Int J Public Health (2014) 59:957–965
DOI 10.1007/s00038-014-0596-0

SSPH+ SWISS SCHOOL OF PUBLIC HEALTH +

ORIGINAL ARTICLE

Maternal posttraumatic stress disorder symptom trajectories following Hurricane Katrina: An initial examination of the impact of maternal trajectories on the well-being of disaster-exposed youth

Shannon Self-Brown · Betty S. Lai · Shannon Harbin · Mary Lou Kelley

Received: 17 March 2014 / Revised: 30 July 2014 / Accepted: 7 August 2014 / Published online: 26 September 2014

Abstract
Objectives This study examined trajectories of posttraumatic stress disorder symptoms in impoverished mothers impacted by Hurricane Katrina, as well as how predictive the maternal trajectories were for youth posttraumatic stress symptoms 2 years post-Katrina.
Methods 360 mother participants displaced by Hurricane Katrina completed self-report measures across four time points related to Hurricane exposure, trauma history, and posttraumatic stress symptoms. Additionally, the youth offspring completed a self-report measure of posttraumatic stress symptoms.
Results Latent Class Growth Analysis demonstrated three primary trajectories emerged among females impacted by Katrina, namely, (1) chronic (4 %), (2) recovering (30 %), and (3) resilient (66 %), respectively. These trajectories were significantly impacted by prior trauma history, but not hurricane exposure. Additionally, data indicated that children whose parents fell into the chronic PTS trajectory also reported high levels of PTS symptoms.
Conclusions This study identified three main trajectories typical of female PTS symptoms following disaster and was the first known study to document associations between PTS outcomes among adults and their offspring impacted by a large natural disaster. Future research is warranted and should explore additional risk and protective factors that impact both the parental and child outcomes.

Keywords Posttraumatic stress symptoms · Trajectories · Parents · Children · Disasters · Growth mixture modeling

Introduction

Understanding the psychological reactions of adults and children following natural disasters represents an important international public health concern, as a substantial portion of the population is impacted by natural disasters each year. In 2012, there were more than 350 natural disasters worldwide which collectively resulted in 9,655 deaths, 124.5 million impacted individuals, and approximately 157 billion dollars in related costs (Guha-Sapir et al. 2013). Furthermore, a significant percentage of adults and children directly exposed to natural disasters experience stress reactions, especially symptoms of posttraumatic stress (PTS) (see Bonanno et al. 2010 for a review). Hurricane Katrina was one of the worst natural disasters in US history in terms of death, destruction, and delayed recovery (Knabb et al. 2006). Studies examining adult prevalence of PTS symptoms following Katrina suggest incidence rates ranging from 16 to 38 % (Galea et al. 2007, 2008; Scheeringa and Zeanah 2008; Kessler et al. 2008; McLaughlin et al. 2011; Mills et al. 2012), while studies of youth have documented rates up to 63 % (Marsee 2008).

In recent years, emerging research has focused more specifically on the individual PTS and related distress trajectories that emerge following natural disaster events. Studying trajectories following natural disasters are

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S. Self-Brown (✉) · B. S. Lai
School of Public Health, Georgia State University,
P.O. Box 3995, Atlanta, GA 30302, United States of America
e-mail: sselfbrown@gsu.edu

S. Harbin · M. L. Kelley
Department of Psychology, Louisiana State University,
Baton Rouge, LA 70808, United States of America

particularly interesting, given that disaster impacts the general population in a given area as compared to more highly selective samples who have experienced a specific type of trauma for whom trajectories have been more comprehensively studied (Norris et al. 2009). Two studies to date have explicitly studied individual trajectories following natural disaster (hurricanes) utilizing mixture modeling techniques, an advanced analytical technique that allows for the examination of trajectories. For instance, (Pietrzak et al. 2013) examined PTS symptoms in adults age 60 years or older who resided in the Galveston Bay area when Hurricane Ike struck in September 2008. Data from three assessment time points (3, 6, and 15 months post-disaster) were examined with latent growth mixture modeling to identify trajectories of disaster-related PTS symptoms. A three-trajectory classification was found with nearly 79 % of the sample having low/no PTS symptoms (i.e., resistant), 16 % having chronically elevated symptoms (i.e., chronic), and 5 % having a delayed-onset course of symptoms (i.e., delayed-onset). Lower education, greater severity of Hurricane exposure, and greater number of traumatic and stressful life events after Hurricane Ike, particularly financial problems, were associated with a chronic PTS trajectory. Trauma exposure and higher levels of stress were also predictive of the delayed-onset trajectory.

Similarly, Lowe and Rhodes (2013) examined trajectories of psychological distress with 386 impoverished, African-American women exposed to Hurricane Katrina across 3-time points (pre-disaster, 1 and 3 years post-disaster). Six trajectories were identified. Members of the two most common trajectories, resilience (62 %) and coping (22 %), exhibited little psychological distress over the course of the study, with those classified as coping exhibiting a slightly higher level of mild psychological distress (below cutoff) than those classified as resilience. A smaller group of participants were classified into one of four distress trajectories (increased distress 4 %; delayed distress 5 %; decreased distress 4 %; or improved distress 3 %). Members of the increased distress trajectory reported levels of distress in mild to moderate at baseline and in the probable serious mental illness range at both post-disaster time points. In contrast, members of the delayed distress trajectory reported low levels of psychological distress both pre-disaster and 1-year post-disaster period; however, levels increased to the probable severe mental illness range at the third time point. Lastly, two trajectory groups reported decreases in psychological distress over the course of the study. Those in the decreased distress trajectory reported psychological distress in the probable severe mental illness category at baseline and decreased at both time points to the mild to moderate range. Members of improved distress, the least prevalent group, began just below the cutoff for probable serious mental illness in the pre-disaster period and decreased to probable absence of distress at the next two time points. Degree of exposure to hurricane-related stressors, experiences of human and pet bereavement, perceived social support, and socioeconomic status were all influential factors in determining the trajectory classification.

While the trajectory classifications differ, as do the primary outcomes studied (PDS symptoms versus psychological distress), both aforementioned studies suggest that the majority of natural disaster survivors are resilient. However, there is a small, yet significant, portion of disaster-exposed adults who experience higher levels of symptomatology that may occur immediately following an event or years after an event, and can be chronic. In addition, there appears to be risk and protective factors that are associated with membership in different trajectories, including demographics (educational level, socioeconomic status, race), hurricane-related experiences (hurricane exposure, hurricane-related stress and bereavement), prior trauma exposure, and social support. Further research is warranted to determine trajectory patterns and associated risk and protective factors for adults following natural disaster.

Purpose of current study

The current study will examine a sample of adult women displaced by Hurricane Katrina, using growth mixture modeling, to identify PTS trajectories following natural disaster and, based on prior studies by Pietrzak et al. (2013) and Lowe and Rhodes (2013), explore the impact of adult prior lifetime history of traumatic event exposure, as well as perceived hurricane life threat and immediate loss/disruption on PTS trajectories. All women included in the current study are parents, and, to date, it remains unclear if parents may have post-disaster PTS trajectories that differ from adults generally, given the challenges of parenting, which may be amplified during a traumatic event (Peek and Fothergill 2008). Further, parenting is a gendered endeavor, thus, it may be particularly important to understand maternal posttraumatic PTS trajectories.

Additionally, this study will expand upon the current literature by examining how adult or parental trajectories relate to youth outcomes. Specifically, this sample collected data among mother–child dyads, which provides a unique opportunity to explore these associations. Previous research has indicated that parent psychological distress is a strong predictor of youth PTSD following disaster (Jones et al. 2002; Mirzamani and Bolton 2002; Rustemli and Karanci 1996; Smith et al. 2001) as well as internalizing and externalizing behavior problems (Spell et al. 2008).

Parental trajectories may have a direct impact on child adjustment because one of the most important protective factors for children exposed to trauma is the presence of a stable, protective, and nurturing parent (Richters and Martinez 1993). This may be a difficult role to fulfill for parents who have been exposed to disaster themselves, and are experiencing high levels of posttraumatic symptoms in response. This will be the first known study to evaluate the relationship between the parent PTS trajectories and child PTS symptoms.

Growth mixture modeling, which allows for explication of differing trajectories, as well as factors associated with each trajectory (Curran and Hussong 2003; Lai et al. 2013; Muthén and Asparouhov 2008; Self-Brown et al. 2013), will be utilized in this study. Based on prior research, we hypothesize that distinct PTS symptom trajectories will emerge among Hurricane Katrina-exposed female adults, and that these trajectories will have a significant impact on youth PTS outcomes, such that mothers whose patterns were consistent with higher initial or chronic PTS patterns would have youth who report higher levels of PTS outcomes. This research will advance the public health field by allowing greater understanding of the mental health trajectories experienced by adults and youth in communities exposed to disaster, and inform decision making about best practices in disaster response that can improve the trajectories of those impacted.

Methods

Participants

This study was conducted as part of a larger study of 423 mother–child dyads living in New Orleans and the surrounding area when Hurricane Katrina made landfall. Participants were assessed at four time points post-Katrina: Time 1 (3–7 months); Time 2 (13–17 months); Time 3 (19–22 months); and Time 4 (25–27 months). At Time 1, most mothers reported being displaced from their home as a result of the hurricane (75 %). Mothers (68 % African-American, 24 % Caucasian, 8 % Other ethnicities) ranged in age from 23 to 67 years old ($M = 38.70$ years; $SD = 7.44$), and had children ranging in age from 8 to 16 years old ($M = 11.61$ years; $SD = 1.56$). Median income prior to Hurricane Katrina was below $25,000; 56 % of participants were single parents.

Procedures

After obtaining IRB approval, principals from six schools were contacted regarding recruitment of participants for the study. Interested maternal participants received a packet containing information about the study, the consent forms (for parent and child), and self-report questionnaires. Mothers completed and returned consent forms to their child's school. In follow-up, questionnaires were mailed to the mother and then participants mailed back the questionnaires in pre-paid envelopes. Children completed questionnaires in small groups at school. Data collection was conducted by graduate students and research assistants trained in data collection procedures, including explaining informed consent, assent, and the limits of confidentiality and administering questionnaires. In addition, research assistants were available to assist children with reading difficulties. Questionnaires were administered at all four time points. Subsequent to Time 1, mother participants were contacted regarding their continued participation and to obtain updated contact information.

Compensation was provided in several ways. At Time 1, children were provided compensation at the discretion of school personnel. This included entry into one of several $5.00 drawings or a class pizza party. During subsequent waves of the study, mothers were compensated $25.00–$50.00 for participation and children were provided with small items such as stickers or pencils.

Of the families contacted regarding their interest in the study, approximately 35 % consented and completed questionnaires. At Time 1, 384 mothers participated in the study. An additional 37 mothers began participating at Time 2, with a participant total of 208 mothers. At Time 3, 2 additional mothers (255 total) began participating, but no additional participants were added during Time 4 (195 total). Of the total 423 participants (including those who first participated at Time 2 and Time 3), 63 participants did not provide responses about their PTS symptoms. Given that PTS symptom severity was the primary measure of this study, these participants were not included in the analyses. Thus, 360 mother participants and their youth were analyzed in this study. The number of participants who completed the Posttraumatic Stress Diagnostic Scale at each wave are as follows: Time 1 = 281 (78 %); Time 2 = 184 (51 %); Time 3 = 187 (52 %); and Time 4 = 172 (48 %). A large percentage of participants completed measures at either three or four time points: 121 (34 %) completed four time points; 94 (26 %) completed three time points; 68 (19 %) completed two time points; and 140 (39 %) completed only one time point. At Time 4, 292 youth participated in this study, completing the UCLA-PTSD RI to measure youth PTSD symptom severity.

Demographic characteristics (gender, income, race, age) were examined to determine whether differences emerged for number of time points participants completed according to any of these variables. No significant differences were found for gender, income, or age. A one-way ANOVA

examining race and number of time points completed revealed a significant difference $F(3, 313) = 3.560$, $p = 0.015$; however, post hoc comparisons (Tukey HSD) revealed no significant differences.

Measures

Adult posttraumatic stress

The posttraumatic stress diagnostic scale (PDS; Foa 1995) is a self-report questionnaire containing items that assesses trauma exposure and PTSD symptoms according to the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition-Text Revision* (*DSM-IV-TR*; American Psychiatric Association 2000). Research has supported the construct validity of the PDS, including high diagnostic agreement with the PTSD module of the Structured Clinical Interview (Foa et al. 1997). Parts I and II of the PDS (Foa 1995) were as used as a measure of parental lifetime trauma exposure, and Parts III and IV, which measure PTSD symptoms were used as a measures of the primary outcome variable of mother PTS symptoms. Scores on the PDS range from 0 to 51, and cutoffs for ranges of severity for PDS scores are mild (0–10), moderate (11–20), moderate-severe (21–35), and severe (scores greater than 36). For this study, the Cronbach's alpha for the PDS was 0.89. Internal consistency in the current sample was adequate across all four waves ($\alpha = 0.83$–0.88).

Child posttraumatic stress

The UCLA-PTSD Reaction Index-Revision 1 (Pynoos et al. 1998) contains 18 items assessing symptoms of PTSD in the *DSM-IV-TR* (American Psychiatric Association 2000). Youth rated their symptoms based on their experiences related to Hurricane Katrina; symptoms were rated on a 5-point scale (0 = none of the time; 4 = most of the time). Summary scores (possible range = 0–68) were used to indicate PTSD symptom levels. The psychometric properties of this scale are good (see Steinberg et al. 2004), and its use in disaster-affected youth has been established (Kelley et al. 2010; Weems et al. 2010; Makrides et al. 2010). Internal consistency in the current sample was excellent across all four waves ($\alpha = 0.91$–0.93).

Immediate loss and disruption

The immediate loss and disruption subscale of the Hurricane-Related Traumatic Events Scale (La Greca et al. 1996; Greca et al. 1996) was used to assess mother's experience of loss and disruption events following Hurricane Katrina. Nine items (rated yes/no) assessed loss and disruption related to the hurricane (e.g., loss of job). The HURTE has primarily been utilized with children. Thus, adult comparison samples were not available.

Results

Preliminary analyses

Mean-level analysis of PTSD symptoms for all participants in this study showed moderate levels of severity across Time 1, Time 2, and Time 3 with a decline in severity at Time 4 (Foa 1995). The average score at Time 1 ($M = 13.30$, SD = 13.03) fell within the moderate range. Time 2 ($M = 11.12$, SD = 12.21) and Time 3 ($M = 11.37$, SD = 12.66) scores also fell within the moderate range; however, by Time 4, scores had decreased to 9.39 (SD = 10.34) which falls within the mild range. Regarding mothers' exposure to traumatic events, 98 % of mother's reported experiencing at least one traumatic event, and the average number of traumatic events endorsed was 2.15 (SD = 1.73). Over all time points, the majority of mothers reported the experience of a hurricane as a trauma (Time 1 = 88.1 %, Time 2 = 88.3 %, Time 3 = 84.6 %, Time 4 = 87.4 %). The most commonly reported traumas in addition to natural disaster were (1) experiencing a serious accident (29 %) and (2) experiencing a non-sexual assault by a known perpetrator (15 %). Preliminary analysis of immediate loss/disruption due to the Hurricane showed that 87 % of mothers reported at least one loss/disruption event; the average number of loss/disruption items endorsed was 4.07 (SD = 2.70). Children in this study reported an average of 10.50 PTS symptom (SD = 11.24).

Identifying maternal PTS symptom trajectories

To identify mother PTS symptom trajectories, we first tested linear latent class growth analysis (LCGA) unconditional models (i.e., models that did not include risk factors) in *Mplus* (version 7.11). Missing data were handled using a maximum likelihood estimator with robust standard errors, using a numerical integration algorithm. LCGA is a subtype of growth mixture modeling which does not allow variation around intercepts and slopes within trajectory groups. As part of model building and testing, we examined quadratic effects without growth mixture modeling, and we also examined growth mixture modeling without quadratic effects. In both cases, we encountered estimation difficulties. Thus, in this paper we modeled linear trajectory forms and utilized LCGA.

We examined fit indices for one to five trajectory group linear LCGA unconditional models (Table 1). Better fit was indicated by lower akaike information criterion (AIC), lower bayesian information criterion (BIC), lower sample size

Table 1 Fit indices and group assignment accuracy for linear unconditional latent class growth analysis (LCGA) models, including child Time 4 posttraumatic stress (PTS) symptoms as a distal outcome. Study conducted from 2005 to 2007 in the United States of America

Number of Trajectories	AIC	BIC	Sample size adjusted BIC	Entropy	Posterior probabilities	LMR-LRT	BLRT
1. Trajectory	8,731.00	8,762.65	8,737.26	1	1	N/A	N/A
2. Trajectories	8,453.52	8,500.99	8,462.92	0.75	0.92–0.93	0.002	0.002
3. Trajectories	8,375.64	8,438.94	8,388.17	0.78	0.85–0.93	0.06	0.07
4. Trajectories	8,323.91	8,403.02	8,339.57	0.77	0.77–0.92	0.04	0.04
5. Trajectories	8,296.48	8,391.42	8,315.27	0.80	0.84–0.98	0.20	0.20

Entropy, LMR-LRT, and BLRT values are not available (N/A) for single-trajectory models

AIC akaike information criterion, *BIC* bayesian information criterion, *LMR-LRT* Lo-Mendell-Rubin likelihood ratio test, *BLRT* bootstrap parametric likelihood ratio test

adjusted BIC, higher entropy, higher posterior probabilities, a significant Lo-Mendell-Rubin likelihood ratio test (LMR-LRT), and a significant bootstrap likelihood ratio test (BLRT) (Jung and Wickrama 2008). The three- and four-trajectory group solutions were identified as models to examine in further analyses. These two models were chosen because they exhibited relatively good fit, as indicated by lower AIC, BIC, and sample size adjusted BIC values. In addition, these models were of substantive interest.

To determine whether three or four trajectories of maternal PTS symptoms fit the data best, we next examined conditional models (i.e., models including risk factors; trajectory membership was regressed on risk factors) for the three- and four-trajectory models. Risk factors of interest were traumatic event exposures, perceived life threat, and immediate loss/disruption. When we examined these conditional models, the three-trajectory group model exhibited a stable trajectory structure similar to the unconditional three-trajectory model. Given that the addition of covariates enhances classification (Muthén 2004), and given the importance of identifying tenable model solutions (Petras and Masyn 2009), we chose the three-trajectory model as our final model. Information about the unconditional and conditional three-trajectory solutions are displayed in Table 2. Three trajectories of maternal PTS symptoms emerged in the final conditional model (Fig. 1), which we named: (a) chronic (4 %), (b) recovering (30 %), and (c) resilient (66 %).

Risk factors and outcomes associated with PTS symptom trajectory group membership

Risk factors

Associations between risk factors and odds of membership in maternal PTS symptom trajectory groups in the conditional three-trajectory model were examined. Odds ratios comparing a designated trajectory group with a reference group are presented in Table 3. For every additional traumatic event reported, mothers were 1.34 times more likely to fall in the recovering group versus the resilient group (CI = 1.12–1.60). No other risk factors significantly distinguished mothers likely to fall in any trajectory group (Fig. 2).

Child outcomes

Next, we examined whether maternal PTS symptom trajectory groups differed with regard to their children's Time 4 PTS symptoms utilizing the AUXILIARY option with the e-setting to test the equality of means on child PTS symptoms. This option conducts posterior probability-based multiple imputations to conduct pairwise mean

Table 2 Parameters for the three-trajectory model of parent posttraumatic stress (PTS) symptoms. Study conducted from 2005 to 2007 in the United States of America

Trajectory	Unconditional model (no risk factors)			Conditional model (contains risk factors)		
	n (%)	Intercept estimate (SE)	Slope estimate (SE)	*n* (%)	Intercept estimate (SE)	Slope estimate (SE)
Chronic	17 (4 %)	28.55 (2.64)***	0.40 (0.17)*	14 (4 %)	27.65 (4.02)***	0.43 (0.32)
Recovering	112 (29 %)	24.81 (1.92)***	−0.39 (.14)**	109 (30 %)	24.69 (2.35)***	−0.40 (0.16)**
Resilient	257 (67 %)	5.98 (0.77)***	−0.09 (0.05)	237 (66 %)	5.79 (0.72)***	−0.08 (0.05)

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

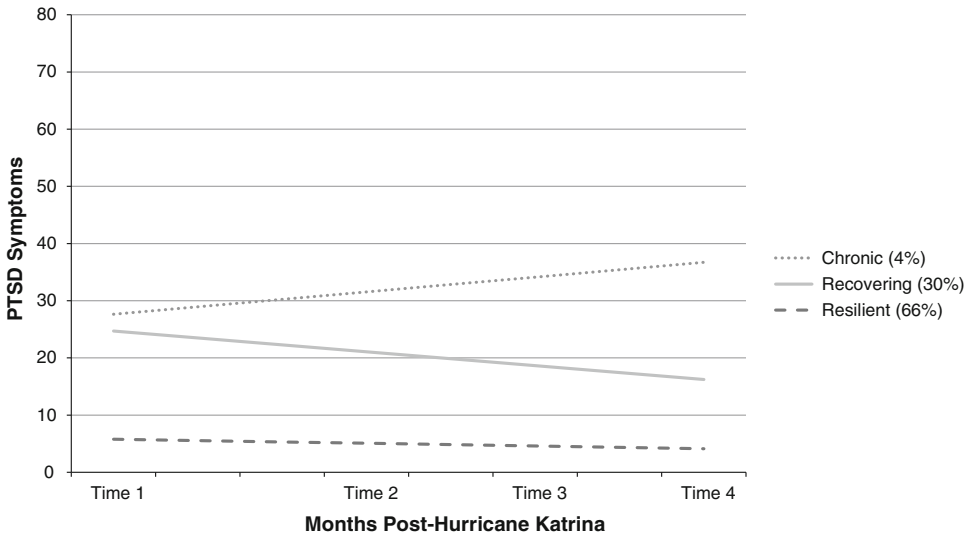

Fig. 1 Mothers' latent posttraumatic stress (PTS) symptom trajectories (conditional model). Study conducted from 2005 to 2007 in the United States of America

Table 3 Risk factors for membership in parent posttraumatic stress (PTS) symptom latent trajectories. Study conducted from 2005 to 2007 in the United States of America

Comparison group	Resilient		Recovering
	Recovering odds ratio (95 % CI)	Chronic odds ratio (95 % CI)	Chronic odds ratio (95 % CI)
Traumatic events	1.34 (1.12–1.60)***	1.00 (0.70–1.42)	0.89 (0.45–1.80)
Perceived life threat	1.44 (0.96–2.17)	1.45 (0.92–2.28)	1.07 (0.60–1.90)
Immediate loss/disruption	1.09 (0.95–1.24)	1.18 (0.99–1.40)	1.25 (0.82–1.91)

CI confidence interval

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

comparisons (Muthen and Muthen 1998–2007). Child mean PTS symptom levels at Time 4 were the highest among children of the Chronic trajectory group ($M = 14.76$, SE = 2.81), followed by the recovering trajectory group ($M = 12.13$, SE = 1.58), and the resilient trajectory group ($M = 9.06$, SE = 0.76). The chronic and resilient trajectory groups significantly differed with regard to children's mean PTS symptoms, $x^2(1) = 3.82$, $p = 0.05$. No other mean differences were significant.

Discussion

The impact of natural disasters on the psychological reactions of adults and children represents an important public health concern, due to the high magnitude of the population affected by disasters and the resulting deleterious health and mental health outcomes each year. This exploratory study had three primary objectives pertaining to the traumatic stress symptoms experienced by adults maternal caregivers and their offspring following Hurricane Katrina, including examining maternal PTS trajectories over a two-year post-disaster period, associated risk and protective factors, and relational PTS trajectories that emerge between mother–child dyads exposed to Katrina.

With regard to PTS trajectories, three primary trajectories emerged among mothers impacted by Katrina, namely, (1) chronic (4 %), (2) recovering (30 %), and (3) resilient (66 %), respectively. More specifically, participants who fell into the Chronic group started with high levels of PTS symptoms, and their symptoms did not decrease over the next three time points, and thus were still high 25–27 months post-Katrina. The recovering group had PTS symptom levels that started high, but significantly decreased over the next three time points. Lastly, the resilient group presented with few symptoms at Time 1, and their symptoms remained low and steady over the remaining time points. In another study examining female trajectories post-Katrina, six trajectories emerged that fell into two broader clusters of resilience and distress (Lowe and Rhodes 2013). While these findings differ in terms of the number of trajectories identified, there were similar rates of both populations who land in the resilient range (62 and 64 %, respectively). The trajectory current findings are more consistent with the three trajectories identified among an older adult sample (males and females) impacted by

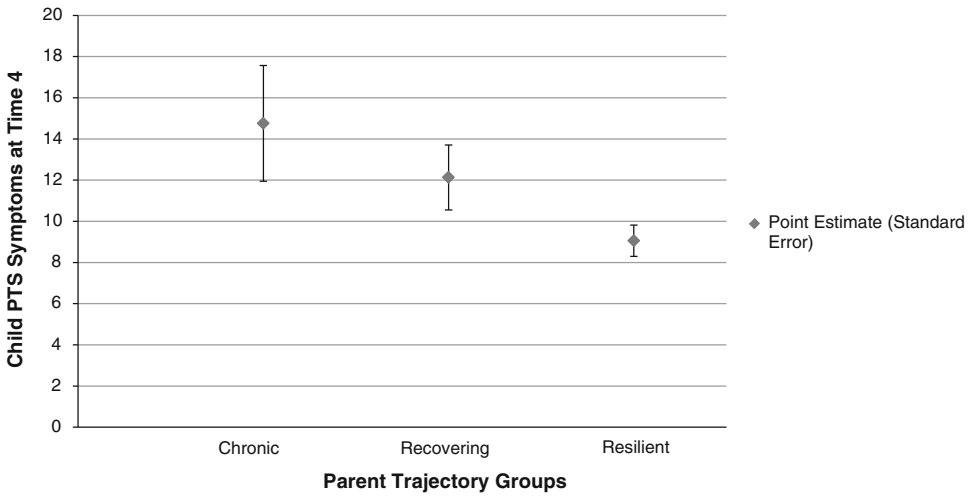

Fig. 2 Child Posttraumatic Stress (PTS) Symptoms by Parent Trajectory Groups. Study conducted from 2005 to 2007 in the United States of America

Hurricane Ike. (Pietrzak et al. 2013); however, no delayed-onset trajectory emerged in the current sample. Regardless of the number of trajectories, it is clear that there is a small but critical portion of individuals who are experiencing chronic symptoms following disaster and continued work is needed to best inform effective decision making regarding how to best offer support for these individuals.

A second purpose of this study was to examine whether hurricane exposure and disruption, as well as cumulative lifetime trauma exposure significantly impacted the trajectory outcomes. For this sample, lifetime trauma exposure emerged as a significant risk factor indicator, such that for each additional traumatic incident reported, an individual was more likely to experience PTS symptoms initially post-Katrina (be classified as recovering) as opposed to resilient. Surprisingly, this variable did not distinguish between those classified as chronic and other trajectories as hypothesized. Interestingly, in the only other study that has examined this risk factor in conjunction with natural disaster PTS trajectories to date, Pietzrack et al. (2013) found that both traumatic experiences prior to the hurricane, as well as those that were experienced in the post-disaster period, placed individuals at significant risk for a delayed-onset PTS trajectory as compared to a resistant or chronic classification. Additional studies examining the unique and combined impact of prior traumatic events and disaster exposure are warranted. Interestingly, the two hurricane exposure variables did not influence PTS symptom trajectories in this study. Perhaps this is a limitation of the measure employed, as this study was the first to utilize the HURTE with an adult versus child sample. It is likely that the hurricane exposure variables are directly related to the specific regions individuals were living in at the time of the disaster. Thus, future studies may consider geocoding methods to serve as another way to measure disaster exposure and disruption.

The final purpose of the study was to explore how maternal PTS trajectories may influence the PTS symptomatology of their children. This is perhaps the most significant contribution of the study, as there is no existing research examining relational PTS trajectories when family members are exposed to the same traumatic event. As hypothesized, data indicated that children whose parents fell into the Chronic PTS trajectory also reported high levels of PTS symptoms. Although prior disaster research has documented the negative impact of parent psychopathology in cross-sectional studies (Spell et al. 2008) and up to 1-year post-disaster (Kelley et al. 2010), this is the first study to document a longitudinal impact 2 years post-disaster.

Study strengths and limitations

The most significant strength of this study is the unique contribution to the literature, as it is the first known study to employ sophisticated analytic procedures to examine how adult PTS symptom trajectories following a natural disaster impact the well-being of their children. This study also had limitations, including the risk of response bias due to the data being based solely on self-report measures of PTSD and hurricane exposure, and the limited external validity of the findings based on specific context of Katrina and the non-representative sample. Additionally, there was significant dropout from Time 1 to Time 4, which could have impacted the findings. For instance, it could be that those mothers who were experiencing the most chronic levels of stress were the most likely to drop out, which could underestimate the percentage of mothers experiencing chronic symptoms 2 years post-disaster. Lastly, the caregiver data were limited to female caretakers; thus, further research is warranted on how paternal functioning contributes to youth post-disaster, as well as whether differences emerge in youth outcomes based on whether they live in a single parent or partnered family context should be explored. A final limitation is that the adult females who

experienced the most chronic levels of stress following Katrina may have not agreed to participate in the study.

Conclusions

This study contributes to the overall understanding of PTS trajectories for adults who are impacted by a significant natural disaster, as well as how maternal mental health functioning post-disaster can impact the mental health functioning of her offspring. Clearly, disaster response should include the implementation of evidence-based interventions that can address the mental health needs of families (both adults and children) following disaster. Future studies examining how community-wide mental health initiatives following disaster can enhance the resiliency of adults and children are warranted. It is only by enhancing the reach of effective practices that we can hope for a public health impact that can reduce the deleterious mental health outcomes for which adults and children are at-risk for in post-disaster circumstances.

Acknowledgments This material is based upon work supported by the US Department of Homeland Security under Award Number: 2008-ST-061-ND 0001 and a research grant from the National Institute of Mental Health (RMH-078148A).

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