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Exposure Outliers: Children, Mothers, and Cumulative Disaster Exposure in Louisiana

Lubna Mohammad
Colorado State University, jaberluna@gmail.com

Lori Peek
University of Colorado Boulder, lori.peek@colorado.edu

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Abstract

Only a limited number of studies have explored the effects of cumulative disaster exposure—defined here as multiple, acute onset, large-scale collective events that cause disruption for individuals, families, and entire communities. Research that is available indicates that children and adults who experience these potentially traumatic community-level events are at greater risk of a variety of negative health outcomes and ongoing secondary stressors throughout their life course. The present study draws on in-depth interviews with a qualitative subsample of nine mother-child pairs who were identified as both statistical and theoretical outliers in terms of their levels of disaster exposure through their participation in a larger, longitudinal Women and Their Children’s Health (WaTCH) project that was conducted following the British Petroleum Deepwater Horizon Oil Spill. During Wave 2 of the WaTCH study, mothers and their children were asked survey questions about previous exposure to and the impacts of the oil spill, hurricanes, and other disasters. This article presents the qualitative interview data collected from the subsample of children and mothers who both endorsed that they had experienced three or more disasters that had a major impact on the child and the household. We refer to these children as exposure outliers. The in-depth narratives of the four mother-child pairs who told stories of multiple pre-disaster stressors emerging from structural inequalities and health and financial problems, protracted and unstable displacements, and high levels of material and social losses illustrate how problems can pile up to slow or completely hinder individual and family disaster recovery. These four mother-child pairs were especially likely to have experienced devastating losses in Hurricane Katrina in 2005, which then led to an accumulation of disadvantage and ongoing cycles of loss and disruption. The stories of the remaining five mother-child pairs underscore how pre-disaster resources, post-disaster support, and institutional stabilizing forces can accelerate recovery even after multiple disaster exposures. This study offers insights about how families can begin to prepare for a future that is likely to be increasingly punctuated by more frequent and intense extreme weather events and other types of disaster.

“I could say that my childhood had not been a childhood; what I thought was a childhood was just me really preparing myself for the next natural disaster to come.” - Oliver Allen, 17 years old, New Orleans, Louisiana

Introduction

What happens to children and families who are exposed to multiple community-level disasters that have a substantial disruptive impact? This is the question that drove this study of “exposure outliers”—defined here as children who have experienced three or more major disasters before the age of 18. They are statistical outliers in that this experience is not normative, yet, in the United States. However, based on disaster loss trends and patterns, the experience of these young people might be a harbinger of what is to come in an era of rapidly accelerating climate change, and therefore it is especially crucial to learn from the accounts of these children and their families.

Over the past four decades, scientists have charted an increasing global frequency of extreme weather including severe storms, flooding, and droughts (Banholzer, Kossin, & Donner, 2014). The rising number of weather-related disasters corresponds to increased damages and economic costs (Matthewman, 2015). This trend is problematic and further exacerbated by the fact that larger numbers of people now live in hazard-prone areas, and these populations may lack money and other resources to properly prepare for and recover from disasters (Schultz & Elliott, 2013). The upsurge in overall population, population density in hazardous areas, rising social and economic inequality, and the frequency and magnitude of natural hazard events indicates that there will be an increasing number of people exposed to multiple disasters in the future.

Within the United States, a 2014 report by Core Logic ranked Louisiana as the third most disaster-affected state in terms of the number of recorded annual disaster events (Botts, Jeffery, Du, & Suhr, 2014). Louisiana is subject to hurricanes because of its coastal location near the Gulf of Mexico and is susceptible to flooding because of its low elevation and proximity to water from the Gulf, the Mississippi River, and various other outlets (Roth 2010). Disaster losses in the area have intensified in recent decades due to both natural and human causes associated with wetland loss, ecological destruction, coastal erosion, and saltwater intrusion (Tierney 2014). Furthermore, the levee systems throughout southern Louisiana, particularly in New Orleans, which were designed to reduce flooding risk, have increased disaster-related damages (Penland et al. 2002; Roth 2010). This is due, in large part, to levee breaches that worsened flooding caused by several hurricanes, including Hurricanes Katrina, Rita, and Gustav (Freudenburg, Gramling, Laska, & Erikson 2009).

Louisiana has been slowly gaining population, with about 4.6 million people currently residing there (U.S. Bureau of the Census, 2018). More than a million people, or about one fourth of Louisiana's total population, live in Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Mary, and Terrebonne parishes. This study focuses on this geographic region—which has been subject to several major disasters over the last two decades—and uses a qualitative subsample of nine mother-child pairs that experienced multiple disaster exposures between 2005 and 2012. Drawing on qualitative narratives and case study vignettes, this work explores the various factors that impeded or fostered post-disaster recovery among children and households that were subject to multiple disaster exposures in this hazard-prone region of Louisiana.

Background and Literature Review

Only a limited number of studies have explored the effects of *cumulative disaster exposure*, defined here as multiple, acute onset, large-scale events that cause disruption for individuals, families, and entire communities. The cumulative nature of disasters has received little scholarly attention, likely because these events are still relatively rare in a given geographic location even though, nationally and globally, they are becoming increasingly common. Conversely, the impact of cumulative adversities or trauma at the individual level has been much more widely examined, especially in the psychological literature. Before delving further into this research, we clarify some of the terminology used here.

While *adversity* is generally used interchangeably with terms such as “problems” or “difficulties,” the definitions for *disaster* and *trauma* have been much more widely debated (Perry & Quarantelli, 2005). This article defines *disaster* as a sudden event that seriously disrupts a society's functioning, creating material, economic, environmental, and/or human losses, while *trauma* includes any emotionally distressing experience that is typically experienced at the individual level. Therefore, while a single event can simultaneously be an adversity, a trauma, and a disaster, these three terms are not always interchangeable. Further, while the current study focused primarily on disaster experiences, other traumatic events and/or adversities were also examined through the in-depth interviews.

Research comparing single and multiple potentially traumatic event exposures indicates multiple exposures will result in worsened well-being. Studies by Keinan, Shrira, and Shmotkin (2011) and Tanskanen, Hintikka, Honkalampi, Koivumaahonkanen, & Viinamaki (2004) found that exposure to three or more traumatic experiences or disasters, such as interpersonal trauma, witnessed violence, and natural disasters, is linked with worsened

psychological well-being among adults. Several studies suggest that the *number* and *characteristics* of traumatic events, such as when there is physical injury, fear of death, or property loss involved, has a stronger correlation with worsened psychological health than does the *type* of trauma experienced (Briere & Elliott, 2000; Green, Corcoran, Petty, Stockton, & Stern, 2005; Tanskanen et al., 2004). A nationally representative study of 925 adult participants, for example, suggested a linkage between the number of cumulative disaster experiences and increased trauma symptoms (Briere & Elliott 2000). Furthermore, the study showed that trauma symptoms did not change based on how distant in time a disaster experience was, regardless of the severity of the disaster.

Research has also shown positive correlations between multiple traumatic exposures and worsened symptoms of post-traumatic stress disorder (PTSD), major depressive disorder (MDD), panic disorder, and depression (Briere & Elliott, 2000; Dennis, et al., 2009; Harvey, et al., 2016; Lloyd & Turner, 2003; Ogle, Rubin, & Siegles, 2013; Reifels, Mills, Duckers, & Odonnell, 2017; Scott, 2007). Cumulative trauma exposure has been associated with higher risks of major physical health problems, such as inflammation in the heart (O'Donovan, Neylan, Metzler, & Cohen, 2012). This is possibly because previous trauma exposure can amplify the impact of future traumatic exposures (Shrira, Palgi, Ben-Ezra, & Shmotkin, 2010). Furthermore, some research suggests that cumulative adversity or repeated trauma exposure can also influence behavioral outcomes among adults. Studies conducted in the United States and Australia have linked cumulative exposure to increases in alcohol dependence and misuse (Harvey, et al., 2016; Lloyd & Turner, 2008). A study of Louisiana fishers who experienced the 2010 British Petroleum Deepwater Horizon Oil Spill (hereafter referred to as the BP Oil Spill) suggested that previous exposure to trauma can make dealing with future trauma more difficult and increase the probability of self-injury (Cherry, et al., 2017).

When examining responses to cumulative adversities, children show similar trends to adults. Exposure to multiple stressors during childhood, such as experienced or witnessed abuse, can cause a toxic stress response in which there are disruptions to the brain, organs, and metabolic systems that impair physical and cognitive development (Shonkhoff & Garner, 2012). Toxic stress is also linked with physical and mental illness, as well as impairments in learning and behavioral difficulties. Studies by Björkenstam, Hjern, Björkenstam, and Kosidou (2018) and Lansing, Plante, and Beck (2017) support these findings, correlating multiple childhood adversities with maladaptive coping strategies such as self-injury and suicide.

Cumulative adversity in childhood has been associated with higher risks of developing PTSD, MDD, substance dependence or abuse, problematic levels of depressive symptomatology, higher levels of distress, and worsened behavioral and physical health. These patterns remain consistent regardless of the type of traumatic events experienced (Catani, et al., 2010; Mersky, Topitzes, & Reynolds, 2013; Roberts, Ferguson, & Crusto, 2012; Scheeringa, 2014; Turner & Lloyd, 1995; Williams, et al., 2007). Not only are children negatively impacted by direct exposure to adversity and disaster, they may also be affected by the accumulation of post-disaster stressors, such as slow recovery of municipal infrastructure, schools, their households, or ongoing disruptions to social networks and peer groups (Peek, 2008). This can lead to “cumulative vulnerability” and place them on what Fothergill and Peek (2015) conceptualized as a “declining trajectory” after disaster.

Despite the multitude of negative impacts that cumulative disaster and/or trauma exposure can generate for children and adults alike, several studies indicate that only a small percentage of people develop severe mental health symptoms or behavioral manifestations (Brewin, Andrews, & Valentine, 2000; Goldmann & Galea, 2014; Norris, Friedman, & Watson, 2002; Rubonis & Bickman, 1991; Vogel & Vernberg, 1993). Additionally, while some people may face long-term mental health problems because of multiple exposures to adverse events, most people’s mental health symptoms diminish with time. In fact, a growing number of studies have linked cumulative adversity with post-traumatic growth and resilience (Cenat, Derivois, Hebert, Amedee, & Karray, 2018; Jirek & Saunders, 2018; Weems, Osofsky, Osofsky, Hansel, & Russell, 2016). A meta review of cumulative disaster exposure on children and families by Osofsky and Osofsky (2013) suggests that secondary factors have major influences on coping and recovery from disasters and other traumas. Specifically, research indicates that those who lack or lose social support, those who experience multiple secondary stressors, and those with pre-disaster mental health problems all are more likely to experience worse outcomes and delayed recovery, while those who are able to garner additional social and financial support may be able to recover from even multiple adversities in a timely manner.

Research Methods

This study adds to the literature on cumulative disaster exposure by focusing on the narratives of nine mother-child pairs. This section briefly describes the Women and Their Children’s Health (WaTCH) study from

which the qualitative subsample was drawn. The approach to qualitative data collection and analysis is then described in greater detail.

The WaTCH Study

WaTCH is a five-year, longitudinal study that was conducted between 2012 and 2016. It was designed to examine the short- and longer-term health impacts of the 2010 BP Oil Spill on women and children living in southeast Louisiana at the time of the disaster (Peres, et al., 2016; Rung A. L., et al., 2016). Adult female participants were primarily recruited by the research team using an address-based sampling frame that relied on the U.S. Postal Service's Computerized Delivery Sequence File, which covers 100% of all U.S. households and was used to generate the 46,649 telephone numbers that were called (Peres, et al., 2016). In addition to this sampling method, some participants were recruited by friends and family or were volunteers (Peres, et al., 2016). Female participants who were mothers of children between the ages of 7 and 18 at the time of the BP Oil Spill also had the option to have one of their children participate within the WaTCH study. If more than one child was living in the home and fit the study inclusion criteria, the child with the birthday closest to the date of the survey interview was included in the study.

WaTCH participants were invited to complete two surveys. The first wave included in-home interviews, carried out between December 2012 and September 2014, that focused primarily on physical and mental health-related questions. The second wave was conducted over the telephone between June 2015 and May 2016 and included many of the same questions as the first survey, as well as additional questions about the disasters experienced by each participant and the impact level of each. The final Wave 1 sample included a total of 620 mother-child pairs. Wave 2 retained 445 mother-child pairs.¹

¹ As of April 2019, seven scholarly papers have been published from the WaTCH study. When examining physical health, the findings indicated that women in the WaTCH study who lived in unfavorable neighborhoods or those with higher rates of pollution, noise, and dangerous conditions had higher rates of obesity than those who did not (Sullivan, et al., 2016). Results regarding mental health indicate that women in southern Louisiana who had physical exposure to the BP Oil Spill self-reported more mental distress and memory loss in the past month, whereas those who were both physically and economically exposed to the oil spill reported higher rates of physical health symptoms, memory loss, and domestic violence after the disaster (Peres, et al., 2016; Rung, et al., 2015; Rung A. L., et al., 2016). Furthermore, physical exposure to the oil spill was linked to higher economic exposure, and both types of exposure were associated with higher levels of depression (Rung A. L., et al., 2016; Rung A. L., Gatson, Robinson, Trapido, & Peters, 2017).

The Exposure Outliers Study

The Exposure Outliers study² drew from the WaTCH Wave 1 and Wave 2 survey sample to identify a subsample of child and mother respondents who fit the following inclusion criteria:

- (1) Participated in both waves of the WaTCH cohort study;
- (2) Indicated that they had experienced three or more of the following disasters: Hurricane Katrina in 2005, Hurricane Rita in 2005, Hurricane Gustav in 2008, the BP Oil Spill in 2010, Hurricane Isaac in 2012, and any other “disasters experienced” as identified in the “other” category of the survey; and
- (3) Endorsed that each disaster experienced had (a) a major impact on the focal child in the study, and (b) a major impact on the household.

While our definition of exposure outliers focuses on the child as having experienced three or more collective-level disasters before the age of 18, it is important to underscore here that our interest in the analysis is on the mother, the child, and the family as a collective unit. As such, our sampling strategy reflected this interest and we ensured that both the mother *and* the child fit the inclusion criteria identified here (see Figure 1 for the questions that were asked of the mother and child during Wave 2 of the WaTCH study).

WaTCH publications have also examined factors that mitigated against mental health problems for adult female participants. Social capital and social support were associated with reduced depression rates, and both were negatively related to oil spill exposure (Rung A. L., et al., 2017). Not completing high school, lower household income, less social support, damage to commercial fishing areas, higher economic exposure to the oil spill, and smelling the oil often were all linked to higher levels of depressive symptoms (Gatson, et al., 2016).

² Peek served as principal investigator for the Exposure Outliers study and was responsible for the research design, recruitment, data collection protocols, theoretical conceptualization, and definitional contribution related to “exposure outliers” and “cumulative disaster exposure.” Mohammad served as a graduate research assistant on the project and assisted with all aspects of data collection and analysis. Mohammad wrote her Sociology master’s thesis drawing on the Exposure Outliers data.

Disaster Impacts

Q20. The next set of questions are about experiences with major storms or disasters in the past. To start, can you tell me which of the following disasters your household has experienced:

Hurricane Katrina in 2005
 Hurricane Rita in 2005
 Hurricane Gustav in 2008
 BP Oil Spill in 2010
 Hurricane Isaac in 2012
 Other (Please specify: _____)
 Other (Please specify: _____)
 Not affected by any disasters

Q21. For each of the disasters that you just listed, can you tell me on how much of an impact it had on [CHILD'S] life. On a scale of 1 to 5, with 1 being "no impact," and 5 being "major impact," how much of an impact did each disaster have on the child directly:

[EVENT]	No Impact				Major Impact
	1	2	3	4	5
HURRICANE KATRINA	<input type="checkbox"/>				
HURRICANE RITA	<input type="checkbox"/>				
HURRICANE GUSTAV	<input type="checkbox"/>				
2010 BP OIL SPILL	<input type="checkbox"/>				
HURRICANE ISAAC	<input type="checkbox"/>				

Q22. In thinking about those same disasters, how much of an impact do you think it had on your household and family? Again, on a scale of 1 to 5, with 1 being no impact and 5 being major impact, how of an impact did each of the following disasters have on your family:

[EVENT]	1	2	3	4	5
HURRICANE KATRINA	<input type="checkbox"/>				
HURRICANE RITA	<input type="checkbox"/>				
HURRICANE GUSTAV	<input type="checkbox"/>				
2010 BP OIL SPILL	<input type="checkbox"/>				
HURRICANE ISAAC	<input type="checkbox"/>				

Figure 1. Disaster Exposure Questions from the WaTCH Wave 2 Survey

Our analysis of the survey data ultimately yielded nine mother-child pairs who met the study inclusion criteria (see Figure 2 for a graphic summary of the sampling procedure). As others have observed, qualitative sampling of this nature is important because it helps to better understand the circumstances of statistical anomalies or theoretical outliers (Ragin, Nagel, & White, 2004). The study of outliers can help test or refine theory and contribute new concepts to the social science literature.

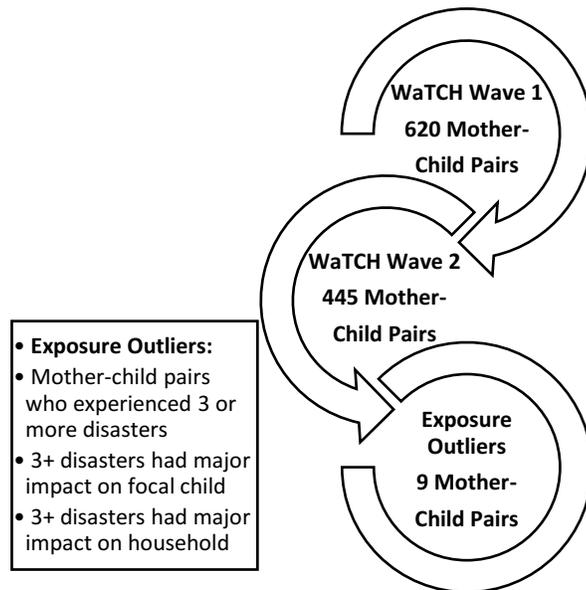


Figure 2. Wave 1 and Wave 2 WaTCH Sample and Exposure Outliers Study Subsample

Qualitative Interviews. Once the mother-child pairs were identified for the Exposure Outliers study, the principal investigators for the larger WaTCH study reached out to the mothers, per our Institutional Review Board (IRB) approved protocol, to ask if they would be willing to participate in the qualitative study. All nine of the mothers agreed to be contacted.

We then called the mothers directly, explained the study and elaborated on why they were selected for this additional qualitative component beyond Wave 1 and 2 of the WaTCH study. We then asked the mother if she and her child would be willing to consider being interviewed. Upon receiving an affirmative response, we discussed informed consent procedures over the telephone with the mother. We rereviewed all informed consent procedures in person with the mother and then with the child at the time of each interview to ensure that both the mother and child were able to make an informed decision and consent to participation in the qualitative interview portion of the study. Each mother received a \$50 gift card after the interview, as did the child.

We traveled to Louisiana twice in 2016 specifically for this research project and conducted all but one of the interviews together. At the time of the interviews, 10 of the interviewees lived in Orleans Parish, six were in

Jefferson Parish, and two were in Plaquemines Parish. Eight of the nine focal children were still living at home at the time of the interview. (The one exception was an 18-year-old young woman who had recently graduated high school, started college, and had moved into a nearby campus dormitory at a local university. She still lived in the same parish as her mother and father, however.)

All interviews were audio recorded after we were granted permission from each participant. We conducted the interviews at the participants' homes, with the exception of the one interview with the 18-year-old college-age respondent that took place at the university library where she was a student. Although we tried to conduct the interviews privately, sometimes there were other people at home listening or "hanging out" when we did the interviews. We did our best to ensure privacy during the interviews, but as other ethnographers have noted, sometimes this is impossible and so we remained flexible but also focused on our sampled respondents (Fine, 1993; Peek & Fothergill, 2009).

The interviews lasted anywhere between 15 minutes with some of the youngest children in the study to well over two hours with some of the mothers. The interviews with the mothers tended to be much more detailed, which undoubtedly had to do with their age and their vivid memories of events. For the children, many of the disasters we were asking about happened when they were quite young, so at times their ability to recall specific details was compromised. Even so, the children were able to speak vividly about the ongoing effects of disasters in their lives.

At the beginning of each interview, we showed the participant a printout of the questionnaires that they had completed previously for Wave 1 and 2 of the WaTCH study. We used the paper copies of the questionnaires, which we had hand-marked with their specific survey responses, to help orient the respondents to the disasters they had endorsed as having had a "major impact" on the child and the household. We also at times used their responses to probe more deeply regarding health issues or neighborhood challenges, for example, that they had endorsed on prior waves of the close-ended questionnaire.

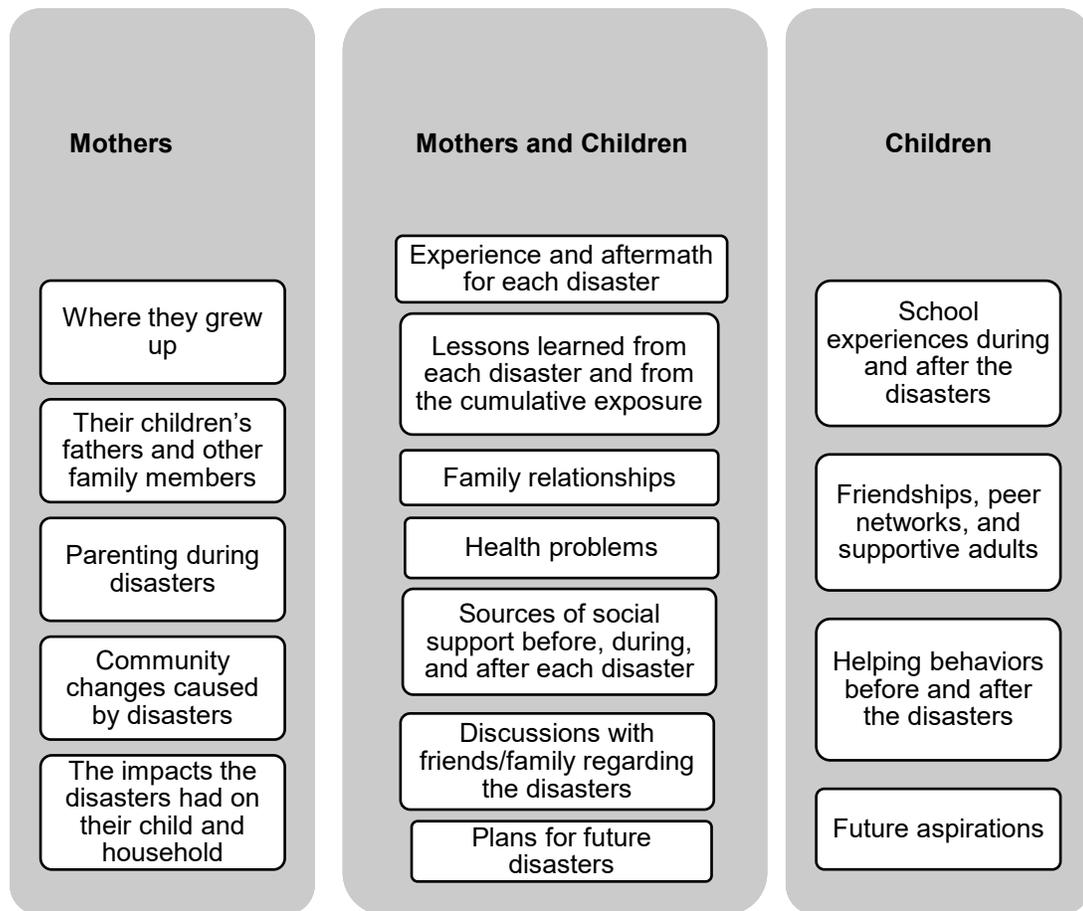


Figure 3. Summary of Interview Topics with the Mothers and Children

As we proceeded through the interview, we asked each respondent to “tell their story” of each of the disasters. We asked the respondents to elaborate on what had happened to the child and what had happened to the family and household in each of these events. We then asked additional questions of the mothers and children, as summarized in Figure 3. At the close of each interview, respondents completed a short sociodemographic information form, which we then used with the interview data to develop a series of data tables to characterize the sample.

The Interviewees: Disaster Exposure and Impacts. All 18 interviewees, who are identified using pseudonyms throughout the

remainder of the article, a common practice to ensure the confidentiality and protection of respondent identity, reported experiencing between four and six major community-level disasters in the Wave 2 WaTCH questionnaire and during the in-depth interviews that were the cornerstone of the Exposure Outliers study.

Table 1 summarizes the reported level of impact severity each disaster had on the participants' family and household (on a scale from 1 to 5, with 1 being no impact and 5 a major impact). The mother and child responses for the household were identical in most cases; discrepancies are noted in parentheses in Table 1.

Table 1.
Household Disaster Exposure and Impact, as Indicated by the Child and Mother

Family	Exposure: Total Number of Disasters	Katrina 2005 Impact	Rita 2005 Impact	Gustav 2008 Impact	BP Oil Spill 2010 Impact	Isaac 2012 Impact	Other Disasters: Exposure and Impact
Smith	5	Major	Major	Major (Mother); None (Child)	Major	Major	None
Michaels	4	Major	None	Major	Some (Mother); None (Child)	Major	None
Jackson	5	Major	Major	Major	Major	Major	None
Allen	5	Major	Major	Minor (Mother); Major (Child)	Major	Some	None
Johnson	5	None	Major	Major	Major	Major	Hurricane Juan Minor (Mother Only)
Bryant	6	Major	Major	Major	Major	Major	Hurricane Ivan Some (Mother and Child)
Green	5	Major	Major	Major	Major	Major	None
Jones	6	Major	Major	Major	Major	Major	Hurricane Betsy Minor (Mother Only)
Williams	6	Major	Major	Major	Major	Major	Hurricane Betsy Minor (Mother Only)

Note: Grey shading in Table 1 highlights those families that experienced what we refer to in the findings section as “problem pile up.”

Table 2 illustrates the severity of impact (on a scale from 1 to 5, with 1 being no impact and 5 a major impact) each disaster had on the focal child, as rated by the mother and child. As noted in Table 1 and again in Table 2, when there was agreement between the mothers and children in terms of their survey responses, that is shown as one answer. Any discrepancies are indicated in parentheses in the table.

Table 2.

Child Disaster Exposure and Impact, as Indicated by the Child and the Mother

Child Name	Katrina 2005 Impact	Rita 2005 Impact	Gustav 2008 Impact	BP Oil Spill 2010 Impact	Isaac 2012 Impact
Alex Smith	Major	Major	None (Child); Major (Mother)	Major	Major
Eric Michaels	Major	None	Major	None (Child); Some (Mother)	Major
Jason Jackson	Major	Major	Major (Child); Some (Mother)	Major	Some (Child); Major (Mother)
Oliver Allen	Major	Major	Major (Child); Minor (Mother)	Major	Some
Jessica Johnson	None	Major	Major	Major	Major
Miranda Bryant	Major	Major	Major	Major	Major
Matthew Green	Major	Major	Major	Major	Major
Samantha Jones	Major	Major	Some	Major	Some (Child); Major (Mother)
Charlie Williams	Major	Major	Major	Major	Major

Note: Grey shading in Table 2 highlights those children in families that experienced what we refer to in the findings section as “problem pile up.”

The Interviewees: Sociodemographic Characteristics.

Sociodemographic information for the children and their mothers is included in Table 3. As shown in the table, most of the interviewees—seven mother-child pairs—identified as African American, one pair identified as White, and one pair self-identified as “other.” Annual household income was indicated as above \$50,000 for two mother-child pairs, between \$20,000 and \$50,000 for five mother-child pairs, and below \$20,000 for two mother-child pairs.

Of the child interviewees, six were male and three were female. All of the mothers identified as female. Hurricane Katrina, which occurred in 2005, was the first disaster that any of the children in the study experienced

and hence is the marker used in Table 3 to indicate child's age. The children ranged from ages 2 to 7 and the mothers ranged in ages from 22 to 52 at the time of Katrina. Of the mothers in the study, three were married, two were divorced, two were single, one was widowed, and one did not identify her relationship status at the time of interview in 2016.

Table 3.
Demographic Information for Mother and Child Participants

Name of Mother	Name of the Focal Child	Focal Child's Age During Katrina in 2005*	Self-Identified Race of Family	Mother's Employment Status 2016	Annual Household Income 2012	Mother's Martial Status 2005*	Mother's Marital Status 2016	Total Number of Children In the Family 2016
Sasha Smith	Alex Smith	2 years old	African American	Employed Full Time Since 2014	<\$20,000	Married	Divorced – In a Dating Relationship	2
Mia Michaels	Eric Michaels	4 years old	African American	Employed Full Time Since 2010	\$20,000-50,000	Single	Single	3
Lacy Jackson	Jason Jackson	2 years old	African American	Unemployed Since 2012	\$20,000-50,000	Married	Divorced	3
Susan Allen	Oliver Allen	6 years old	African American	Employed Full Time Since 2015	\$20,000-50,000	Married	Widowed	5
Christina Johnson	Jessica Johnson	3 years old	Mixed Race	Employed Full Time Since 2005	\$20,000-50,000	Dating Children's Father (On and Off)	Single	3
Natalie Bryant	Miranda Bryant	5 years old	African American	Currently Unknown/ Unemployed in 2005	<\$20,000	Single	Single	3
Jackie Green	Matthew Green	7 years old	White	Self Employed Since 2008	>\$50,000/ Year	Married	Married	2
Sophia Jones	Samantha Jones	6 years old	African American	Employed Full Time Since 2010	\$20,000-50,000/ year	Married	Married	4
Daniela Williams	Charlie Williams	4 years old	African American	Stay at Home Mother/Wife	>\$50,000/ Year	Married	Married	2

Note: Grey shading in Table 3 highlights those families that experienced what we refer to in the findings section as "problem pile up."

Qualitative Data Analysis. The 18 audio interview files (9 with the mothers, 9 with the children) were transcribed verbatim, checked for accuracy, and coded using ATLAS.ti, which is a qualitative data analysis software program. Following Saldaña (2009), we completed three major rounds of coding, with the initial round focused on identifying general themes and patterns that emerged from the literature we had already reviewed and from the data we had collected. Early codes were intentionally broad and focused on categories such as age, class, race, memory, social

support, friendships, loss, displacement, and reactions to and recovery from the disasters. The second round of coding involved completing simple counts to understand the frequency of various responses, as we searched for the most prevalent themes. We then began looking for more conceptual themes and broader patterns in the data. This ultimately led us to sort four of the mother-child pairs into the “problem pile up” group, and five of the pairs into the “adaptive capacity” group that we describe further below. During our third round of coding, we identified illustrative quotes from the interviews associated with the identified patterns. We met regularly throughout this iterative coding process to discuss preliminary findings and to update codes, operational definitions, and associated memos.

As with much inductive work that seeks to identify emergent patterns in narrative data, as we progressed with data collection and analysis, we refined, narrowed, and focused our research questions (Marshall & Rossman, 2006). In the end, the study sought to answer why some families experienced a problem pile up related to multiple disaster exposures, while others who experienced the same disasters were able to recover. This was especially of interest because, as shown in Tables 1 - 3, the responses to the survey questionnaires and the socio-demographic backgrounds of respondents were similar in many ways.

Findings: Cumulative Disaster Exposure

Although all the respondents in this study experienced several community-level disasters that they reported had a major impact on the focal child and the household, there was variation across the families in terms of the severity of the disaster exposures and the long-term recovery processes that followed. This variation was driven by a complex array of social factors and forces that both preceded and followed the actual disaster impact.

This findings section is organized around the narrative cases of each of the nine mother-child pairs. Their stories are presented to shed light on both this variability as well as common themes across the cases. The section begins with the four mother-child pairs that experienced what we refer to as problem pile up. These households endured the most severe cumulative disaster impacts and the most protracted recovery processes. After presenting the qualitative themes and four problem-pile-up cases, we then turn to the remaining five mother-child pairs. Their stories underscore how pre-disaster resources, post-disaster support, and institutional stabilizing forces can accelerate recovery even after multiple disaster exposures.

Exposure Outliers and Problem Pile Up

Each of the mother-child pairs that experienced problem pile up had different stories to tell. However, there were four *common themes* that cut across their stories and helped explain why these families faced an accumulation of disadvantage and stalled recovery in the aftermath of multiple disasters (see Figure 4).

First, these families suffered many pre-disaster stressors related to financial and health related issues that worsened considerably in the aftermath of each of the major disasters. The four mothers who fit this category reported their household income was less than \$50,000 a year. These financial and associated health difficulties predated Hurricane Katrina in 2005, but they grew more dire after that storm and the other disasters that followed.

Second, the mother-child pairs told stories of both material loss and loss of social support that exacerbated mental and physical health challenges and further diminished their already precarious financial situations and recovery processes. Three of the four mothers in this category were married at the time of Katrina in 2005, but by the time of our interview in 2016, two were divorced, one was widowed, and one remained single. These women all had primary caregiving responsibilities for the focal child in the study, as well as other children in the household. The women and their children reported disaster-induced family separation and issues related to the loss of social and associated financial support. In addition, these families experienced the death of one or more loved ones following at least one of the major disasters.

Third, these families were the most likely to be displaced multiple times and for extended periods that stretched across months and even years, as they moved between the homes of family members and friends, temporary shelters, and temporary housing. The instability that emerged from those displacements had cascading effects in terms of housing, neighborhood, schooling, and employment prospects for the children and the mothers in the study. All four mother-child pairs in this group identified as African American and the mothers and children discussed facing stigma and discrimination based on their racial identify during displacement, which caused further stress and amplified various forms of disadvantage.

Fourth, while the mothers and children indicated in the WaTCH surveys that all or almost all of the disasters that we asked about had a “major impact,” it became clear during the interviews that Hurricane Katrina was the most devastating disaster that they had experienced in terms of pushing the families into a long cycle of disorder, loss, and displacement. The mothers and children spoke of Hurricane Katrina as the most destructive and disruptive of all the disasters, and one of the mothers in our

study indicated that it was “impossible to recover” after such a devastating blow to the family and surrounding community.

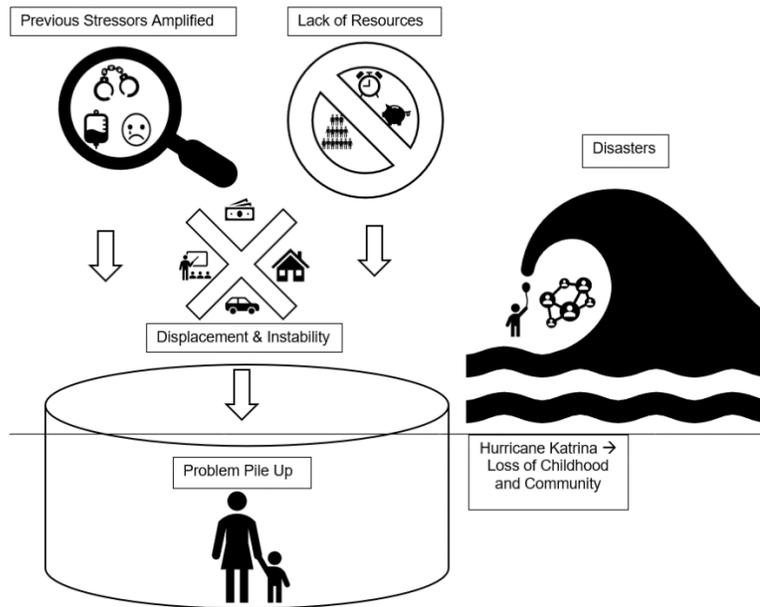


Figure 4. Common Themes Informing Problem Pile Up

As the vignettes below illustrate, each of the stories that the mothers and children shared were unique. However, the common themes across their interviews help show that the mothers and children who faced the most negative impacts of the cumulative disaster exposures were socially situated in ways that decreased their ability to prepare for disasters and mobilize resources to quickly recover.

The Smith Family. The Smith family illustrates how catastrophic events—like Katrina—as well as subsequent disasters amplify and exacerbate pre-existing health problems and financial challenges, making it impossible to address any one issue separately from the others. When Hurricane Katrina struck in 2005, Sasha Smith was unemployed, battling throat cancer while recovering from a broken neck she had sustained in an automobile accident, and living in New Orleans with her husband and young son. The focal child, Alex Smith, was only 2 years old at the time of Katrina, although when we interviewed him in 2016, it was apparent that the storm had cast a long shadow over his childhood.

Sasha had lived her entire life in New Orleans and therefore knew all about hurricanes and the damage they can cause. When the dire warnings

for Katrina were issued, she, her husband, and her young son did not evacuate, however, due to her fragile medical condition. But after the storm made landfall and the levees were breached, the floodwaters rose so quickly that the family was forced to flee to the Superdome, where they stayed for several days before they were able to secure transportation out of the city to Georgia. After a brief stay in Georgia with her husband's father, and after learning that all their possessions had been lost in the flooding, they left to live with another family member in Alexandria, Louisiana. In December 2005, they were displaced again, this time to Houston, Texas. Sasha's husband, John, lost his job in the fall of 2005 as a consequence of all the moves and the economic downturn that followed Katrina. The family was left with no source of income and no steady place to live, which sent her into a spiral of depression. Recalling that time, Sasha shared:

I was dealing with cancer, with the loss of my grandma, plus the other surgery I had just had from the broken neck. I had to wear the halo where the poles come out... And so then, bam, here came Katrina, so I was like, every time I would be getting over something, something else was always happening in my life where the depression never left. Up to this day, I still suffer badly. A low depression and more anxiety than ever in my life.

While Alex remembered more recent disasters such as the 2010 BP Oil Spill and Hurricane Isaac in 2012, when we asked him which disaster affected him the most, he immediately responded: "Katrina." When we asked why it was the worst disaster, he elaborated and focused on what the storm did to his family and the city where he was born:

We had to move out of our house, we moved into a trailer camp. We lost everything [in Katrina]. In New Orleans, I see like, the buildings, like the school buildings are all messed up. Old houses and things that were just left after Katrina, people left here and never came back.

In 2007, soon after Alex turned 4, Sasha and John decided to return to New Orleans. She had recently suffered a miscarriage, and decided it was time to get back home, closer to some of her family members who had also returned after the storm. But in 2008 Hurricane Gustav hit, causing Sasha's husband to lose his job once again and forcing the closure of Alex's school. The family fled to a hotel for a few days, moved again, and then finally returned to their damaged home. Soon after Hurricane Gustav, Sasha had another miscarriage, which she believed was because of hurricane-related mold and debris in her home. A handful of months after the miscarriage, Sasha became pregnant again and ended up having her youngest son, Andrew. Andrew was born with heart problems, adding to Sasha's list of concerns and driving her into a "deeper depression."

Sasha and her children were forced to move again in 2010 after John, who was never able to secure stable employment after Katrina, was arrested and sent to prison for selling drugs. After so much hardship, this was a truly “heartbreaking time” for Sasha as she struggled with whether to tell her two young children about why she and their father had split up.

In 2012, while she was a financially struggling single mother of two children and still fighting cancer, Hurricane Isaac made landfall. This hurricane severely damaged the family’s home, caused curfews to be implemented around the city and temporarily left the family with little access to food, water, or air conditioning.

It was not until 2014, nine years after Hurricane Katrina, that Andrew’s medical problems improved. Sasha entered into a new romantic relationship, was hired for a full-time job, and saved just enough to place a down payment on a modest one-story home in New Orleans East. Although things continued to look up in subsequent years, Sasha was still without a functioning vehicle in 2016 and living paycheck to paycheck. In addition, while thankful for her home, she worried about violence and crime. As a mother of two young black boys, she experienced a great deal of stress and worry related to unjust policing practices, violence in the neighborhood, and the associated abandonment of certain areas during the long restoration after Katrina. In reflecting on the interconnections between disasters and various other social problems, Sasha observed:

I think it’s more like, when you finally get settled in to making a way for you and your kids, here comes something bad. Even if it’s not a storm, just the murder that’s going on down here, just the violence that trying to keep your kids, especially boys, away from things like that, it’s kinda hard, especially when you’re a single mom.

Alex, in summing up how the disasters affected his childhood, shared:

We have had our ups and downs. We had people getting sick, there were many bad things, but there were good things too. I guess I just know now that you always gotta have a back-up plan. You gotta have a back-up plan. I’d like to get my family to a safe place.

The Smith family’s story demonstrates how pre-disaster stressors— in this case, the combination of health problems and financial struggles— made coping with the multiple disaster exposures much more difficult. Additionally, disaster exposure not only worsened these pre-existing stressors, but also piled up additional stressors, including loss of home, job, and property; long and unstable displacement experiences; incarceration; bereavement; and structural discrimination associated with disinvestment and neighborhood abandonment.

The Michaels Family. The Michaels family story is one of enduring financial hardship and health struggles that worsened with each disaster exposure. Mia Michaels was a single mother of two young boys at the time of Katrina (she had her third child in 2007). With each successive disaster, she felt that she and the children were unable to “grow” because they were in a near constant state of setback. Mia had long struggled with health issues stemming from a lifelong battle with obesity and unreliable access to healthcare, and following Katrina and then again after the BP Oil Spill, she lost her job and her meager benefits. Eric, the focal child in the study, was only 4 years old at the time of Katrina, but he was well aware of how the various disasters that had affected his childhood also affected the people around him.

Well before Hurricane Katrina, members of the Michaels family were confronting multiple chronic health issues. Mia Michaels had been diagnosed as diabetic, Eric and one of her other sons were both asthmatic, her parents suffered from chronic health problems, and her grandmother had dementia. These health problems all increased Mia’s worries during each disaster, as she never knew whether the disaster would “make everything even worse” when it came to their health. Further, just before Hurricane Katrina in 2005, Mia and her youngest son’s father divorced, leaving Mia with the responsibility of raising and caring for the children basically on her own and with the wages from an hourly position in the medical industry. Recounting her disaster experiences and other struggles over the decade following Katrina, Mia noted:

I was in a situation where I felt like we were good, we were in a good place and you can grow; and ... every time I feel like that, something happens, something else happens, something else happens, something else happens. So, you can’t get into a place where you are just like, you know what, growth. I’m growing, these kids are growing, everybody is good, everybody is happy. It’s like you can’t never really get stable because of all of that that’s going on...

When we interviewed Eric, he emphasized repeatedly that Katrina was “the worst disaster” of those he and his family experienced. He knew that Katrina was “especially hard” for his mom, but he also observed how it had changed his teachers and even his grandmother, making these adults in his life more “worried,” and “nervous.” He told us a lengthy story about how each time a heavy rainstorm would pass, his grandmother would make him and his siblings move away from the windows. As he described how the many disasters he had endured had shaped his childhood, he concluded the best thing he could do was pray:

Katrina did mostly affect us, all the people around us, knowing all the people that died in the city... all the damage it caused to the whole city. Now I've been through three disasters, through three hurricanes... I mostly depend on God and pray. I always pray during the hurricanes, so I hope we are gonna be alright.

Suffering from a serious bout of postpartum depression after a life-threatening experience giving birth to Eric, Mia had also turned to prayer for comfort throughout her adult life. But even her strong faith and the social support from the church were not enough to overcome the disruption that followed Katrina and the subsequent disasters that upended her life and her family's livelihood.

From 2005 to 2009, as a consequence of Katrina and the destruction it wrought, Mia moved her family from New Orleans to Mississippi, to Florida, back to Mississippi, and then to Baton Rouge, Louisiana. With each move came a new school environment for the children and intermittent work opportunities for her. The moves also caused breaks in her and her children's access to healthcare, which she asserted worsened each of their conditions. She had been having "trouble with her kidneys" since Katrina. In 2007 she had a premature birth. Her son, born at 28 weeks, was later diagnosed with developmental disabilities and was "potentially on the autism spectrum." When her grandmother, already in frail health, died less than a month after Hurricane Gustav in 2008, Mia started feeling depressed and anxious. In April of 2009, her uncle died and she had a miscarriage. Mia spoke of the impact of the loss and grief in her life, and noted how this took a toll on her already strained mental health:

After Gustav, at that point in time I was still grieving. I really wasn't in no good place for the kids. I honestly, I really wasn't, for none of the kids. It was just more or less like I was, every day I was just moving, just to move, just to move.

Mia eventually pulled herself out of her depression, in large part because she "had to find a school" for her boys, and she "had to get it together." But just as she felt like she was beginning to recover, the BP Oil Spill hit and she lost her job. Around that time Eric started having severe allergy attacks and regular nosebleeds. Her blood pressure went "through the roof" during Hurricane Isaac in 2012 due to "stress and depression," and Eric had a bout of asthma attacks. Although she tried to remain positive through all the health challenges, Mia underscored just how hard it was for her and her children:

It was just like, oh my God, what is going on? I'm not staying for any more hurricanes ever, I don't care if it be a tropical storm, I'm leaving! I'm not

staying I'm not. It's like I can't get it right, my children can't get it right. Our whole life is fake it 'til you make it. Stay positive. So I'm like you know I'm not faking it right now because I'm not making it, you know ... You always have to keep adapting and learning survival skills because it's not ever gonna stop. It's not ever gonna stop.

At the end of our interview, as we were saying goodbye, Mia said she wanted to add one more thing. She shared with us that she had marked off all the disasters in the survey, but just the week prior to our interview, the apartment where she and the boys had lived in Baton Rouge had flooded. She shook her head and said, *"How many disasters can one person go through?"*

The Jackson Family. The Jackson family experienced a wide array of problems before, during, and after the various disasters that they endured. Lacy Jackson was born and raised in Plaquemines Parish in Louisiana. She became a mother at the age of 20, and at the time of Katrina had three young children. Jason, the focal child in the study, was only 2 years old when Katrina happened, and as a consequence of that disaster and subsequent events, he and his older sibling were separated from their mother for long stretches of time. The Jackson family story is one of enormous loss, displacement, family separation, ongoing and mounting adversity, and elusive recovery.

Four months prior to Hurricane Katrina, Lacy had given birth to her baby daughter. She was living at home with her mother, father, and siblings in Plaquemine's Parish when storm warnings were issued for the region. Plaquemines is low-lying and subject to severe hurricane damage, so Lacy and her husband decided they would evacuate with their baby daughter and Jason while they sent their oldest daughter with her mother and father.

Although Lacy had hoped to evacuate to Texas, where her parents had headed, she and her husband ended up in Hattiesburg, Mississippi, where he had extended family. By the time they arrived in Hattiesburg, the family home where they hoped to stay was so overcrowded that they ended up in a shelter. As they watched images of the inundation and destruction of New Orleans and coastal Louisiana, Lacy, who is African American, was deeply wounded by the openly racist depictions of Katrina survivors in the media. She was also troubled by the poor treatment that she and others received from emergency response personnel in the shelter. This influenced her willingness, or lack thereof, to seek out help in future disasters (also see Fothergill 2004 on the "stigma of charity").

Lacy was most stressed, however, by her children's health. During the displacement, Jason was diagnosed with eczema and asthma and while in the shelter, and her baby daughter lacked food and became sick after

Lacy stopped producing breast milk because of the “extreme stress and anxiety.” She related in heart-wrenching detail what she went through to try to feed her baby:

They [the shelter] had a little clinic where people could be seen, but they had a lot of elderly people. You had a lot of people who really, really needed care. They used to have a line wrapped around the gym where I guess the doctor’s office was set up. But they didn’t have stethoscopes; thermometers. They were waiting on those to be shipped in or flown in by whoever, so they couldn’t check to see if you had a temperature. My baby, it had gotten to the point where I would take bread, and I would chew bread up until it got real, real wet inside, and I would just feed her the bread, because I didn’t know what else to give her. You know, she was a little baby. So, she ended up getting sick. She had a lot a gas. They didn’t have any drops, gas-relief drops or anything. So, I would stand in a line every day, with her, just so they can check her, because she wasn’t sleeping...

But milk [formula] finally did come [to the shelter], which was like a week or so later, when milk did come, when she first got on the milk, she was real sick because she hadn’t been having her milk for so long. So, when I would go stand in the line with her, the people would hear her screaming, even the elderly people, and they would always tell me to go to the front of the line, but every time I would go to the front of the line, there was nothing they could do for her. You know, they would try they best. They had like Tylenol or something like that to help cope with the pain she was having; stomach pains from hunger, because there was nothing they could do ... As time went on, they started getting little things. And everything they got for a baby, the doctor ended up making me a basket. So, he made me a basket with all kinds of baby stuff. And he was telling me he appreciated my patience for waiting with them. I told him, I had no choice. I mean, there was nothing else I could do.

Soon after leaving the shelter in Mississippi, Lacy and her family moved to a hotel in Baton Rouge, Louisiana, and then to a FEMA trailer on the outskirts of the city. While there, tragedy struck again when her husband unintentionally hit her one year old daughter with a car:

My baby girl had gotten ran over by a car. Actually, her dad ran her over with my car. She’s still living, but she was 13 months old. So, I ended up staying in the hospital with her a month and a week for her to recover and go through everything that she went through.

While Lacy was in the hospital with her daughter, she learned that the FEMA trailer where they had been living was contaminated:

In the process of me staying in there, my FEMA trailer was contaminated with formaldehyde. So, by me going back and forth and seeing my baby, I

don't know, by them running tests on her, it came up on her or in her system, or something. So, the doctor told me I could no longer go back to my travel trailer and they would set me up a room in the hospital. He did this against hospital orders. I had a room there where I slept, but I was traveling back and forth to go see my baby before I had a room. When he told me the trailer was contaminated, he wrote out paperwork and everything.

When my daughter came home, I was going to need a handicap-accessible trailer. All of that, I submitted it to FEMA. FEMA refused to give me—they had half-sized travel trailers—FEMA refused to give me the half-sized travel trailers which are handicap accessible. They also refused to give me another travel trailer. They wanted me, well I'm not going to say they wanted me, they made me live in that trailer. So, when my baby came home and she recovered from the hospital, I lived in that trailer, but I only lived in there maybe two weeks.

During this entire period, Lacy was still separated from her oldest daughter, who remained with Lacy's parents as Lacy tried to "get back up" on her feet, while helping her youngest daughter to recover from serious injuries and caring for Jason. After leaving the FEMA trailer in Baton Rouge, Lacy, her husband, and their two youngest children moved to her grandmother's house and then to Georgia. When we asked Jason about this time in his young life, he said he "didn't remember much at all," just that "Katrina made us move all the time."

In Georgia in 2007 and 2008, Lacy noted that for the first time in the year's since Katrina, she felt their lives began to stabilize; she and her husband were both working, her daughter was beginning to recover from the injuries sustained in the accident, Jason had started kindergarten, and they had an affordable and safe apartment. However, in 2008 she was injured at work, again diminishing her financial situation and sending her into depression. Lacy and her family's financial situation continued to deteriorate, and they were eventually evicted from their apartment after they were unable to make rent.

They left Georgia in the summer of 2008 and decided to return to Louisiana. This time, they moved in with friends in New Orleans. When Gustav made landfall, they evacuated for a brief period of time, but when they returned they landed in a homeless shelter because they were not able to move back in with friends. She told us that this is why she had marked that Gustav had a "major impact" on their family, because it was just "one more disaster, one more time" they were forced to leave.

In the years after Gustav, Lacy and her husband began to have problems, "fighting and fussing" more often with each other. Then in 2010, the Deepwater Horizon oil rig exploded, spewing millions of gallons of oil

into the Gulf of Mexico. Lacy and her husband secured temporary positions working on the oil spill clean-up, which “paid well” and “brought some stability” to her household and finances. The job lasted nearly three months and Lacy had to work long shifts, barely seeing her children. When we asked Jason if he remembered that time, he said:

I used to remember my momma and daddy coming home smelling like oil. They had those clothes, the little vest things you wore when you were trying to pump oil from the water. And then I used to see the things on the news where they'd have the fire and the smoke coming up, burning the water to get the oil.

It was also a scary time for Lacy, as she noted that her health was quickly diminishing. After developing a severe skin rash and vision problems, Lacy had to quit the job. When we interviewed her six years later, she was still enmeshed in a lawsuit filed by workers against British Petroleum.

In 2011, after leaving the oil spill position, Lacy and her family moved back to Algiers in Orleans Parish where her mother and father—who were also permanently displaced from Plaquemine's Parish after Katrina—were now living. Lacy, her husband, and her three children stayed there for nearly a year, in part to help care for her mother. In December 2011, Lacy's father died unexpectedly from a heart attack, which left the whole family in a “state of shock and depression.” This exceptionally sad time was also the first time in the years since Katrina that Lacy was reunited with her oldest daughter, who had been living with Lacy's parents since August 2005.

When Hurricane Isaac made landfall in 2012, Lacy, her husband, and her three children evacuated in advance of the storm, and when they returned, they found an apartment in another part of Algiers. While Hurricane Isaac's impacts were relatively inconsequential for the family compared to the other disasters they had endured, its effects on the broader economy amplified Lacy's financial burdens. The mounting familial and financial losses left her children in a state of perpetual uncertainty. Her youngest daughter shared a visceral sense of the upheaval:

I was like, what's going on now? What's gonna happen? Is the world gonna end? Are we gonna be okay? Like, I don't, I don't know what's about to happen next. Is everything and everybody okay? So for now, me and my siblings are going to discuss an escape plan ... I'm scared if we have another hurricane, we're not gonna have a place to go or, like before we get there, everything is going to be gone and damaged and flooded and people are going to get hurt. That's why I just want to grow up.

As his sister spoke, Jason listened and then shared that recently they had a major rainstorm in New Orleans that caused some flooding. He said

that as the “water was raising up in the ditches around us, I thought I was going to die. I thought a tornado was going to come and get us.”

The instability that the children expressed surrounding disasters was further amplified in the own household. In 2014, Lacy and her husband split up after several tumultuous years, leaving her with full responsibility for the three children. Lacy struggled as a newly single mother trying to make ends meet and care for her children. In 2014, Lacy’s entire family was left reeling again when her young niece died of Sudden Infant Death Syndrome (SIDS). As Lacy talked about this added trauma, she pulled out her cell phone and showed us a picture of the child dressed in a white christening gown. She sobbed as she told us again and again what a special child she was.

During our interview, Lacy expressed how the combination of disasters, deaths, secondary stressors, protracted and multiple displacements, and financial burdens put her “into a depression” and triggered her “anger problems.” Adding to this, she said that the government’s failures—particularly those related to a lack of compensation for the damage to her family’s home caused by Hurricane Katrina and her family’s stay in the contaminated FEMA trailer—added to her psychological distress. Regarding the overall losses generated by the disasters, Lacy said, “So it’s a lot of rebuilding and it’s not just rebuilding things that you lost. It’s rebuilding your mindset. It’s rebuilding a whole lot. And it took a lot for me, because I was younger [when Katrina happened].”

She captured the interconnected and cascading nature of all this personal adversity and the collective disasters as follows:

You don’t recover. Because I really think now, before Katrina, I was better off. I had a job, I was working six to seven days a week. You know, it was a lot of things that I had and that I could do. And since Katrina, and then it started with Katrina like a thud. It was like a timeline, like one thing after another. So, I feel that’s why I’m in the situation I am in today. Because there’s so many incidents, then on top of that, I’ve been having so many deaths in my family.

While the Jackson household attempted to recover from each disaster, every time things started to stabilize, some additional challenge or issue would emerge, continuously worsening conditions and creating a situation where they could not attain stability. Lacy discussed how she lacked social support, saying that she had “no one to turn to” for comfort or assistance, as her loved ones were also affected by these disasters and “had to deal” with their own problems that stemmed from the hurricanes and BP Oil Spill of the past decade. While Lacy acknowledged she had received some help “here and there” along the way, none of this was enough for her family to overcome the deeply entrenched challenges they faced.

The Allen Family. Susan Allen and her son, Oliver, were the fourth mother-child pair that we placed in the problem pile up category. Lacy Jackson, whose story was just recounted, was Susan's adult daughter (and hence Oliver is Lacy's little brother). Because the mother-child pairs for this study were selected via analysis of the survey data, we only learned of the family connection once we started conducting the interviews. In recounting Lacy's story above, it is clear that her mother, Susan, was a source of support at different moments in Lacy's struggle to recover after many disasters. But Susan's story is also one of loss, displacement, and upheaval. It illustrates how difficult it is for families to help one another to recover when multiple households within a given family are affected by multiple disasters.

Susan and her husband lost their family home in Plaquemines Parish during Katrina. The destruction there was "so complete and so devastating" that they never even considered moving back to their old neighborhood. Susan told us it was "completely flattened in Katrina." She recollected, "It was nothing, nothing left down there. Everything was gone. Everything. Nothing to go back to but ground." Upon seeing the devastation, her husband, who had inherited the house from his parents and rebuilt it, broke out in tears. Their son, Oliver, recalled this experience:

So, when was able to [go back home], I witnessed my father cry for the first time. I've had so many memories down here and now my cat's missing, my bike's gone, my house is on the ground, and I'm like, "What are we going to do now, where do we go from here?"

Although they lost nearly all their material possessions in Katrina, Susan, her husband, Oliver, and Lacy's daughter—who, as previously noted, lived with them for years after Katrina—were able to secure rental housing on the outskirts of New Orleans soon after Katrina. The Allen family moved two more times between 2005 and 2008, and then the family was displaced again by Hurricane Gustav in 2008. While Gustav caused some financial hardship, the Allen family did not permanently lose their home or jobs after that disaster as they had in Katrina.

Just when things were beginning to look up for the Allen family and they finally felt like they were re-establishing a new home, tragedy struck. On Christmas morning in 2011, Susan's husband had a massive heart attack and died in front of her in their living room while she tried to resuscitate him. Not only was Susan bereft by the loss of her husband, but she was also left as the sole guardian of Oliver and the only source of income for the household, which threw them into emotional and financial turmoil.

Describing the difficulty of recovering from disasters while confronting profound personal loss, Oliver, said that the disasters “took his childhood away.” He remembered worrying a lot and “losing my smile” during and after the traumatic events. Previous research indicates that home loss and displacement can create feelings of isolation and loss of self, status, meaning, security, comforts, purpose, and cultural identity (Cox & Perry, 2011; Fussell & Lowe, 2014; Wadsworth, Santiago, & Einhorn, 2009). Similarly, Oliver stated that the permanent displacement from his home in Plaquemines Parish following Hurricane Katrina had a lasting impact on him because he lost the place where he “was loved and accepted.” Describing the emotional impact of loss and displacement, Oliver recalled:

I was so happy when I was down there [Plaquemines Parish]. And now it's like I'm up here, in a different place. I could still have the same smile on my face, but now I have more challenges because, you know, I didn't have to worry about stepping out on my porch and somebody trying to rob me or walking to school and somebody trying to be like, “Hey, you need to lift?” No, I didn't have to worry about that, because everybody down there, we all knew each other. If I did something wrong, I know my parents knew. It's better, that's my home. And I still, to this day, say that Plaquemines in my home, I don't say, oh, these other places I've lived are my home or anywhere else is my home. No. Plaquemines is my home, that's where I feel the most comfortable... I know when I'm down there I'm safe, I'm at home, I'm respected.

Oliver and his family moved 10 times in the 10-year period following Katrina. Oliver explained how much the disasters and displacements shaped his childhood by forcing him to grow up quickly and become responsible for himself and his family:

And it's just the tears, it's just the tears. So I had to develop a sense of strength at a young age, like everything that you see now had to happen at a young age. The man I am today probably wouldn't be the man I was back then if Hurricane Katrina did not happen.

In her interview, Susan explained that all the personal adversities and community-level disasters she had faced since 2005—including the hurricanes, the death of her husband and her granddaughter from SIDS, and other family issues—left her feeling overwhelmed and “haunted.” While she was glad that her son Oliver had found some meaning in the face of all the loss, she felt differently:

So, I mean, all of these storms and you know, now after all of this, then my husband [dies], then the grandbaby [dies] and it's just been one thing after another, after another, and it just hasn't stopped.

The Allen family story, like that of the Smith, Michaels, and Jackson families, all underscore how difficult it is to disentangle the impacts of a catastrophic, community-level disaster from personal traumas and adversities. Their stories also highlight how disruptive Hurricane Katrina was as a catalyzing disaster, which led to the initial displacement for all of these families. But it was also the subsequent disasters that spurred an accumulation of disadvantage and ongoing disruptions. The sheer volume and magnitude of problems experienced made recovery feel elusive at best, impossible at worst, for these deeply affected families.

Exposure Outliers and Resources, Coping, and Adaptive Capacity

The five-remaining mother-child pairs in this study all indicated that they had experienced multiple community-level disasters that had a major impact on the focal child and on the household. Several *common themes* emerged that helped explain why even in the face of cumulative disaster exposure, these families were able to develop and exhibit adaptive capacity (see Figure 5). These families had more material resources and social support before and after the disasters, which helped shield them from some of the most severe consequences of the hurricanes and oil spill that marked the lives of the mothers and children. These households endured fewer material losses and experienced less emotional and physical strain when compared to the families in the problem pile up category. They also had fewer and shorter post-disaster displacements, which allowed them to achieve stability more quickly. In the end, the mother-child pairs in this category all shared that they were able to accumulate lessons from each disaster, which helped them prepare both materially and mentally for future disasters. This section highlights the stories of the five mother-child pairs who were able to mobilize resources to adapt to multiple disaster exposures.

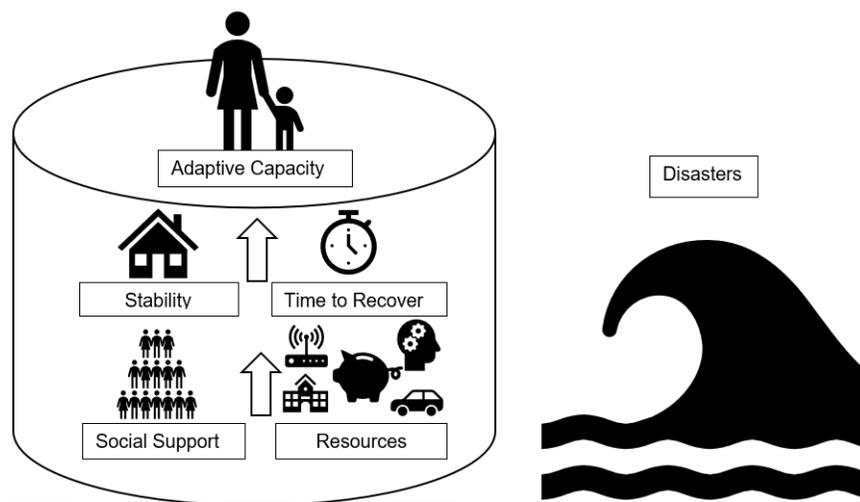


Figure 5. Common Themes Informing Adaptive Capacity

The Johnson Family. The Johnson family experienced challenges as a consequence of the disasters that they endured in the years prior to our 2016 interviews. What differentiates this family from the four described previously is that they had an extensive family support system. This ensured they had a place to evacuate to as hurricanes bore down on the Gulf Coast. Because their home was never badly damaged or destroyed, they also experienced far less disruption in the other spheres of their lives such as schooling and work. Moreover, because of their large and extensive social network, they were able to seek and receive social and financial support from others not affected by a given disaster. They experienced no major deaths or other traumatic incidents in the family, beyond Christina's ex-husband's drug use and the divorce that followed. Even though that caused upheaval, the children, including the focal child, Jessica, still remained in functioning schools and in the community where she was born and raised. Christina was also able to maintain steady employment through each of the disasters that her family experienced, although she sometimes worked two jobs to "make ends meet."

Hurricanes Katrina, Rita, and Gustav all caused damage to the Johnson family's house in Terrebonne Parish and led to a series of evacuations ranging from three weeks to just under three months. During these periods, the family moved to hotels for short periods of time or to the homes of nearby family members when they needed shelter for longer durations. Each new hurricane brought some damage to the house, but as Christina recounted, they had "dad, uncles, cousins, family, stuff like that" to help with the repairs.

Christina also had several sources of income from a variety of sometimes part-time and sometimes full-time jobs that she held, including delivering mail for the U.S. Postal Service, working in the local grocery store that her aunt owned, and helping her dad with his minnow business and her uncles with crabbing operations in the Gulf of Mexico. Her family connections were especially important in terms of her ability to attain financial stability even after multiple disaster exposures and following the divorce from her husband. After the BP Oil Spill, when Christina could no longer fish in the Gulf, she was able to fall back on her part-time job at the Post Office and the work at her aunt's supermarket. She took pride in her ongoing ability to provide for her daughters, even after all the disasters they had been through:

Even though it is just me trying to provide for them, I do whatever I can to try to get them what they want. They have computers, school clothes, and, I mean, I get them what they want. I do anything I can to provide.

Christina also focused on trying to help her daughters to learn valuable lessons after each disaster. Talking to them about everything from hurricanes to the divorce was central to her parenting strategy:

We talk about it, the moment something happens, and then for a little while after. I just try to explain to them what has happened, talk to them, and then let it go until another one comes [laughter].

Christina had a wry sense of humor and embedded in her words and actions was a strong recognition that "another one" would be coming in terms of disasters, so she wanted to help her daughters be prepared. Jessica, the focal child, had adopted the approach that "talking is good" in terms of coping with disasters; this has also been affirmed by experts who study disasters. During our interview, she observed that school had become an important outlet to help her to process multiple disaster exposures:

In school, we talk about it. Like how a hurricane destroyed all these homes and stuff like that, and like how it took forever for the water to drain out because they didn't have a good system. So that helps us to understand why sometimes it takes like months to rebuild homes and stuff like that.

After the BP Oil Spill, Jessica also emphasized that her school encouraged the children to talk about what was happening at home and in their neighborhood. Jessica said this helped her to "actually understand" what was happening around her, and to know she could ask for support if she needed it:

I don't think they closed down the school [after BP], but I know that in school we would talk about how bad things were and why some people were losing

their jobs and stuff like that. We knew that mainly everybody from down here works on the water. So we all knew how bad it was, and they would say, like, "If you need help just let the school know."

When we asked Jessica what helped her to recover, she noted that the message she received at school, "it's gonna get better and to keep our heads up," would motivate her to remember that there "was something good that was going to come out of something bad happening." She also said the main lesson she had learned from all the disasters was that "We have to stick together through these hard times. We can always push through, even though something bad is happening."

The interview data with Christina and Jessica highlight how families can develop adaptive capacity, even after enduring multiple disasters. Their stories also show, however, that "learning lessons" from disasters may only be fully possible when basic needs are met. Once those needs are met, then it may be more possible for children and adults to develop a stronger sense of self-efficacy.

The Bryant Family. The Bryant family endured six disasters between 2004 and 2012. Unlike the families that experienced the most severe problem pile up, however, the Bryant family was able to repair their home each time around, and so they were never forced into long and recurring displacements. While the family still suffered considerable loss, Natalie Bryant, the mother in the study, argued that they were able to learn from each disaster, which allowed them to prepare for the next event that would come their way. Miranda Bryant, the focal child, also emphasized throughout her interview how important her mother and extended family were in terms of helping her and her two siblings survive and even thrive after the disasters. The Bryant's story illuminates how families are able to learn lessons and adapt to disaster when they have stable housing and steady support from extended family members.

The Bryant family experienced Hurricane Ivan in 2004, which resulted in a short evacuation but ultimately caused no major damage to their home. In 2005, Natalie lost her mother in June and then in August and September her family was affected by Hurricanes Katrina and Rita. In recalling the various adversities and disaster exposures that happened in 2005, Natalie, a single mother of three children, recounted:

And then too, my backbone, my mother, she passed in 2005 and after that I was on my own with the hurricanes and so I learned a lot for my age. It was just a hard time. It's just something that you have to go through in life and build yourself up at your own pace, and that's what I did. Make myself stronger, because I have to be there for the kids and stuff too.

Natalie's daughter, Miranda, also shared how difficult the loss of her grandmother was for her, and how that was amplified by the onset of Katrina:

I lost my grandma. It's sad, like I try too hard to remember stuff from her, and all I can remember is disaster because Katrina. We did not even have enough time to grieve I feel, because then Katrina happened and it's just [hits table] right after you lose a person you love, and that's always been there for you, it's just like, you had no time between that to take a breath and be like, "Okay I got this," and then something major happens.

Although Natalie and Miranda were still trying to process their grief, they were fortunate to have a large and extended family network to help them both emotionally and financially. When Katrina threatened the Gulf Coast, they evacuated to Natalie's sister's home in Houston before the hurricane made landfall. This ensured that the family was shielded from the worst of the hurricane and the devastating flooding that followed.

Their home, which was located on the Westbank of New Orleans, had wind and water damage from Katrina and Rita, but because they had familial support and it was repairable, they were able to move home by January of 2006. During the time of displacement, Miranda recalled that it was hard to miss school during those months after Katrina and Rita. She also was quick to describe how her mother, her older cousins, and her aunts would patiently sit and help her with her schoolwork to ensure she could "catch up." By the time she returned to school in January 2006, she had not fallen far behind and was able to transition quickly back to the classroom.

While the family experienced Hurricanes Gustav and Isaac and the BP Oil Spill, these disasters were less disruptive. At the time of our interview, Natalie did not voice any issues with housing, employment, or finances, and in fact, she underscored that the 2004 and 2005 hurricane seasons had actually helped her to prepare for Gustav in 2008, the BP Oil Spill in 2010, and Isaac in 2012:

It was just, you know, by then I was used to it after all the earlier hurricanes and stuff I'd been through. So I just made sure I [followed] the do's and the don'ts and you know, just fought through it.

Miranda, who was only 4 years old at the time of Katrina, explained how important her mom and her extended family were to her then and are now. She said, "I love the relationship we all have as a family and how open and helpful we are to each other. Any time we are struggling, they send money, they do anything to make sure we are okay." While Miranda had to "grow up" and start helping her mother when she was very young, she also

said the disasters made her more prepared, mature, and independent. She explained:

It's made me more prepared, I think, because I know stuff like this happens. And anything can happen. Like our house can get destroyed. And I think going through this, it's gonna prepare and make me more strong-willed to fight through it. And so I feel like if we just, if I've never been through this, I'd be completely lost. But I've basically lived my life going through this stuff, and I kind of know and I have experience, so I'm gonna know what to do. I am not gonna be as lost and confused as I would have been if I hadn't gone through this.

Both Natalie and Miranda were able to see the disasters that they had endured as learning experiences that had made them stronger as individuals and as a family unit. They also remained in an intact home and embedded in a strong and supportive extended family over the years, which ultimately helped them through what would have otherwise been even more challenging times.

The Green Family. Jackie and Matthew Green, the focal mother and child in the study, both indicated on the WaTCH questionnaire that they had experienced five major disasters that had a major impact on Matthew and on the household. They evacuated for the four hurricanes they experienced; they did not leave for the BP Oil Spill, but it was financially disruptive for their family. Even so, the challenges for them were less severe than those who experienced problem pile-up in this study. Various factors explain this pattern, including that the Green parents both had steady employment through almost the entire duration of the various disasters. The family had a second house to evacuate to during Hurricane Katrina and Rita in 2005, and their primary home in southern Louisiana was never deemed unlivable. Most of their disaster-related problems were short lived. Moreover, unlike the families that experienced the most severe problem pile ups, the Green parents maintained their marriage throughout the disasters, and they had ongoing support from family, friends, and their neighbors. Although they did not define themselves as “wealthy,” they recognized that they had a vital financial safety net through the property and land that they owned.

Of the hurricanes experienced, the combination of Hurricane Katrina and Rita had the largest impact on the Green family in terms of the disruption to the children's schooling and to employment status of the Green parents. Jackie Green lost her job and her husband was unemployed for three weeks after Katrina. Jackie noted that after those hurricanes, pressures began to mount:

Our bills don't stop. That's another thing with Katrina and Rita. Your bills don't stop coming in, but your paycheck stops because you're not working. So that's stress-level, big time right there.

Amplifying those strains, the children were also forced to attend a temporary school for several weeks, which caused some adjustment problems for them, including issues associated with bullying. Nevertheless, Matthew noted that even with those challenges, "It didn't affect me very much, it just affected where I lived for a little while." He went on to share that going through the disasters and then being able to return to his smaller, more tightknit community and school helped him to recognize how "good" things were for him and his sister because they had a chance to return home and to a sense of the familiar:

It really did make me realize how good we have it down here. The small schools, everybody knows each other. It actually made me more worried about this [our community] getting damaged from future disasters, because of how good this is.

When the BP Oil Spill devastated the Gulf Coast in 2010, it shut down local beaches and impacted the Green family hotel business. In the aftermath of the spill, they had a surge of oil cleanup workers who stayed at the hotel and kept money flowing into their business. Even so, Jackie referred to this as a "false economy" in that it initially appeared as if recovery was happening, but after the workers went away, the tourists did not return. In addition to the financial strains that the drop in tourism caused, the family members, who were all natives of Louisiana, were unable to spend time on the beach, were unable to fish, and dealt with the noxious oil fumes that led to sinus problems and skin rashes.

In 2016, the Green family was still struggling because of the BP Oil Spill's ongoing impact on their business and the broader Gulf Coast economy. Aside from this, the family was doing relatively well, with stable housing still intact, their business still operational, both children progressing in school, only minor health challenges, and no familial turmoil. Even though hurricanes caused school closures in 2005, 2008, and 2012, Jackie and Matthew described how the local school system had a policy that adds on time to students' days, which helped the children "make up" lost time and prevented any major negative impacts to their education. But Matthew did state in his interview that he continues to worry about future hurricanes but also observed that there are "disasters anywhere that you live."

As Matthew reflected on coming of age during a time marked by so many disasters, he explained that this had brought their small coastal community together since everyone helped one another. Additionally, he discussed how these experiences made him more mature and willing to

reach out to others. Matthew advised that staying close to family and friends and helping out are key for young people coping with disaster. Jackie agreed, and emphasized how proud she was of her family, and how thankful she was for the ample resources they had to “make it through all the difficult times.”

The Jones Family. The Jones family faced home damage, family turmoil, medical problems, multiple moves, uncomfortable living situations, and job loss following the five major disasters they experienced from 2005 to 2012. What differentiated the family from the most severe cases of problem pile up included the Jones’s stable marriage, their fewer displacements over a shorter physical distance, and less severe employment and financial problems. Sophia Jones, the focal mother, fought to restore the family home in the Upper Ninth Ward of New Orleans, which helped to provide an anchor through the various storms they weathered. Samantha, the focal child, was keenly aware of all that she had lost in the various disasters, but also recognized how much the support of her parents and family members made in helping her to recover. This buoyed her throughout her childhood and helped her to excel in terms of her academic achievement and her overall disaster recovery trajectory.

Sophia Jones and her family evacuated to her brother’s house in Baton Rouge during Hurricanes Katrina and Rita in 2005. During the displacement, the family and Sophia’s brother had some serious conflicts, and Sophia’s marriage also suffered as a consequence. During our interview, she shared that her husband wanted her to “sit and wait” for the recovery to happen and she “couldn’t do that.” Sophia explained why even though they were only an hour away from their former home during the displacement, it was so important for her to work with her family to restore their house in New Orleans:

See the whole point and the whole view everybody had was, “Let’s get in the spot which is closer to where you stayed so you won’t need to hustle and bustle.” We know you goin’ to work. You go to work every day, like every second you had, you go back to that home and try to do a little something. It might be put up a nail, you did something. Everybody had a routine, everybody had goals, everybody, you know you had to get this done, everybody had a date.... The whole focus was that you were coming home eventually. So, let’s put all our energy here.

Samantha, who was six years old when Katrina made landfall, knew how hard her mother had worked to keep her in a stable situation following that disaster and the others that followed. In looking back, she recalled having “adjustment issues” after Katrina and shared that she struggled to

make new friends because she was labeled as a “victim” by both teachers and peers. She recounted:

The thing that made it hard were the people’s attitudes and behaviors toward me. I don’t think any aid could have really helped me, because they provided that, if like you needed anything they were able to get that to you. The only thing that really impacted me was the attitudes and behaviors of people toward me.

Samantha was the youngest child in the family, and her mother was a fierce advocate for her daughter. As she watched Samantha struggle after the storm, she became more resolute about returning to New Orleans. She convinced her husband to rent a small apartment in New Orleans, so they left her brother’s house about a year after Katrina. After spending a year in the apartment, they moved into Sophia’s mother-in-law’s house to save money that they could then apply toward their housing recovery. After that transition, Sophia’s husband went back to work, Sophia landed a full-time job at a home improvement store, Samantha finally settled in a new school in New Orleans that she “really liked,” and the Jones family continued the long process of gutting and fully refurbishing their badly flooded home.

In 2008, Hurricane Gustav struck, and although their home was not further damaged and they were not displaced from their temporary housing, Sophia had just had major brain surgery before the event. She said that the surgery helped to “numb [her] emotions,” which she believed ultimately helped her get through the difficulties associated with the mounting number of disasters that she and her family were confronted with during that period.

Sophia had recovered from the surgery and returned to work by 2010 when the BP Oil Spill occurred. She was subject to respiratory testing at work and she stopped eating seafood, which had been a staple in their family diet before the storm. The disaster also spawned financial cutbacks in the city that Sophia believed caused her hours at work to be reduced. This placed a financial strain on Sophia and her family and left her emotionally distraught. Additionally, Sophia and Samantha both linked the BP Oil Spill and the air quality after Katrina to their respiratory problems, allergies, and asthma.

In 2012, after moving to another apartment while still repairing their home, the Jones family had to evacuate for a few days because of Hurricane Isaac. There was some flooding in the city, intermittent power outages, and food shortages, but they were soon able to return. Finally, in 2016, 11 years after Hurricane Katrina, Sophia noted that they had “achieved stability” again, as they had moved back into their own, fully restored home. When we arrived there for our interview in late 2016, it

looked like a new house both outside and in, with fresh landscaping, a well-manicured lawn, and a spotless interior.

Samantha also recovered from the earlier turmoil she felt as a child. She proudly shared with us that she had been selected for several academic awards at her high school which provided ability to “shield” her from the most serious impacts of disaster. When we invited her to reflect on her experiences since 2005, she said the various disasters made her “a more helpful, selfless, and mature person.” At the same time, she also recognized that there were undoubtedly things she lost as a consequence of the storm, and moments of her childhood had been taken from her. She elaborated:

Losing everything and having to start over again, and I mean, you know, we didn't expect to be gone that long, so we didn't pack that many clothes and things, like all of our stuff. I had just joined a dance school right before like, I was supposed to start ballet I think that Monday [when Katrina happened] but I never did. So I could've been a dancer or something, but that opportunity is gone.

Samantha believed the disaster experiences taught her how to adapt and claimed that in order to survive disasters, one must have a positive attitude and attempt to learn from the experiences. Furthermore, she attributed her academic success and ability to cope with the disasters to her family's support and her parent's protection, and especially to her mother who was her most fierce advocate.

The story of the Jones family highlights how difficult cumulative disaster exposure is for families, even those who deem themselves finally “recovered.” Their narratives also highlight the important role that steady employment and financial resources can play in fostering a multi-year recovery process.

The Williams Family. This Williams family, like the others in this study, experienced multiple major disasters from 2005 onward. But when compared to the other interviews with the mother-child pairs, their family's experience was perhaps the best case scenario for developing adaptive capacity: the impacts of the disasters they experienced were minimal, they endured few secondary stressors, the parents remained married and the father gainfully employed, they had attained financial stability well before Katrina, they owned their home, and they had ample social support from friends and extended family. It was as if the Williams family had robust shock absorbers, which helped them to make it through the various disaster events with minimal harm and disruption.

The socio-economic status of the Williams family was integral to their disaster recovery experiences. Daniela's husband, Bob was a veteran who

had long worked in the offshore oil drilling industry. Although the industry is affected by larger market ebbs and flows, because of his tenure in the position and his high rate of pay, they had ample savings and thus were able to feel “comfortable” and sometimes he even “made more money after the disasters.” For example, after Katrina in 2005 and the BP Oil Spill in 2010, Bob had his hours increased because other workers were displaced or otherwise unavailable. This further boosted the household’s income and minimized the stress they felt.

Hurricane Katrina was the only disaster that caused the family to evacuate for an extended period. Bob stayed behind to work, while Daniela took Charlie, the focal child, and his sister to Atlanta. During that stretch, the family stayed in two different hotels that Daniela was able to pay for with her credit card. When Daniela and her children returned home, there was only some minor damage to the home that was caused by a leaky window and roof. While Daniela emphasized that Hurricane Katrina was the worst disaster she has ever endured, she was also quick to acknowledge how limited their losses were compared to others in New Orleans and the surrounding area. She was contemplative regarding the positive and negative aspects that came with that disaster:

The fact that you had to leave for so long and the unknown [was what made Hurricane Katrina the worst disaster experienced]. It was like, you relied heavily on your electronic gadgets, be it your phone or your computer, because a lot of it you didn’t know. But when I tried to talk to him [Bob, her husband], to see what was going on and things like that, a lot of people didn’t have that. I was fortunate he stayed. Other people didn’t have that. My house, I did have that relationship with my husband, he stayed here, I was gone. He told me when, where, it’s time to come back.

The family was already evacuated when Hurricane Rita made landfall in 2005, and they did not evacuate again for Hurricanes Gustav or Isaac. Because of the location of their home on higher ground on the outskirts of New Orleans, they also did not suffer any home damage or other losses as a result of these hurricanes. While the BP Oil Spill increased Bob’s workload and caused the Williams family to implement some restrictions on the consumption of seafood, neither Daniela nor her son Charlie noted any additional major negative impacts to their lives.

In 2016, the Williams family was doing well financially and had maintained economic, housing, schooling, and employment stability since late 2005. Regarding her disaster experiences Daniela concluded:

I think if anything it [the cumulative disaster experiences] makes you stronger. Because you have to deal with it. You just don’t know when, where. But it’s something that mentally, you have to say, "Okay I have to

prepare myself." Be it getting batteries for your lights, your flashlights ... You got to mentally prepare for it. You just don't know what the outcome is gonna be.

She also proclaimed that preparation and communication with one's children is key for dealing with disasters. Daniela elaborated:

Yeah, I guess the relationships I have with me and my children, I keep them aware of everything ... I just kinda talk to them. I make them aware of everything step by step by step. What we're gonna do, how we're gonna do it, this is the plan We're all on the same page. Maybe a case where mentally they may say, "Sheesh, another frickin' hurricane." But they never express it to me. I think we're all kinda like, "Road trip." [laughter]

Charlie, her youngest child, expressed similar views, describing how the disaster experiences made him more prepared and advised other children that in disaster situations "It would seem hard in the beginning, like adjusting, but in the end, it'll get better." Charlie did struggle some with school in the years after the BP Oil Spill, but he said it was just because "school got harder" and he did not attribute his challenges to the disaster.

The Williams family fared the best of all the families in the current study, showing no long-lasting effects from any of the disasters. While they did face displacement, familial separation, and some missed school during Hurricane Katrina, these problems were all short-lived and the family had no severe damage to their house, no disruptions to their employment, and no major change to their financial status.

Conclusion

This exploratory project contributes to the scholarly literature on cumulative adversity and multiple disaster exposures through the introduction of the term *exposure outliers*, here defined as children who have experienced three or more major community-level disasters before the age of 18. While our definition emphasizes how children along the Gulf Coast are already experiencing multiple, collective-level disaster events, this research was ultimately designed to explore how cumulative disaster exposure impacts the family system. The interview narratives included in this article demonstrate common themes as well as variation both within and across families. These variations were driven by a combination of socio-demographic factors—including age, race, gender, marital status, income, and employment status, pre-disaster resources, or lack thereof, and disaster characteristics—such as disaster damages, degree and scope of losses, changes in social support networks, amounts of assistance received, stigma and uncertainty faced, and length and number of

displacements. These factors interacted in dynamic and complex ways and ultimately impacted a family's ability to cope with and recover from the cumulative disaster exposures. However, it was how the family was socially situated *before* each major disaster event and how these factors built upon one another *after* each disaster that determined whether a family faced problem pile ups or achieved a self-defined status of recovery.

Of the nine mother-child pairs that were a part of this Exposure Outliers study, four pairs experienced what we refer to as problem pile up in the aftermath of Katrina and other subsequent large-scale disaster events. For these households, when there were pre-disaster stressors and multiple, concurrent, and severe adversities, these challenges enhanced each other, creating a pile up of problems that was made worse with each new disaster. A lack of material resources and social support added to the pre-disaster stressors and the direct impact of the disaster experiences, creating longer and more unstable displacements for families, exposing the primarily African American, low income, single mothers and their children to stigma and discrimination, along with slowing the recovery time for each disaster. This problem pile up seriously slowed or completely impeded disaster recovery for the most vulnerable survivors, making future disaster preparations nearly unimaginable.

The problem pileup narratives underscore that disaster impacts were more than simply additive in the lives of the focal children and their families. Instead, each disaster compounded already existing inequalities and amplified various forms of social and economic inequality. For these four mother-child pairs, Hurricane Katrina was the catalyst to their problem pile ups, not only creating the highest levels of loss, discrimination, and displacement of the disasters experienced, but creating a sense of lost childhood for children and loss of community for families, that seemed to have a lasting emotional impact on participants.

In contrast, five of the pairs who were similarly exposed to multiple disasters were able to achieve recovery when they had the requisite material, financial, and social support to shield them from harm and to help them maintain stability. When these mitigating conditions were in place, participants were able to show some adaptive capacity to disasters, accumulating lessons from each experience, which helped them prepare, both materially and mentally, for future disasters. Along with the boost to preparation skills, these experiences reduced levels of uncertainty, lessening the impacts future disasters had on these participants.

Previous research corresponds with our findings, linking higher income and high levels of social support with adaptive capacity and quicker recoveries from disaster and other forms of adversity, and lower income,

minority race, single motherhood, mental and physical health problems, concurrent adversities and loss of material resources and social support to worsened adversity and disaster impacts and slower recovery periods (Abramson, et al., 2014; Black, Arnell, Adger, Thomas, & Geddes, 2013; Bonanno, Galea, Bucciarelli, & Vlahov, 2007; Bonanno, Brewin, Kaniasty, & La Greca, 2010; Broussard & Myers, 2010; Cherry, et al., 2016; Garrison & Sasser, 2009; Gray, Frankenberg, Gillespie, Sumantri, & Thomas, 2014; Joseph & Butler, 2010; Peacock, Dash, & Zhang, 2007; Weber & Hilfinger Messias, 2012). The current study contributes to the literature conceptually through defining what it means to be an exposure outlier and empirically by showing how these different variables can build upon one another to either protect against the impacts of cumulative disaster exposures or worsen their impacts, ultimately diminishing prospects for recovery.

Challenges and Limitations

As with any study, this project led us to grapple with a series of methodological challenges and limitations. First, interviewing mothers and children so many years after they experienced different disasters revealed gaps and inconsistencies in memory (see Quas et al., 1999). Most relevant to the present study was the issue with recall inconsistency concerning the selection of “Major Impact” on the survey compared to the ability of respondents to articulate what a major impact meant, especially during the immediate response and long-term recovery phase after each disaster. This was especially true of child respondents, where seven of the nine children who marked a disaster as having a major impact on them in the surveys had some trouble recalling at least one of those events. Other studies correspond with the patterns we observed regarding age and recall ability (Bahrick, Parker, Fivush, & Levitt, 1998; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994; Peterson, Warren, & Short, 2011; Quas, et al., 1999; Rubin, 2000; Terr, 1988)

These gaps between interview and survey responses occurred less frequently with the adult interviewees, with two out of the nine mothers showing some recall inconsistency between what they marked on the survey and what they were able to share in the qualitative interview. In addition, the mothers, like the children, sometimes had a hard time distinguishing Hurricane Katrina from Hurricane Rita, two storms that occurred weeks apart. These respondents especially struggled to remember why they had marked Rita as a “major impact.” Most came to the conclusion that their rationale had likely been that they were still displaced from Katrina, but few recalled specific or vivid details about Rita in the way they did for Katrina, which still stands as the most costly and one of the deadliest disasters in modern U.S. history.

While the majority of participant interviews were conducted privately, without the presence of family members, six interviews occurred while their families were in the same room. The presence of family members may have altered the flow of the interview, and we recognize that participants may have modified their responses because they knew their family members were listening. Additionally, participants may have changed, added, and/or excluded information because of comments their family members made during the interviews. We observed, however, that as the family members listened to one another, they were genuinely interested in the interview process and sometimes tried to be helpful by adding additional details to the interview. While we do not include these additional family members as part of our study sample, they did influence some of the interview dynamics, likely in ways that both enriched and perhaps truncated some responses.

Another limitation of the current study is related to sampling. Two of the nine mothers were related to one another and another participant stated that her sister also participated in the WaTCH study. This suggests that even though the initial sampling for the larger WaTCH study relied primarily on an address-based sampling frame, which was intended to provide a random sample of women and children in Southeast Louisiana, the use of family and friends to recruit some of the participants for the WaTCH study may have created some sampling bias both in the larger study and our Exposure Outliers study.

Finally, with a sample size of nine mother-child pairs, this study is obviously relatively small in scope. However, the sampling approach was systematic, in that we had clear selection criteria and we drew our qualitative sample from a much larger and longer-term quantitative study. We believe there are important conceptual and empirical lessons to be learned from the exposure outliers included in this study.

Future Research

Even with these challenges and limitations in mind, this is one of the first available studies on children who have experienced three or more major disasters before the age of 18 and of the mothers who care for these children and try to help stabilize the household. We hope that what we were able to learn from their experiences will inspire additional studies of children and families who have been exposed to multiple community-level disasters.

Our study was qualitative and exploratory since we set out to better understand how multiple disaster exposures affect children and their mothers and why such cumulative experiences impact people differently. Future research should incorporate qualitative investigations with more geographically representative samples, while using quantitative data to test the relationship between the many different variables that influence recovery outcomes. Studies such as the current one should be conducted on a larger scale, with a representative sample, and involve entire families rather than just mothers and one focal child. Based on the findings of this study, we also suggest that more research be conducted on children and the long-term impacts of cumulative disasters and chronic adversity over the life course. More detailed analyses of the ways that age, gender, race, and other sociodemographic characteristics influence problem pile up and adaptive capacity are warranted. Future research should also more carefully explore how displacement influences children and families, especially depending on the distance, receiving location, and length of each disruption. Parenting strategies and parental support for children who experience multiple disasters is warranted, as is research on how these

disasters influence children's academic success and parental employment and intimate relationships.

With the growing intensity and frequency of climate-related disaster events, widening social and economic inequality, and population concentration in hazard-prone areas, the exposure outliers interviewed for this study may represent harbingers of future loss and disruption. Lessons learned from the current study and future research are vital for understanding and mitigating against the negative impacts of extreme events for children and families and responding effectively when disaster occurs. There is much knowledge to be gained from children and mothers who have already been forced to endure multiple exposures to disaster. With each new event, the need to listen to families who have become expert in disaster becomes all the more urgent.

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