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Longitudinal predictors of school problems in youth affected by Hurricane Katrina

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LONGITUDINAL PREDICTORS OF SCHOOL PROBLEMS IN YOUTH AFFECTED BY
HURRICANE KATRINA

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Abstract

 In the wake of Hurricane Katrina, youth faced significant disruption to their lives due to the storm damage and, for many, long-term evacuation. One domain of functioning that faced significant threat because of this disruption was student engagement. The purpose of this study was to examine predictors of student engagement, as measured by the BASC-2-SRP School Problems scale, in youth affected by the Hurricane Katrina over four time points (3-7 months, 13-17 months, 19-22 months and 25-27 months post-Katrina). Participants included 426 youths living in New Orleans and the surrounding parishes at the time Hurricane Katrina made land-fall. Examined predictors included hurricane exposure, PTSD symptoms, peer and parent social support, violence exposure, internalizing problems, and externalizing problems. Analyses included repeated measures ANOVA and hierarchical regression. Results indicated stability in student engagement, internalizing problems, externalizing problems, and violence exposure across time. PTSD symptom severity decreased over time. Social support increased over time. Predictors at Time 1 showed decreasing influence and were no longer significant by Time 4. Analyses showed an evolving picture of predictors of student engagement over time.

<center>**Introduction**</center>

In the wake of Hurricane Katrina, the youth of New Orleans and the surrounding parishes faced significant disruption to their lives, including disruption to their schools. While a growing number of studies have examined predictors of traumatic reactions, few studies have examined how disaster exposure impacted the relationship between youth and their school. This study examines predictors of student engagement in a sample of disaster-exposed youth over four time points.

Trauma exposure in youth is a common occurrence, with studies suggesting that most youth experience a traumatic event before reaching adulthood (Copeland, Keeler, Angold, & Costello, 2007; Costello, Erkanli, Fairbank, & Angold, 2002). Copeland and colleagues (2007) found that trauma exposure within the past year was upwards of 71% in a sample of youth 2-17 years old. Furthermore, trauma exposure varies depending on the living context of the youth, such that urban youth are more likely to experience exposure to violence than their rural counterparts (Snyder & Sickmund, 2006). Snyder and Sickmund (2006) found that over 98% of urban adolescents had been exposed to violence. Although rural and suburban adolescents experienced lower levels of violence exposure, over half had experienced some level of violence. The unfortunate reality is that most youths will have been exposed to trauma by the time they reach adulthood. Given the likelihood of childhood trauma exposure, understanding its impact is critical.

Trauma Reactions

Youth's reactions to trauma can vary widely. One of the most relevant disorders in the aftermath of trauma exposure is Posttraumatic Stress Disorder (PTSD). According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-

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TR; APA 2000), to receive a diagnosis of PTSD, a person must have experienced a traumatic event that induced fear, helplessness, or horror during the event, and report re-experiencing, avoidance/numbing, and arousal symptoms which persist beyond one month.

Criteria for PTSD were developed primarily on adult-reported symptoms, but a number of symptoms have been adapted to address developmental differences in childhood. For the fear, helplessness, and horror criterion, the DSM-IV-TR cautions that youth may experience this as agitated or disorganized behavior. Also, re-experiencing in youth may appear as play that mimics the trauma, traumatic reenactment, or may not appear directly related to the trauma, such as having nightmares without trauma-related content (APA, 2000).

In the newest edition of the DSM, the DSM-5, changes have been made to symptom grouping. The new criteria still contains the avoidance and arousal clusters, but it also includes intrusive symptoms and persistent negative changes to cognitions or mood. The inclusion of intrusive symptoms is to draw more attention to the presence of dissociative symptoms such as flashbacks, depersonalization, and derealization which can range on a continuum from minimal loss of awareness to total loss of awareness. In addition, the DSM-5 has made attempts to address developmental considerations by creating specific criteria for children ages six and under (APA, 2013).

Even with these adaptations, critics argue that the PTSD diagnosis does not truly represent a developmentally-sensitive description of trauma reactions. In general, youth symptoms tend to be more diffuse, as youth may not have the cognitive development to link the traumatic event to their behavior, as is more prevalent in the adult presentation of PTSD (Pynoos, Steinberg, & Piacentini, 1999). This is especially true for youth who experience chronic maltreatment, which some researchers believe is more accurately characterized by

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complex PTSD and includes both typical symptoms and additional symptoms of self-regulatory disturbance. Complex PTSD shows distinct outcomes from single or discrete-episode trauma (Cloitre et al., 2009; Courtois, 2008).

In addition, trauma reactions, especially in youth, may present as disorders outside the realm of PTSD. Studies examining trauma reactions and comorbid disorders have found that trauma-exposed youth show higher rates of depression, somatic symptoms, non-PTSD anxiety disorders, and externalizing disorders such as Oppositional Defiant Disorder and inattention than their non-exposed peers (Carrion, Weems, Ray, & Reiss, 2002; Copeland et al., 2007; Kernic et al, 2003; Levine & Kline, 2011; Schonfeld, 2011). In a study on female victims of sexual abuse, Daignault & Hebert (2009) found several distinct symptom patterns including internalizing/withdrawal symptoms, externalizing symptoms, and a polyclinical symptom response. This emphasizes the need to assess for secondary trauma symptoms and not just PTSD. In another study, lack of motivation or "negative" symptoms were found to be the most prominent symptoms in a sample of Indonesian students exposed to natural disasters (Widyatomoko, Tan, Seyle, Mayawati, & Silver, 2011). These negative symptoms may not appear directly related to the trauma, and thus, may be unjustly misinterpreted as lack of interest in school. Inattention, in particular, can be misinterpreted as disinterest or mislabeled as a symptom of Attention-Deficit/Hyperactivity Disorder, when, in fact, it may be related to re-experiencing of traumatic events (Kernic et al., 2003). Re-experiencing symptoms may overwhelm the youth's cognitive capacity leaving little room to attend to academic material. Also, trauma symptoms may persist months or years post-trauma making it even more difficult to link presenting symptoms with past trauma exposure (Boer, Smit, Morren, Roorda, &

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Yzermans, 2009). Misattribution of symptoms can lead to a delay in appropriate diagnosis and treatment. Therefore, it is important to assess for lifetime trauma exposure.

Predictors of Trauma Reactions

Numerous predictors of traumatic reactions have been identified (for a comprehensive review see Norris, et al., 2002). However, much debate continues to exist as to the stability and reliability of these predictors (Cox, Kenardy, & Hendrikz, 2008). Demographic variables including gender and race have been studied in the child trauma literature (Vernberg, La Greca, Silverman & Prinstein, 1996). As race is often intertwined with other socio-economic variables, little consistency has been found; however, in general, minority status has been found to be a risk factor both in predicting the likelihood of trauma exposure and the resulting negative sequelae (Goodman, Miller, & West-Olatunji, 2010; Goodman & West-Olatunji, 2012).

Gender also is predictive of trauma outcomes, but this has not been consistent throughout the literature. In the adult literature, men are more likely to experience a traumatic event, but women are more likely to be diagnosed with PTSD (Norris et al., 2002). Less consistency exists in the child trauma literature. La Greca, Silverman, & Wasserstein (1998) found that gender was not a significant predictor of posttraumatic symptoms, but Breslau (2001) found contradicting results. In a more recent study, Doron-Lamarca, Vogt, King, King, & Saxe (2010) found that gender moderated predictors of traumatic stress symptoms including internalizing symptoms, externalizing symptoms, and the impact of prior stress exposure.

The nature and extent of trauma exposure also is linked to subsequent traumatic reactions. Both severity of exposure and number of traumatic events are predictive of impairment (Breslau, Chilcoat, Kessler, & Davis, 1999; Chapman, Dube, & Anda, 2007; Copeland, et al., 2007; Kessler, 2000; Vernberg et al., 1996).   For example, community violence exposure has

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been shown to contribute to trauma symptoms in disaster-exposed youth (Kelley, Self-Brown, Bosson, Hernandez, & Gordon, 2010; Salloum, Carter, Burch, Garfinkel, & Overstreet, 2011; Weems, et al., 2010). In a study by Kelley and colleagues (2010), community violence exposure and hurricane exposure were equally predictive of PTSD symptom severity in youth who experienced Hurricane Katrina (see also Self-Brown, Lai, Thompson, McGill, & Kelley, 2013).

The impact of life threat, loss of possessions, and disruption of routines related to trauma exposure have been examined in their ability to predict negative outcomes (La Greca, Silverman, Vernberg, & Prinstein, 1996; La Greca et al., 1998). Life-threat, often measured as subjective belief that the victim would experience harm, injury, or death has most consistently been identified as a predictor of posttraumatic stress symptoms (Cox et al., 2008). Aside from life threat, disruption, which combines loss of possessions and disruption of routines, also contributes to negative trauma outcomes (Vernberg et al., 1996).

From an ecological-needs perspective, it is important to understand people within the youth's environment and their role in trauma outcomes (Weems & Overstreet, 2009). Social support has been identified as a protective factor against negative trauma reactions (Vernberg, et al., 1996), but the extent of its influence is unclear. Social support has been measured both globally and in terms of the effect of specific individuals (e.g., parents, peers, and teachers). Research consistently has found that social support, in general, serves as a protective factor and is associated with resilience to trauma. Specifically, it is found to act as a moderator between degree of exposure and psychopathology. Llabre & Hadi (1997) found that at high exposure levels, social support acted as a buffer against psychopathology post-disaster, especially in girls. In contrast, another study found that the presence of social support was not related to outcomes, but the lack of support was associated with poorer outcomes (Schiff, 2006).

More typically, though, social support has been measured in terms of who is providing the support (Harter, 1985). Parent, peer/friend, and teacher social support have been examined for their unique role as a buffer between trauma exposure and subsequent symptoms. In a study on positive adjustment in youth post-Katrina, Vigna, Hernandez, Paasch, Gordon, & Kelley (2009) found that parental support improved positive adjustment. Other research, however, has found that family support did not act as protective factor for Hurricane Katrina-impacted youth, but extra-familial support did (Pina et al., 2008). Also, peer support has been found to foster resilience (La Greca, Silverman, Lai, & Jaccard, 2010; Self-Brown, et al., 2013).

Trauma and Academic Functioning

One critical aspect of functioning in youth is academic performance. Poor academic performance is linked with negative outcomes including higher rates of criminal activity, drug use, and lower income (Barry & Reschly, 2012). Therefore, understanding predictors of academic performance is critical in ensuring youth maintain a positive developmental trajectory.

Traumatic events have great potential to disrupt academic functioning. Although sparse, some studies have shown that post-trauma psychopathology has been linked with negative academic outcomes. Studies examining community violence have found that violence exposure is linked with negative academic outcomes (Daly, Shin, Thakral, Selders, & Vera, 2009). Schwartz and Gorman (2003) found that PTSD symptoms moderated the relationship between community violence exposure and grades. In addition, disorders such as PTSD have been linked with cognitive deficits such as difficulty with sustained attention and executive functioning, cognitive skills critical to academic functioning, in chronically exposed youth (Beers & Debellis, 2002; Meichenbaum, 2009). Other studies have found an association between family violence and lower levels of reading achievement (Duplechain, Reigner, & Packard, 2008; Thompson &

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Trice-Black, 2012; Thompson & Whimper, 2010) and more general academic functioning such as grade-point average and standardized test scores (Henrich, Schwab-Stone, Fanti, Jones & Ruchkin, 2004; Paolucci, Genius, & Violato, 2001).

Some studies posit that trauma symptoms impair academic functioning both directly and indirectly. Trauma symptoms can act directly on academic functioning by tying up attentional resources. For example, traumatic intrusive memories may decrease attention available for academic material leading to academic deficits. Trauma can also exert an indirect influence by disrupting routines which leads to the increased likelihood of dropping out early. (Dyregrov, 2004).

Less research has been conducted on the impact of disasters and academic functioning. In one study, Broberg, Dyregrov, & Lilled (2005) found that adolescent students who experienced a fire in a discotheque were more likely to drop-out of school early. In a study of war-exposed youth, Stermac, Elgie, Dunlap, & Kelly (2010) did not find differences in academic achievement; however, this was measured in youth who had been evacuated from the war-zone.

Literature emerging in the aftermath of Hurricane Katrina shows mixed results on the impact of the disaster. Ward, Shelley, Kaase, & Pane (2008) found that displaced youth had lower academic achievement than their non-displaced peers, but this difference pre-existed the hurricane. In contrast, Baumeister (2010) found that PTSD symptom severity predicted post-disaster academic achievement even after controlling for pre-disaster academic achievement. PTSD, however, was not related to school attendance. Thus, there is still considerable debate on the role of disasters in academic functioning. In addition, disasters, in particular, have the potential to cause significant and enduring disruption, due to their potential to disrupt structures and routines that might otherwise mitigate the negative impact of the trauma.

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Hurricane Katrina

Hurricane Katrina, which struck the Gulf Coast on August 29th, 2005, caused unparalleled disruption, displacement, and loss to families, especially those living in New Orleans. The U.S. Census Bureau (2006) estimated that over 500,000 individuals were displaced between August and December of 2005 as a result of the hurricane. In addition, Hurricane Katrina became the costliest natural disaster with estimated losses topping $100 billion US dollars (Knabb, Rhome, & Brown, 2005), and contributed to deaths (U.S. Department of Homeland Security, 2006). The extended evacuation of the city led to months of disruption to youth's regular routines. Many found themselves attending schools in different cities and states, sometimes without the benefit of their regular caregivers who had to return to work or were unable to be evacuated with their family.

Literature on Hurricane Katrina shows that the storm had a significant impact on the emotional and psychological well-being of youth living on the Gulf Coast. Studies examining rates of psychopathology after the disaster have found elevated rates of PTSD, depression, and anxiety in youth (Pina et al., 2008). Several studies have reported approximately 10-13% of youths experienced "severe" levels of PTSD according to the UCLA Reaction Index in the months following Hurricane Katrina (Hensley & Varela, 2008; Kelley, et al., 2010; Spell et al., 2008; Weems et al., 2010).

Additional research is needed to understand the long-term psychological impact of Hurricane Katrina and the role this played in impacting academic outcomes. Studies have shown conflicting results over the longitudinal outcomes of Hurricane Katrina victims. Some studies have found that PTSD and depression symptoms showed a gradual decrease over time (Kronenberg et al., 2010), which is consistent with past disaster research. However, other studies

have shown an increase in traumatic stress symptoms beyond the initial assessment (Weems et al., 2010). Studies measuring the academic impact of Katrina have found that youth displaced as a result of the storm showed persistently lower academic achievement than their non-displaced peers, although it is unclear if this is due to pre-existing academic deficits (Ward et al., 2008)**.**

Resilience and Risk in the School Environment

Disaster-exposed youth are often faced with the compounded burden of trauma exposure and disruption of routines in their home, community, and school. As schools are often a source of stability for trauma-exposed youth (Pfefferbaum, 1997), the ability to maintain academic functioning is a step towards fostering resilience in other domains of functioning (Belsky, 1993; Freisthler, Merritte, & LaScala, 2006; Hobfoll, Horsey, & Lamoureux, 2009; Lynch & Cicchetti, 1998). The school can be a vital source of routines, structure, and predictability (Barenbaum, Ruchkin, & Schwab-Stone, 2004). In addition, social support provided by teachers and peers can facilitate resilience and recovery both directly to the child, and indirectly to the parent by lessening the burden parents carry in trying to reestablish normalcy in the home (Barenbaum et al., 2004; Daly et al., 2009).

For youth that experience posttraumatic psychopathology, school can provide mental health resources that may otherwise go unused (Clettenberg, Gentry, Held, & Mock, 2011). In a study examining mental health provision in the schools, Hutchinson, Carton, Broussard, Brown, & Chrestman (2012) found that adolescents were more likely to access mental health services when provided through a school-based mental health center than in community-based services, and those who engaged mental health services were less likely to engage in risky behaviors. This is critical given the research indicating a substantial gap between the rate of clinical levels of psychopathology and mental health care utilization (Schonfeld, 2011).

Measures of Academic Functioning

Given the amount of time youth spend at school, and the potential of schools to be a source of stability in a post-disaster environment, understanding how to maximize student functioning within the academic environment is critical. Studies in the general population have measured academic outcomes in several ways. Test performance and grade-point average are common outcome measures of academic functioning, but these are often subject to fixed influences such as IQ, and thus, less available as a target of intervention (Barry & Reschly, 2012; Masten et al., 1988). Test performance and GPA also fail to address many of the other interpersonal challenges faced by students that potentially affect school success (Ladd, Kochenderfer-Ladd, Visconti, Ettekal, 2012).

Student Engagement

In an effort to understand interpersonal factors related to positive academic functioning, researchers have examined student engagement (Barry & Reschly, 2012; Finn, 1993, Osterman, 2000). This theoretical concept developed out of the desire to understand factors that predict school retention. However, its usefulness has grown because of its relationship with a number of positive outcomes, not just in its relationship to drop-out rates. (Christenson, et al., 2008). In addition to predicting drop-out rates, engagement is viewed as a relevant factor for assessing a number of student competencies including academic achievement, post-secondary education outcomes, and socio-emotional well-being (Reschley & Christenson, 2012), in addition to absenteeism (Janosz, Archambault, Morizot, & Pagani, 2008; Park, Holloway, Arendtsz, Bempechat, & Li, 2012) . In a study of elementary school children, those who reported higher levels of engagement in 3rd grade showed lower drop-out rates in high school (Ladd & Dinella, 2009). Student engagement has also been associated with positive intra/interpersonal outcomes.

In a study of African street children, Malindi & Machenjedze (2012) found that improving engagement increased prosocial behavior, future orientation, provision of support, as well as improved academic outcomes.

Student engagement also shows usefulness beyond a theoretic construct as a potential target of intervention. Unlike other predictors of academic success, such as grade-point average and standardized test scores, which often are subject to intrapersonal characteristics that are difficult targets of intervention, engagement is viewed as malleable and subject to intervention at the individual, class, teacher, and district level (Fredricks, McColskey, Meli, Mordica, & Mooney, 2011).

Defining Student Engagement

Student engagement is studied across a number of fields including psychology, education, and human development. This has led to a number of differences in how student engagement is studied, and what it is called. School bonding, school connectedness, school attachment, school identification, and the lack of student engagement, school problems, have all been studied as a way to address the student's bond or sense of connection to their school and people they associate with their school such as classmates, teachers, and administrators (Barry & Reschley, 2012; Carter, Reschley, Lovelace, Appleton, &Thompson, 2012)

Two traditional models of student engagement have directed much of the initial research on this construct. One model is Connell &Wellborn's (1991) self-systems model of student engagement, which focused on the role of intrapersonal dynamics based on the individual's need for competency, autonomy, and relatedness. Competence in the school environment includes developing strong academic skills, while autonomy denotes independent learning, and

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relatedness describes positive student-teacher or student-to-student relationships. In Wellborn's model, schools that foster these characteristics are likely to have students with improved academic outcomes.

A second early model of student engagement is Finn's participation-identification (PI) model (Finn, 1989; Finn, 1993). Finn defined student engagement as an interaction between participation and affect. Finn proposed that students who actively engage in the school environment by asking questions and following school rules, and who also have positive affective engagement such as a sense of affiliation and inclusion, show higher rates of student engagement and have improved academic outcomes (Finn & Rock, 1997; Finn & Zimmer, 2012). Students who feel a sense of belongingness and feel accepted by teachers and their fellow classmates are more likely to complete school, and conversely, students who feel alienated by their peers and teachers will show higher rates of absenteeism and be more likely to drop-out before completing high school (Finn & Cox 1992).

Contemporary theories of student engagement have drawn on both the PI model and self-systems model, and view student engagement as a multi-dimensional construct. Theories have proposed various numbers of dimensions, but three facets of student engagement, cognitive, behavioral, and affective have emerged most consistently in the literature (Archambault, Janosz, Morizont, & Pagani, 2009; Carter, et al., 2012; Finn & Zimmer, 2012). Affective or emotional engagement is defined as a sense of belongingness at school and has been shown to uniquely predict academic achievement (Reyes, Brackett, Rivers, White, & Salovey, 2012; Skinner, Zimmer-Gembeck, & Connell, 1998) and school completion (Eccles, Wigfield, & Schiefele, 1998). Affective engagement includes positive relationships with teachers and fellow students and also is called emotional engagement. It is considered an internal indicator of engagement in

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that it is perceived internally by the individual and is not readily observable. However, self-report of this construct has linked the presence of affective engagement with positive outcomes (Carter et al., 2012).

Cognitive engagement is the student's investment in learning. Like affective engagement, it is an internal indicator of engagement, but cognitive engagement relates to the belief that school will bring about positive opportunities. Constructs studied under cognitive engagement include student motivation and self-determination (Finn, 1993). It also encompasses the student's perceived competence in mastering academic tasks and the student's perception of the relevance of academic tasks to their goals (Appleton & Lawrenz, 2011).

Behavioral engagement encompasses overt behaviors related to engagement. This aspect of engagement is sometimes split into two components of behavioral and academic engagement. The behavioral component includes the student's involvement in school activities, extra-curricular activities, and attendance at school. The academic component includes time spent on academic tasks such as time spent completing schoolwork and amount of classroom participation (Carter et al., 2012; Christenson & Thurlow, 2004).

Predictors of Student Engagement

Studies have identified several predictors of student engagement. Demographic characteristics such as minority status and gender appear related to student engagement (Garmezy, 1991). Although minority status has been shown to predict lower levels of student engagement, this relationship may be mediated by environmental risk factors (Woolley & Bowen, 2007). A study by Ladd & Dinella (2009) showed that school belongingness, a measure of student engagement, acted as mediator between SES status and drop-out rates. Gender also plays a role in student engagement. Studies have shown that girls typically report higher levels of

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student engagement than boys (Goodenow, 1993; Lam et al., 2012). In addition, engagement acts as a mediator between gender and academic achievement (Lam et al., 2012)

Social support plays a key role in student engagement. Studies examining social support in the general population have found mixed evidence for the unique ability of parent, peer, and teacher support to predict student engagement (Furrer & Skinner, 2003). Daly and colleagues (2009) found that teacher support increased engagement in minority youth, and Woolley and Bowen (2007) found that adult support in the form of teacher or parent support increased engagement. Studies also have shown the importance of parent support on academic achievement in general (Ginsberg & Bronstein, 1993; Grolnick, Ryan, & Deci, 1991; Lynch & Cicchetti, 2002).

Peer support, however, shows a less consistent relationship with student engagement. Peer support has been found to play a role in improving student engagement (Perdue, Manzeske, & Estell, 2009); however, in a large-scale international study, Lam and colleagues (2012) found that although peer support was predictive of engagement, peer support was not related to academic achievement in girls and only minimally related to academic achievement in boys. In addition, association with problem-behaving peers is negatively related to engagement and negates the role of parental support on student engagement (Simons-Morton & Chen, 2009).

 In the trauma literature, peer resilience has been associated with positive classroom behavior in students exposed to community violence which indicates that peer influence has a potentially unique protective role in trauma exposure and student engagement (Tol, Jordans, Reis, & de Jong, 2009). Overall, the relationship between social support, student engagement, and academic achievement appears to be complex and subject to many mediating factors that lend themselves to continued exploration (Wang & Eccles, 2012).

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Although emotional and behavior problems have been linked with academic underachievement (Barry & Reschley, 2012), little research has been conducted on the relationship between psychopathology and student engagement. Given that student engagement encompasses emotional, cognitive, and behavioral aspects, further exploration of the role of psychopathology on student engagement is warranted.

Study Rationale

The purpose of this study is to examine student engagement over multiple time points in youth impacted by Hurricane Katrina. Although the impact of community and family violence on youth's academic functioning has been examined, there is a paucity of research examining the relationship between disaster exposure and student engagement. Given the potential for disasters to cause significant disruption to both the academic environment and sources of academic support, understanding the role and predictors of student engagement post-disaster is a relevant contribution to the literature. Examining student engagement as an outcome variable is potentially beneficial in that this variable is related to absenteeism and school completion, while being more viable as a target of intervention than traditional measures of academic success like grade-point average and standardized test scores (Barry & Reschley, 2012; Reynolds & Kamphaus, 2004). The School Problems composite scale of the BASC-2-SRP will be used as a measure of student engagement. The School Problems scale examines negative attitude towards teachers and negative attitude towards school, key components of student engagement.

Examining student engagement over multiple time points is an important contribution to the disaster literature as few studies have examined longitudinal outcomes related to disasters, and outcomes related to traumatic responses have been inconsistent requiring further exploration. Little is known about how long disaster-related variables continue to impact student engagement.

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This study examines both initial disaster variables and on-going disaster variables to determine their impact on student engagement.

Variables included as predictors in the analyses are predictors relevant to disaster outcomes that literature suggests would influence student engagement. Variables including gender, minority status, violence exposure, parent support, and peer support show relevance in both the disaster and student engagement literature. Disaster-related variables including PTSD symptoms and hurricane exposure have not been examined in the student engagement literature, but have great potential as predictors of engagement given the likelihood of these variables disrupting youth's relationship with their school and teachers. Internalizing and externalizing symptoms were included to examine the role of general psychopathology which has been found to disrupt academic achievement. It will also be used to compare the influence of general predictors of student engagement with trauma-specific psychopathology.

Hypotheses

The following hypotheses are put forth in this study:

1. Preliminary analyses will examine changes in the predictor and criterion variables over the four time points. It is hypothesized that student engagement and social support (parent and peer) will gradually increase over time, while hurricane exposure, PTSD symptoms, internalizing problems, and externalizing problems will decrease across time, in youth exposed to Hurricane Katrina. No hypothesis is put forth regarding changes in violence exposure.

2. The following Time 1 predictors will be examined for their impact on Time 1 student engagement: Gender, minority status, hurricane exposure, PTSD symptoms, violence

exposure, social support from peers and parents, internalizing problems, and
externalizing problems.

    a.   It is hypothesized that female gender will predict higher levels of student
engagement. In addition, minority status will predict lower levels of student
engagement.

    b. It is hypothesized that higher levels of hurricane exposure, PTSD symptoms,
internalizing problems, externalizing problems, and violence exposure will predict
lower levels of student engagement.

    c. It is hypothesized that parent and peer social support will predict higher levels of
student engagement.

3. Time 1 predictors will be examined as prospective predictors of subsequent student
engagement at Time 2, Time 3 and Time 4. It is predicted that Time 1 hurricane-related
predictors including hurricane exposure and PTSD symptoms will show a weakening
relationship to student engagement at each subsequent time point, while non-hurricane
related predictors including internalizing problems, externalizing problems, and violence
exposure will continue to predict lower levels of student engagement. It is predicted that
Time 1 peer and parent social support will continue to predict higher levels of student
engagement.

4. Concurrent predictors at Time 2, Time 3, and Time 4 will be examined for their impact
on student engagement while controlling for Time 1 predictors, including Time 1 student
engagement. It is hypothesized that on-going loss/disruption due to hurricane exposure,
internalizing problems, externalizing problems, and violence exposure will predict lower
levels of student engagement above and beyond Time 1 reported symptoms, while the

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relationship between PTSD and student engagement will attenuate across time. It is predicted that on-going parent and peer social support will continue to act as a protective factor, such that it will predict higher levels of student engagement.

Method

Participants

Participants in this study include youth initially in grades 4th-8th living in southern Louisiana at the time Hurricane Katrina made landfall on August 29th 2005. A convenience sample was used including both displaced and non-displaced youth from Orleans, Jefferson, and East Baton Rouge Parishes. Only youth in the regular classroom were included in the study. Initially, 426 youths participated in the study. Youths' ages at Time 1 of the study ranged from 8-16 years old (M=11.61, SD=1.56). Youths were 52% female and were primarily African-American (68%), with 25% identifying as Caucasian, 4% identifying as Asian, 2% identifying as Hispanic, and the remaining 1% identifying as other. Given the low number of participants who were not either Caucasian or African-American, the race variable was collapsed into dichotomous categories of Caucasian or non-Caucasian in subsequent analyses. The majority of youths (75%) reported that they had been displaced as a result of Hurricane Katrina. Median income for families was less than $25,000 and 55% were identified as single-parent households.

Procedures

Data for this study is derived from an existing database studying the longitudinal effects of Hurricane Katrina on mothers and their children. Approval for the study was obtained from Louisiana State University's Institutional Review Board. Principals from available schools were contacted regarding consent to enter schools to recruit for the study. Initially, six schools were available and granted permission to recruit participants. Youth were given information to provide to their parents on participating in a multi-wave, longitudinal study. Interested parent participants were provided a packet containing details of the study, consent forms, and self-report questionnaires. Parent-completed packets were returned with their child to their school in sealed

envelopes. Youth completed packets at their school under the supervision of a trained research assistant. The research assistant was available to explain procedures, gain assent, answer questions, and read questionnaires to participants, when needed.

Youth completed questionnaires at four time points: Time 1 questionnaires were administered 3-7 months post-Katrina; Time 2 questionnaires were administered 13-17 months post-Katrina; Time 3 questionnaires were administered 19-22 months post-Katrina; and Time 4 questionnaires were administered 25-27 months post-Katrina. Subsequent to Time 1, parents were contacted prior to data collection to confirm continued participation and gain updated contact information.

Compensation was provided several ways. At Time 1, compensation was provided at the discretion of school personnel and included $5.00 drawings or a class pizza party. For subsequent time points, parents were compensated monetarily ($25.00-$50.00), and children received small items such as stickers or pencils.

An initial evaluation of the rate of participation showed that approximately 35% of families contacted about participating in the study completed and returned consent forms and questionnaires. Of the initial 426 participants, 388 participants were recruited at Time 1. An additional 38 participants were recruited at Time 2, but no new participants were recruited at Time 3 or Time 4.

Eight youths did not provide responses to the School Problems composite scale on the BASC-2 at any time point. As the School Problems composite scale was the primary outcome measure in this study, these participants were omitted from the analyses; therefore, the total number of participants included in the analyses was 418. Of these participants, 307 (74%) participated at Time 1, 328 (79%) participated at Time 2, 326 (78%) participated at Time 3, and

307 (74%) at Time 4. Most youth completed measures at either three or four time points: 149 (36%) completed four time points; 167 (40%) completed three time points; 69 (17%) completed two time points; and 33 (8%) completed one time point.

Because of the variability in the number of time points completed, demographic characteristics (gender, income, race, and age) were examined to determine if there were significant differences in the number of time points completed or the make-up of participants at each time point. No significant differences were found.

Measures

Demographic Questionnaire. Parents completed a demographic questionnaire regarding child age, gender, grade and race in addition to information regarding household income and marital status.

Behavioral Assessment System for Children, 2nd edition, Self- Report of Personality (BASC-2-SRP; Reynolds & Kamphaus, 2004). The BASC-2-SRP is a multi-dimensional self-report questionnaire that assesses psychopathology and adaptive functioning. The BASC-2 SRP has multiple forms based on the youth's age. In this study, the BASC-2-SRP child version was used for youth ages 8-11 years old, and the BASC-2-SRP adolescent version was used for youth 12 and older. The measure contains corresponding scales for both the child and adolescent version. It contains 14-16 primary scales and five composite scales. For the purpose of this study, the composite scales of School Problems, Internalizing Problems, and Inattention/Hyperactivity were used. The School Problems scale has previously been used as a measure of student engagement as it measures negative attitude towards teachers and school (Barry and Reschly, 2012). Extensive studies have been completed on the BASC-2-SRP showing good psychometric

properties (Reynolds & Kamphaus, 2004). The Inattention/Hyperactivity scale was used as a measure of externalizing problems.

Internal consistency for both the composite scales and their contributing subscales on the BASC-2-SRP was analyzed. Internal consistency was evaluated separately for the child and adolescent versions. For the School Problems composite, internal consistency ranged from α=.77-.83 across all four time points on the child version and α=.77-.87 on the adolescent version. For the Internalizing Problems composite scale, internal consistency ranged from α=.95-.96 on both the child and adolescent versions. For the Inattention/Hyperactivity composite scale, internal consistency ranged from α=.86-.88 across all four time points on the child version and α=.76-.84 on the adolescent version. Discussion of internal consistency in the BASC-2-SRP is presented in the appendix.

Hurricane-Related Traumatic Experiences (HURTE). The HURTE is a youth self-report measure of hurricane exposure (La Greca, Silverberg, Vernberg, & Prinstein, 1996; Vernberg, et al., 1996). This measure contains two scales: Loss/Disruption (e.g. having to change schools, not being able to see friends) and Life-threat (e.g. witness life-threatening events to self or others). Both scales were used to assess hurricane exposure at Time 1. All items are rated dichotomously. A follow-up version of the HURTE was provided subsequent to Time 1 assessing on-going loss and disruption.

UCLA PTSD Reaction Index-Revision 1 (UCLA PTSD-RI; Pynoos, Rodriguiez, Steinberg, Stuber, & Frederick, 1998). The UCLA PTSD-RI is a youth self-report that contains 18 items assessing symptoms of PTSD according to DSM-IV-TR criteria. Youth rate symptoms based on experiences related to Hurricane Katrina. Symptoms are rated on a five-point scale (0=none of the time; 4= most of the time). Two items assess emotional numbing (items 10 and

11). The more severe score for either of these items was used. Summary scores are used to indicate PTSD symptom levels. Psychometric properties are good (Steinberg, Brymer, Decker, & Pynoos, 2004). In the current sample, internal consistency was excellent across all four time points (α=.91-.93).

Screen for Adolescent Violence Exposure (SAVE; Hastings & Kelley, 1997*).* The SAVE is a 32-item self-report questionnaire for youth ages 11-16. The SAVE contains three scales: Home, School, and Community Violence. Total Violence Exposure combining the three scales was used in this study. The SAVE has adequate psychometric properties (Hastings & Kelley, 1997). Internal consistency for the SAVE ranged from α=.94-.97 across all four time points.

KID-SAVE (Flowers, Hastings, & Kelley, 2000). The KID-SAVE is adapted from the SAVE and measures violence exposure in youth ages 8-11. The KID-SAVE also is self-report and contains 35 items. The KID-SAVE contains three scales (Home, School, and Community Violence), and the total score combining the three scales was used in this study. Internal consistency for this measure was α=.92-.93 across all four time points. Due to the differences in the number of items per scale, participants' scores on the SAVE and KID-SAVE were converted to z-scores and combined to arrive at a single measure of Violence Exposure.

Social Support Scale for Children (SSSC; Harter, 1985). The SSSC is a self-report measure of social support in youth. It contains 24 items and three scales (Parent Support, Teacher Support, and Peer Support) derived from an initial validation sample (Harter, 1985). The Parent Support and Peer Support scales were used in the current study. Internal consistency for Parent Support was α=.74-.83 across all four time points. Internal consistency for Peer Support was α=.73-.87 across all four time points.

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Hypothesis 1: Change in Variables across Time

Preliminary analyses were conducted to examine changes in both predictor and criterion

variables across time. A repeated measures ANOVA was used. Variables showed violations in

sphericity; therefore, all repeated measure ANOVAs were conducted using the Greenhouse-

Geisser correction. When applicable, post-hoc comparisons were conducted using a Bonferroni

correction for significant variables. Means and standard deviations for all variables are presented

in Table 1.

Table 1. Variable Means and Standard Deviations across Time 1-Time 4

Variables	Time 1 M(SD)	Time 2 M(SD)	Time 3 M(SD)	Time 4 M(SD)
School Problems	50.39 (10.53)	49.87 (10.48)	49.68 (9.62)	49.21 (10.23)
UCLA PTSD-RI*	17.46(14.27)	13.87(12.76)	12.13(12.91)	10.23(11.55)
Life Threat	.73 (1.15)	--	--	--
Loss/Disruption*	3.10 (2.28)	2.62 (1.13)	2.07 (.83)	1.97 (.84)
Parent Support*	3.28 (.74)	3.44 (.64)	3.49 (.65)	3.52 (.58)
Peer Support*	3.10 (.63)	3.27 (.63)	3.35 (.58)	3.35 (.58)
SAVE[a]	39.29 (42.87)	36.96 (31.78)	30.83 (26.07)	42.62 (43.46)
KSAVE[a]	15.40 (11.72)	16.27 (11.47)	17.26 (11.21)	14.36 (11.40)
Internalizing Problems	47.62 (9.96)	47.89 (10.44)	48.06 (10.98)	48.27 (10.93)
Inattention/ Hyperactivity	49.08 (11.09)	49.52 (11.10)	51.31 (11.78)	50.14 (11.61)

*Significant change in score across time points
[a]Converted to z-scores and combined to form Violence Exposure variable

Contrary to hypothesis 1, which predicted that student engagement would increase, the

School Problems scale showed stability across all four time points. A repeated measures

ANOVA determined no significant changes across time, $F(2.69, 398.21)=.478$, p=ns. Average

T-scores were in the non-clinical range across all four time points. At Time 1, approximately

79% of youths denied experiencing clinically significant levels of School Problems, while 15%

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were classified as "At-Risk" (T-score ≥60 and <70), and 6% were classified as having clinical

levels of School Problems (T-score ≥ 70).

It was predicted that internalizing problems and externalizing problems would decrease

across time; however, analyses showed that both variables remained stable across time. On the

Internalizing Problems scale of the BASC-2-SRP, youth did not show a significant change in

their T-scores across time $F(2.27, 329.10)=.12$, p=ns. Average T-scores were in the non-clinical

range across all four time points. Approximately 81% of youths denied experiencing clinically

significant levels of Internalizing Problems, while 16% of youths were classified as "At-Risk"

(T-score ≥60 and <70), and 3% were classified as having clinical levels of Internalizing

Problems (T-score ≥ 70) at Time 1.

On the Inattention/Hyperactivity scale of the BASC-2-SRP, youth did not show a

significant change in T-scores $F(2.54, 378.21)=.970$, p=ns . T-scores were in the non-clinical

range across all time points. Approximately 78% of youths denied clinically significant levels of

Inattention/Hyperactivity, while 17% were classified as "At-Risk" (T-score ≥60 and <70), of

Inattention/Hyperactivity, and 5% were classified as having clinical levels of

Inattention/Hyperactivity(T-score ≥ 70) at Time 1.

As predicted in hypothesis 1, hurricane exposure, as measured by Loss/Disruption,

showed a significant linear decrease $F(1.58, 373.79)=29.65$, p=.00 across time. Post-hoc

comparisons revealed that youth showed higher endorsement of Loss/Disruption items at Time 1

(M=3.10, SD=2.28) than Time 3 (M=2.07 SD=.83), or Time 4 (M=1.97, SD=.84).In addition,

Loss/Disruption decreased between Time 2 (M=2.62, SD=1.13) and Time 3, and Time 2 and

Time 4. Items most frequently endorsed at Time 1 included difficulty seeing friends (60%) and

having to go to a new school (52%). By Time 4, items most frequently endorsed included no

longer living in the same house as before Hurricane Katrina (36%) and still having to go to a different school (30%). The second hurricane exposure variable, Life Threat, was only measured at Time 1. Items most frequently endorsed included my pet died or got hurt during the hurricane (21%), and I saw someone else get badly hurt (18%).

As predicted in hypothesis 1, PTSD symptoms, based on the UCLA PTSD-RI, showed a significant decrease in symptom severity across time, $F(2.69, 635.66)=31.40$, $p=.00$. Scores on the UCLA PTSD-RI showed a linear decrease across time points. Post-hoc comparisons indicate a significant decrease in scores between Time 1($M=17.46$, $SD=14.27$) and Time 2 ($M=13.87$, $SD=12.76$), Time 3 ($M=12.13$ $SD=12.91$), and Time 4($M=10.23$, $SD=11.55$). In addition, a significant decrease was found between Time 2 and Time 4, and between Time 3 and Time 4. Mean scores at Time 1, Time 2, and Time 3 were in the "mild" range, but by Time 4, symptoms had decreased into the "doubtful" range according to published cutoff scores (Nader, 2004). At Time 1, 24% of youths reported at least "moderate" symptoms of PTSD. This shows that PTSD symptoms can persist for some time, in this case over one and a half years, post-disaster. The linear decrease in PTSD symptoms and hurricane exposure, variables most closely linked to the hurricane, replicates previous research on disaster recovery (Boer et al., 2009; Broberg et al., 2005; Goenjian, et al., 2011).

Results indicate that social support increased across time, in line with the proposed hypothesis. Parent Support showed a significant increase across time, $F(2.68, 548.91)=8.98$, $p=.00$. In general, youth showed moderate to high levels of Parent Support with possible scores ranging from one to four with higher scores indicating greater support. Post-hoc comparisons of indicate a significant increase in Parent Support between Time 1($M=3.28$, $SD=.74$), and Time 2

(*M*=3.44, *SD*=.64), Time 3 (*M*=3.49, *SD*=.65), and Time 4 (*M*=3.52, *SD*=.58). Parent Support scores at Time 2, Time 3, and Time 4 were not significantly different from each other.

Similarly, Peer Support also showed a significant increase across time, $F(2.86, 582.87)=15.13$, *p*=.00. Post-hoc comparisons of Peer Support showed a significant increase between Time 1 (*M*=3.10, *SD*=.63) and Time 2 (*M*=3.27, *SD*=.63), Time 3 (*M*=3.35, *SD*=.58), and Time 4 (*M*=3.35, *SD*=.58). Peer Support scores at Time 2, Time 3, and Time 4 were not significantly different from each other. Like Parent Support, Peer Support scores potentially ranged from one to four with higher scores indicating greater support. Youth reported moderate to high levels of Peer Support across all four time points.

No hypothesis was put forth regarding violence exposure. Despite disruption to the communities where participants lived, participants did not report changes in violence exposure over time, $F(2.88, 660.18)=.93$, *p*=ns. This is possibly due to participants already living in violence-prone areas of southern Louisiana (U.S. Federal Bureau of Investigation, 2010). Descriptive analysis of responses to SAVE items indicate that over half of youths endorsed the items, "I have seen people screaming at each other in my school and neighborhood," and "I have seen the police arrest someone in my neighborhood." On the KSAVE, over half of youths endorsed the following items: "I have seen someone get badly hurt;" "I have seen a grown-up hit a kid;" "I have seen someone get beat-up;" "I have heard about someone getting killed;" and "I have heard about someone getting shot." Over three-quarters of youths endorsed, "I have seen the police arrest someone" and "I have seen people scream at each other." This indicates that a large number of participants in this study have been exposed to significant acts of violence.

Regression Analyses

Given the number of predictors included in the regression analyses, a power analysis was conducted using G*Power 3.1. The current sample size (n=418) was adequate to detect a small to medium effect size (effect size $\geq$ .07; Faul, Erdfelder, Buchner, & Lang, 2009). Missing values appeared to missing at random, as indicated by no significant differences between responders and non-responders across each time point. Missing values were replaced with item means (Tabachnick & Fidel, 2007).

For all subsequent analyses, the primary outcome measure of student engagement was the School Problems scale of the BASC-2-SRP. Initial zero-order correlations were examined to determine if a significant relationship existed between the predictor and criterion variables. Gender and minority status did not show a significant correlation with School Problems at any time point and were removed from further analyses.

The following predictor variables were included in the regression analyses: Life/Threat and Loss/Disruption (hurricane exposure variables), the UCLA PTSD-RI (PTSD symptoms), Parent Support and Peer Support (social support variables), Violence Exposure, Internalizing Problems, and Inattention/Hyperactivity (externalizing problems variable). Multicollinearity among predictor variables was assessed. Diagnostic tests did not indicate excessive overlap between variables. All tolerance values were greater than .90.

Hypothesis 2 and Hypothesis 3: Analysis of Time 1 Predictors on Time 1-Time 4 School Problems. In order to examine hypothesis 2 and hypothesis 3, Table 2 presents four separate regression analyses examining the role of Time 1 predictors on Time 1, Time 2, Time 3, and Time 4 School Problems. Hypothesis 2, which posited the relationship between Time 1 predictors and Time 1 student engagement, was partially supported. Time 1predictors

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significantly predicted Time 1 School Problems $F(8,344)=25.06$, $p=.00$. The model accounted

for 37% of the variance. Violence Exposure, Internalizing Problems, and

Inattention/Hyperactivity all significantly predicted higher levels of Time 1School Problems.

Peer Support marginally predicted lower Time 1School Problems. This indicates that Time 1

violence exposure, internalizing problems and externalizing problems are risk factors related to

lower levels of school engagement, as predicted in hypothesis 2.

Table 2. Regression Analyses of Time 1 Predictors on Time 1-Time 4 School Problems

Time 1 Predictors	Time 1				Time 2				Time 3				Time 4			
	β	R^2	F	p	β	R^2	F	p	β	R^2	F	p	β	R^2	F	p
Step 1		.37	25.06	.00		.09	5.20	.00		.07	3.98	.00		-.01	.71	.68
Life Threat	-.02			.74	.03			.60	.17			.00	-.06			.31
Loss/ Disruption	-.02			.62	.01			.79	-.06			.24	.02			.74
UCLA PTSD-RI	-.08			.19	.04			.57	.06			.36	-.02			.78
Violence Exposure	.10			.05	-.00			.94	-.03			.53	-.03			.63
Parent Support	.02			.70	.11			.04	.00			.95	-.05			.36
Peer Support	-.08			.10	-.09			.12	.03			.55	.09			.12
Internalizing Problems	.26			.00	.13			.09	.13			.10	.10			.21
Inattention/ Hyperactivity	.37			.00	.16			.02	-.07			.34	-.01			.89

Hypothesis 3, which posited the relationship between Time 1 predictors and subsequent

student engagement at Time 2, Time 3, and Time 4, was partially supported. Time 1 predictor

variables contributed significantly to the model at Time 2 and Time 3, but by Time 4, Time 1

predictors no longer accounted for a significant amount of the variance associated with Time 4

School Problems. See Table 2 for additional details. Time 1 variables significantly predicted

Time 2 School Problems $F(8, 398)=5.20$, $p=.00$. The model accounted for 9% of the variance.

Time 1 Parent Support and Inattention/Hyperactivity significantly predicted increased Time 2 School Problems, while Internalizing Problems marginally predicted increased Time 2 School Problems. This indicates that parent support is a risk factor for lower levels of student engagement, contrary to the hypothesis that parent support would act as a protective factor related to student engagement. As predicted, internalizing and externalizing problems appear to be risk factors for lower levels of student engagement.

Time 1 variables significantly predicted Time 3 School Problems $F(8, 400)=3.98$, $p=.00$. The model accounted for 7% of the variance. Time 1 Life Threat significantly predicted increased Time 3 School Problems, while Time 1 Internalizing Problems marginally predicted increased Time 3 School Problems. In contrast to the proposed hypothesis that hurricane exposure variables would show a weak relationship to student engagement across time, hurricane exposure, in the form of Life Threat, appeared as risk factor for decreased student engagement at Time 3, 19-22 months post-Katrina.

Hypothesis 4: Analysis of Concurrent Predictors on Time 2-Time 4 School Problems. Additional regression analyses were conducted to examine hypothesis 4 which posited the relationship between concurrent predictors (Time 2, Time 3, and Time 4 predictors) on Time 2, Time 3, and Time 4 student engagement, while controlling for Time 1 predictors. Overall, hypothesis 4 was supported in that concurrent predictors showed a stronger relationship with student engagement than Time 1 prospective variables. There was partial support for specific predictors and their relationship to student engagement at each time point.

At Time 2, Time 1 predictors were entered in step 1 and Time 2 predictors were entered in step 2. Overall, the 2-step model was significant $F(16, 396)=25.28$, $p=.00$. Both step 1 and step 2 significantly predicted Time 2 School Problems, but step 2 increased the predicted

variance by 36%. Time 1 Parent Support and Time 1 School Problems significantly predicted

increased Time 2 School Problems. Time 2 Internalizing Problems and Time 2

Inattention/Hyperactivity significantly predicted increased Time 2 School Problems. Table 3

provides additional details. Results of the analysis indicate that Time 1 variables continue to

influence Time 2 student engagement, but the concurrent presence of internalizing problems and

externalizing also act as strong risk factors for lower levels of student engagement.

Table 3. Regression Analysis of Concurrent Time 2 Predictors of Time 2 School Problems while
Controlling for Time 1 Variables

Variables	Beta	R^2	ΔR^2	ΔF	p
Step 1: Time 1 Variables		.14	.14	7.62	.00
Life Threat	.07				.06
Loss/Disruption	-.02				.64
UCLA PTSD-RI	-.02				.72
Violence Exposure	.03				.57
Parent Support	.10				.02
Peer Support	-.08				.07
Internalizing Problems	-.11				.07
Inattention/ Hyperactivity	-.10				.06
School Problems	.26				.00
Step 2: Time 2 Variables		.50	.36	41.16	.00
Loss/Disruption	.06				.11
UCLA PTSD-RI	-.09				.08
Violence Exposure	.03				.42
Parent Support	-.07				.08
Peer Support	.03				.49
Internalizing Problems	.38				.00
Inattention/Hyperactivity	.38				.00

As seen in Table 4, at Time 3, the 2-step model including Time 1 and Time 3 predictors

was significant $F(16, 395)=23.03$, $p=.00$. Both step 1 and step 2 significantly predicted Time 3

School Problems, but step 2 increased the predicted variance by 37%. Time 1 Life Threat and

Time 1 School Problems predicted increased Time 3 School Problems. Time 3 Violence

Exposure, Time 3 Internalizing Problems, and Time 3 Inattention/Hyperactivity predicted

increased Time 3 School Problems, while Time 3 UCLA PTSD-RI significantly predicted

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decreased Time 3 School Problems. At Time 3, trauma exposure-related variables appear most

relevant to student engagement, although not entirely in the expected direction, given that PTSD

symptoms appear to be a protective factor predicting increased student engagement. As with

Time 2 predictors, internalizing problems and externalizing problems act as strong risk factors

predicting lower levels of student engagement.

Table 4. Regression Analysis of Concurrent Time 3 Predictors of Time 3 School Problems while Controlling for Time 1 Variables

Variables	Beta	R^2	ΔR^2	ΔF	p
Step 1: Time 1 Variables		.11	.11	5.54	.00
Life Threat	.13				.00
Loss/Disruption	-.01				.86
UCLA PTSD-RI	.01				.80
Violence Exposure	-.08				.08
Parent Support	-.03				.52
Peer Support	.07				.12
Internalizing Problems	-.03				.57
Inattention/ Hyperactivity	-.09				.11
School Problems	.16				.01
Step 2: Time 3 Variables		.48	.37	46.87	.00
Loss/Disruption	.07				.08
UCLA PTSD-RI	-.20				.00
Violence Exposure	.15				.00
Parent Support	.06				.20
Peer Support	-.09				.06
Internalizing Problems	.33				.00
Inattention/Hyperactivity	.40				.00

At Time 4, the overall 2-step model was significant $F(16, 403)=1.94$, $p=.016$, which

partially supports hypothesis 4. Variables in step 1 did not significantly predict Time 4 School

Problems. Variables entered in step 2 predicted 6% of the variance associated with Time 4

School Problems. Time 4 Inattention/Hyperactivity significantly predicted increased Time 4

School Problems. See Table 5 for additional details. Time 1 predictors showed no relationship

with Time 4 School Problems. It is surprising, however, that even concurrent predictors show

only a weak relationship with Time 4 School Problems, which does not support the hypothesis

that concurrent variables would show a strong relationship with student engagement.

Table 5. Regression Analysis of Concurrent Time 4 Predictors of Time 4 School Problems while Controlling for Time 1 Variables

Variables	Beta	R^2	ΔR^2	ΔF	p
Step 1: Time 1 Variables		-.01	.01	.38	.94
Life Threat	-.02				.64
Loss/Disruption	-.06				.30
UCLA PTSD-RI	.05				.41
Violence Exposure	-.03				.63
Parent Support	.02				.73
Peer Support	.01				.82
Internalizing Problems	.04				.63
Inattention/ Hyperactivity	-.06				.42
School Problems	.03				.65
Step 2: Time 4 Variables		.03	.06	3.93	.00
Loss/Disruption	.65				.51
UCLA PTSD-RI	.11				.92
Violence Exposure	-.34				.73
Parent Support	-.05				.96
Peer Support	.10				.27
Internalizing Problems	.45				.65
Inattention/Hyperactivity	2.96				.00

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Discussion

Change in Variables across Time

In general, most youth showed remarkable resiliency post-Katrina. An examination of common behavioral and emotional problems showed average levels of internalizing and externalizing symptoms over all time points. This is in contrast to hypothesis 1 which predicted that these variables would show initial elevation and then decrease across time. It also contradicts other published studies which have shown significant and persistent elevations in psychopathology in trauma-exposed youth (Boer, et al., 2009; Copeland et al., 2007; Kernic et al., 2003; Carrion, et al., 2002; Levine & Kline, 2011; Schonfeld, 2011). In agreement with hypothesis 1, social support showed a significant increase across time in this sample. Despite the potential for significant disruption to social support due to evacuation and the destruction of so much of the area, youth reported moderate to high levels of social support from both peers and parents, even in the early months after Hurricane Katrina. Also in agreement with hypothesis 1, PTSD symptoms showed a linear decrease across time, consistent with literature on disaster recovery (Boer et al., 2009; Broberg et al., 2005; Goenjian, et al., 2011).

Time 1 Predictors of Student Engagement

One purpose of this study was to examine the role of early (Time 1) predictors of student engagement and their relationship to student engagement across time (Time 1, Time 2, Time 3, and Time 4). Examining the role of Time 1 predictors on student engagement shows an evolving picture of relevant symptoms. In partial support of hypothesis 3, the relationship between Time 1 predictors and student engagement attenuates and becomes insignificant by Time 4, two years post-disaster. However, there is little consistency in predictors across Time 1, Time 2, or Time 3.

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An initial examination of gender and minority status showed no relationship with student engagement at any time point which is in contrast to previous literature and hypothesis 2 that minority status and being male would predict lower student engagement (Garmezy, 1991; Woolley & Bowen, 2007). At Time 1, hurricane exposure and PTSD symptoms showed little relationship with Time 1 student engagement, while internalizing problems, externalizing problems, and violence exposure showed a significant relationship with student engagement. This is somewhat surprising given the presence of elevated PTSD symptoms in the sample at Time 1 and stable, non-clinical levels of internalizing and externalizing problems. This also is in contrast with Hypothesis 2 which posited that hurricane exposure and PTSD symptoms would significantly predict lower levels of Time 1 student engagement. However, given that a substantial minority of youth reported subclinical or clinical levels of internalizing and externalizing problems, these symptoms may reflect a subset of students suffering from significant impairment.

Time 1 social support from peers emerged as a trending protective factor related to Time 1 student engagement, as predicted in hypothesis 2. This is especially promising, as some studies have found that social support in general, and peer support specifically, does not have a relationship with student engagement, especially in the presence of violence exposure (Daley, 2008; Criss, 2002). Also, peer support runs the risk of having a negative influence when it provided by deviant peers (Maschi, 2008).

At Time 2, Time 1 externalizing problems remained predictive of lower levels of Time 2 student engagement. In addition, Time 1 parent support appears as a risk-factor for Time 2 student engagement. This is unexpected and goes against hypothesis 3, given that parent-provided social support is generally found to be a protective factor against negative outcomes.

One possible explanation for this unusual result may lie in the type of parent support being provided. In a study on styles of parenting practices and student engagement, Simons-Morton and Chen (2009) found that high parent engagement predicted lower student engagement in 6th grade children; however, authoritative parenting practices were associated with higher levels of student engagement. In addition, given that both parents and their children were exposed to Hurricane Katrina, it is possible that additional parent variables (e.g. maternal psychopathology and on-going parent loss/disruption) may be mediating the relationship between parent support and student engagement.

It was posited in hypothesis 3 that the relationship between Time 1 hurricane-related variables and student engagement would attenuate across time. However, at Time 3, Time 1 life-threat appears as a significant predictor of Time 3 School Problems. Despite the fact that other hurricane-related variables (i.e. PTSD symptoms, loss/exposure) did not appear significant at Time 3, previous literature indicates the potential for on-going stress related to trauma exposure, especially in regards to Hurricane Katrina, where studies have found continued symptoms up to two years post-disaster (Kronenberg et al., 2010; McLaughlin et al., 2009). In addition, life threat has been found to be a consistent risk factor for subsequent negative outcomes post-disaster (Cox et al., 2008).

Concurrent Predictors of Student Engagement

After examining initial Time 1 predictors of student engagement, another purpose of this study was to examine concurrent predictors of student engagement across subsequent time points while controlling for prospective variables measured at Time 1. Entering Time 1 variables in step 1 of each regression analysis allowed for statistical control of previously studied variables to provide a clearer picture of the influence of concurrent predictors.

Both Time 2 and Time 3 models indicate that concurrent variables play a large role in predicting student engagement, as predicted in hypothesis 4. The variables showing the strongest ability to predict student engagement include both internalizing and externalizing problems, which match extant literature on predictors of student engagement in non-trauma exposed youth (Baker, Grant, & Morlock, 2008; Henricsson & Rydell, 2004; Molins & Clopton, 2002). This does not disprove the influence of hurricane-related variables, however. At Time 2, Time 2 PTSD symptoms approach significance and at Time 3, Time 3 PTSD symptoms are significant predictors of student engagement. In contrast to hypothesis 4, however, PTSD symptoms at both Time 2 and Time 3 predict higher levels of student engagement. Although this result is difficult to explain, other studies have found that even chronically traumatized youth have been found to display remarkable resilience in academic functioning (Stermac, Elgie, Clark, & Dunlap, 2012). The hurricane exposure variable, Loss/Disruption measured at both Time 2 and Time 3 show a trend of predicting lower levels of student engagement, but Time 1 Loss/Disruption was not predictive of student engagement, indicating that the type of disruption being experienced by Time 3 has a unique and negative impact on School Problems above and beyond the initial disruption.

In addition, Time 1 internalizing and externalizing problems show a trend towards significance despite the significant presence of Time 2 internalizing problems and externalizing problems. In other words, youth who experience internalizing problems and externalizing problems at Time 1 show a trend of continued problems with student engagement at Time 2, but this does not account for the entire relationship between internalizing problems, externalizing problems, and Time 2 student engagement. This distinction disappeared by Time 3, when only concurrent Time 3 internalizing and externalizing problems predicted Time 3 student

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engagement. Overall, it appears that internalizing and externalizing problems act as significant risk factors for lower levels of student engagement.

By Time 4, Time 1 variables show little influence on Time 4 student engagement. In addition, curiously, concurrent variables also show little predictive validity. Although the model was significant, variance associated with the model was small (3%). Of the variables introduced in the model, Time 4 externalizing problems, alone, remained predictive of Time 4 student engagement. By Time 4, hurricane-related variables showed little influence on Time 4 student engagement while externalizing appears to be the most consistent risk factor for lower levels of student engagement. This indicates that other variables, not included in the model, may be influencing student engagement.

Implications and Future Directions

The purpose of this study was to examine both initial and concurrent predictors of student engagement in youth exposed to a disaster. While, on average, youth reported stable and minimal psychopathology, upon further examination, a more complicated picture emerges. A significant minority showed elevated levels of internalizing problems, externalizing problems, and problems with student engagement. Time 1 variables do not present a consistent picture of risk or resilience. Concurrent variables show a clearer picture of risk factors including internalizing and externalizing problems, yet concurrent measures of hurricane exposure and PTSD symptoms continue to play a role in predicting student engagement. It is curious that these variables do not stand-out at Time 1, and yet, as time progresses, they appear relevant.

Given the inconsistency of predictors across time, further research is needed to determine how the presented predictors relate to student engagement. Researchers are beginning to recognize the heterogeneity of responses to potentially traumatic events. Advanced multivariate

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statistical techniques including latent profile analysis and growth mixture modeling are emerging as state-of-art techniques for moving beyond mean-level analyses and examining trauma exposure from a person-centered perspective (Bonnano & Mancini, 2012). For example, although, on average, youth experienced typical levels of student engagement, within this sample there was a considerable minority who experienced significant problems with student engagement. Perhaps these subgroups who experienced problems would respond differently to the presented predictors over time. By assessing for the presence of distinct subgroups within the given sample, future research may paint a clearer picture of relevant predictors of student engagement.

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Evaluation of the Internal Consistency of BASC-2-SRP Composite Scales
and Contributing Subscales

As described in the measures section, this study used three composite scales from the
BASC-2-SRP: School Problems, Internalizing Problems, and Inattention/Hyperactivity.
According to theBASC-2 Manual, the composite scales are derived through factor analysis and
rational analysis of the contributing subscales. The reliability and validity of the BASC-2-SRP
has been well-established as a valid and reliable screener of psychopathology in children and
adolescents (Reynolds & Kamphaus, 2004). However, because the participants in this study are
sampled from a specific population of hurricane-exposed youth, it is important to demonstrate
that these scales are reliable for the given sample.

One measure of reliability is internal consistency. Internal consistency measures the
correlation between two items proposed to measure a given construct. In the BASC-2-SRP
individual items are grouped into subscales which are further grouped into composite scales. It is
important to understand the internal consistency of both the subscales and the composite scales
in order to select an appropriate, reliable scale for inclusion in the proposed analyses.

One well-established measure of internal consistency is Cronbach's alpha. Cronbach's
alpha measures the pairwise correlation between items. Cronbach's alpha is determined by the
following formula: $\alpha = rk/[1+(k-1)r]$ where k is the number of items in the proposed scale, and r
is the mean of the inter-item correlations. It is a convenient measure of internal consistency
because it only requires a single test administration to derive an estimate of reliability (Gliem &
Gliem, 2003). Scores fall between zero and one with scores falling closer to one indicating
higher reliability. The following guidelines are commonly used to determine the quality of a
scale's internal consistency: $\alpha \geq .90 =$ excellent; $\alpha \geq .80 < .90 =$ good; $\alpha \geq .70 < .80 =$ acceptable;

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α≥.60<.70=questionable; α<.60=unacceptable. Although higher internal consistency indicates greater reliability, exceptionally high reliability (α≥.95) may indicate items that are redundant, (George & Mallery, 2003).

Definitions of each BASC-2-SRP scale are provided in Table 8.10 (pg. 74) of the BASC-2 Manual. The School Problems composite scale was the primary outcome measure in this study. According to the BASC-2-SRP manual, the School Problems scale is a measure of engagement in school. It is comprised of three subscales including Attitude to School, Attitude to Teachers, and Sensation Seeking. Attitude to School is defined as, "feelings of alienation, hostility, and dissatisfaction regarding school." Attitude to Teachers is defined as, "feelings of resentment and dislike of teachers; beliefs that teachers are unfair, uncaring or overly demanding." Sensation Seeking is defined as, "the tendency to take risks and to seek excitement. In the BASC-2-SRP Child version, only Attitude to School and Attitude to Teachers is included in the School Problems composite scale.

The Internalizing Problems composite scale, used as a predictor variable in this study, is described as a broad index of inwardly directed distress that reflects internalizing problems. It includes the subscales of Atypicality, Locus of Control, Social Stress, Anxiety, Depression, Sense of Inadequacy, and Somatization. Atypicality is defined as, "the tendency toward bizarre thoughts or other thoughts and behaviors considered odd." Locus of Control is defined as, "the belief that rewards and punishment are controlled by external events or people." Social Stress is defined as, "feelings of stress and tension in personal relationships; a feeling of being excluded from social activities." Anxiety is defined as, "feelings of nervousness, worry, and fear; the tendency to be overwhelmed by problems." Depression is defined as, "feelings of unhappiness, sadness, and dejection; a belief that nothing goes right." Sense of Inadequacy is defined as,

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"perceptions of being unsuccessful in school, unable to achieve one's goals, and generally inadequate." Somatization is defined as, "the tendency to be overly sensitive to, to experience, or to complain about relatively minor physical problems and discomforts." In the BASC-2-SRP child version, the Internalizing Problems composite score contains all subscales except the Somatization scale. The BASC-2-SRP adolescent version contains all of the above-mentioned subscales.

The Inattention/Hyperactivity scale, also used as a predictor variable in this study, is described as a measure of the ADHD symptoms of hyperactivity and attention problems. As the name suggests, it contains the two subscales of Attention Problems and Hyperactivity. Attention Problems is defined as, "the tendency to report being easily distracted and unable to concentrate more than momentarily." Hyperactivity is defined as, "the tendency to report being overly active, rushing through work or activities, and acting without thinking." Both subscales are included in the child and adolescent versions of the BASC-2-SRP.

As presented in Table 6, internal consistency was analyzed for both the composite and subscales at all four time points. Because the child and adolescent versions contain different subscales contributing to the composite scales, they were analyzed separately. In general, the composite scales showed good to excellent internal consistency across child and adolescent respondents and across all four time points. For children, internal consistency ranged from .77-.83, and for adolescents it ranged from .77-.87 indicating similar reliability between the two versions.

Table 6. Internal Consistency of BASC-2 Composite Scales and Subscales

Global Scale	Subscale	Child (Ages 8-11)				Adolescent (Ages 12+)			
		Time Point				Time Point			
		1	2	3	4	1	2	3	4
School Problems		0.83	0.82	0.77	0.80	0.77	0.85	0.87	0.85
	Attitude to School	0.70	0.67	0.60	0.55	0.57	0.78	0.75	0.79
	Attitude to Teachers	0.74	0.78	0.70	0.80	0.75	0.82	0.83	0.82
	Sensation Seeking	*	*	*	*	0.67	0.61	0.66	0.62
Internalizing Problems		0.95	0.96	0.96	0.96	0.95	0.96	0.96	0.96
	Atypicality	0.79	0.83	0.81	0.83	0.81	0.84	0.81	0.83
	Locus of Control	0.61	0.74	0.74	0.66	0.73	0.81	0.80	0.81
	Social Stress	0.83	0.82	0.80	0.79	0.79	0.81	0.84	0.84
	Anxiety	0.85	0.87	0.87	0.89	0.78	0.82	0.83	0.84
	Depression	0.74	0.78	0.80	0.87	0.82	0.84	0.84	0.85
	Inadequacy	0.77	0.81	0.76	0.74	0.77	0.78	0.82	0.81
	Somatization	*	*	*	*	0.64	0.68	0.73	0.72
Inattention/ Hyperactivity		0.87	0.88	0.86	0.88	0.77	0.81	0.84	0.76
	Attention Problems	0.72	0.78	0.73	0.77	0.49	0.60	0.64	0.46
	Hyper-activity	0.81	0.80	0.80	0.81	0.76	0.79	0.82	0.82

*Scale not present in BASC-2-SRP child version

An examination of internal consistency among the subscales contributing to School Problems shows considerable variability. Attitude to School for both children and adolescents showed less internal consistency with Cronbach's α values ranging from .55-.70 for the child version and .57-.79 for adolescents. The Sensation Seeking subscale on the adolescent version also showed questionable internal consistency with Cronbach's α ranging from .61-.67. Internal consistency on the Attitude to Teachers subscale was higher on both the child and adolescent

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version with values ranging from .70-.80 on the child version and .75-.83 on the adolescent version.

Internal consistency on the Internalizing Problems composite scale was very high for both the child and adolescent version. Both versions had values of .95-.96 across all time points indicating excellent reliability. Internal consistency on subscales varied. Internal consistency on the adolescent version was generally higher than the child version. Internal consistency was lowest on the Somatization scale of the adolescent version with values ranging from .64-.73 across time points. On the child version, Locus of Control showed lower internal consistency with values ranging from .61-74 across time. Otherwise, the remaining scales showed adequate to good reliability for both the child and adolescent versions.

Internal consistency for the Inattention/Hyperactivity composite scale was in the good range (.86-.88) on the child version and in the acceptable to good range (.76-.84) on the adolescent version. Internal consistency on the Hyperactivity subscale also was in the acceptable to good range on both the child and adolescent version. On the Inattention subscale, internal consistency was in the acceptable range on the child version, but was below the acceptable range on the adolescent version with values ranging from .46-.64.

Overall, the composite scales show higher internal consistency than their contributing subscales. This makes sense statistically, as internal consistency tends to increase with the number of items in the scale. Subscale internal consistency shows variability across subscales, respondents (child vs. adolescent), and time points. Given the variability in the internal consistency and the presence of internal consistency values below acceptable cut-off values, composite scales were the most suitable choice to include as variables in this study.

Appendix B
Institutional Review Board Approval

Institutional Review Board
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INSTITUTIONAL REVIEW BOARD

ACTION ON PROTOCOL APPROVAL REQUEST

TO: Mary Lou Kelley
Department of Psychology

FROM: Robert C. Mathews
Chair, Institutional Review Board for Research with Human Subjects

DATE: November 9, 2005

RE: **IRB# 2561**
TITLE: "Predictors of Recovery I children Evacuated from Hurricane Katrina"

New Protocol/Modification/Continuation : N

Review type: Full ___X__ Expedited _____   **Review date:** **10/14/2005**

Approved__X____ Disapproved _____ [1]**Developmental Approval _____**

Approval Date: 11/09/2005   **Approval Expiration Date:** 11/09/2006

Risk Assessment: Minimal ____**X**_____ Uncertain _____ Greater than Minimal _____

Re-review frequency: (annual unless otherwise stated) _____

Number of subjects approved: ___400___

By: Robert C. Mathews, Chairman _____

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING -- Continuing approval is CONDITIONAL on:
1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. SPECIAL NOTE:

All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.fas.lsu.edu/osp/irb

[1] Developmental Approval means that the project can proceed to develop instruments to be used in the study. However, no data on human subjects can be collected until all instruments have been approved by the IRB.

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Vita

Julia Thompson graduated *Summa Cum Laude* from the University of Arkansas at Little Rock in 2006 with a Bachelor of Science in psychology. She completed her graduate training in child clinical psychology at Louisiana State University, receiving her Master of Arts degree in December 2009 and her Doctor of Philosophy degree in May 2014. Julia completed her pre-doctoral internship in rural integrated care at the Munroe-Meyer Institute, part of the Nebraska Internship Consortium in Professional Psychology. Her interests include factors related to risk and resiliency in youth impacted by trauma. She is currently seeking a postdoctoral position working with trauma-exposed youth.