the variables included accounted for more variance in the Total Perceived Preparedness model. These results support the claim that, given the cross-sectional design of the current study, a model that not only predominantly predicts students' Total *Perceived* Preparedness as the main outcome but also includes their *Actual* Preparedness may be a more accurate conceptualization of the current study's results than the alternative (i.e., Actual Preparedness as the main outcome). This makes sense considering that, when asked at one time point, reports of how prepared participants perceive themselves to be most likely include the awareness of the actions they have taken to prepare or knowledge of the preparedness supplies they have access to.

Interestingly, the results also suggest that the more confidence students had in UM's ability to prepare for a disaster the more emergency supplies they reported having; however, this only applied to students that had experienced approximately three different types of natural disasters or less. This effect was not seen in students who experienced



more than three different types of natural disasters. While on average, students reported being *fairly confident* in UM's ability to prepare for a natural disaster, students who have more experience with disasters may have higher expectations when it comes to preparedness. Regardless, overall Total Experience was still found to be a significant predictor of both Actual and Total Perceived Preparedness when controlling for all other variables.

### **Study Limitations**

Like all studies, the current investigation was not without limitations. First and foremost, the exploratory nature and cross-sectional design limited the ability to make concrete cause and effect assertions from the results. While there are known areas that are typically at higher risk for certain natural disasters and some natural disasters are more likely to occur *around* the same time every year (e.g., weather-related disasters as opposed to earthquakes), conducting research on natural disasters in general is difficult considering the inconsistency of when and where a natural disaster will occur. For example, justifying a longitudinal study in order to obtain pre- and post-disaster data is difficult when you have a vague idea where, when, or if, a disaster will even occur.

While previous research aided and informed the development of the questionnaire administered in the current study, several potential areas for improvement were discovered. One example is how the current study measured Total Experience. As mentioned previously, participants were only asked to select what *types* of natural disasters they had experienced. While this gets at an aspect of experience (i.e., how many different types of natural disasters experienced), it does not help to fully understand the

estimated number of disasters experienced across the different types. More depth is needed in regards to what type of disaster was experienced, how much time has passed since it was experienced, and how specifically it affected the individual. However, given there are several different types of disasters, moving forward, a balance needs to be made between the burdensomeness of the questionnaire (e.g., duration) and getting pertinent information. One way to do this may be to tailor questions to specific regions by omitting natural disasters that may not be a risk in that specific area or to combine similar types of natural disasters such as snowstorms, blizzards or ice storms into one category in areas where these types of natural disasters are less common.

Furthermore, more recent research suggests possible alternative methods of measuring perceived threat. Stein, Birnir-Guven, Duenas-Orsorio, and Subramanian (2014) found that more preparation was predictive of the damage caused by the disaster. The results were understood as people living in places of higher risk are more prepared but being in a higher risk area is a result of being susceptible to more damage. In regards to the current study, perhaps instead of asking about the likelihood of an occurrence, asking about the likelihood of the occurrence *resulting in damage* (e.g., structural, physical injury, etc.) may be more meaningful. Having a better understanding of the nature of the experience (e.g., how personal or proximal) may prove to be important in understanding the relationship between experience and preparedness. In general, more accurately explicating constructs being measured will provide a much more robust understanding of how to increase preparedness.

Of course, balancing the depth of which the data reflects each construct and the breadth of domains accounted for can be difficult when attempting to minimize the

burdensomeness of completing a questionnaire. Unfortunately, being a university-wide study, providing effective incentives to balance the burden was not feasible; thus, keeping the questionnaire brief, was that much more important. As a result, given the more global evaluative objective of the current study, depth was sacrificed in order to increase the breadth of information obtained.

Another limitation was that the Actual Preparedness variable, created from totaling the number of emergency supplies that participants had access to, was limiting. Tanner and Doberstein (2015) used a similar method to measure preparedness and discovered that students may simply be “coincidentally” prepared as opposed to having full preparedness kits. For example, items such as spare batteries may be nothing more than extra batteries *coincidentally* laying around and not actually indicative of proactively being prepared for a disaster. Additionally, in the current study, participants were not asked about preparedness behaviors such as if they took the initiative to download weather apps for their smart phones that provide alerts about weather or if they participate in weather-related drills or trainings. Also, especially given that the majority of participants in the current study lived off campus, it may be useful to ask about their knowledge of insurance options (e.g., renter’s, flood insurance, etc.). More effort needs to be made in identifying items and actions that exemplify disaster preparedness while not being confounded by routine activities or items commonly found in a household.

As with any study, one has to consider the limitation that there may be differences between those who volunteer to be a participant and those who do not. Inherent to any research is that any human being has to consent to participate and therefore, may somehow differ from a population of individuals that do not consent. In addition to

consenting, some participants were dropped due to inappropriate responding. In both of these cases, specific characteristics likely played a role in how people responded or whether they participated. Some people are more responsible than others, some people have more time to complete surveys, and some people give more value to being of assistance to others, etc. Such factors certainly influence whether people answered fully and honestly, or whether they simply participated.

### **Directions for Future Research**

There are several potential implications for future research. To start, “preparedness” is a broad concept that can be defined in many ways (e.g., perceived, actual, institutional, personal, etc.). Therefore, when conducting research, researchers need be thoroughly descriptive in how they are measuring preparedness specifically to facilitate future comparisons, study replication, or practical application. Additionally, asking students about barriers to being prepared can help identify how institutions can better support their students (Tanner & Doberstein, 2015). For example, one question could simply be, “What things prevent you from being more prepared?” Also, disaster-related knowledge questions could provide useful information. One factor that may explain why experience is so predictive of preparedness is that perhaps those who have had more experience know more about what to do or what they could have done better. Increasing knowledge may be another effective method to increase preparedness without needing to actually experience a disaster.

Furthermore, continuing to learn more about demographic and social influences may be useful as well. In regards to the mixed findings related to gender differences,

researchers may want to ask about marital status/committed relationship, whether students have children, and *total* household income. More related to residential status, it may also be useful to look at the relationship between disaster preparedness and where students believe the burden of responsibility lies when comparing students living on and off campus.

In regards to omitting international students, the differences between international and non-international students implies that conducting research solely on international student populations, at least within a public university, may be warranted. Questions used in the current study may still be useful in understanding international students perspectives, however, a stronger emphasis on where students are from, what specific experiences they have had, and barriers impeding their preparedness in their current context (e.g., are they not receiving or not understanding the information non-international students are getting) may prove to be more informative, especially in the initial assessment stages of a research program. In general, acquiring more information about where students grew up and to what degree they value disaster preparedness could benefit future research. Students who are coming from a region more prone to natural disasters may hold disaster preparedness at a higher value and therefore be more prepared.

While a broader assessment-oriented phase of developing a research program is critical in determining the most effective methodological approach, relevant population characteristics and natural disaster risks, the science is still evolving and several potentially viable theories have emerged that will help to integrate the available empirical work conducted on disaster preparedness with the current findings. One example is the Protective Action Decision Model (PADM) proposed by Lindell and Perry (2012). The

PADM is one of several Expectancy Valence Approaches (Kellens et al., 2013) and focuses on initial “pre-decision processes” that further influence decision-making and behavioral responses, including preparation. The PADM is a comprehensive framework that has empirical support across areas of risk communication, evacuation modeling, and long-term hazard adjustment.

Lindell and Perry (2004) also suggested classifying adaptive measures according to the phases of a disaster’s life cycle as mitigation, preparedness, and recovery.

Interestingly, the “preparedness” phase in PADM is discussed as more of a last resort safety precaution, taking place right before or during a disaster, which differs from other conceptualizations that refer to preparedness more generally as actions that mitigate negative effects of disasters (FEMA, 2014; McEntire & Myers, 2004; WHO, 2014).

Regardless of whether PADM fits as a model for UM, other theoretical frameworks exist that include core components that can be examined in future studies. Examples include the education of students, the use of heuristics (e.g., fear increasing communication or preparedness in the case of the current study), and social factors (see Kellens et al., 2013). Utilizing and testing existing theories in future research will provide an empirically supported structure and foundation to methodologies and help expand the knowledge of the field more broadly.

Looking at a framework, such as the PADM, in relation to the current study, one could suggest that more global (as opposed to focal) preliminary information was gathered pertinent to each component of the model: environmental and social cues, psychological processes, situational impediments and facilitators, and the feedback loop (Lindell & Perry, 2012). More specifically, the basic information acquired in the current

study has exposed areas that need further attention such as the absence of information related to barriers to preparedness actions (i.e., situational impediments), or the importance of access to, and confidence in, information pertaining to the natural disasters themselves as well as relevant warning systems and resources (i.e., environmental and social context). Future research could now, under the assumption that the PADM would be used, focus on filling in the gaps of knowledge with supplemental information, revising questions to improve the efficiency and accuracy of the data obtained, and testing specific models supported by the PADM's empirical foundation.

### **Specific Institutional Recommendations**

The practical application of results is a valuable product of conducting research.

Therefore this study concludes with specific recommendations to the institution that was the subject of study. Two broad areas of improvement include: a) the communication and dissemination of information about UM specific natural disaster-related risks resources and b) broadening methods of educating and preparing students for natural disasters.

**Communication/Dissemination.** In particular, UM has made the extra effort to put together an extremely comprehensive mitigation plan. However, according to the results of the current study, students know little about this plan. For example, not only does the plan identify earthquakes as a risk to UM but also labels them as a “Medium” risk with a “Likely Occurrence” and a “High Mitigation Priority”. The students surveyed in the current study reported earthquakes as being the least likely to occur and the natural disaster they were least concerned about relative to any of the other natural disasters,

including hurricanes, which are not identified as a hazard in the plan and as a lower threat by student reports relatively speaking.

Incorporating information about natural disaster preparedness into classes or lecture-oriented events where there is direct communication, may assure students receive the information and at least get them thinking about the topic. For example, information could be given at new student and transfer student orientations, and professors could be encouraged or required to add a short blurb to their syllabi (i.e., hypothetically would be reviewed in class), as opposed to more indirect methods such as creating flyers or posting signs. There are also classes (EDHE) specifically designed to aid students in the transition from high school to college, whose attendance ranges anywhere from 25 to just fewer than 500 students (R. Reysen, personal communication, January 4, 2016), that may be a viable mode of information dissemination related to disaster preparedness. Increased communication about natural disasters more generally may initiate a cultural shift within the student body in how they view natural disasters and preparedness. Because some of the more severe natural disasters occur so infrequently and rarely directly affect the same individuals in the region where UM is located, it is important to create a culture where natural disaster preparedness is inherent. By talking about and educating students on a more daily/consistent basis, natural disaster preparedness may become a more natural part of every day life versus something students only think about during certain times of year.

In regards to targeting specific student characteristics that may be exclusively lacking in their preparedness (whether actual or perceived), such as women, international students, or students living on campus, several potential options exist to effectively disseminate preparedness-relevant information. Efforts to increase communication



between UM's IRT and the Residential Housing Association may facilitate discussion about how to better inform students living on campus. Conducting focus groups with students living on campus may also provide insight on what improvements could be made. Similarly, the Office of International Programs at UM has a well organized website and Facebook page that lists groups, events and broader programs in place solely to aid in international students' cultural transition. These resources potentially provide ample opportunities to communicate to the international student population. More generally, continuing to educate students and then reassessing the population will hopefully help discover what factors lead to existing inequalities (e.g., gender) as well.

**Broadening Methods.** The current study found that a significant predictor of natural disaster preparedness was experience. This is extremely important given the implications for training and future methods of preparing students for disasters. Clearly, one would not suggest that students, or anyone for that matter, become storm chasers in order to learn how to better prepare for natural disasters, but other options have proven effective in increasing their ability to act in an emergency situation, such as table top exercises and weather-related drills. Having students walk through real-life scenarios and participate in exercises where they must physically rehearse what they would do in the event of a disaster can enhance their confidence, competence, and capabilities when a real emergency occurs.

## **Conclusion**

The current study is a preliminary investigation within a specific educational context, and is part of an emerging science of disaster preparedness. The methods used were essential

in the initiation of what will become a much more comprehensive model of disaster preparedness research. Before applying a more structured framework to this program of research, researchers involved in the current study conducted a critical phase that involved a broad assessment and evaluation of the proximal environment in relation to natural disaster preparedness that included gaining a better understanding of the student population's preparedness as well as their perceptions and attitudes of preparedness. By first getting an idea as to where students stand in regards to natural disaster preparedness, the institution and researchers can move forward more effectively applying a strong evidenced-based framework to both research methods and the dissemination and implementation of preparedness techniques used within the institution.

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## LIST OF APPENDICES

## APPENDIX A: STUDY QUESTIONNAIRE

## Appendix A

## Text

**Welcome and Demographic Questions****Ole Miss Student Disaster Preparedness Survey**

This brief, 10-minute survey is part of a joint effort between the University of Mississippi's Clinical-Disaster Research Center (UM-CDRC) and the University's Incident Response Team (IRT). Your responses to this brief survey will help us learn about your experiences with different kinds of disasters. This information is essential in assisting the University with disaster preparedness efforts on campus.

Research studying on-campus issues affecting our University couldn't be done without your help, so we really appreciate you taking the time to participate.

To navigate through this study, please click the '>>' button at the bottom of the screen. You will not be able to go back to a previous screen.

**Consent to Participate in this Survey****Description**

This brief, 10-minute survey is part of a joint effort between the University of Mississippi's Clinical-Disaster Research Center (UM-CDRC) and the University's Incident Response Team (IRT). Our goal is to develop a program of research that will serve our campus and community in the event of a disaster. Your responses to this survey will help us learn about your awareness and experiences with different kinds of disasters. This information is essential in assisting the University with disaster preparedness efforts on campus. If at any time you have questions or concerns relating to this survey, please contact Dr. Stefan Schulenberg (sschulen@olemiss.edu; 662-915-3518).

**Risks and Benefits**

There are no anticipated risks associated with participating in this project beyond those normally encountered in daily life. Benefits associated with your participation include increased understanding of attitudes towards disaster preparedness.

**Costs and Payments**

The survey should take approximately 10 minutes. There are no other costs for helping us with this study.

**Confidentiality**

Your name will not be associated with the responses that you give. Therefore, we will not be

able to identify you from the information that we collect, and all data collected will be reported in group summaries.

**Right to Withdraw**

Please understand that your participation is voluntary. You may choose to discontinue your participation at any time without penalty or loss of benefits.

**IRB Approval**

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have any questions, concerns or reports regarding your rights as a research participant, please contact the IRB at (662) 915-3929.

**Statement of Consent**

I have read the above information. By continuing to the next screen, I consent to participate in the study.

What is your age?

What is your sex?

- ☐ Male  
☐ Female

With which ethnicity do you *most* identify?

- ☐ Black/African American  
☐ White/Non-Hispanic  
☐ Alaskan Native  
☐ Hispanic/Latino  
☐ Asian  
☐ Pacific Islander  
☐ Native American Indian  
☐ Multiracial  
☐ Other

What is your academic classification?

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior
- ☐ Graduate Student
- ☐ Other

Are you an international student?

- ☐ Yes
- ☐ No

What is your major? (If you are a double major, please list your primary major.)

In which state is your permanent residence?

Do you live on campus?

- ☐ Yes
- ☐ No

Are you in a social fraternity or sorority?

- ☐ Yes
- ☐ No

**Vulnerability**



How *likely* is it that each of the following situations will occur at Ole Miss in the *next year*?

	Not at all likely			Somewhat likely			Extremely likely
Hurricane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tornado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flooding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Severe Thunderstorm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Residential/Building Fire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blizzard/Snow Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School Shooting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Terrorist Attack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bomb Threat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large-scale Disease Outbreak (e.g., Flu, West Nile Virus)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How *concerned* are you about each of the following situations occurring at Ole Miss in the *next year*?

	Not at all concerned			Somewhat concerned			Extremely concerned
Hurricane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tornado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flooding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Severe Thunderstorm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Residential/Building Fire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blizzard/Snow Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School Shooting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Terrorist Attack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bomb Threat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large-scale Disease Outbreak (e.g., Flu, West Nile Virus)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How sure are you that you know what to do if the following situations were to occur at Ole Miss?

	I have no idea what to do			I have some idea what to do			I have a very good idea what to do
Hurricane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earthquake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tornado	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flooding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Severe Thunderstorm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Residential/Building Fire	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ice Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blizzard/Snow Storm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School Shooting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Terrorist Attack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bomb Threat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large-scale Disease Outbreak (e.g., Flu, West Nile Virus)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How confident are you that Ole Miss is prepared to deal with an emergency situation related to weather?

Not at all confident		A little confident		Fairly confident		Very confident
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How confident are you that Ole Miss is prepared to deal with an emergency situation related to on-campus violence (e.g., a shooting on campus)?

Not at all confident		A little confident		Fairly confident		Very confident
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How confident are you that Ole Miss is prepared to deal with an emergency situation related to

a large-scale disease outbreak?

Not at all confident	.	A little confident	.	Fairly confident	.	Very confident
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How capable is Ole Miss to educate students on the proper procedures relating to campus emergencies?

Not at all capable	.	A little capable	.	Fairly capable	.	Very capable
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Whose responsibility is it to educate you on the proper procedures relating to campus emergencies?

My responsibility alone	.	.	The responsibility of both me and the University	.	.	The University alone
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Imagine that an emergency situation occurred at Ole Miss. How likely would you be to follow instructions provided by the following people?

	Very Unlikely	Unlikely	Somewhat Unlikely	Somewhat likely	Likely	Very Likely
One of your professors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A faculty member, but not one of your professors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A non-academic staff member (e.g., a cafeteria worker, a groundskeeper)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An academic staff member (e.g., a department secretary, a dean)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An officer from the University Police Department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A supervisor in your housing complex (e.g., Resident Assistant, House Mother, Landlord)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other students



Which of the following emergency supplies do you have in your campus dorm room/apartment/house? (Check all that apply.)

- ☐ First aid kit
- ☐ Flashlight
- ☐ 3-day supply of clean drinking water
- ☐ 3-day supply of food
- ☐ 3-day supply of prescription medications
- ☐ Emergency weather radio (e.g., Battery-operated or hand cranked)
- ☐ List of emergency phone numbers
- ☐ Spare batteries
- ☐ Other

**Emergency Experiences**

Which of the following emergency situations have you personally experienced? Check all that apply.

- ☐ Hurricane
- ☐ Earthquake
- ☐ Tornado
- ☐ Flood
- ☐ Severe Thunderstorm
- ☐ Residential/Building Fire
- ☐ Ice Storm
- ☐ Blizzard/Snow Storm
- ☐ School Shooting
- ☐ Terrorist Attack
- ☐ Bomb Threat
- ☐ Large-scale Disease Outbreak

☐ Other☐ None of the above

You indicated that you have experienced a weather-related emergency event (a tornado or a severe thunderstorm, for example). Which of the following have you experienced as a result of a WEATHER-RELATED emergency situation? Check all that apply.

- ☐ Saw others injured or killed
- ☐ Got injured yourself
- ☐ Felt a direct threat to your life
- ☐ Provided first aid
- ☐ Lost a significant amount of material possessions
- ☐ Could not get in touch with other family members
- ☐ Was separated from members of your immediate family
- ☐ Could not get to a store for three or more days
- ☐ Lost electricity for three or more days
- ☐ Were forced to leave your community or neighborhood due to an evacuation order
- ☐ Had to leave home for three or more days
- ☐ Had to leave work/school
- ☐ None of the above

You indicated that you have experienced a violence-related emergency event (a school shooting or terrorist attack, for example). Which of the following have you experienced as a result of a VIOLENCE-RELATED emergency situation? Check all that apply.

- ☐ Saw others injured or killed
- ☐ Got injured yourself
- ☐ Felt a direct threat to your life
- ☐ Provided first aid
- ☐ Lost a significant amount of material possessions
- ☐ Could not get in touch with other family members
- ☐ Was separated from members of your immediate family

- ☐ Could not get to a store for three or more days
- ☐ Lost electricity for three or more days
- ☐ Were forced to leave your community or neighborhood due to an evacuation order
- ☐ Had to leave home for three or more days
- ☐ Had to leave work/school
- ☐ None of the above

**Information Access**

The following questions are designed to help us understand how you receive information regarding weather, emergencies, etc.

How do you PRIMARILY receive information about bad weather occurring in Oxford (e.g., tornado warnings, flood watches)?

- ☐ I rely on RebAlert text messages
- ☐ I receive updates from a weather service (e.g., Weather.com, Accuweather) on my phone or via email
- ☐ Radio/Television Alerts (i.e., Emergency Broadcast Service)
- ☐ I use the Lafayette County alert system
- ☐ My parents alert me
- ☐ My friends alert me
- ☐ Facebook/Twitter
- ☐ Other
- ☐ I don't automatically receive information about bad weather

What would you suggest is the BEST way for campus-related WEATHER emergency messages to reach you?

- ☐ Television news
- ☐ Email (e.g., UM Today)
- ☐ Text messages (e.g., RebAlert)
- ☐ Ole Miss emergency webpage

- ☐ Mass telephone call
- ☐ Radio station
- ☐ Emergency alert on campus (e.g., sirens)
- ☐ Facebook message
- ☐ Twitter message
- ☐ Other

What would you suggest is the BEST way for on-campus VIOLENCE-related emergency messages to reach you?

- ☐ Television news
- ☐ Email (e.g., UM Today)
- ☐ Text messages (e.g., RebAlert)
- ☐ Ole Miss emergency webpage
- ☐ Mass telephone call
- ☐ Radio station
- ☐ Emergency alert on campus (e.g., sirens)
- ☐ Facebook message
- ☐ Twitter message
- ☐ Other

What percentage of UM Today messages do you read?

- |  |  |
|--|--|
| <input type="radio"/> 100% (all of them) | <input type="radio"/> About 40%                          |
| <input type="radio"/> About 90%          | <input type="radio"/> About 30%                          |
| <input type="radio"/> About 80%          | <input type="radio"/> About 20%                          |
| <input type="radio"/> About 70%          | <input type="radio"/> About 10%                          |
| <input type="radio"/> About 60%          | <input type="radio"/> 0% (none of them)                  |
| <input type="radio"/> About 50%          | <input type="radio"/> I do not receive UM Today messages |

What percentage of RebAlert text messages do you read?

- |  |   |
|--|---|
| <input type="radio"/> 100% (all of them) | <input type="radio"/> About 40%                               |
| <input type="radio"/> About 90%          | <input type="radio"/> About 30%                               |
| <input type="radio"/> About 80%          | <input type="radio"/> About 20%                               |
| <input type="radio"/> About 70%          | <input type="radio"/> About 10%                               |
| <input type="radio"/> About 60%          | <input type="radio"/> 0% (none of them)                       |
| <input type="radio"/> About 50%          | <input type="radio"/> I do not receive RebAlert text messages |

Below are some questions about some of the University's efforts to inform students.

Are you aware that the University has created a video designed to prepare students on how to respond during a shooting on campus?

- ☐ Yes  
☐ No

Have you seen this video?

- ☐ Yes  
☐ No

Given that you have seen this video, how effective do you think this video was in preparing you for a shooting on campus?

- ☐ Not at all effective  
☐ A little effective  
☐ Somewhat effective  
☐ Very effective  
☐ Extremely effective

Are you aware that the University posts informational signs in buildings to prepare students for emergency situations, such as tornadoes and the flu epidemic?

- ☐ Yes  
☐ No



Have you read one of these signs?

- ☐ Yes  
☐ No

Given that you have read one of these signs, do you think this is a good way to communicate with students about emergency issues?

- ☐ Yes  
☐ No

#### **Thank You and Debriefing**

Thank you for your participation in this study.

Please use the space below to provide us with information related to your thoughts/feelings about Ole Miss and emergency preparedness that you were not able to express in the questions you were asked.

Please use the space below to provide us with information related to the survey itself. Was it hard to understand? Were questions confusing? Was it too long?

This concludes the survey.

If you have any further questions or concerns about your participation in this study, feel free to contact Dr. Stefan Schulenberg (sschulen@olemiss.edu; 662-915-3518).

On behalf of the University of Mississippi's Clinical-Disaster Research Center and the University's Incident Response Team, we thank you for your help with this research. Your participation is greatly appreciated!

Please click the >> button at the bottom of the screen to finish this survey.

## APPENDIX B: STUDY TABLES AND FIGURES

Table 1. *Descriptives for primary outcomes per natural disaster*

Natural Disaster	Experience ( <i>N</i> = 782)	Likelihood* <i>M</i> ( <i>SD</i> )	Concern* <i>M</i> ( <i>SD</i> )	Perceived Preparedness* <i>M</i> ( <i>SD</i> )
Hurricane	45.5%	2.30(1.47)	2.33(1.68)	4.61(2.25)
Tornado	64.6%	4.67(1.59)	4.34(1.86)	5.48(1.84)
Earthquake	18.1%	2.06(1.20)	2.23(1.61)	4.08(2.20)
Blizzard/Snow Storm	33.1%	2.37(1.43)	2.28(1.68)	4.12(2.27)
Ice Storm	46.2%	2.95(1.64)	2.63(1.80)	4.18(2.24)
Severe Thunderstorm	88.6%	6.00(1.46)	3.93(2.00)	5.86(1.69)
Flooding	46.9%	3.90(1.64)	3.24(1.86)	4.74(2.01)

*Note.* \*Due to missing data, *N*s range from 799 to 806 depending on the natural disaster.

Table 2. *Means (SDs) for primary outcomes of international and non-international students*

	International	Non-International
Variable	( <i>N</i> = 35)	( <i>N</i> = 739)
Total Likelihood	2.78(0.98)	3.50(0.92)
Total Concern	3.35(1.90)	2.96(1.30)
Experience	1.54(1.70)	3.66(1.55)
Total Perceived Preparedness	3.38(1.61)	4.79(1.54)
Actual Preparedness	2.89(2.07)	4.55(2.11)

*Note.* Due to missing data, a listwise analysis was conducted.

Table 3. *Correlation analyses for primary outcomes*

Bivariate Correlations									
	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Total Likelihood	3.50	.93	–						
2. Total Concern	2.97	1.31	.56**	–					
3. Perceived Preparedness	4.80	1.55	.03	-.15**	–				
4. Actual Preparedness	4.56	2.12	.07	-.01	.28**	–			
5. Total Experience	3.66	1.55	.16**	-.02	.37**	.28**	–		
6. Confidence in UM	5.19	1.44	-.04	-.08*	.20**	.05	-.03	–	
7. UM Capability to Educate	5.51	1.34	.07*	.06	.04	.01	-.08*	.39**	–

Note. \*  $p < .05$ . \*\*  $p < .01$ .

Table 4. *Results from exploratory regression analyses*

<b>Regression 1: Perceived Preparedness</b> $F(5, 733) = 43.21, p < .001, R^2 = .23$			
	$\beta$	$t(733)$	$p$
Confidence in UM	.20	5.72	< .001
Total Likelihood	.08	1.25	.213
Total Concern	-.19	-4.04	< .001
Total Experience	.31	9.14	< .001
Actual Preparedness	.13	5.14	< .001
<b>Regression 2: Actual Preparedness</b> $F(5, 733) = 18.97, p < .001, R^2 = .12$			
	$\beta$	$t(733)$	$p$
Confidence in UM	.04	.84	.403
Total Likelihood	.07	.72	.471
Total Concern	.01	.13	.900
Total Experience	.27	5.21	< .001
Perceived Preparedness	.27	5.14	< .001

Figure 1. *Relationship between students' confidence in UM and Actual Preparedness as a condition of Total Experience*

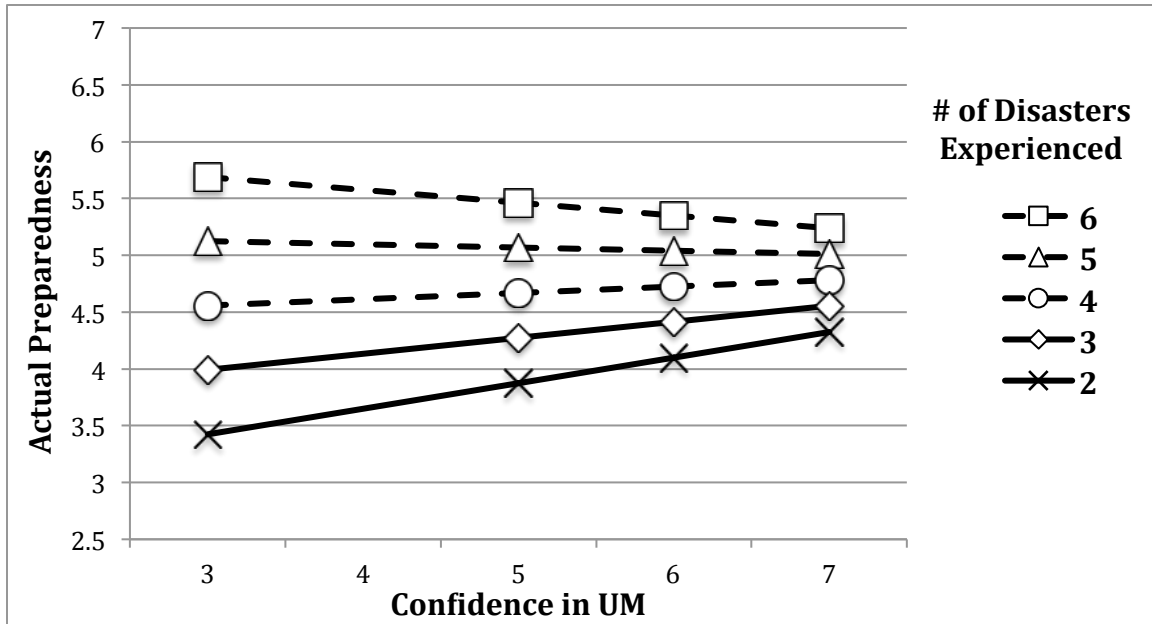
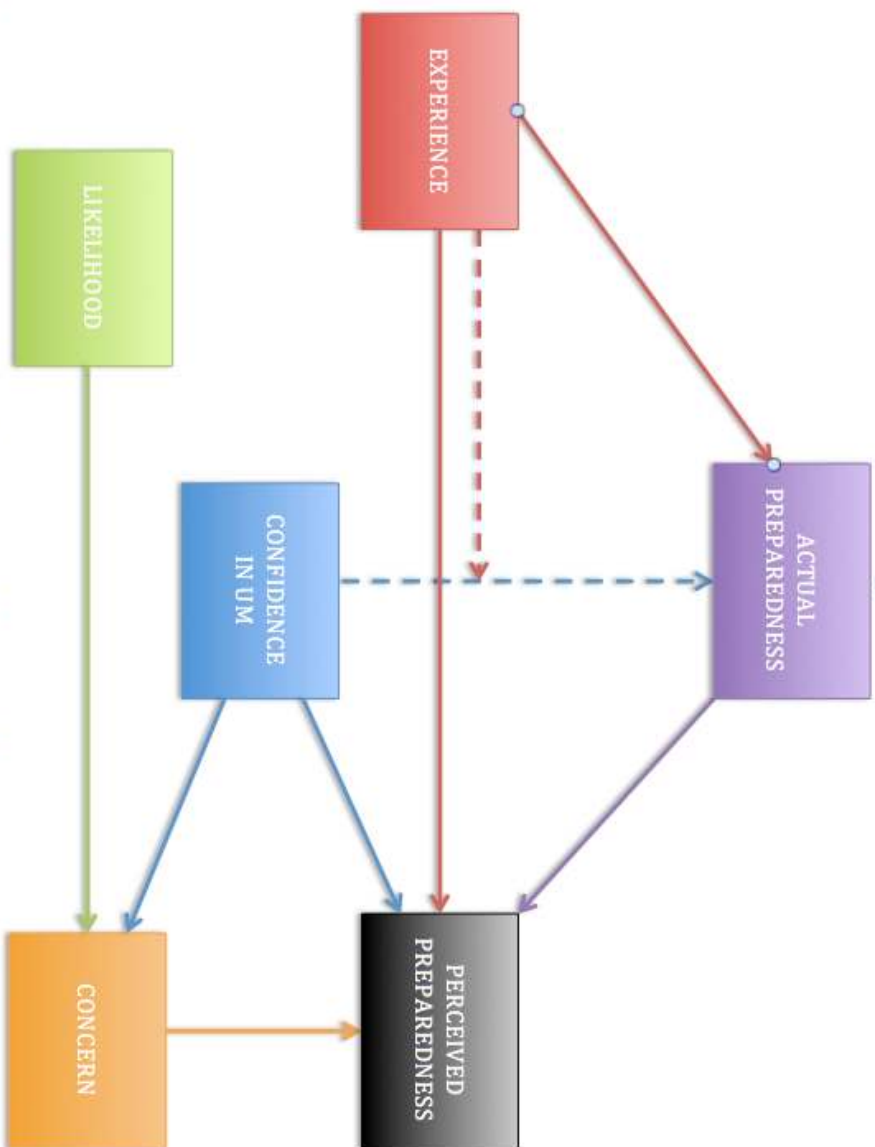




Figure 2. *Proposed Disaster Preparedness Conceptual Diagram*



Note. The arrows reflect a linear relationship between the corresponding variables identified through separately ran regression analyses; the dotted line represents an existing interaction term.

## VITA

### Curriculum Vitae

**MATHEW A. TKACHUCK, B.S.**

Graduate Student

Clinical-Disaster Research Center (UM-CDRC)

Department of Psychology

University of Mississippi

C: 206-719-7808

[matkachu@go.olemiss.edu](mailto:matkachu@go.olemiss.edu)

### **EDUCATION**

- |         |   |
|---------|---|
| Present | <b>Doctoral Candidate, Clinical Psychology</b><br>University of Mississippi, Oxford, MS |
| 2009    | <b>Bachelor of Science, Psychology,</b><br>University of Washington, Seattle, WA        |
| 2007    | <b>Work Immersion Study Program</b><br>Radolfzell, Germany – Stuttgart, Germany         |
| 2007    | <b>Associates of Arts</b><br>North Seattle Community College, Seattle, WA               |

### **RESEARCH EXPERIENCE**

#### **Graduate Research Assistant**

09/13 – Present      Department of Psychology, University of Mississippi Clinical  
Disaster Research Center

*Duties:* Managing data collected from projects pertaining to meaning/purpose in life, PTSD, suicidality, and disasters. Supervising undergraduates in presentations/honor's theses. Providing ad hoc reviews of literature including book chapters and journal articles in the fields of conduct disorder, assessment, disaster mental health, and positive psychology. Preparing data for quarterly reports on disaster preparedness to The University of

Mississippi. Participated in community outreach activities in the service of disaster preparedness and recovery.

*Faculty Supervisor:* Stefan E. Schulenberg, Ph.D.

**Project Coordinator**

04/12 – 07/13    Dialectical Behavior Therapy (DBT) Intensive Training Evaluation Research  
Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Developed and organized study materials including preparing surveys, data collection and data management. Maintained compliance with Institutional Review Board (IRB) applications, modifications, and protocols. Coordinated and supervised undergraduate research assistants and other study staff, and served as a liaison between the study staff and the DBT trainers and other training staff in matters of data collection, collaboration and organization. Managed online and paper surveys and maintained subject databases. Conducted statistical analysis of subject data to create status reports for trainee-subjects and to evaluate training efficacy.

*Direct Supervisor:* Marsha Linehan, Ph.D.

**Co-Investigator**

06/10 - 09/12    Skills Use and Emotion Regulation in Personality Disorders and Psychopathy  
Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Designed and obtained needed assessments for a survey-based research study on skills use and emotion regulation in cluster B personality disorders and psychopathy. Used an online survey building application to create the questionnaire for the study. Designed participant recruitment materials. Wrote, revised and submitted the IRB application. Monitored study activities. Conducted data analyses looking at differences between groups and for predictors of the propensity to endorse cluster B personality disorder and psychopathic traits.

*Direct Supervisor:* Andrada Neacsiu, Ph.D.

**Undergraduate Research Assistant**

07/11 – 07/13    Assistant to the Associate Director of the Behavioral Research and Therapy Clinics  
Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Assisted in management of an NIMH-funded multi-site research study comparing the outcome effects of DBT to an individual and group supportive therapy in a high-risk adolescent population. Assisted in preparation of University of Washington IRB application submissions and revisions. Developed study management protocols. Coordinated assessment development between four institutions. Recruited, interviewed and trained undergraduate students and volunteers, and oriented new staff. Developed and maintained databases for study-related task tracking and DBT training materials. Assisted in writing DBT experimental training proposals and corresponding University of Washington IRB applications for treatment facilities implementing DBT. Developed protocols for the process of DBT accreditation and certification. Edited and revised grant submissions for foundation funding.

*Direct Supervisor:* Kathryn Korslund, Ph.D.

*Faculty Supervisor:* Marsha Linehan, Ph.D.

06/09 - 04/11    DBT for Suicidal and Self-Injuring Women with Borderline Personality Disorder (BPD) and PTSD  
Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Responsible for all aspects of recruitment, phone screening, and scheduling potential participants for an NIMH-funded study to develop a protocol to treat PTSD among suicidal and self-injuring BPD women receiving DBT. Trained in suicide risk management to administer phone screens and clinical assessment interviews with potential study participants. Trained to reliability and administered the International Personality Disorder Examination (IPDE) to participants. Maintained databases for scheduled client assessments, and organized and managed client payments. Recruited, trained, oriented, and coordinated research assistants, work-study students, and volunteers. Developed and maintained training manuals, clinic databases, and protocol documents. Maintained and coordinated correspondence between

treatment providers and clinical assessors. Developed and maintained relationships with potential referring agencies and practitioners in the community for the purposes of study recruitment.

*Direct Supervisor:* Melanie Harned, Ph.D.

03/08 - 09/09    A Component Analysis of DBT for Suicidal Women with Borderline Personality Disorder

Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Scheduled client assessments, managed client payments and administered phone screens to potential clients for an NIMH-funded study on suicidal women with BPD. Conducted clinical assessment interviews to measure treatment effects (including a Treatment History Interview, the Situational Competency Test, and the Means-Ends Problem Solving procedures). Provided general clerical support to clinic staff. Transcribed assessment interviews.

*Direct Supervisor:* Susan Bland, MSW

*Faculty Supervisor:* Marsha Linehan, Ph.D.

03/08 - 09/09    DBT for Opiate Dependent Men and Women with Borderline Personality Disorder

Behavioral Research and Therapy Clinics, Department of Psychology,  
University of Washington, Seattle, WA

*Duties:* Scheduled client assessments, managed client payments and administered phone screens to potential clients for a NIDA-funded study on opiate dependent men and women with BPD. Administered participant urinalyses. Conducted clinical assessment interviews to measure treatment effects (including a Treatment History Interview, the Situational Competency Test, and the Means-Ends Problem Solving procedures). Provided general clerical support to clinic staff. Transcribed assessment interviews.

*Direct Supervisor:* Susan Bland, MSW

*Faculty Supervisor:* Marsha Linehan, Ph.D.

## **PEER REVIEWED PUBLICATIONS**

Harned, M. S., **Tkachuck, M. A.**, Youngberg, K. A. (2013). Treatment preference among suicidal and self-injuring clients with borderline

personality disorder and PTSD. *Journal of Clinical Psychology*, 69(7), 749-761.

Harned, M. S., Ruork, A. K., Liu, J., & **Tkachuck, M. A.** (2015). Emotional activation and habituation during imaginal exposure for PTSD among women with borderline personality disorder. *Journal of Traumatic Stress*, 28, 253-257.

### **PAPER PRESENTATIONS, SYMPOSIA, PANELS, & POSTERS**

Baczowski, B. J., Aiena, B. J., Florez, I. A., **Tkachuck, M. A.**, Smith, C. V., Schulenberg, S. E. (2013, November). Informing disaster preparedness efforts on a college campus. *Poster presented at the 47<sup>th</sup> annual Association for Behavioral and Cognitive Therapies Conference, Nashville, TN.*

Harned, M. S., **Tkachuck, M. A.**, Youngberg, K. A. (2011, November). Treatment preference among suicidal and self-injuring clients with borderline personality disorder and PTSD. *Presentation at the 45<sup>th</sup> annual Association for Behavioral and Cognitive Therapies Conference in Toronto.*

Harned, M. S., **Tkachuck, M. A.**, Liu, J., Ruork, A. K. (2012, November). Emotional engagement and habituation during exposure therapy for PTSD for patients with BPD. *Presentation at the 46<sup>th</sup> annual Association for Behavioral and Cognitive Therapies Conference in National Harbor, MD.*

Landes, S. J., Goodman, M., Jackson, C., Goldstein, M., **Tkachuck, M. A.**, Korslund, K. E., & Linehan, M. M. (2012, November). Outcome of intensive training and implementation of DBT in the VA. *Poster presented at the 17<sup>th</sup> annual International Society for the Improvement and Teaching of Dialectical Behavioral Therapy Conference in National Harbor, MD.*

**Tkachuck, M. A.** (2015, March). A bridge too short: Using acceptance and commitment therapy to aid in veteran readjustment through the integration of two disparate cultures. *Panel presented at the 1<sup>st</sup> annual Southeastern Chapter of the Association for Contextual Behavioral Science Conference in Lafayette, LA.*

**Tkachuck, M. A.** & Neacsiu, A. D. (2012, November). Skills use and emotion regulation in expressive personalities. *Poster presented at the 46<sup>th</sup>*

*annual Association for Behavioral and Cognitive Therapies Conference in National Harbor, MD.*

**Tkachuck, M. A.,** Weathers, L. N., & Florez, I. A. (2016, June). Meaning in Life, Psychological Flexibility, and Valued Living: Birds of a Feather? *Poster to be presented at the 14<sup>th</sup> annual Association for Contextual Behavioral Science Conference in Seattle, WA.*

Weber, M. C., **Tkachuck, M. A.,** Weathers, L. N., & Schulenberg, S. E. (2015, April). Emergency preparedness of University of Mississippi students. *Presentation at the 2<sup>nd</sup> annual University of Mississippi Conference on Psychological Science in Oxford, MS.*

Weber, M. C., Weathers, L. N., **Tkachuck, M. A.,** & Schulenberg, S. E. (2015, April). Emergency preparedness of University of Mississippi faculty and staff. *Presentation at the 2<sup>nd</sup> annual University of Mississippi Conference on Psychological Science in Oxford, MS.*

White, K. E., Stephens, L. T., Weber, M. C., **Tkachuck, M. A.,** & Schulenberg, S. E. (2016, April). *Tornado preparedness of UM students.* Paper presented at the Third Annual Conference on Psychological Science, Oxford, MS

## **CLINICAL EXPERIENCE AND TRAINING**

### **Therapist, Assessor, Skills Trainer, Consultant**

07/14 – Present                      The Baptist Children's Village, Water Valley, MS  
*Clinical Supervisor: C. Randy Cotton, Ph.D.*

05/14 – Present                      Psychological Services Center, University of Mississippi (Dept. of Psychology clinic)  
*Training:* Provide evidence based individual psychotherapy primarily based on cognitive-behavioral principles. Conduct intake assessments, develop treatment plans, provide therapy, and prepare client process notes and reports. Received training in evidence based treatments such as Acceptance and Commitment Therapy, CBT for Social Anxiety and Depression, Behavioral Activation, Exposure and Response Prevention.  
*Clinical Supervisors:* Stefan Schulenberg, Ph.D., Scott Gustafson, Ph.D., Kelly Wilson, Ph.D.

- 07/14 – 07/15 North Mississippi Regional Center, Oxford, MS  
*Training:* Provided individual and group therapy, functional assessments, social skills training, comprehensive intellectual assessments for determination of ICF/IID and HCBS services, composed behavior plans, and updated and composed yearly treatment plans for individuals with intellectual and developmental disabilities. Conducted assessments for autism spectrum disorder using the Autism Diagnostic Observation Schedule, Second Edition.  
*Clinical Supervisor:* J. Scott Bethay, Ph.D.
- 03/14 – 04/14 Clinical-Disaster Research Center, University of Mississippi  
*Training:* Co-lead a weekly Mindfulness-Based Strengths Practice group for individuals seeking to reduce stress and anxiety. Discussed participants' strengths and taught mindfulness exercises to develop more awareness of present moment experiences.  
*Clinical Supervisor:* Stefan Schulenberg, Ph.D.
- 01/11 - 07/11 Emotion Regulation Treatment Study, Behavior Research and Therapy Clinics  
*Training:* Co-lead an Activities Based Support Group for individuals who met criteria for either a mood or anxiety disorder plus high emotion dysregulation. Completed orientation interviews with individual group members before first group session. Managed participant payments and other group administration tasks as needed.  
*Clinical Supervisor:* Andrada Neacsu, Ph.D.  
*Faculty Supervisor:* Marsha Linehan, Ph.D.
- 06/07 - 08/07 Psychological Counseling for Political Refugees (PBV), Stuttgart, Germany  
*Training:* Assisted psychologists with preparing, updating, and organizing client files.  
 Helped clients in making appointments and answered questions in order to begin, continue, or conclude counseling that would potentially improve their mental health and help establish asylum in Germany. Reviewed and discussed client profile and potential treatment modalities with clinic psychologists.  
*Clinical Supervisor:* Dieter David

## **MILITARY SERVICE**



08/99 - 08/04 **United States Marine Corps – Sergeant**, Honorable Discharge  
Airframe/Hydraulic Helicopter Mechanic/Air Crew, San Diego, CA –  
Twice deployed

### **COMPUTER AND LANGUAGE SKILLS**

#### **Software Proficiency**

SPSS, R, PsychInfo, PubMed, Refworks, Microsoft Word, Microsoft  
Excel, Outlook, Access, PowerPoint, Catalyst Web Tools

#### **Language Skills**

Language: English (native); German (proficient)

### **HONORS/AWARDS/DECORATIONS**

#### **Academic:**

Dean's List, University of Washington – Four quarters

#### **Military Awards:**

Marine Corps Good Conduct Medal  
Global War on Terrorism Expeditionary Medal  
Sea Service Deployment Ribbon (x2)  
National Defense Service Medal  
Humanitarian Service Medal  
Meritorious Unit Commendation  
Meritorious Mast (3<sup>rd</sup> Award)  
Certificate of Appreciation