PARENT AND ADOLESCENT CONTRIBUTIONS TO FAMILY HARDINESS IN THE WAKE OF A NATURAL DISASTER

by

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ABSTRACT

IRIS FRAUDE MCMILLAN. Parent and Adolescent Contributions to Family Hardiness in the Wake of a Natural Disaster. (Under the direction of DR. JENNIFER LANGHINRICHSEN-ROHLING)

Researchers have typically focused on individuals' abilities to respond to natural disasters, while family processes post-disaster have received far less attention. Yet a family may be more than a sum of its parts and little is known about how the resilience and vulnerabilities of individual family members contribute to their overall perceptions of their families' strength. To fill this gap, this study investigated how mothers' and adolescents' reports of their individual resilience and personal level of emotion dysregulation predicted their perceptions of family hardiness after experiencing an impactful natural disaster (i.e., a tornado that destroyed the adolescents' high school). Data from a sample of 29 mother-adolescent dyads (M_{age} = 45.07 years and 16.66 years) were analyzed using Actor-Partner Interdependence Modelling. Results indicated that greater emotion regulation difficulties, but not individual resilience were predictive of higher levels of family hardiness among families surviving a natural disaster. Numerous problems with the family hardiness measure were uncovered suggesting the need for further conceptual, definitional, and measurement clarity for this construct. Thus, these findings should be interpreted with caution. Moreover, the mechanisms responsible for the findings of the current study remain subject for future research.

DEDICATION

This thesis is dedicated to the 2012 Murphy Panthers and their families who showed resilience and hardiness throughout everything they endured.

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INTRODUCTION

On December 25th, 2012 a powerful winter storm made its way through the deep south of the United States ranging from Texas to Alabama. A massive tornado outbreak developed from this storm and generated a total of 31 tornadoes, also known as the Christmas day tornados. In Mobile, AL, the tornado outbreak caused widespread damage to trees and powerlines, homes, and other structures. A large wedge of an EF2 tornado directly hit an historic high school located in the middle of town and resulted in severe damage. The entire roof of the school's auditorium and band building were torn off, other roofs on the school were also lifted off and deposited back onto the buildings, and six portable classrooms were leveled. Due to the significant damage to the school's structure, students and faculty were relocated to a suburban magnet school to finish the 2012 school year. Unfortunately, they quickly discovered that the magnet school was already filled with middle school students; thus, the high school students were eventually placed in portable classrooms located in a fenced-in gravel area behind the magnet school for the remainder of the school year. Although students were brought back to the historic high school for the 2013/2014 school year, rebuilding efforts extended over two years with the severely damaged auditorium finally being reopened in 2016. With the high school serving some of the poorest neighborhoods in Mobile, AL and 43.34% of its student body receiving free lunch (Alabama Department of Education, 2016), the temporary relocation of the school added physical disruptions to an already vulnerable community.

Physical disruptions such as those experienced by the Mobile community are common consequences of natural disasters and are known to extend the duration and impact of traumatic events (World Health Organization, 1992). Unfortunately, the

Christmas day tornadoes were not the only natural disaster impacting Mobile, AL, as an EF1 tornado taking a similar path had occurred just five days prior. Such increases in the frequency and severity of natural disasters, are common, yet neglected, consequences of climate change (Boon et al., 2012). In particular, the Southeast and Midwest of the United States have been frequently and negatively impacted by severe tornadoes and hurricanes (Holland & Bruyère, 2014). These tornadoes and hurricanes range in severity, destructiveness, and long-term impacts on those affected.

While the economic impact of natural disasters may be central to individual, family, and community recovery and is primarily targeted by disaster relief efforts, natural disasters can also result in severe and enduring psycho-social loss (e.g., loss of a defined work occupation and roles; Hackbarth et al., 2012; Reich, 2006). Per definition, a disaster is conceptualized as an event that causes severe ecological and psychosocial disruption, that greatly exceeds the coping capacity of those affected by it (World Health Organization, 1992). Natural disasters not only have a direct detrimental impact on families through the destruction of homes, schools, and property, but also through their induction of subsequent psychosocial transitions (Almedom, 2005). When families are confronted with a stressful event, such as a natural disaster, a set of demands is placed on the family unit. These include coping with the stressor/traumatic event itself, handling the hardships associated with the stressor, and continuing to manage prior experiences/stressors (e.g., living in an under-resourced community, poverty) that can exacerbate the impact of the traumatic event (McCubbin & Patterson, 2008). Thus, with the increasing prevalence of natural disasters and the growing recognition of their potential for long-lasting impact, it is important to understand not only how families are

impacted by these types of events and whether pre-existing family vulnerabilities can impede recovery efforts, but also what individual and systemic capacities families have to endure and recover from natural disasters.

Family processes (i.e., family cohesion) are well studied and are known to buffer the stressful life experiences of individual family members in general (Waysman et al., 2001) and adolescents in particular (Kingon & O'Sullivan, 2001). Yet, research suggests that a family units' capacity for adaptation is likely to be influenced by the personal strengths and weaknesses of each family member (Walsh, 1996, 2002, 2003, 2016). However, it is unknown whether each family member contributes equally to this equation or whether some family members (e.g., potentially parents and/or mothers) have a greater influence on family outcomes than others (e.g., children). Therefore, the aim of the current study was to investigate family level post-disaster processes. More specifically, this study explored how family units adapted to and coped with a natural disaster that impacted adolescents from an under-resourced community by examining the role of two family member's (parent and adolescent) risk and protective factors on one key family process (hardiness).

Literature Review

Two theoretical frameworks, namely the Bioecological Model of Human Development and the Conservation of Resources Theory, were utilized to conceptually understand how families are impacted by natural disasters. Each is described below.

Bioecological Model of Human Development

The bioecological model of human development (Bronfenbrenner & Morris, 2006) offers a relevant framework not only for understanding the intersecting influences

of personal, social, and ecological contexts across time and how they relate to the impact of natural disasters, but also for the identification of factors within the ecosystem that may help facilitate recovery (Boon et al., 2012). The model consists of a series of concentric circles that reflect the various social systems in which the individual is embedded. More specifically, the microsystem is thought to reflect the individual's immediate environment and its interaction, i.e., family relationships, whereas the mesosystem includes more proximal interactions between various aspects of the microsystem (e.g., between parents and their offspring's school). Furthermore, the exosystem entails distal interactions (i.e., indirect relationships such as larger societal structures) and is embedded in the overall temporal context, also known as the chronosystem (Bronfenbrenner & Morris, 2006). Thus, this model not only acknowledges individual characteristics and behavior but also considers the influence of larger contexts (e.g., family systems, community structures) as well as their interactions to understand the impact of natural disasters.

Furthermore, the bioecological model of human development connotes that changes in one aspect of the microsystem can challenge other microsystemic aspects. For instance, a loss of community resources (i.e., reduced availability of social programs/after school programs) has been shown to negatively impact the quality of the adolescent-parent relationships, particularly in the context of other vulnerabilities such as low income (Lerner & Castellino, 2002). In other words, the quality of family relationships and processes is influenced by other factors in the immediate family environment. Especially in the context of natural disasters, this interdependence between individuals and their immediate environment is key to understanding post-crisis family processes.

For example, among survivors of Hurricane Katrina, family factors, such as parent-provided social support were shown to be predictive of youth's positive adjustment to the natural disaster (Vigna et al., 2009). Although this framework allows the allocation of protective and risk factors across all system levels, unfortunately, it provides little guidance on specific predictors of family units' post-disaster adaptation and coping.

Conservation of Resources Theory

The Conservation of Resources (COR) Theory (Hobfoll & Schumm, 2002) is a second theoretical framework that is particularly well-suited to discern the impact of natural disasters on families. COR is an empirically supported resource-based stress theory that postulates that a misfit between personal, social, economic, and environmental resources and external demands results in a stress response (Hobfoll, 2001). More specifically, according to COR, stress occurs when resources are lost or threatened, e.g., through natural disasters, or when individuals are unable to gain sufficient resources despite significant resource investment, e.g., unfruitful rebuilding efforts.

Within this framework, resource gain has been shown to be crucial for post-disaster psychosocial functioning. For example, Bakic and Ajdukovic (2019) found that an increase in individual resources after a severe flooding event was associated with a decrease in post-traumatic stress symptoms and an increase in life satisfaction, one and a half years after the disaster. Additionally, they also found that a decrease in interpersonal resources was significantly associated with an increase in post-traumatic stress and depressive symptoms (Bakic & Ajdukovic, 2019). In contrast, communities, institutions, or families who cannot cope with a stressor through the investment of other resources (i.e., low resource communities, or financially challenged families) are particularly

vulnerable to the impact of natural disasters (Holmgrenn et al., 2017). For instance, Lowe et al. (2016) studied two population-based samples from communities affected by Hurricane Sandy 12 to16 months (n = 421) and 25 to 28 months (n = 420) post-disaster and found that individuals living in low socioeconomic status communities were at a heightened risk for post-traumatic stress symptoms, even two years after the hurricane. Thus, the absence of pre-disaster monetary and interpersonal resources appears to have a long-lasting, detrimental impact on the mental health of natural disaster survivors.

Although the conservation of resources theory is commonly used to study the relevance of socioeconomic resources, it can also be used to better understand the role of family resources (e.g., resilience, emotion regulation) for the adaptation to and coping with natural disasters. One theoretical domain to consider when examining how families navigate stressors and cope with crisis is an internal resource, namely family hardiness, a construct central to the current study.

Family Hardiness – A Critical Resource

Family hardiness has been defined as a family's internal strengths and persistence marked by their perceived control over life events as well as their sense of meaningfulness in life, involvement in activities, and a dedication to master and traverse new and challenging experiences as a family unit (Figley, 1989). Furthermore, family hardiness includes the family's stress resistance and their resources for adaptation that represent a buffer or mediating factor amidst the impact of other stressors and demands. Although the terms family hardiness and family resilience are oftentimes used interchangeably, it is important to highlight their conceptual differences. Family resilience refers to a family's capacity to endure and recover from stressful life

challenges (Walsh, 1996, 2002, 2003, 2016), entailing an interaction between risk and protective factors relative to a specified outcome (Patterson, 2002). In other words, family resilience is delineated in terms of risk and protective factors. Family hardiness on the other hand is thought to capture "the characteristics, dimensions and properties of families which help families to be resilient to disruption in the face of change and adaptive in the face of crisis situations" (McCubbin & McCubbin, 1988, p. 248). Therefore, family hardiness can be considered an antecedent of family resilience, that constitutes a critical strength of families as it relates to their ability to reduce stress.

In the context of natural disasters, family hardiness has been shown to be a strong predictor of family coping. For example, among a sample of 452 Hurricane Katrina survivors, family hardiness, as measured by the Family Hardiness Index (McCubbin et al., 1996), emerged as a strong predictor of family coping. More specifically, survivors of Hurricane Katrina who viewed the hurricane's impact on their family as a challenge and opportunity for growth were more likely to effectively cope (Hackbarth et al., 2012). Family coping, in turn, is known to be a significant predictor of reduced post-disaster psychological distress (Sattler, 2006). Meanwhile, low family hardiness was also shown to be predictive of the development of post-traumatic stress disorder among victims of the Yugoslav wars (Jovanovic et al., 2004). Consequently, family hardiness appears to be a key factor that promotes a family's ability to adapt to and cope with a significant challenge such as a natural disaster.

Finally, there is empirical and theoretical support for a bioecological approach to the study of family hardiness. Through a bioecological lens, the interdependence of individuals within various systems (i.e., members of the family on a microsystemic level)

is an important aspect of a family unit's strength and functioning (Masten, 2016). In other words, a family's capacity to endure and recover from a stressful life challenge and to emerge as an even stronger, more resourceful, and more resilient family unit (Walsh, 1996, 2002, 2003, 2016) entails an interaction among individual family member's risk and protective factors. In the following, resilience, a protective factor, and emotion dysregulation, a risk factor, and their associations with family hardiness will be discussed.

Resilience – A Contributing Factor

While resilience has been traditionally defined as an individual's capacity to bounce back from adversity (e.g., Sippel et al., 2015), its conceptualization varies substantially and is influenced by the historical and sociocultural context in which the research was conducted (Fletcher & Sarkar, 2013). Most commonly, resilience is characterized as either a personality trait, a dynamic process, or an outcome. Representing a conceptual shift from a deficit-oriented approach to a strength-based focus, these three conceptualizations are representative of different research orientations and reflect the movement to a more ecological framework.

In its early stages, research on resilience was primarily concerned with the individual. This is reflected in the early trait conceptualizations. For example, Block and Block (1982) used the term "ego-resilience" to describe an overall protective personality trait marked by resourcefulness, character strength, and functional flexibility in response to environmental demands. Early research utilizing this trait conceptualization of resilience primarily focused on characteristics within the individual with external factors receiving little attention. However, the growing awareness about influential external

factors rapidly led to conceptualizing resilience as a process rather than a personality trait. In contrast to earlier trait conceptualization, resilience was then defined as "a dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar et al., 2000, p. 543). Thus, resilience as a process is thought to develop and unfold across the different levels of the bioecological systems model, acknowledging the temporal and contextual variability in the effect of protective and promotive factors (Fletcher & Sarkar, 2013). Conceptualizing resilience by clarifying the conditions under which risk exposure contributes to adversity and by examining the developmental timing of adaptive processes, allowed researchers to further explore resilience promoting protective factors (Kim-Cohen, 2007). Resilience promoting factors in turn, are thought to work together to contribute to a good outcome regardless of the experience of stressors (Hjemdal et al., 2006). This is reflected in the conceptualization of resilience as an outcome —the level of adjustment after a stressful event—which implicitly connotes that resilience is unmeasurable without the presence of a distressing event which requires adjustment (Mancini & Bonanno, 2006, 2009).

While the three conceptualizations of resilience all highlight different aspects of the construct, they can be best summarized and aligned as sharing the definition that resilience is a positive personality characteristic that enhances individual adaptation (Wagnild & Young, 1993). In short, resilience is the product of a system's capacity for adaptation and is observed as individuals adjust to stressful events. In other words, individual resilience depends on the resilience of other, connected systems, entailing a multitude of processes that arise from dynamic interactions between systems (Boon et al., 2012; Masten, 2018). Thus, the development of individual resilience is based on the

interaction between an individual and their environments, highlighting the importance of a bio-ecological approach to the study of resilience.

A bioecological approach to the study of resilience in the micosystemic context has been reflected in third wave models of family resilience. For instance, the Family Resilience Model (FRM; Henry et al., 2015) suggests that even in the context of severe disruption of the family's dynamics and across the experience of multiple family-level risk factors, families still have the potential for positive adaptation based upon protective factors available at different levels of the family system as well as within the bioecological system (Henry et al., 2015). This represents an integration of theories on individual resilience, ideas from family systems theory, and models of family stress and coping. Moreover, within this framework, the family's ability to adapt to and cope with significant challenges is thought to represent the synergy of a family's relationship patterns. Those relationship patterns are commonly summarized as family adaptive systems (FAS; Patterson, 2002). The interactions constituting the FAS span across various domains including emotional climate, authority and control, worldview, and beliefs system, as well as organizational processes facilitating the maintenance of the family system (Henry et al., 2015; Patterson, 2002; Walsh, 2016). These components of family interactions, in turn, provide the family with a foundation from which to accomplish specific family tasks. For instance, positive emotional family climate was shown to be a protective factor, promoting children's adaptive expression and regulation of strong negative emotions such as anger (Houltberg et al., 2012). Relatedly, parents who experience difficulties in emotion regulation were shown to also report lower levels of family functioning, less closeness, and more conflict with their adolescent children (Li

et al., 2017). Thus, interactions constituting the emotional climate of the family are important aspects of basic family functioning (Henry et al., 2015; Patterson, 2002) and ultimately contribute to the family units' capacity to endure and recover from a stressful life challenge.

The Emotion System – Vulnerability within Family Adaptive Systems

The ability to identify, monitor, and respond to emotional experiences in response to contextual demands (Gratz & Roemer, 2004) is central as it constitutes a critical component of social interactions and represents an important capacity for interpersonal relationships. This skill also affects how individuals engage with their environment. For instance, difficulties in emotion regulation are reflected in communication behaviors (Bradbury & Shaffer, 2012), influencing the emotional tone of communication and the expression of thoughts and intentions (Lopes et al., 2005). The inability to regulate emotions in an appropriate manner can contribute to difficulties in social interactions and has been linked to an increased risk for life-long mental health issues (Kalmakis & Chandler, 2014; Poole et al., 2018). Additionally, the ability to communicate one's needs properly is important for obtaining psychosocial resources, such as social support (DeSteno et al., 2013). Thus, emotion socialization, or the ways in which emotional competencies such as emotion expression, recognition, and regulation are acquired, represents an important part of development.

Models of emotion socialization (e.g., Morris et al., 2007) highlight the importance of microsystemic intra-familiar processes for the development of emotion regulation. The way parents respond to their off-springs' emotions is important for the development of emotion regulation capacities (Morris et al., 2007). Not only does

parental responsiveness involve the expression of (positive and negative) emotions in the parent-child relationship, but parental responsiveness also contributes to the overall emotional climate of a family. These emotion-related family processes can also be observed within the context of other microsystemic family processes, such as family cohesion (Henry et al., 2015). Furthermore, there is empirical support for the intergenerational transmission of emotion regulation difficulties with greater parental emotion dysregulation shown to be associated with greater emotion dysregulation among adolescents (Buckholdt et al., 2014). Similarly, parents and adolescents' use of emotion regulation strategies has been shown to be associated (Silva et al., 2018). More specifically, in a sample of 33 12- to 18-year-old adolescent–father–mother triads, Silva et al. (2018) examined adolescents' and parents' use of two emotion regulation strategies, namely cognitive appraisal and expressive suppression, in their daily life using momentary assessments. The results of the study indicated that mothers', but not fathers', use of both emotion regulation strategies, cognitive appraisal, and expressive suppression, were associated with adolescent's use of both emotion regulation strategies and that this association was mediated by the quality of the mother-adolescent relationship (Silva et al., 2018). These findings suggest not only that a mother's own emotion regulation skills are important for the development of children's emotion regulation early on in life but also that mothers continue to be influential for adolescents' development and expression of emotion regulation. Yet, it remains unknown how much adolescents, as opposed to mothers, contribute to the overall emotional climate of the family and how their emotional dysregulation is linked to the family's internal strengths after a natural disaster.

Furthermore, there are multiple reasons why adolescence represents a prime time to study processes related to emotion regulation after a natural disaster. First, adolescent development is characterized by substantial biological, emotional, and psychosocial changes; these are more likely to provoke intense experiences of emotional arousal (Silk et al., 2003). Consequently, adolescents may be more susceptible to experiencing an emotional impact post exposure to a natural disaster. Secondly, the rapid development of mental and physical capacities during this developmental period increases adolescents' stress reactivity (Spear, 2000). It also makes adolescents vulnerable to the effects of events that require self-regulation as this ability is not fully matured until young adulthood (DeRosa & Pelcovitz, 2008; Steinberg, 2001). For adolescents, emotion dysregulation represents a harmful transdiagnostic risk factor for a wide range of psychopathology (McLaughlin et al., 2011). It is well known that various forms of psychopathology, especially affective and behavior disorders, increase substantially during adolescence (Silk et al., 2003). Adolescents' inability to regulate their emotions has been shown to also function as an intrapersonal mechanism that explains the detrimental impact of stressful life events on adolescent mental health outcomes (McLaughlin & Hatzenbuehler, 2009). Therefore, emotion dysregulation represents a central individual risk factor that not only increases vulnerability to the impact of natural disasters but also shapes interactions contributing to a family unit's capacity to endure and recover from a natural disaster. Nevertheless, little is known about the relative influence of emotion dysregulation on family hardiness after a natural disaster. The aim of the current study was to fill this gap by examining the interdependence of mothers and

adolescents' emotion dysregulation to predict their family's post-disaster internal strength or hardiness.

Additionally, adolescence is also known as a pivotal time for psychosocial development marked by the negotiation of autonomy-related changes within the microsystem. As such, enhanced knowledge about an adolescent's role in post-crisis family processes is tantamount. While the traditional conceptualization of adolescent development commonly denotes this period as a time of heightened "storm and stress" (Arnett, 1999), the idea of adolescence being a time of distress and conflict has been challenged and is no longer considered to be normative (Steinberg, 2001). Although adolescents' strivings for autonomy from parental guidance can be a potential source of conflict, the co-occurring acquisition of new skills can represent a significant contribution to the family system. For instance, with the parent-adolescent relationship becoming more egalitarian during adolescence (De Goede et al., 2009), the views, strengths and functioning of both parties (adolescents, parents) are likely to be important (and perhaps more equal) contributors to the overall resources of the family. While prior research has highlighted the important role of mothers' emotion regulation strategies as a coping resource (e.g., Silva et al., 2018), other strengths (e.g., maternal resilience) of potential importance for adolescents (e.g., family hardiness) to cope with a natural disaster are less explored.

The Current Study

While considerable research has focused on individual risk and protective factors that impact an individual's ability to respond to natural disasters, they are commonly studied at the individual level. Similarly, previous assessments of the family unit's ability

to adapt and cope have primarily relied upon the self-report of one family member, oftentimes the parent (e.g., Campbell & Demi, 2000; Clark, 2002; Weiss et al., 2013). To address this gap, the current study sought to study post-disaster family level processes by utilizing a dyadic approach that included the maternal caregiver and the impacted adolescent. Specifically, this study considered how family units adapted and coped with a natural disaster that impacted adolescents from an under-resourced community. Specifically, the study simultaneously examined the role of two family member's (mother and adolescent) risk and protective factors on family hardiness. With the utilization of advanced dyadic modelling, the proposed study had the goal of filling in identified gaps in the literature by addressing the following aims:

Aim 1: To investigate how adolescents and mothers' individual resilience affected their perceptions of family hardiness.

Hypothesis 1: Adolescents' and mothers' individual resilience would significantly and positively predict family hardiness.

Hypothesis 1.1: Adolescent's individual resilience would significantly and positively predict their own perception of their family's hardiness (actor effect).

Hypothesis 1.2: Mother's individual resilience would significantly and positively predict their own perception of their family's hardiness (actor effect).

Hypothesis 1.3: Adolescent's individual resilience would significantly and positively predict their mother's perception of their family's hardiness (partner effect).

Hypothesis 1.4: Mother's individual resilience would significantly and positively predict their adolescent's perception of their family's hardiness (partner effect).

Aim 2: To examine how adolescents and mothers' difficulties in emotion regulation would relate to their perceptions of family hardiness.

Hypothesis 2: Difficulties with emotion regulation among adolescents and their mothers would be predictive of lower family hardiness.

Hypothesis 2.1: Adolescents' difficulties in emotion regulation would significantly and negatively predict family hardiness (actor effect).

Hypothesis 2.2: Mothers' difficulties in emotion regulation would significantly and negatively predict family hardiness (actor effect).

Hypothesis 2.3: Adolescent's difficulties in emotion regulation would significantly and negatively predict their mother's perception of their family's hardiness (partner effect).

Hypothesis 2.4: Mother's difficulties in emotion regulation would significantly and negatively predict their adolescent's perception of their family's hardiness (partner effect).

Aim 3: To add to existing research on family hardiness by studying the association of resilience and each of the three components of family hardiness separately to obtain a more nuanced understanding of family processes.

Hypothesis 3: Individual resilience would be a significant predictor of all three components of family hardiness.

Hypothesis 3.1: Adolescent's and their mother's reports of individual resilience would significantly and positively predict innovative and active family efforts (challenge).

Hypothesis 3.2: Adolescent's and their mother's reports of individual resilience would significantly and positively predict the family's sense of internal strengths, dependability, and ability to work together (commitment).

Hypothesis 3.3: Adolescents and their mothers' reports of individual resilience would significantly and positively predict the family's sense of being in control of family life (control).

Aim 4: To add to existing research on family hardiness by examining whether adolescents' and mothers' perception of their family hardiness (and its components) would significantly differ with respect to their individual resilience and difficulties in emotion regulation.

Hypothesis 4.1: Adolescents' and mothers' reports of family hardiness would significantly differ with respect to their individual resilience.

Hypothesis 4.2: Adolescents' and mothers' reports of family hardiness would significantly differ with respect to their individual difficulties in emotion dysregulation.

Hypothesis 4.3: Adolescents' and their mothers' reports of the family's efforts to be innovative and active would significantly differ with respect to their individual resilience.

Hypothesis 4.4: Adolescents' and their mothers' reports of the family's co-oriented commitment would significantly differ with respect to their individual resilience.

Hypothesis 4.5: Adolescents' and their mothers' reports of the family's sense of being in control of family life would significantly differ with respect to their individual resilience.

METHOD

Participants

The current study utilized secondary data collected as part of the Family Resiliency to Disaster Study, which recruited families with students attending a large urban high school in Mobile, AL. The Family Resiliency to Disaster Study investigated the impact of the 2012 Christmas day tornado, which occurred as part of a larger scale tornado outbreak and produced significant damage to the area. A total of 29 mother-adolescent dyads participated in the Family Resiliency to Disaster Study. Participating adolescents were on average 16.7 years of age (SD = 1.01 years) and more than half of the sample (69%) consisted of female identified individuals. Adolescents were predominantly High school seniors at the time of their participation, but grade ten to 12 students were represented in the current sample. More than half (58.6%) of the participants identified as African American/Black. Participating mothers were on average 45.1 years of age (SD = 6.43 years) and also African American/Black (57.1%). As it pertains to the total household income, 70.4% of the participating mothers reported an annual household income of less than $60,000. Participating mothers were predominantly married (89.3%). Out of all married participating mothers, 57.1 % (16) reported having been married before. Additional sample characteristics are displayed in Table 1 and Table 2.

Procedure

Participants were recruited via flyers distributed around the impacted high school or handed out at school wide events from November 2013 to November 2014. Snowball sampling was also used. Adolescents having attended high school at the time of the

December 25th, 2012 Christmas tornado were considered to be eligible for participation if they were fluent in English and if their primary parent was at least 19 years of age and agreed to participate. Eligible families were asked to come into the Family Resiliency Lab. Informed consent of the parent was obtained in written format. Adolescents completed an individual assent form. After consent and assent were obtained, each family member was asked to complete an assessment package. While completing these forms, the mother-adolescent dyads were separated. The individual assessment package consisted of questionnaires about family functioning, family problem-solving strategies, and adaptation to crisis. Questionnaires pertaining to participants' resilience, emotion regulation, suicidal ideation, and other negative affective states (anxiety, depression, stress) were also included in the individual assessment packages. On average, participants spent one hour completing the paper-pencil questionnaire package and engaged in an interaction task (not relevant for the current study). Participants were compensated for their time with Visa gift cards. Measures pertinent to the current study are described below.

Measures

Individual Resilience. The Resilience Scale (RS; Wagnild & Young, 1993) was used to measure adolescents' and mothers' individual resilience. The measure consists of 25 items assessing various facets of resilience such as personal competency (e.g., "When I make plans, I follow through with them") and acceptance of self and life (e.g., "I do not dwell on things that I can't do anything about"). The items are scored on a 7-point scale ranging from 1 (disagree) to 7 (agree), which are summed to obtain an overall resilience score. Possible scores range from 25 to 175 with scores below 121 reflecting low

resilience, whereas scores of 147 or higher are reflective of high individual resilience. The measure's internal consistency was good to excellent in the current sample, with Cronbach's alpha= .89 and .96 for adolescents and mothers, respectively.

Individual Emotion Dysregulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was used to assess difficulties in emotion regulation. It consists of 36 items assessing six factors related to emotion dysregulation: (1) Nonacceptance of emotional responses (e.g., "When I'm upset, I become angry with myself for feeling that way"); (2) Difficulties engaging in goal-directed behavior (e.g., "When I'm upset, I have difficulty thinking about anything else"); (3) Difficulties with impulse control (e.g., "When I'm upset, I have difficulty controlling my behaviors"); (4) Lack of emotional awareness (e.g., "I am attentive to my feelings"); (5) Limited access to emotion regulation strategies (e.g., "When I'm upset, I believe there is nothing I can do to make myself feel better"); and (6) Lack of emotional clarity (e.g., "I have difficulty making sense out of my feelings"). Items are scored on a 5-point frequency scale ranging from almost never (1) to almost always (5). Several items including those constituting the lack of emotional awareness subscale are reverse scored. The measure yields a total score summing the scores of all items, as well as six subscale scores. Higher DERS scores suggest greater difficulties with emotion regulation. In prior research, the DERS has demonstrated high internal consistency. The overall difficulties in emotion regulation scale evidenced good internal consistency ($\alpha = .84$) for the participating adolescent sample and demonstrated similar internal consistency ($\alpha = .86$) in the current sample of mothers.

Family Hardiness. To measure the internal strength and durability of the family unit, the Family Hardiness Index (FHI; McCubbin et al., 1996) was administered to both adolescents and their mothers. The measure consists of 20 items and participants are asked to indicate the degree to which each statement describes their current family situation utilizing a 4-point Likert-type scale ranging from 0 (false) to 3 (true). There is also a "not applicable" response which also receives a score of zero. Three different dimensions of family hardiness are assessed: Commitment (e.g., "We have a sense of being strong even when we face big problems"), Challenge (e.g., "We seem to encourage each other to try new things and experiences") and Control (e.g., "Most of the unhappy things that happen to us are mainly due to bad luck"). To obtain a total score for family hardiness, nine items are reversed before summing the values of all responses. Subscale scores are obtained by adding up the values of the corresponding items. Across subscales and the total score, higher scores indicate greater levels of internal strength and durability of the focal family unit; the maximum possible total score is 60. The FHI evidenced good internal consistency of .84 (Cronbach's alpha) for its total score among adolescents, and acceptable internal consistency with $\alpha = .70$ among mothers. However, the internal consistencies of the three subscales were considerably lower in the current sample with Cronbach's alphas of .58, .73, and .52 for adolescents on the Challenge, Commitment, and Control subscales and internal consistencies of .20, .51, and .69 for mothers on the Challenge, Commitment, and Control subscales. This was in stark contrast to existing research on Hurricane Katrina survivors where the subscales evidenced Cronbach's

alphas between .65 and .81 (Hackbarth et al., 2012)[1]. As a result, only the FHI total scores were utilized for this study.

Demographic Information. Adolescents and their mothers were asked to answer a set of questions pertaining to a) general demographic information (age, sex, race/ethnicity, religion), b) household/family structure, c) military service, d) income and disaster related financial assistance, and e) the impact of the tornado (i.e., financial, social, economic).

[1] Hackbarth et al. (2012) used the FHI in an adult sample consisting of 452 survivors of Hurricane Katrina. The participants primarily identified as female and white, with an average age of 47.7 years.

STATISTICAL ANALYSES

Preliminary descriptive analyses of the data were conducted. These included the estimation of covariance and mean structures (means, variances, covariances) as well as correlations, univariate and bivariate distributions, and outliers. The initial screening of the raw data indicated that data were missing at random (MAR) as indicated by a non-significant Little's MCAR test ($\chi^2 = 3.77$, df = 10, $p > .05$). Missing values were observed among the family hardiness outcome variables for both adolescents and their parents with 25% missingness per variable. Thus, cases were excluded from subsequent analysis yielding a final sample of 21 dyads. First and second order moments were obtained, and the data were tested for multivariate outliers by calculating Mahalanobis distances and testing their significance using the Chi Square test for significance. No multivariate outliers were identified. Variance inflation factors (VIF) were obtained and indicated the absence of collinearity. Skew and Kurtosis statistics were calculated. Apart from mothers' resilience, which evidenced slight positive skew, all other variables evidenced normal distribution in the current sample, as indicated by skewness and kurtosis values of less than 1.96 (Kim, 2013). As the family hardiness subscales Challenge, Commitment, and Control evidenced low internal consistencies for at least one of the two dyad members, subscale analyses were deemed inappropriate and were not conducted. Preliminary analyses were conducted in IBM SPSS for Mac.OS, Version 26.

Although participating dyad members are theoretically distinguishable (i.e., by their position within the family system), dyads were treated as empirically indistinguishable due to small sample size (Kenny et al., 2006). Multilevel modeling was deemed to be appropriate considering the small sample size ($n < 50$) and the mixed

variables of indistinguishable dyad members. Generalized least squares analyses, a type of linear mixed modeling that takes the correlation within dyads into account, as well as correlated errors and restricted maximum likelihood estimation were utilized to estimate Actor-Partner Interdependence Models (APIMs). Due to the indistinguishable nature of the dyads, the two actor effects were set to be equal as well as the two partner effects. Thus, only one actor and partner effect were estimated as direct effects were constrained to equality due to indistinguishability. All predictor variables were grand-mean centered prior to the estimation. To determine the amount of variance in family hardiness explained by actor and partner effects, pseudo-R^2 was calculated using the formula provided in Kenny et al. (2006). The parameter *k* (Kenny & Ledermann, 2010) , an index reflecting the ratio of the partner effect to the actor effect, was obtained to detect additional dyadic patterns (e.g., couple or contrast). The Monte-Carlo Method, specifically the parametric bootstrap was used to obtain the confidence intervals for *k* (Kenny & Ledermann, 2010). APIMs were estimated using the R package *DyadR* and compared to results obtained from the APIM_MM shiny application (Kenny, 2015). No differences between the RStudio estimated APIM models and the APIM_MM shiny application were observed.

RESULTS

Descriptive Statistics

Across all participating adolescents, a moderate impact of the tornado during the six months following the disaster was reported (M= 5.55, SD = 2.34; on a scale where 10 equals high impact and 1 equals low impact). Participating adolescents tended to report either major (20.6%) or minor (38.0%) tornado damage in their immediate environment. The financial situation of 86.2% (25) of the participating adolescents was reportedly unaffected by the tornado and only 13.8% (4) expressed worries about the economic impact of the tornado. Notably, 51.7% (15) of the adolescents were concerned about the occurrence of another natural disaster. Participating mothers' reports about the impact of the tornado during the six months following the disaster were also moderate (M = 6.54, SD = 2.15) with 21.4% (6) reporting major damage and 39.3% (11) reporting minor damage. For a majority of mothers (75%), their financial situation reportedly had not changed. However, 32.1% (9) worried about the economic impact of the tornadoes and 21.4% (4) reported having received food stamps since the Christmas day tornadoes. Like the participating adolescents, 50% of the participating mothers reported being worried about the occurrence of another natural disaster. Interestingly, 21.4% of the participating mothers and 20.7% of the participating adolescents indicated that the tornadoes had improved their social relationships with family and friends.

As seen in Table 3, mothers and adolescents' average scores on the Resilience scale were relatively high as indicated by means just below the ‘high resilience’ cut-off of 147. Furthermore, their average total scores on the Difficulties in Emotion Dysregulation Scale (DERS) were indicative of moderate levels of emotion regulation. However, the

average family hardiness index (total score) was relatively low indicating that both mothers and adolescents perceived their family to have little internal strength and durability. As anticipated, there was a negative correlation between adolescents' resilience and emotion dysregulation (r = -.39, p < .05) of moderate effect size. In other words, greater individual resilience was related to reports of less emotional dysregulation among adolescents. Similarly, mothers' individual resilience was also negatively correlated with their emotion dysregulation (r = .41, p < .05) and this association was of moderate effect size. This suggests that greater resilience is associated with more emotion regulation among adolescents and their mothers. Unexpectedly, mothers' difficulties in emotion regulation were positively associated with family hardiness (r = .49, p < .01) and this relationship was of moderate effect size. More difficulties in emotion regulation were associated with greater perceived internal strength and durability of the family unit among mothers but not adolescents. As anticipated based on previous research (Silva et al., 2018), adolescents' reported emotion dysregulation was positively associated with mothers' emotion dysregulation (r = .32, p < .01). This association is of moderate effect size and suggests that greater maternal emotion dysregulation is associated with greater emotion dysregulation among adolescents. Unexpectedly, mothers' and adolescents' individual resilience (r = -.06) and mothers' and adolescents' perceived family hardiness were not significantly correlated with one another (r =.24). No other variables, including demographic variables, evidenced significant bivariate correlations with the focal variables.

To assess the extent to which mothers' and adolescents' scores are associated with one another (i.e., the degree of dependence in their reports), intraclass correlation

coefficient (ICC) for the predictor and outcome variables were calculated using Double-Entry (Pairwise) ICC (r_p; Alferes & Kenny, 2009; Gonzalez & Griffin, 1999; Griffin & Gonzalez, 1995). As seen in Table 3, resiliency evidenced an intraclass correlation coefficient close to zero suggesting the absence of dyadic dependence in the current sample. Both, emotion dysregulation and family hardiness evidenced positive ICCs of medium effect size suggesting that dyads were moderately similar in their overall reported emotion dysregulation and perceived family hardiness. As intraclass correlation coefficients are the quotient of the between-dyad variance and its divisor the total variance, it can also be interpreted as the proportion of variance explained by the dyad. While 6% of the variance in resilience in the current study was explained by mother-adolescent dyads, 24% of the variance in Family Hardiness and 33% of the observed variance in Emotion Dysregulation were due to dyads, highlighting the importance of dyadic effect estimates in the analyses. To test the significance of the intraclass correlation coefficients (r_p), Z-tests were conducted. The result of Z-tests indicated that the intraclass correlation coefficients for resilience, emotion dysregulation, and family hardiness were non-significant (p's > .05). This suggests a lack of statistically significant agreement not only between mothers and adolescents reported resilience and emotion dysregulation, but also their perception of family hardiness.

As noted previously, reliability analyses of dependent and independent variable measures were conducted and revealed low internal consistencies for the three family hardiness subscales of Challenge, Commitment, and Control for both mothers and adolescents. This was surprising considering that the measure evidenced significant correlations with other aspects of family functioning (see APPENDIX A). For example,

bivariate correlation of the FHI subscales were conducted with the subscales of the Family Assessment Device (FAD; Epstein et al., 1983). For the adolescent sample, significant, positive correlations of large effect size were evident for the Challenge and Commitment subscale and the FAD subscales of Global Functioning (i.e., the overall health/pathology of the family), Problem Solving (i.e., the family's ability to resolve problems), Roles (i.e., established patterns of behaviors for handling family functioning), and Affective Responsiveness (i.e., ability to experience appropriate range of affect). Additionally, significant positive correlations of moderate effect size were found for Challenge and Commitment FHI subscales and the FAD Communication subscale (i.e., the exchange of information among family members) for adolescents. These findings were only partially replicated in the sample of mothers, where similar correlations for the FHI Commitment subscale were found. However, among mothers, the Challenge subscale was not significantly correlated with any of the FAD subscales. Similarly, the FHI Control subscale did not evidence significant correlations with any of the FAD subscales in either sample, raising concerns about this subscale's convergent validity. In short, only the FHI Commitment subscale evidenced the moderately strong relationships with other measures of positive family functioning for both adolescents and mothers.

Actor-Partner Interdependence Models

To examine Aim 1, an Actor-Partner Interdependence Model (APIM) with adolescents' and mothers' resilience as independent variables and the two reports of family hardiness (index scores) as dependent variables were estimated using generalized least squares analysis with correlated errors and restricted maximum likelihood estimation due to positive nonindependence (Gistelinck et al., 2018). As can be seen in

Table 4, there were no significant actor or partner effects of resilience on family hardiness. As indicated by the estimated intercept, the predicted Family Hardiness total score was 18.89 for mothers and adolescents with average resilience, ($p < .01$). Only 3.5% of the observed variance was explained by the actor and partner effects of adolescents' and mothers' resilience on family hardiness.

To examine Aim 2, a second Actor-Partner Interdependence Model (APIM) with adolescents' and mothers' emotion dysregulation (total score) as independent variables and their reported family hardiness (index score) as dependent variables was estimated. Similar to the first APIM, the predicted Family Hardiness total score was 18.73 for mothers and adolescents with average emotion regulation and of significance ($p < .01$). Furthermore, there was also a statistically significant actor effect on family hardiness ($b = .35$, $p < .05$). This effect was of moderate effect size and suggests that adolescents' and mothers' reports of greater difficulties with emotion regulation are associated with reports of greater family hardiness. No significant partner effect was found (Table 5).

Although the partner effect was statistically not significant, the estimated ratio of the partner effect to the actor effect provided preliminary evidence for a potential dyadic pattern effect. Specifically, the actor and partner effects resulted in *k* that equaled -.56, indicating a possible contrast pattern[2], i.e., a positive actor effect and a negative partner effect (Kenny & Cook, 1999). The 95% confidence interval for k obtained through parametric bootstrapping ranged from -3.33 to 0.38, indicating that both a contrast pattern and an actor-only pattern were possible. In other words, how a family member perceives

[2] According to Kenny and Ledermann (2010), a contrast pattern exists when *k* equals –1 while an actor-only pattern exists when *k* is equal to 0. A *k* of 0.5, an actor effect twice as large as the partner effect, indicating something in between the couple and the actor-only pattern.

their family's hardiness could be negatively predicted by the difference between the person's own emotion regulation difficulties and the emotion regulation difficulties of the other family member (contrast pattern) as well as solely by their own emotion regulation difficulties. The relative difference in emotion dysregulation could predict how hardy one perceives their family to be. However, given that only the actor effect was significant, the k parameter only provides preliminary support for a potential contrast pattern.

To examine Aim 3, three Actor-Partner Interdependence Models (APIMs) with adolescents' and mothers' resilience as independent variables and each of the three family hardiness subscales as dependent variables were proposed. However, due to the low reliability of the Family Hardiness Index subscales in the current sample, the third aim of this study could not be addressed.

To examine Aim 4, the two actor paths and two partner paths of the APIMs described in Aim 1 to Aim 3 were proposed to be constrained to equality and then to be compared to the baseline APIM (estimated in Aim 1) using Chi-square (χ^2) difference test statistics. However, the significance testing of Double-Entry (Pairwise) intraclass correlation coefficients indicated indistinguishability of the dyads, thus requiring the use of multilevel modeling with both actor and partner effects constrained to equality in the initial analyses. Hence, aim four could not be addressed.

DISCUSSION

The current study examined post-disaster family level processes by utilizing a dyadic approach. Specifically, this study considered how family units adapted and coped with a natural disaster that particularly impacted adolescents from an under-resourced community. The role of two family member's (mother and adolescent) risk and protective factors on family hardiness was examined with the overall goal to 1) investigate how adolescents' and mothers' individual resilience would affect their perceptions of family hardiness, 2) examine how adolescents' and mothers' difficulties in emotion regulation would relate to their perceptions of family hardiness, 3) study the dyadic association between resilience and the three components of family hardiness, namely challenge, commitment, and control, and 4) examine whether adolescents' and mothers' perceptions of their family hardiness (and its components) are significantly different with respect to their individual resilience and difficulties in emotion regulation. Results relevant to each of the proposed aims will be discussed in turn.

First, it was noteworthy that, at the outset of the study, the bivariate relationships among the variables were not as anticipated. Specifically, although individual resilience was positively associated with emotion regulation among mothers and adolescents in the current study, individual resilience was not significantly related to either family member's report of family hardiness. Moreover, with a few exceptions, the subscales of the Family Hardiness Index (FHI) evidenced poor internal consistency for at least one of the dyad members. However, in line with prior research (e.g., Mestre et al., 2017), higher levels of individual resilience were shown to be associated with more emotion regulation

among both adolescents and their mothers. Also, as was found with Silva et al. (2018), mother's and adolescent's reports of emotional dysregulation were shown to be related.

Contrary to existing dyadic research reporting actor effects for resilience factors (e.g., Rayens & Svavarsdottir, 2003), neither significant actor nor partner effects for resilience on family hardiness were found. Furthermore, the absence of significant actor and partner effects was contrary to existing theoretical frameworks, namely, the systems concept of mutual causality which suggests an interdependence between individual and family resilience factors (Hawley & DeHaan, 1996). However, the results of the current study do suggest that emotion dysregulation is an important of family hardiness.

Unexpectedly, greater difficulties with emotion regulation were associated with greater perceived internal strength and perceptions of greater durability of the family unit among mothers but not adolescents. Actor-effects indicated that greater difficulties with emotion regulation were predictive of higher levels of self-reported family hardiness. Furthermore, the estimated ratio of the partner effect to the actor effect provided preliminary evidence for a dyadic pattern effect. Thus, it may be possible that the effect of adolescent's emotion dysregulation on their own perception of family hardiness may be the opposite of the effect the mother's emotion dysregulation has on the adolescent's perception of family hardiness and vice versa. Adolescent's difficulties in emotion regulation might be positively associated with their perception of their family hardiness while also negatively associated with the mother's perception of their family hardiness. Thus, if a dyadic pattern effect were present, it may have provided evidence for developmental differences and adolescent's role in post-crisis family processes.

Yet, the absence of significant partner effects does not support such conclusions and the possibility of a contrast pattern should be further examined in a data set with distinguishable dyads. Consequently, the underlying mechanism through which individual resilience and emotion dysregulation impact family hardiness among low-resourced families remains not well understood. In other words, the interdependence of individuals within various systems (i.e., members of the family on a microsystemic level) and its overall contributions to a family unit's capacity to endure and recover from a natural disaster remains needs additional attention.

Overall, the bivariate association between emotion dysregulation and increased family hardiness among adolescents and their mothers, as well as the positive actor effect both suggest that mothers' and adolescents' emotion dysregulation could be directly and indirectly related to their own perception of their family's internal strength and durability. It also may be possible that mothers and adolescents with greater emotion regulation difficulties are more likely to rely on other family members for the management of the family's stress and adaptation due to an awareness of their own deficits. It is possible that other mediating factors, such as the quality of the mother-adolescent relationship, may impact post disaster family processes at the individual and dyadic levels as suggested by other research findings (e.g., Li et al., 2018). Relatedly, individual resilience may have a moderating effect on the association between emotion dysregulation and higher levels of family hardiness. It will be important for future research to further disentangle the dyadic association between emotion dysregulation and family hardiness to better understand post-disaster protective and risk factors.

Implications

Literature on resilience-related family processes continues to represent a mixture of family stress and family strengths foci (Hawley & DeHaan, 1996). However, considering a combination of both, as was done in the current study, did yield unexpected findings. More specifically, the absence of a significant association between individual resilience and family hardiness gives rise to important theoretical considerations. The Family Resilience Model (FRM; Henry et al., 2015) suggests that families' positive adaptation to the severe disruption of the family's dynamics (e.g., due to a natural disaster) is largely impacted by the availability of protective factors. Yet, the results of the current study suggest that high levels of individual resilience on its own are not predictive of mothers' or adolescents' perception of their family's internal strength and durability. Furthermore, the degree to which family hardiness, a construct from coping and stress theory, diverges from and converges with other measures of family resilience and functioning is not well understood. In the following, emerging concerns about the theoretical and empirical underpinnings of family hardiness will be discussed.

First and foremost, the results of the current study raise concerns about operationalization of family hardiness, its current measurement, and its construct validity. Relative to traditional measures of family functioning (e.g., the Family Assessment Device; Epstein et al., 1983) that specifically reference the family unit in the anchoring of its items (e.g., by referring to the family or by using first-person plural pronouns), the Family Hardiness Index (FHI) includes a number of items that are quite general and may be unrelated to the family unit or family functioning (e.g., "It is not wise to plan ahead and hope because things do not turn out anyway" or "Life seems dull and meaningless").

Furthermore, the scaling of the FHI conflates responses options that express that a statement is false with ratings of inapplicability for the family (both responses receive a score of zero). Thus, the obtained total and subscale FHI summed scores do not distinguish between family disagreements and lack of hardiness and lack of applicability. Moreover, the measure instructs participants to indicate the degree to which it describes their family, suggesting a Likert-type response scale, but provides a true/false rating scale. Considering the overall large percentage of reverse-coded items on the Family Hardiness Index and its negative correlation with resilience in the current study, it may also be possible that the Family Hardiness Index (FHI) is a measure of family dysfunction rather than family strength.

However, a consideration of the correlations between subscales of the FHI and the Family Assessment Device (FAD) indicates that family hardiness and its three subcomponents are inconsistently related to other aspects of family functioning for mothers and adolescents, raising some concerns about construct validity. More specifically, the FHI control subscale did not correlate with other aspects of family functioning for both dyad members. This may suggest that a family's sense of being in control of family life may be unrelated to other aspects of family life, including the family's perception of their internal strength and durability. Additionally, the FHI challenge subscale was associated with aspects of family functioning for adolescents but not their mothers. Therefore, it may be possible that family functioning is more important for adolescents' perceptions of innovative and active family efforts than it is for their mothers. Finally, although the FHI commitment subscale was associated with various aspects of family functioning for both, adolescents, and their mothers, it surprisingly did

not show associations with global levels of family functioning. Thus, the question of what construct is measured by the Family Hardiness Index needs further consideration as correlations do not support the idea of family hardiness being a shared experience or a family-level construct.

Relatedly, the extent to which hardiness can be understood as a family-level construct also remains unknown. Up to this point, family hardiness has been primarily assessed through an individual lens (i.e., by using the report of one individual family member). The current study is one of very few studies to have investigated this construct on a dyadic level. Considering that family hardiness is theorized to reflect a family unit's experience, it was expected that there would be shared variance in reports. However, t the Family Hardiness Index was originally developed to assess an individual family member's perception of family hardiness rather than specifically developed to capture the views of multiple family members. This may explain the unexpected lack of agreement between mother's and adolescent's reports of their family's hardiness. Furthermore, some subscales of the Family Hardiness Index evidenced exceedingly low reliability in the current sample and raise important questions about the degree to which the Family Hardiness Index reliably captures the different facets of family hardiness.

Furthermore, high levels of individual resilience but low levels of family hardiness were reported in the current sample; these findings are contrary to existing theoretical frameworks. While the overall high average levels of individual resilience among adolescents and their mothers may be best explained by the relatively high community disaster resilience reported for the geographic region (Bakkensen et al., 2017), the overall level of family hardiness was relatively low compared to other studies

that also examined family hardiness after a natural disaster (e.g., Hackbarth et al., 2012). A possible explanation for this may be that the time period between the disaster and the actual data collection was longer for this study than in previous research. Additionally, the obtained results may be specific to the Mobile, Alabama public high school community. Moreover, although it may be possible that the low levels of family hardiness evident in the current study can co-exist with higher levels of individual resilience, the lack of significant positive correlation between these variables challenges existing theory. Thus, the theoretical and empirical overlap between individual and family protective factors remains not fully understood and should be subject to future research.

There also remain several theoretical questions pertaining to emotion dysregulation as an individual risk factor. Based on assumptions derived from family adaptive systems (FAS; Patterson, 2002), it was expected that family members' emotional dysregulation would have a diminishing effect on family units' capacity to endure and recover from a stressful life challenge. However, in the current study, greater difficulties with emotion regulation were shown to be predictive of higher levels of self-reported family hardiness. A possible explanation for the surprising results may lay in the operationalization of emotion regulation difficulties as a trait-level. Thus, it may be possible that post-disaster emotion regulation, like resilience, has to be viewed in relation to context (e.g., family interactions) and in response to stress (Cole et al., 2004; MacPhee et al., 2015) rather than being conceptualized as an individual's learned ability. In other words, it may be possible that families are hardier if family members are able to experience appropriate range of affect and exchange information about their difficulties

with emotion regulation with one another. In sum, it appears as if resilience and emotion regulation can serve as both individual risk and protective factors that impact how families navigate the impact of a stressor (e.g., natural disaster), subsequently mediating the association between stressor and adaptation. However, the exact nature of such processes remains subject to further research.

An alternative theory that may elucidate some of the processes surrounding stress and adaptation of a family unit is the Theory of Resilience and Relational Load (TRRL; Afifi et al., 2016). The TRRL is a framework on communication patterns underlying adaptation and coping. Based on the theory of emotional capital (Feeney & Lemay, 2012), which postulates that dyads can endure stressors when dyad members have built "emotional capital" within the relationship (Feeney & Lemay, 2012), the TRRL conceptualizes resilience as a process of calibration. Hereby, positive adaptation to a stressor is facilitated through relational partners having on-going conversations about stress and continuous investment in their relationships. Through the maintenance of family relationships, family members are thought to accumulate positive emotional reserves.

Greater relationship maintenance behaviors (e.g., promoting feelings of validation or security) minimizes perceptions of stress and reduces physiological stress as a whole (Afifi et al., 2019). Moreover, family members are more likely to invest in their relationships and build their emotional reserves if they have a more communal orientation (e.g., belief that family members are "in it together") in their approach to the stressor and life in general (Afifi et al., 2016). Thus, even in the presence of emotion regulation difficulties, the existence of emotional capital/positive emotional reserves could explain

why mothers' and adolescents' emotion regulation difficulties predicted higher levels of family hardiness. Future research would benefit from incorporating communication theories such as the TRRL to further explore interpersonal communication patterns that relate to post-disaster family level processes on the adaptation to and coping with a natural disaster including the role of family member's risk and protective factors for family hardiness.

Limitations

The results of the current study are limited by the relatively small sample size. Although the dyads participating in the current study are theoretically distinguishable, due to small sample size, dyads had to be treated as indistinguishable for the main analyses. This in turn required that actor and partner effects had to be constrained to equality, preventing us from examining whether adolescents and mothers' perception of their family hardiness were significantly different with respect to their individual resilience and difficulties in emotion regulation. Additionally, since several of the Family Hardiness Index subscales evidenced exceedingly low reliability, several of the proposed hypotheses could not be tested.

Additionally, sample characteristics and recruitment procedures further limit the generalizability of these results. In line with traditional gender-stereotypes about child-rearing practices, primarily mothers, rather than fathers, elected to participate in the present study, yielding a study sample of mother-adolescent dyads only. Consequently, the results of the current study may not hold up for father-adolescent dyads, as well dyads with grandparents, extended families, or other individuals serving as primary caregivers. Additionally, the obtained results are highly specific to the West-mobile public high

school community. The destroyed high school primarily serves a low resource community and participants received monetary compensation for their time. While this may raise concerns regarding the impact of self-selection on the results of the current study, it is important to note that there were no significant associations between demographic variables, predictors, and outcomes.

Finally, the cross-sectional study design does not allow any causal inferences and resilience is dynamic and subject to change based on the many interactions within and between systems (Masten & Motti-Stefanidi, 2020). Thus, future research would benefit from operationalizing resilience as a process, which would include the measurement at multiple timepoints (Distelberg et al., 2018) to obtain a better understanding of resilience and related processes after the occurrence of a natural disaster

Conclusions

The current study utilized post-disaster dyadic data to investigate how family units adapt and cope with a natural disaster by exploring the dyadic effects of mother and adolescent risk and protective factors on their perceptions of their family's hardiness. The results of the current study indicated that greater emotion regulation difficulties among adolescents and mothers were related to higher levels of family hardiness. While the exact mechanisms responsible for the findings of the current study remain subject for future research, considering the overall challenges related to the recruitment of adolescent-parent dyads after the occurrence of a natural disaster, the findings provide new direction for stress and coping research. More specifically, future research would benefit from a mixed-method, longitudinal approach to the study of family dyads post-disaster. Finally, it would be important to consider the relational context of family

hardiness and how relational resilience processes vary across phases of adaptation to the impact of a natural disaster.

TABLES

Table 1: Adolescent Participant Demographics

	n (= 29)	%
Sex		
Male	9	31.0
Female	20	69.0
Grade		
Year 10	7	21.4
Year 11	10	34.5
Year 12	12	41.4
Ethnicity/Race		
African American/Black	17	58.6
Asian	0	0.0
Hispanic White	1	3.4
Non-Hispanic White	8	27.6
Multiracial	3	10.3

Table 2: Mother Participant Demographics

	n = (29)	%
Marital Status		
Married	25	86.3
Divorced	2	6.9
Never Married	1	3.4
Unknown	1	3.4
Average Household Income		
$15,000 – 19,999	3	10.3
$20,000 – 39,999	5	17.2
$40,000 – 59,999	11	38.0
$60,000 – 79,999	3	10.3
$80,000 – 99,999	3	10.3
>$100,000	2	6.9
Unknown	2	6.9
Ethnicity/Race		
African American/Black	16	57.1
Asian	1	3.6
Hispanic White	0	0.0
Non-Hispanic White	10	35.7
Multiracial	1	3.6
Unknown	1	3.6

Table 3: Descriptive Statistics and Pearson Correlations for Resilience, Emotion Dysregulation, and Family Hardiness

Variable	Resiliency RS	Emotion Dysregulation DERS total	Family Hardiness FHI total
RS	-	-.39*	-.35
DERS total	-.41*	-	.18
FHI total	-.37	.49*	-
Adolescents x Mothers	-.06	.32*	.24
ICC N =29	-.06	.33	.24
Mean (SD) Adolescents	146.93(17.0)	75.28(18.78)	20.45(8.11)
Mean (SD) Mothers	145.75(23.27)	72.61(17.81)	17.00(5.56)

Note. Adolescents' bivariate correlations are above the diagonal and mothers' bivariate correlations are below the diagonal. RS = Resilience Scale. DERS total = Difficulties in Emotion Regulation Scale total score. FHI total = Family Hardiness Index total score. $^{*}p < .05$ (two-tailed). $^{**}p < .01$ (two-tailed). ICC = intraclass correlation coefficient.

Table 4: Effect Estimates for the Actor-Partner Interdependence Model of Resilience predicting Family Hardiness

		$CI_{95\%}$ for *b*			
Effect	*Estimate (b)*	Lower	Upper	β	*p*
Intercept	18.89	16.43	21.36		<.001
Actor	-0.08	-0.18	0.02	-0.24	.136
Partner	0.01	-0.09	0.11	0.02	.894
k	-0.09	-4.96	4.12		

Note. The intercept represents the predicted score for Family Hardiness when Resilience for the average Resilience score as Resilience was grand-mean centered prior to the analysis.

Table 5: Effect Estimates for the Actor-Partner Interdependence Model of Emotion Dysregulation predicting Family Hardiness

		$CI_{95\%}$ for *b*			
Effect	*Estimate (b)*	Lower	Upper	β	*p*
Intercept	18.73	16.30	21.17		<.001
Actor	0.13	0.02	0.25	0.35	.027
Partner	-0.07	-0.18	0.04	-0.19	.193
k	-0.56	-3.33	0.38		

Note. The intercept represents the predicted score for Family Hardiness when Emotion Dysregulation for the average Resilience score as Emotion Dysregulation was grand-mean centered prior to the analysis.

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APPENDIX A: FHI CORRELATIONS WITH OTHER ASPECTS OF FAMILY FUNCTIONING

Correlations Matrix for Family Measures for Adolescents Above the Diagonal and Mothers Below

Variable	1	2	3	4	5	6	7	8	9	10	11
1. FHI total	-	.82**	.82**	.70**	**.71****	**.53****	**.70****	**.54****	.39	.30	**.45****
2. FHI chall	.25	-	.57**	.57**	.58**	.54**	.53**	.43*	.26	.02	.45**
3. FHI commit	.66**	.38	-	.23	.77**	.57**	.76**	.54**	.37	.57**	.48*
4. FHI control	.86**	.25	.66**	-	.34	.31	.27	.21	.29	.02	.21
5. FAD GF	.44*	.28	.52**	.35	-	.81**	.62**	.82**	.68**	.36	.71**
6. FAD PS	.36	-.04	.43*	.39	.81**	-	.51**	.72**	.60	.23	.72**
7. FAD Roles	**.58****	.36	.62**	.29	.63**	.51**	-	.44*	.37	.51**	.49**
8. FAD Aff R	.38	.17	.43*	.27	.84**	.73**	.48**	-	.59**	.23	.75**
9. FAD Aff I	.05	.06	.03	.16	.68**	.60**	.38	.59**	-	.08	.55**
10. FAD BC	.21	.16	.26	.16	.36	.23	.50**	.26	.08	-	.32
11. FAD Com	**.47***	.21	.51**	.42*	.52**	.74**	.52**	.74**	.55**	.34	-

Note. FHI total = Family Hardiness Index total score. FHI chall = Family Hardiness Index Challenge Subscale. FHI commit = Family Hardiness Index Commitment Subscale. FHI Control = Family Hardiness Index Control Subscale. FAD GS = Family Assessment Device General Functioning Subscale. FAD PS = Family Assessment Device Problem Solving Subscale. FAD Roles = Family Assessment Device Roles Subscale. FAD Aff R = Family Assessment Device Affective Responsiveness Subscale. FAD Aff I = Family Assessment Device Affective Involvement Subscale. FAD BC = Family Assessment Device Behavior Control Subscale. FAD Com = Family Assessment Device Communication Subscale. * $p < .05$ (two-tailed). ** $p < .01$ (two-tailed).