

Studying Higher-Order Structure in the Characterization of Stressful Events

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Dedication

The author wishes to dedicate this dissertation to her friends and family for their love and support throughout her graduate school career.

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Abstract of Dissertation

Studying Higher-Order Structure in the Characterization of Stressful Events

A key predictor of children's mental health is stress. Research has used 4 different characteristics to describe the context of stressors: 1) independence/dependence, 2) domain, 3) type of threat, and 4) locus of event. These characteristics only have been examined separately. The degree of conceptual overlap between the 4 characteristics indicates the possibility of a higher-order structure. This dissertation examined if a) there is evidence of higher-order structure, b) it varies by individual characteristics, and c) it is stable over time, using data from a longitudinal study examining child and family adaptation following parental job loss. LCA was used to determine the higher-order structure. A 6-class solution provided the best fit. The 6 classes of events were 1) education, 2) health, 3) stressors within relationships, 4) loss of relationships, 5) happen to close ties, and 6) school relationships. The solution was not found to vary across SES, gender, age or ethnicity. There was partial but not complete replication across the two time points. A higher-order structure for stressful events should be examined in future research. These findings could help to integrate the stress and developmental literatures. Finally, this information could be used to design interventions to help children experiencing stress.

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Chapter 1: Introduction

This dissertation will examine if there is evidence of higher-order structure in the characterization of stressful events. In this section, I will begin by discussing the importance of studying the impact of stressful events on children's mental health and reviewing the definition of stressful events. I will then discuss how variation in the nature of the stressful context has been treated in past research. After reviewing the findings, I will present theoretical extensions of the literature and present an argument as to why there might be higher-order structure in stressful events. Finally, I will present my research questions.

Children's mental health impacts not only the child, but also the child's family, peers, and school. At least one in ten, or approximately 6 million, children and adolescents in the United States have a serious emotional disturbance. Because of this, children's mental health is a public policy priority (U.S. Department of Health and Human Services, 1999).

One key predictor of children's mental health is stress. Stress has negative effects on physical as well as mental health, and it has been linked to an increased risk for many forms of psychopathology including externalizing disorders (Goodyer, Kolvin, & Gatzaniz, 1986, 1987). The definition of what constitutes a stressor has varied tremendously in the literature. Definitions have varied in terms of the duration of the stressful context, the nature of that context, and the severity of exposure to that context. Three time scales are typically used in describing stressors. Brown and Harris (1978) defined a stressor as an event or situation lasting at least two weeks but no more than one

month, in which one is exposed to life changes involving significant negative consequences or the threat of those consequences. A second form of stressor, labeled hassles, are considered to be day to day events, such as having a flat tire or spilling coffee on one's clothes (Brown & Harris, 1978). The third category of stressors was labeled difficulties by Brown and Harris (1978). This encompasses more chronic, long-term stressors, such as poverty or ongoing chronic illness. Brown and Harris defined difficulties as occurring for at least a month. There is evidence that stressors measured at these different time scales may make somewhat independent contributions to psychopathology. For example, Serido, Almeida, and Wethington (2004) found that chronic stressors (difficulties) and daily hassles are distinct from one another and contribute uniquely to psychological distress. This paper will focus on life events, using Brown and Harris's definition of an event as some change in life circumstance that takes place within a two week period.

Variation in the Nature of the Stressful Context

Stressors occur in a wide range of contexts. While many investigators have simply added up counts of events across those contexts, others have identified specific dimensions or categories in an effort to characterize important variation in context. It remains an outstanding question as to the best way to describe this variation. In the following section, I will describe several methods in which this has been done and review research concerning whether or not these are truly independent ways of describing stressful contexts.

Traditionally, research has used four different characteristics for describing the context of the stressor: 1) independence/dependence, 2) domain, 3) type of threat, and 4)

locus of event. In the following section, I will discuss each of these four descriptions of stressful context in turn. First, I will define the term and how it came to be included in research, then describe the different methodologies used to study each context, and finally I will discuss the research relating each context to symptoms and outcomes. I will end with a discussion further clarifying the particular context and how the existing research might inform the organization and conceptualization of this description of the stressful context for future research. After discussing the four different descriptions, I will summarize the overall findings and pose possible theoretical extensions and future research questions to extend the research in this area.

Independence/dependence. The dimension of independence and dependence is used to better understand the extent to which an individual contributed a particular event's occurrence. An example of an independent stressor would be the death of a loved one. A dependent stressor might be a friendship ending or failing a test, where the individual likely contributed to some degree for the stressor's occurrence. Dividing stressors into independent and dependent events was originally done to better understand the etiology and maintenance of depression in adults through contextual threat (Brown & Harris, 1978¹). In order to understand how stressful events predict psychopathology, this distinction then was used to help differentiate between events that might have been caused by the psychopathology versus those that were independent of it. While studying adults' fateful life events, Shrout et al. (1989) examined the distinction between controllable and uncontrollable life events and their relationship with psychopathology. The dimension of controllability/uncontrollability is somewhat different than the

¹ As this paper is focused on the child and adolescent stress literature, the studies discussed focus on children and adults unless otherwise stated.

dimension of independence/dependence. For instance, it is possible to have an event that is dependent but would not feel “controllable,” such as a break-up with a significant other. This subtle difference in definitions represents an area where the literature is not consistent in use of terminology. Considered from a developmental perspective, as children grow older, they often seek new experiences and spend more time away from adult supervision. Therefore, adolescents have more opportunities to engage in activities (i.e., dependent events) that may lead to further stressful events.

Researchers have utilized a variety of methods to study the dimension of independence/dependence. Studies based on Brown and Harris’ (1978) LEADS system, which was created for use with adults, typically have raters code the dependence level of each event on a scale of 1 to 5, such that 1 represents an event that is completely independent and a 5 represents an event that is completely dependent (e.g., Rudolph & Hammen, 1999). Typically, an event that receives a score of 2 is partially independent, while a 3 is partially dependent and a 4 is moderately dependent. A dichotomous variable is then created where events coded 3, 4, or 5 are counted as dependent and those receiving a 1 or a 2 are coded as independent. Studies that rely on a checklist inventory of stressful events (e.g., Williamson, Birmaher, Dahl, & Ryan, 2005) often have a panel rate the events as either independent or dependent, again creating a dichotomous variable. It does not appear that researchers have used the dimension of independence/dependence as a continuous variable instead of a dichotomous variable.

Regarding its association with symptoms and outcomes, key research has been completed with adults and the relationship between independent and dependent events and depression. The reciprocal effects of dependent stress and depression have been

consistently demonstrated (e.g., Daley et al., 1997). This is known as the “stress-generation hypothesis” whereby individuals with depression influence the creation of future stressors which in turn can increase their level of depression. It has been shown that while both independent and dependent stressors increase the future level of depression, depression only impacts future dependent stressors (Daley et al., 1997).

More recently, this research has been extended to children and adolescents. Sandberg, McGuinness, Hillary and Rutter (1998) compared the incidence of both independent and dependent events in a sample that included clinically referred children, community controls, and children with chronic asthma (ages 6 – 16 years). Life events were measured using the Psychosocial Assessment of Childhood Experiences (PACE), a LEADS-inspired interview, and both the child and parent were interviewed. Both life events and chronic stressors were measured. Events were rated by objective raters for independence/dependence on a 4-point scale, where “independent” and “probably independent” were combined into one category and “dependent” and “probably dependent” were combined into a second category. After being rated, data from the parent and child interviews were combined for a “best-estimated” rating of the occurrence, timing, and impact of the events.

The results indicated that the children in the clinically-referred sample had experienced significantly more life events than either the control or asthma sample children. This was true for events independent of the child and family, events independent of the child but not the family, and particularly for events dependent upon the child’s behavior. A similar pattern emerged for chronic adversities, where the clinically referred population had more major adversities overall, and particularly more

dependent adversities. Adversities was the term used by Sandberg et al. (1998) and is the same as the term difficulties discussed earlier in this paper. A greater proportion of the clinically referred population's events were dependent (one-third) as compared to the other two populations (one-fifth of the control group and one-ninth of the asthma group). Age impacted the findings such that older children were more likely to experience more dependent events. These findings are consistent with the findings of Rudolph et al. (2000) regarding age and dependent stressors. SES impacted chronic adversities in that children whose parents were unemployed experienced more major independent adversities. These findings highlight the impact of stressful events in general and dependent events in particular on child psychopathology.

Williamson, Birmaher, Anderson, Al-Shabbout, and Ryan (1995) studied the relationship between independent and dependent life events and Major Depressive Disorder (MDD) in adolescents (ages 12-18). Both the adolescent and a parent were interviewed using the Life Events Record (LER), a checklist of stressful events. Only events of a negative nature were included in analyses. The authors rated the events as being either independent or dependent. Depressed adolescents were not found to differ overall in either the total number of stressful life events or the number of independent events experienced as compared to the control. However, depressed adolescents were more likely to experience more dependent life events than the control adolescents. These findings are somewhat different than the findings of Sandberg et al. (1998). The clinically-referred population in Sandberg et al's study (1998) included children with externalizing, anxiety, and co-morbid disorders. It is possible that stressful events differentially predict the different disorders, which was not examined in their analyses.

This could account for the discrepancy in the findings and suggests an area of further research. Additionally, depressed adolescents who reported one or more dependent life events were found to be less severely depressed than depressed adolescents with no dependent life events. This suggests that stress may impact one form of depression but is not the only cause of it.

Rudolph and Hammen (1999) studied both gender and age differences in a clinically-referred population of children aged 8-18 experienced stressors. Stress was measured using the Child Episodic Life-Stress Interview, which is based on the LEADS system. Parents and children were interviewed, and events were included from parent report only, child report only, and reported by both. Each event was rated for severity (1-5 scale, 1 = no negative stress/impact, 5 = severe negative stress/impact), dependence (as discussed above), and domain (six mutually exclusive domains: parent-child, family, peer, and other-interpersonal were all interpersonal, school and other-non-interpersonal were both non-interpersonal). The researchers created separate stress indices for dependent and independent events by summing the threat ratings across the relevant events, and they used the same method for each the six domains.

Both age and gender impacted the types of stressors one was likely to experience, such that adolescents experienced more stressors than pre-adolescents. Preadolescent girls experienced the highest levels of independent family stress and conflict, while adolescent girls generated the highest levels of dependent parent-child stress and conflict. Additionally, adolescent girls experienced the highest levels of both independent and dependent peer stress and conflict. In contrast, adolescent boys were most likely to create dependent noninterpersonal stressors. Overall, boys experienced more independent

noninterpersonal stress than girls. Girls were most likely to respond to dependent stress with depressive symptoms. There was a trend for depression to be associated with dependent stressors (especially noninterpersonal) in preadolescence, whereas independent stressors (particularly interpersonal) were found to be related significantly to depression in adolescence. There was a negative association between anxiety and dependent noninterpersonal events for both boys and adolescents, which suggests that higher anxiety levels may protect children from engaging in externalizing behaviors that might generate further stressors. These results demonstrate that teasing apart both the dependence of the stressor as well as the domain might be helpful in understanding further the cause of children's symptoms and behaviors.

A study conducted by Rudolph et al. (2000) examined stress-generation in a developmental context using the Child Episodic Life-Stress Interview. The children in the clinically-referred sample ranged in age from 8-18 years. Stressors were rated for dependence and severity using the same methods as Hammen and Rudolph (1999); however domain was coded as either interpersonal or non-interpersonal. Chronic stress was captured using the Chronic Stress Interview for Children. The results revealed that both depression and externalizing behavior were linked with self-generated (e.g., dependent) stress; additionally, there was specificity of both predictors and outcomes. Neither depression nor externalizing behavior was related to independent stress levels. Depressed adolescents experienced significantly more dependent events than did depressed pre-adolescents. Children with comorbid depression and externalizing experienced the highest levels of stress. Using independence/dependence as a dimension of stress helps to predict differentially depression and externalizing behavior.

Williamson et al. (2005) studied anxious, depressed, and control children (6-12 years) to determine differences in the occurrence of stressful life events. Data regarding life events was collected from one of the child's parents using the Life Events Record (LER), a checklist of stressful events that the child might have experienced over the past year. Events were parsed further into dependent and independent events by an objective rater, and were also rated for loss. Depressed children were more likely to experience stressful life events as compared to both anxious and control children; this was particularly true for independent events. Specifically, independent loss events occurred much more frequently in depressed children as well. The results of Williamson et al. (2005) are not consistent with those of Rudolph et al. (2000) with regards to the type of events (independent or dependent) most often experienced by depressed children. If the children in Williamson et al.'s (2005) sample were referred recently because of their symptoms, they might not have begun to create dependent stressors for themselves. In addition, the children were younger and therefore potentially less likely to create dependent stressors for themselves, which fits with the findings of Rudolph and Hammen (1999). An alternative explanation is that because stress was measured by checklist instead of a contextual interview, it was harder to divide stressors into independent or dependent events accurately.

Using independence/dependence as a method of categorizing stressful events has shown substantial promise in capturing variation that is relevant for understanding the effects of stressors on psychopathology. Reviewing these studies helps identify methodological questions in studying independence/dependence. The dimension of independence/dependence is also referred to as controllability (Shrout et al., 1989); this

can be problematic for researchers due to the lack of consistency in terms. All five of the studies pertaining to child stress made independence/dependence a dichotomous variable; however, both Rudolph and Hammen (1999) and Rudolph et al. (2000) originally rated this dimension on a 5-point scale and Sandberg et al. (1998) used a 4-point scale. It might be interesting to see if there were different results when independence/dependence were treated as a continuous variable with all 5 levels included in analysis. The method used to determine stressful life events could potentially impact the rating of independent/dependence as well. The two Rudolph et al. studies (1999, 2000) examined the relationship between independence/dependence and domain, while Williamson et al. (2005) found a relationship between both independence/dependence and type of threat with their impact on symptoms. While the results of these two studies suggest an interaction between independence/dependence and other dimension of stress, no formal test was conducted. The Sandberg et al. (1998) and Williamson et al. (1995) studies focused solely on independence/dependence, likely because they were pioneering studies in this area. Research in this area traditionally has focused more on depression than externalizing behavior, most likely as an outgrowth of the adult findings. Disruptive behavior is the most common reason that children are referred for mental health services, and, therefore, examining the impact of stress on externalizing behavior could help to clarify the etiology and maintenance of externalizing behavior.

Domain. Domain refers to the area of life in which an event occurs (e.g., school, home, work), and it was originally included in the research of stressful life events as another means to understand context (Brown & Harris, 1978). Practically, domain represents a means of dividing the world into reasonable settings about which one could

inquire. Domain tends to include the areas of physical safety, and interpersonal and economic stressors. Theoretically, domain plays an important role as well. Hammen and Rudolph (1996) discuss interpersonal theory, which postulates that stressors impact interpersonal relationships, which then impact mental health. It has been demonstrated consistently that stressors in the interpersonal domain predict depression (Daley et al., 1997). When considering research with pre-adolescents and adolescents, it has been noted that female friendships are characterized by higher levels of intimacy and disclosure than male relationships (Berndt, 1982). Previous research also indicates that while girls are more likely to be impacted negatively by interpersonal events, boys are more likely to be impacted negatively by events in the school domain (Larson & Ham, 1993). These findings suggest the domain could have differential effects by gender.

Regarding methodology, the LEDS includes 10 domains, while other instruments vary in the number of domains included. Sometimes the domains are more finely parsed. For example, interpersonal stressors may be further sorted into those involving family, peers, or parent-child interaction (Rudolph & Hammen, 1999). In other cases, domains are defined more broadly, such as defining an event only as interpersonal or non-interpersonal (Rudolph et al., 2000). The decision about which domains to include can vary depending on the participants involved in the study. For instance, school-related stress may be more relevant for children while work-related stress is likely more relevant for adults.

As mentioned earlier, Rudolph and Hammen (1999) studied the transactional nature of stress and the impact of stress and gender. Regarding the findings related more specifically to domain, there was not a significant difference in the overall number of

stressors experienced by either gender. However, girls experienced more interpersonal stressors and boys experienced more non-interpersonal stressors. This tendency increased with age within each gender (e.g., adolescent girls were more likely than pre-adolescent girls to experience interpersonal stressors). Depression was most strongly related to interpersonal conflict for girls. The other findings that integrated dependence and domain were reviewed earlier, and involved further analyses regarding domain beyond the more rudimentary interpersonal versus non-interpersonal distinction.

Rudolph et al. (2000) examined the impact of domain in addition to the effects of the dependent nature of the event. Domain was divided into either interpersonal or non-interpersonal events. The methods of the study and the results pertaining to independence/dependence were reviewed earlier. Both depression and externalizing were related to dependent events, while neither was related to independent events. When examining the impact of domain, it was found that depression was related to interpersonal episodic and chronic stress while externalizing behavior was related to noninterpersonal episodic and chronic stress. Noninterpersonal chronic stress focused on events in the school domain. The domain of the stressor clearly impacted which outcome (depression vs. externalizing) is most likely to result.

Little and Garber (2004) examined the influence on interpersonal and achievement orientations and stress on depressive and aggressive symptoms in a longitudinal study of middle-school students. The students' mean age was 11.8 years, and all the children were entering either eighth or ninth grade. Stressors were measured using a school-hassles questionnaire. Summed stressor-scores were computed for the peer and academic domains. For girls in the sample, those with a high achievement orientation

showed higher aggression when academic stress increased, while girls with low achievement orientations showed less aggression when academic stress increased. For boys, regardless of achievement orientation, as academic stress increased so did aggression. Both boys and girls with high achievement orientations reported increased aggression when they experienced peer-related stress. Peer-related stress also led to increased depressive symptoms particularly for females with high interpersonal orientations. Increased academic stress was linked to increased depressive symptoms in all girls. These findings suggest gender as well as personality differences impact the experience of aggressive and depressive symptoms in the face of peer and academic stressors.

Liu et al. (2000) studied the relationship between life events and behavior problems in Chinese adolescents (ages 12-18). The Adolescent Self-Rating Life Events Checklist (ASLEC) was used to measure stress. For all items checked, the adolescents then rated the stressfulness of the event on a 5-point scale. A sum score was created as a measure of total stress intensity. Life stress was converted to a categorical variable with three categories (low, medium, and high) for analyses. The risk of engaging in externalizing behavior increased as the life-stress score increased. Stressors in the interpersonal and academic domain significantly increased the risk for externalizing behavior. Since depressive symptoms were not measured, it is unknown how they would have been impacted by these same stressors.

Using domain as a method of categorizing events successfully captures variation and helps predict psychopathology. Considering these articles together helps synthesize current findings regarding the relationship between domain of stress and symptoms and

guide ideas for future research. For children, it is logical that the majority of their stressors would fall into either the academic or interpersonal domain. However, these are crude distinctions to make when analyzing the data. Based on the findings of Rudolph and Hammen (1999), it might prove helpful to break the interpersonal domain into the smaller categories of peers, family, parent-child, and other. Stressors within the non-interpersonal domain are typically defined as academic or other. It might be interesting to further parse the types of academic stress to see if different types of academic stressors lead to different symptoms. For instance, failing on a test could be related more to depressive symptoms, while being suspended could be related more to externalizing. In addition, stressors may fit in more than one domain (e.g., severe conflict with a teacher could be placed in both the school and interpersonal domain).

Type of goal threat. Type of goal threat emerged as a specific stressful context based on Lazarus' (1966) research with adults, who stated that when an individual encounters a potentially stressful event, there are three levels of appraisal. The first level of appraisal is to determine if a situation disrupts the achievement of one's goals, thus rendering it a stressful situation. The secondary appraisal consists of the attributions one makes and expectations one has while determining the best course of action to take. The third level is the mutual influence of coping and appraisal on each other. Type of goal threat is related to these first two levels of appraisal. The types of goal threats identified as being particularly stressful for adolescents include relational threat, personal loss, and health threat (Garnefski, Boon & Kraaj, 2003). Using a sample of adult women, Hudek-Knezevic and Kardum (2000) found that the appraisal of the threat better predicted the

type of cognitive coping strategy than the appraisal of the controllability, and cognitive coping strategy was significantly related to depressive symptoms.

Brown (1989), in studying stressful life events experienced by adults, identified 15 different event types, including loss, danger, trauma, challenge, and goal frustration. The different types were posited to be related to a specific emotional response for each type. In the LEDDS, independent raters code each event by type. Other studies vary in the threat types they choose to include. For instance, Sandler, Reynolds, Kliwer and Ramirez (1992) chose to include only conflict and loss. The types of goal threat included in a particular study might depend on the sample being used and the research questions at hand. Sandler et al. (1992) studied children from divorced and bereaved families; thus, loss and conflict were the threats most likely to be encountered. Some studies have rated the level of each type of threat. Kendler, Hettema, Butera, Gardner, and Prescott (2003) included four types of threat (loss, humiliation, entrapment, and danger) and each was rated on a 5-point scale where 0 equals no threat and 4 represents a severe threat. These ratings were treated as continuous variables. Coding the level of each of these threat types allows for a more specific and rigorous analyses than coding threat as a dichotomous variable (i.e., experienced threat or not). It also allows for more complexity in the coding of a particular event. The Kendler et al. study (2003) was based on the LEDDS method, and therefore there was a rich description of each event from which to base the ratings. In contrast, Sandler et al. (1992) used a checklist method to identify stressful events.

Research on threat type in the adult tradition has focused more on internalizing disorders. Finlay-Jones and Brown (1981) examined how loss and danger, measured

contextually, differentially predicted symptoms in women. They found that severe loss events predicted depressive symptoms while severe danger events predicted anxiety symptoms. Women who experienced mixed depression/anxiety were more likely to have experienced both types of events. Kendler et al. (2003) also examined the impact of different types of events, measured using a LEDES-based system, on generalized anxiety disorder (GAD), major depression (MD), and mixed episodes of MD-GAS. They found that both MD and mixed MD-GAS were best predicted by higher reports of experiencing loss and humiliation, while GAS was best predicted by higher reports of loss and danger. MD-GAS was predicted by high reports of entrapment, and MD was predicted by death and respondent-initiated separation. When loss events were combined with humiliation, they were more likely to be depressogenic than pure loss. No sex differences emerged in the findings. Results such as these sparked further interest in studying similar relationships between threat type and outcomes for children and adolescents.

Sandler et al. (1992) studied the relationship between separations and conflicts and their ability to predict differentially symptoms in children. Children in the sample, aged 8-16, had experienced parental death, parental divorce, or asthma or were in the comparison group who had not experienced one of these events. Stress was measured using the General Life Events Schedules for Children (GLESC), a checklist measure. Children reported both the occurrence of the event in the past three months, and if it had occurred more than usual, the same, or less than usual over the past three months. Objective raters coded the events as either conflict or loss events, and sum scores were created for conflict and loss events.

Children who experienced conflict events were more likely to display externalizing behaviors, but were not more likely to experience depression, while separation events were significantly related to depression but not externalizing behavior. These findings were significant for bereaved children, while only the relationship between conflict and externalizing was significant for the control group. However, for the children who experienced divorce, conflict events predicted depressive symptoms and separation predicted externalizing symptoms. The divorce findings are particularly intriguing, and highlight the importance of how children interpret events that occur in their lives.

Williamson et al. (2005) studied the occurrence of stressful life events in depressed and anxious children, as discussed previously. Events that were independent of the child's behavior and characterized as loss events occurred more often for depressed children. Depressed children experienced more stressful life events than either control or anxious children. This was particularly true for females.

Threat is a useful method of categorizing types of events as it captures variation and predicts psychopathology. Taken together, these studies help provide an understanding of the current state of research using threat as a context. While there is a plethora of evidence linking type of event to different symptoms, the research is not always consistent. This could be due to the different types of children included in the samples. Also, researchers often only look at certain constellations of symptoms in their study (i.e., conduct disorder, anxiety) as well as certain types of events, which makes it harder to compare results across studies. Both Williamson et al. (2005) and Sandler et al.

(1992) used checklists to measure stress. Using a more contextual measure of stress might have helped to better explain their findings.

Regarding ideas for future research, a number of questions arise based on these findings. While Williamson et al. (2005) included independence/dependence as a measure in their study, the other researchers discussed above did not utilize any of the other contexts in addition to threat. Independent and dependent events could interact with threat type to differentially predict symptomatology. In addition, the line between domain and threat type is somewhat hazy. It is possible that studies focusing one or the other are capturing theoretical overlap between these two contexts. For instance, interpersonal events and loss are measuring similar contexts, as both tap into relationship threat. Alternatively, it could be that including both domain and threat type allows for a more precise understanding and prediction of the impact of different stressors on symptoms. For example, loss in the parent-child domain could lead to different symptoms than loss in the peer domain. Direct tests of this thesis would require rating each stressor in terms of both threat and domain, and then testing whether these two factors interact to predict outcomes. I was unable to find any studies to date that have conducted such tests.

Locus of event. Locus of event describes to whom the stressful life event occurred. In adult research, event locus is typically separated into self or other. However, research with children has demonstrated that events that happen to their parents often impact symptoms as much as do events that happen directly to the child (Williamson et al., 1998). While this has been identified as a fourth context of stressful events, little to no research has been done in this area, even though Brown and Harris's original coding system for the LEDDS included rating of locus of event. Some events may have a direct

impact on both: for example, economic stress is primarily a stressor for the parents, but it can also have direct effects on the child. However, studies that impact family-levels and family adversity typically do not allow us to distinguish between child- and other-level stressors. Since there is little research regarding event locus, I will review articles that have focused primarily on the impact of family-level stressors, specifically family adversity, as these are the most relevant to locus.

Patterson (1987) posited a model through which family stress impacts the development of antisocial behavior. The family environment was a significant factor in the development of these behaviors. In particular, when families were stressed, parenting skills were disrupted. The disruption in parenting was then linked to more problems with parental discipline, thus increasing the likelihood of antisocial behaviors occurring due to coercive family patterns. This model was replicated with samples of seventh graders (median age of 12.4) in Oregon and Iowa (Conger, Patterson, & Ge, 1995).

Conger, Ge, Elder, Lorenz and Simmons (1994) studied the impact of economic stress on coercive family processes and their impact on adolescents' symptoms (seventh graders, median age = 12.4). The sample included a sufficient range of economic status to test hypotheses. Economic pressure was directly related to parent-adolescent financial conflict. Marital and financial conflict were significantly related to parental hostility towards the child. Parental hostility then increased the risk of both internalizing and externalizing symptoms for the child.

The impact of family-level adversity on the child's mental health was examined by Wickrama, Conger and Abraham (2005). The longitudinal study included measures of family adversity during the child's adolescence as well as measures of various disruptions

and symptoms during the transition to adulthood for the same children (seventh graders, median age = 12.4 at T1). Stressful events were measured using a checklist method, and a sum score of events was created. Two-parent families experienced less stressors than did divorced, single-mother families. In addition, households in which the adults were more educated and earned a higher income experienced fewer stressful events. Family adversity was predictive of a disrupted transition to adulthood, which was significantly related to concurrent psychopathology. Physical illness during the transition predicted psychopathology in young adulthood. Physical illness, psychopathology, and disrupted transition to adolescence all predicted young adult adversity as well. These results highlight the impact family-level stressors can have on a child's symptoms over time.

Grant et al. (2003) used meta-analytic methods to test a mediational model in which negative parenting mediates the relationship between economic stressors and child psychopathology. The studies included in the analyses were both cross-sectional and longitudinal. This model was generally supported by the analyses. However, for the model of the total sample, the best fit included a direct pathway between poverty and internalizing symptoms. The best fit for the longitudinal subsample included a direct pathway between poverty and externalizing symptoms. Gender acted as a moderator, such that the relationship between poverty and negative parenting was stronger for boys, while the association between negative parenting and internalizing was stronger for girls.

These studies highlight that event locus has not been included in many studies. However, family-level stressors, such as poverty, can be considered within this framework. It is logical that family-level stressors would impact the child even though they are not a self-locus event. It has been consistently demonstrated that there is a

relationship between family-level adversity and child symptomatology. In addition, family-level adversity has been shown to disrupt parenting, which then impacts child symptoms as well. While family adversity has been shown to predict negative mental health outcomes, the methods used in the studies reviewed above do not capture enough information to truly allow us to determine the locus of these events. This is an example of the methodological issue of intracategory variation, which will be discussed in greater detail later in the paper.

There is much room for future research in this area. It would be possible to categorize events as self-locus, family-locus, and other-locus and then examine if these categories differentially predict child symptoms. In addition, there is potential theoretical overlap between independence/dependence and event locus. It is conceivable that the two dimensions are capturing similar processes, such that family-locus and other-locus events are all independent events. In this case, however, self-locus events could be further broken into independent and dependent events and may have differential effects. There is also some theoretical overlap between events in the family domain and family-locus events.

Theoretical Extensions

As discussed in the preceding section, a number of studies in the literature reviewed above utilized more than one of the four ways of characterizing stressors. Independence/dependence has been studied in combination with both domain and threat type. Domain was primarily studied in relation to independence/dependence. Threat type was typically studied on its own, but Williamson et al. (1995) examined the relationship between threat type and independence/dependence. Locus of event has been

studied the least, and it has not been studied in relation to the other ways of characterizing stressors. Of the studies that examined more than one way of characterizing stressors, all of them had significant findings regarding the combinations of stressors and their ability to predict outcomes. No studies were found that examined all four contexts.

It is unclear if these four different contexts are independent or whether they are highly associated with one another. There is some degree of conceptual overlap that would indicate that they would be associated with each other, which would indicate that creating higher order groups would be very useful in characterizing the nature of stressful events. There is a great deal of theoretical overlap between interpersonal events and dependent events. In part, this is a definitional issue; many coding manuals specify that any interpersonal event should be coded as dependent (e.g., the LEDDS and CASEC) (Brown and Harris, 1978; Howe, 2006). It is therefore difficult to untangle which of the two factors contributes more to any given outcome. Following similar logic, there is also theoretical overlap between non-interpersonal events and independent events.

Independence/dependence has similarities to threat type. Coping strategies are based on the goals one perceives as threatening. An event's dependence or independence might impact the type of threat one perceives and how one chooses to cope with it. One might perceive a health threat as being more dependent and therefore adopt more active coping measures. Alternatively, a threat that is more independent, such as loss, might lead to more passive coping measures since the individual would perceive they cannot change the situation itself. These different coping strategies might serve as mediators for various outcomes. This is an example of co-occurrence.

Locus of event also overlaps theoretically with independence/dependence. Locus is divided into events that are self- or other-focused. By definition, events that occur to others are much more likely to be independent. However, self-focused events could be either independent or dependent. There is merit in utilizing both forms of descriptions for events as it provides a more complex understanding of an event and might predict outcomes differentially.

It is also conceivable that there is conceptual overlap between threat type and domain type. For example, events that represent an achievement threat would more conceivably occur in the school or employment domain. Events characterized by loss threat are most likely to occur in the interpersonal domain. While there is overlap between threat type and domain type, it might still be useful to have both distinctions to better understand the configurations of stressors that best predict certain outcomes.

Domain type and locus of event may co-occur as well. Events that are interpersonal in nature would be coded as self-focused since they, by definition, involve the self and another person. Non-interpersonal events could be either self- or other-focused.

Finally, threat type and event locus may also co-occur. Loss events are more likely to be other-focused since the loss is related to losing someone else. Health threats could be self- or other-focused. A sick parent would definitely constitute a stressor for a child. Achievement threat type events are more likely to be self-focused since someone else's achievement frustration is probably not as stressful.

There are multiple contexts of stressors. Another question to ask is whether each context contributes independently, if there are more complex interactions, or if there are

unique factors. Regarding the literature, with these questions in mind, I looked first to see whether the study examined more than stressor. The next question is the type of analysis performed to study the relationship between the categories. The different possibilities include looking at 1) correlations or associations between the different types of stressors, 2) similar main effects on outcomes, 3) interactions among different constructs in predicting outcomes, and 4) analysis of higher order structure across these constructs, including factors, clusters, or latent classes. At this time, no studies have been done that look at interactions among these constructs or attempt to study higher order structure.

The majority of the 12 studies reviewed earlier only looked at one context of stressor and therefore the type of analysis used to examine the relationship between contexts was not applicable. Table 1 provides a summary of the studies included in the literature review, the age range of their sample, and the stressful contexts included. Of the studies examining more than one factor, none examined main effects or clusters. Only Rudolph and Hammen (1999) examined the correlations between the different types of stressors. Total dependent stress was significantly positively related [$r(47) = 0.67$, $<.0001$] to interpersonal conflict stress. Interpersonal conflict stress was also significantly positively correlated [$r(47) = 0.28$, $p < .01$] with total independent stress. Significant relationships were not found between independent and dependent stress. The interactions conducted did not cross the different types of stressors with each other, but looked at the relationship of age and gender with the different stressors (e.g. age x gender x dependent interpersonal stress). No other studies examined associations among any of these constructs.

Table 1

Summary of Age Range, Stress Dimensions, and Data Analysis Characteristics in Literature Review

Study	Age Range (years)	Stress Dimensions Included			
		Independence/dependence	Domain	Threat	Locus
Rudolph and Hammen (1999)	8-18	X	X (parent-child, family, peer, other-non-interpersonal, academic, and other non-non-interpersonal)		
Rudolph et al. (2000)	8-18	X	X (interpersonal vs. not)		
Williamson et al. (2005)	6-12	X		X (loss)	
Sandberg et al. (1998)	6-16	X			
Williamson et al. (1995)	12-18	X			
Little and Garber (2004)	Mean = 11.8, entering 8 th or 9 th grade		X (peer and academic)		
Liu et al. (2000)	12-18		X (interpersonal and academic)		
Sandler et al. (1992)	8-16			X (separation and conflict)	
Conger, Patterson, and Ge (1995)	7 th grade, median age = 12.4				X
Conger, Ge, Elder, Lorenz and Simmons (1994)	7 th grade, median age = 12.4				X
Wickrama, Conger and	7 th grade,				X

Abraham (2005)	median age = 12.4	
Grant et al. (2003)	Meta- analysis	X

Based on the findings in the literature review, it appears feasible that there could be sufficient overlap to reflect some higher-order structure. Many of the categories appear to overlap by definition; however, each of the four descriptions may also provide a more nuanced understanding of the character of any given stressor. At this time, it is difficult to place these clusters in a strong theoretical framework; although, it is possible to examine how the various contexts divide and hang together to form factors. These factors may help us later to understand better the relationship between stressors and outcomes.

Based on the studies reviewed earlier, the following stressful contexts predict externalizing behavior: noninterpersonal events (especially academic), family-focus stressors, parental death, family financial adversity, conflict, academic events, and interpersonal events. Three possible factors that might emerge from these findings are 1) academic/noninterpersonal, 2) conflict, and 3) family level. Academic/non-interpersonal stressors could include dependent, self-focused events. Conflict related stressors would be interpersonal, dependent, and both peer- and family-related. Family level stressors could include the death of a parent, family adversity, family conflict, family-focus, independent events.

Events that were found to predict depression include: interpersonal, dependent events, independent events, loss, parent death, separation, family financial adversity, and humiliation. Two possible factors that emerge are interpersonal and family level. The

interpersonal cluster could include both dependent events and humiliation. Family level stressors might include loss, death of a parent, separation, and family adversity.

Fewer studies included anxiety as an outcome measure. Anxiety was found to be predicted by loss, danger, and family financial adversity. Both loss and family financial adversity could be categorized as family-level stressors.

Based on the literature, it appears that further research regarding higher order constructs for different ways of measuring stress would add to the knowledge base in this area. In order to study the higher order constructs, it is important to determine the best methods for capturing data regarding life events. Research regarding the impact of experiencing stressful life events has typically relied upon checklists to produce a count of the number of stressful events experienced (Dohrenwend, 2006). This tradition began in 1967, when Homes and Rahe published the Schedule of Recent Experiences (SRE), a checklist of 43 events. While research using checklists has provided useful information about the impact of stressful events on psychopathology (Goodyer et al., 1986, 1987; Frank et al., 1996), the downside to using checklists is the ability to accurately categorize stressors. Because checklists typically include broad categories of events, people vary greatly in the information they use to decide whether or not they have experienced a stressor within a particular category, thus making the results more subjective (Rudolph et al., 2000; Dohrenwend, 2006).

An alternative method to checklists was developed by Brown and Harris (1978) in their Life Events and Difficulties Scales (LEDS) system. The LEDS system focuses on the context in which the event occurs in order to help determine the meaning of these events for the individual by collecting data using an intensive interview process as

opposed to using a checklist. It focuses on events that occurred in the past year. Objective raters then score the event for contextual threat, comparing each event to an established dictionary of events. Threat is rated on a 4 point scale based in part on how normative the event is. Because the LEDS collects detailed descriptions of each event, it is possible to rate each event in terms of other characteristics as well. As noted above, investigators have developed rating systems for each of the four characteristics of stressors and have successfully applied them to LEDS data. The current study utilizes data collected by a method inspired by the LEDS and modified for use with children and adolescents in order to help address the problems of intracategory variability.

Research Questions

- 1) Is there evidence of higher-order structure when the four stressor constructs are considered together?
- 2) If there is evidence of higher-order structure, is it stable or does it vary across gender, age, ethnicity, or SES of the child?
- 3) Is there evidence that any pattern of higher-order structure found in the first wave of data will replicate in the follow-up data collected one year later?

Chapter 2: Methods

Participants and Procedure

This study utilizes data from a longitudinal study examining child and family adaptation following parental job loss. A complete description of the study methods can be found in Howe (2006). A summary follows. The sample was recruited by contacting randomly selected individuals who applied for unemployment insurance within the state of Maryland. Families were sampled from nine counties, including suburban and urban areas (Baltimore City, Baltimore County, Montgomery County, Prince George's County, Anne Arundel County, Howard County, Frederick County, Carroll County, and Harford County). Families were sampled based on information from the Maryland Department of Labor, Licensing, and Review (MDLLR). During the period of recruitment MDLLR received between 1337 and 2934 weekly applications for unemployment insurance (UI) from recently unemployed workers in these counties. MDLLR provided the project with weekly lists of all applicants who had applied for unemployment insurance four weeks earlier. A randomly selected subset of these applicants received letters describing the study and soliciting participation. Those who were interested in participating returned a post card or called to express their interest.

Sampling procedures. Interested participants were contacted by an interviewer who administered a brief standardized screening questionnaire over the telephone to determine whether the job seeker and his or her family met eligibility criteria. These criteria included the requirements that the job seeker have a child living in the household who was between 9 and 14 years of age, was laid off from work within a specific time frame, and was able to speak English well enough to participate in the study.

Over the course of the study 2910 families indicated interest in the study. Of this original number, 491 were deemed eligible and were still interested in participating in the study when recontacted. Those cases were assigned to interviewers for data collection.

Field interviewers contacted those 491 families by telephone and described the study and its procedures in greater detail. They determined whether one or two parents in the family were eligible to participate, using the criteria in Table 2.

Table 2

Criteria for Determining Parent Participation in Project

Family Composition	Data Collection Procedures
Child ~ Job Seeker ~ Partner/Spouse (child living with JS & partner/spouse at least 1 year)	All 3 members must participate; regular data collection procedures
Child ~ Job Seeker ~ Partner/Spouse (child living with JS at least 1 year; child living with partner/spouse more than 6 months, but less than 1 year)	All 3 members are strongly encouraged to participate; will remain a case if Partner/Spouse decides not to participate; regular data collection procedures
Child ~ Job Seeker ~ Partner/Spouse (child living with JS at least 1 year; child living with partner/spouse less than 6 months)	Only Child & Job Seeker participate; modified data collection procedures (i.e., Session 2)
Child ~ Job Seeker (child living with JS at least 1 year)	Child & Job Seeker participate; modified data collection procedures (i.e., Session 2)

Table 3 describes the final status of all cases assigned to field interviewers. Field staff were unable to contact or interview almost 40% of the eligible cases before the time limit expired, and a small percentage were also found to be ineligible when interviewers reviewed eligibility criteria another time. Around 10% had a family member who refused

to participate, and another 8% agreed but decided not to continue after participating in the initial interviews. A total of 203 families completed all T1 procedures.

Table 3

Final Status of Cases Assigned to Field Staff

Status	N	% of total
Unable to contact or interview before time limit	193	39.3
Ineligible on closer inspection	7	1.4
Contacted, refusal by one or more family members	47	9.6
Death or incapacity of member since screening	3	0.6
Agreed, but broke off during interview period	38	7.7
Completed T1 interviews	203	41.3

After enrolling in the study, parents and children were interviewed in their homes and completed a set of study questionnaires as part of the first (T1) assessment. Families also identified two of the child’s teachers, and these teachers were sent questionnaires to assess current child functioning. Families were contacted three times across the next 18 months. Six months after the initial interviews were completed, parents and teachers completed a subset of the original questionnaires about the child’s functioning (T2) and returned them by mail. Twelve months after T1, the family was again contacted and participated in both in-home and telephone interviews (T3). Eighteen months after T1 initial interviews, parents and teachers were again sent questionnaires and returned them through the mail (T4). This study used data from T1 and T3.

Measures

Instruments used in this study included a structured interview with the parents and children at T1 and T3.

Demographic variables. The initial structured caregiver interviewer collected information on current family monthly income, the child’s race/ethnicity, and the child’s

birth date. Income was converted to monthly household income as it was provided as weekly, monthly, or yearly salary. Child's race/ethnicity was based on parents' ethnicity and was categorized as White, African-American, or Other because of the small number of other ethnic groups participating. The child's age was calculated at the time of the initial interview and converted into a whole number.

Descriptives. The final sample at T1 contained data from 203 families with ratings on 1735 total events. Of these 203 families, 110 of the target children were males, and 93 were females. The age of the children ranged from 8- to 15-years-old, with a mean age of 11.3 years ($SD = 1.7$). Regarding ethnicity, 84 of the children were Caucasian, 93 were African-American, and 25 children belonged to other ethnic groups. Of the sample, 18 children had data present for both parent's ethnicities and were biracial. In this case, the child was assigned the ethnicity of the mother. The average education of the parents was used as a proxy for socio-economic status (SES), and ranged from 8 to 20 years of education, with a mean of 14.2 years of education ($SD = 2.2$). There were 104 two-parent families in the sample, and 99 single-parent families. Results from the Teacher Report Form (TRF) were used to determine the range of psychopathology in the sample. Teachers completed the TRF for 134 children in the sample. The TRF was only completed for a subset of the children in the sample because not all of the teachers returned the form; however, the teachers for each child in the sample received the form. The t-scores for the internalizing and externalizing totals were used. A t-score of 60-63 (84th to 90th percentiles) is in the borderline range, while a t-score greater than 63 falls in the clinical range for both the internalizing and externalizing total scores (Achenbach, 1991). In this sample, the range of internalizing t-scores on the

TRF was 36-73, with a mean of 52.2 (SD = 8.5). Seven percent of the sample had t-scores above 63; a regular sample, by definition, would have ten percent in the sample above 63 because a t-score of 63 represents the 90th percentile. For externalizing behavior, the range of t-scores, according to teacher report, was 39-77, with a mean of 53.6 (SD = 9.1). Fifteen percent of our sample had t-scores over 63, which is somewhat higher than an average sample. The results of the TRF indicate that the sample's distribution of psychopathology is comparable to that of a general community sample for both internalizing and externalizing behaviors.

Stressful events. The Contextual Assessment of Stressful Events in Childhood (Howe et al., 2004) is a semi-structured interview and rating system that includes a number of components: Basic Principles Manual; Parent Version of the CASEC Life Events Checklist; Parent Version of the CASEC Structured Interview Protocol; Child Version of the CASEC Life Events Checklist; Child Version of the CASEC Structured Interview Protocol; CASEC Events Dictionary, and CASEC Rating software. This system was based upon several earlier systems designed for the contextual assessment of stressful events (e.g., Brown & Harris, 1978). The CASEC incorporates materials from the adult Life Events and Difficulties Scales (LEDS), the adolescent version of the LEDS, and the Psychosocial Assessment (PACE) (Frank & Birmaher, 1997; Sandburg et al., 1993).

In this study, the CASEC system was applied in the following way. Interviewers first administered the CASEC Life Events Checklist to both parents and target children. The events in this checklist were designed to provide initial information about potentially stressful events covered by the more extensive CASEC interview. The interviewers then

identified all events that were endorsed by at least one family member. These events were then used to select the module of the CASEC interview that covered this type of event. This system was used to streamline the CASEC interview by eliminating modules that were not relevant for a particular child. A number of modules were not “gated” in this way, but were always administered. These included modules relating to Employment events, and events involving Parent-Child issues.

Interviewers were trained extensively in the use of the CASEC system prior to beginning data collection. The CASEC integrates both structured and semi-structured interview formats, allowing the interviewer to determine whether a particular domain of events is relevant for a child prior to collecting information about the child’s unique circumstances surrounding events in that domain. In addition, the interviewers utilized calendar methods in order to date specific events.

Each of the interviews was audio-recorded. After the interview was complete, interviewers reviewed these recordings and extracted information about each event described. This information was used to write a brief description of the essential elements of that event. Interviewers then used the CASEC events dictionary, coded the descriptions on a number of dimensions included focus (to whom the event was occurring), type of threat, and level of threat both at the beginning of the event and across a two week period following the initiation of the event. The CASEC dictionary provided baseline ratings for prototype events in each domain, as well as rating modifications and example events. Ratings of level of threat were based on a 4-point scale, where 4 equals minimal, 3 equals some, 2 equals moderate and 1 equals severe. The current study included stressful events with an immediate rating of a 2 or 1 given prior research

indicating that the more severe events have been associated with predicted psychopathology in adolescents (e.g., major depressive episode). Litvinov (2007) examined the extent of overlap in ratings of the same event and determined a system for which rating to use in case of overlap. In the case of report by more than one person, the higher rating was used because it provided more detail about the context of the event. When the event was rated by a parent and a child, the date from the parent report was always used because it was thought to be more reliable.

These events were coded for independence and dependence by a separate team of trained raters. Coding of the stressful life events for independence/dependence ratings was conducted utilizing “General Principles for Rating Dependence/Independence” (Howe, Kelley, Umylny, & Weiss, 2003). Ratings are based on an ordinal scale (ranging from 1 to 5) with a rating of 1 indicating that the event was totally independent of the child’s behavior and a rating of 5 reflecting that the event was totally dependent on the child’s behavior. When rating complex events (where various characteristics of one event lead to different ratings), raters always included the rating that reflected greater dependence on the child.

Research assistants conducted coding of stressful life events for independence/dependence ratings. Initial inter-rater reliability was established on selected life event data with a reliability rating of at least .80. After initial adequate inter-rater reliability was established, biweekly gold standard meetings assessed inter-rater reliability throughout the rating process. All gold standard reliability was above .80. For this study, events will be dichotomized into independent (score of 1 or 2) or dependent (score of 3-5). This variable then becomes an ordered categorical variable.

Domain type was assigned by the interviewer based on the extraction and using the CASEC events dictionary. There were 12 possible domains from which to choose: 1) education, 2) work, 3) reproduction, 4) housing/residence/neighborhood, 5) finances/possessions, 6) crime/legal, 7) health, 8) romantic relationships, 9) parents, 10) friends/peers/leisure, 11) other relationships, and 12) pets/death/miscellaneous. From here, each domain (e.g., education) is further divided into subdomain (e.g., start or change school) and each subdomain included one or more prototype events (e.g., child returns to same school). The prototype events included in the dictionary were chosen because they represent the most commonly occurring events. For the purposes of this study, I will focus on primary domain as a conceptual means to organize events. Domain is a multi-category system of organizing events, and the variable, therefore, is not binary by definition.

Threat type was coded by the interviewer based on the extraction for each event. The threat types included were related to the secondary appraisal of threat and included six possibilities: 1) threat related to failure, 2) threat related to rejection or negative evaluation by others, 3) threat of loss of close tie, 4) threat of physical harm to self, 5) threat of loss of desired activities, and 6) threat of loss of possessions or money. It was possible to have more than one type of threat coded for an event, therefore these are not exclusive. The threat data consists of six separate binary variables (e.g. one either experienced threat related to failure or did not).

Locus was also rated by the interviewer based on the event extraction. Six types of locus were included: 1) close tie, 2) interaction between child and close tie, 3) way the child was treated by close tie, 4) loss of or substantial reduction in contact with close ties

or pets, 5) aversive nature of the interaction between the child and people not identified as close ties, and 6) the way the child is treated by people who are not identified as close ties. As the interviewer entered the data about the extraction into the database, they arrived at the questions about locus, which were of two main types. First, there was a gating question about the particular type of locus (e.g. is this an event that is threatening to the child because it happens to a close tie or important other?). If the answer was no, the interviewer moved on to the next question. If the answer was yes, the interviewer responded to a further series of questions about the locus (e.g., who was the close tie involved?). Each one of the categories is binary, because either one experienced that locus or did not.

Chapter 3: Results

Analytic Plan

For this study, I use the combined child and parent report events for both T1 and T3.

1. The first step in the analysis is to examine the distributions of the main variables being studied and determine if I need to do any preliminary paring down of categories. For instance, there are 12 domains but I might only want to look at 3. The categories I consider paring down are domain, threat type, and locus.
 - a. For domain, I determine the number of events with secondary, tertiary, and quartyary domain ratings. I compare the primary ratings to the secondary and tertiary ratings to determine the overlap within the same domain category, and use this information to create a single, multinomial variable. I then examine the distribution of events across the categories to determine if I should recombine categories.
 - b. I then consider threat type and locus together because of overlap between the two areas of categorization. I first consider the frequencies of events for each category for both threat and locus, and determine that there is conceptual overlap between the two areas of categorization. I then consider the events with more than one rating per event for each area of categorization to determine if the areas of categorization would best be treated as single, multinomial variables. I then look more closely at threat and locus individually to determine how to treat events with more than one rating and if

any categories should be recombined. Finally, I create a set of rules to allow me to assign the events to one category per event.

2. Next, I conduct tests of higher-order structure on the T1 combined parent and child event data to determine if there are distinct patterns that emerge. (See below for more in-depth discussion of type of analysis.) While doing this, I correct for non-independence across events in my analysis by using the complex sampling option in M-plus.
3. I perform analyses to determine if the results change based on the child's gender, age, ethnicity, or SES,
4. I then try to replicate these findings with the T3 data.

One important facet of the analytic plan is to choose the best model to analyze the data for higher order structure. I would not use principal components analysis because I cannot assume my variables are mutually uncorrelated. The two types of analyses one might use are confirmatory factor analysis and latent-class analysis. Factor analysis results in one or more factors representing continuous scales. Latent-class analysis tests whether the data can be summarized by one or a few binary classes. See Table 4 for a summary of the variable to be included in the analysis.

Table 4

Variables to Be Included in Analysis

Variable	Possible number of constructs	Variable Type
Independence/dependence	1	Ordered categorical
Domain	1 (12 categories)	Multi-category
Threat Type	6	Binary
Locus	6	Binary

I use procedures described by Muthen (2006) and Muthen and Asparouhov (2006) to test whether data based on this set of indicators can better be characterized by a set of one or more continuous factors, or by a set of latent classes. The MPLUS statistical package is used because of its capacity to estimate both latent factor and latent class models using a combination of continuous and categorical measured indicators. I estimate a series of models, beginning with single-factor and single-class models. Models of increasing complexity (e.g. with two, three, or four factors) are estimated until fit statistics indicate that model fit is being degraded. I then compare model fit statistics for the best-fitting latent factor and latent class models.

Muthen (2006) also suggests that a mixed methods approach which integrates latent factors and latent classes may be most helpful because of the type of data being analyzed. Hybrid models of analysis allow for both dimensional and categorical representation of data (Muthen & Asparouhov, 2006). This type of analyses combines factor analysis and latent-class analysis and is possible using the MPLUS program. I explore whether these data are better represented by such a hybrid model.

Once these analyses have been used to select the best-fitting model, I use MPLUS to test whether model parameters are invariant across child age, gender, SES, and ethnicity. I also test whether the final model from these analyses is replicated in the data from the 12-month follow-up.

A factor-analytic model has been used successfully to determine higher-order factors of types of coping with stress (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). It is hoped that these analyses will further contribute to our

understanding of how stressors differentially impact child and adolescent mental health outcomes.

Findings

This section contains the results of the analyses. I begin by describing the structure of the data set. Then, I describe how I cleaned and prepared the data for analysis, and the rationale behind my decisions. Next, I describe the analyses I conducted and the results of the analyses.

Structure of Data

The T1 data set consists of a series of ratings of 1,735 events in four main areas of categorization: domain, locus, threat, and independence/dependence. Three of these four areas of categorization (domain, locus, and threat) allowed an event to receive a rating on more than one category. Each category was represented by an independent, binary rating; thus, for each category, an event received a rating of zero or one. An event could receive a rating for up to four different domains out of the twelve possibilities. The rating system allowed an event to be rated as belonging to any or all of the six locus and six threat categories. The fourth area of categorization, independence/dependence, assigned each event to only one of five possible categories. This meant that in the original data set, domain consisted of four variables with twelve possible categories each, locus consisted of six binary variables, threat consisted of six binary variables, and independence/dependence consisted of one variable with five categories.

Inspection of the data indicated that relatively few events were assigned to more than one domain, locus, or threat category. For domain, the vast majority of the events received a rating for the primary domain rating (1,730 of 1,735 events). For the

secondary domain rating, 263 events received a rating, which is 15% of the total sample. Only 53 events received a tertiary domain rating (3%), and 10 events received a quaternary domain rating (<1%). For locus, 32% of the events had no locus rating, and 51% had only one locus rating. Fifteen percent of the events had two ratings, and less than one percent of the events had three or more ratings for locus. For threat, 22% of the events had no threat rating, and 50% had one rating. Twenty-five percent of the events had two threat ratings, three percent had three ratings, and less than one percent had four threat ratings. These findings supported the notion that there were relatively few events with multiple ratings within the same area of categorization; therefore, these ratings were likely not independent of each other, and the data is not best represented with independent, binary variables for each area of categorization. Instead, this suggested that each of these three areas of categorization might be best categorized as a multiple category variable with mutually exclusive categories. In addition, a number of these categories included relatively small numbers of events, suggesting that more stable results might be obtained through combining some categories with fewer events to form a smaller total number of categories within that area of categorization. The specific details for the treatment of each area of categorization will be discussed in more detail below.

Data Preparation

Domain. I began by examining domain in more detail. Each event was originally coded for 12 domains: 1) education, 2) work, 3) reproduction, 4) housing/residence/neighborhood, 5) finances/possessions, 6) crime/legal, 7) health, 8) romantic relationships, 9) parents, 10) friends/peers/leisure, 11) other relationships, and 12) pets/death/miscellaneous. Each event was rated for a primary, secondary, tertiary,

and quaternary domain, when they applied. After determining the number of ratings per event, the results indicated that there were relatively few events with multiple ratings (15%).

I then compared the ratings of the primary domain to the ratings of the secondary and tertiary domains (Table 5) to determine any added value of the additional domain ratings. When comparing the overlap between primary and secondary domain ratings, 62% of ratings fell within the same domain for both the primary and secondary rating. Forty percent of events fell within the same domain when comparing primary and tertiary domain ratings; however, only 3% of events received a tertiary domain rating. The events that were not matched across domain were randomly distributed, and thus did not provide more in-depth information about domain structure. These findings supported the strategy of defining domain as a single, multiple category variable, using only the primary domain rating.

Table 5

Overlap between Primary Domain, and Secondary and Tertiary Domain

Domain comparisons	N (%) Match)	N (%) Mismatch)	N of events rated at both times
Primary vs. secondary	163 (62%)	100 (38%)	263
Primary vs. tertiary	21 (40%)	32 (60%)	53

Next, I examined the frequency and distribution of events across the primary domains (Table 6), to determine if the frequency of events with certain domains were small enough that some categories should be recombined. Previous studies that used domain to further understand the impact of stressful events either divided domain into interpersonal versus non-interpersonal, or happens-to-other versus happens-to-self. Both

of these distinctions are very broad, and result in a loss of contextual information about the events. I wanted to determine if there was enough information in the domain ratings to merit using more specific categories. The events were not evenly distributed across the domains: four domains each contained more than 10% of the total events while four other domains each contained less than 5% of the total events. The small numbers of events in many of the categories suggested that combining categories would prove helpful for analyses.

Table 6

Frequencies of Original Domain Variables

Domain	Frequency	Percent (%)
Education	458	26
Work	179	10
Reproduction	36	2
Housing/residence/neighborhood	62	4
Finances/possessions	17	1
Crime/legal	101	6
Health	258	16
Romantic relationships	22	1
Parents	202	12
Friends/peers/leisure	148	9
Other relationships	117	7
Pets/death/miscellaneous	103	6

I used the distributions of events across domain to create six final domain ratings (Table 7) based on primary domain ratings for each event. I integrated the domains with very few events into areas that were conceptually related. Some of the original domains were broken apart in order to be re-combined with other domains based on theory. The first domain contains education related events and did not change (458 events). The second domain consists of parent-related events; it combines events from the parent domain (202 events) and the pets/death/miscellaneous events that involved death of

parents (3 events). The third domain includes financially related events; it combines work events (179 events) and finance/possession events (17 events). The fourth domain includes all other relationships besides parents; it combines events from peers/friends/leisure (148 events), romantic relationships (22 events), pets and death of anyone besides a parent (100 events), and other relationships (117 events). The fifth domain represents health-related events; it combines events from the health (258 events) and reproduction (36 events) domains. Approximately one-third of the reproductive events were child-related (12 events); 11 events were related to menarche and 1 concerned a false pregnancy scare. The sixth domain includes events that occurred in the external community environment, and it combines crime/legal events (101 events) and housing/residence/neighborhood (62 events). Geopolitical and miscellaneous events were not included in any group as they did not conceptually fit with any of the new domains (8 events). The final result was that each event was assigned to only one category within the domain variable; therefore, domain became an individual variable with six categories instead of an area of categorization.

Table 7

Final Frequencies for Domain

Domain	Frequency	Percent (%)
Education	458	27
Parents	205	12
Work/finances	196	11
Other relationships	379	22
Health	321	19
Crime/legal/neighborhood	163	9

Locus and threat. The next areas of categorization I examined were locus and threat. These two rating systems came from different lines of research, and it became

apparent that one of the codes was very similar within the two systems. For locus, each event was coded on one of six original categories: 1) close tie, 2) interaction between child and close tie, 3) way the child was treated by close tie, 4) loss of or substantial reduction in contact with close ties or pets, 5) aversive nature of the interaction between the child and people not identified as close ties, and 6) the way the child is treated by people who are not identified as close ties. Based on the number of events with no ratings on locus (32%) and the original category definitions (Table 8), it became apparent that there was no locus rating for *happened to child*, and this could account for the number of events with no locus rating.

Table 8

Frequencies for Original Locus Categories

Type of Locus	Frequency	Percent (%)
Happened to close tie	738	43
Aversive interaction close tie	140	8
Treated by close tie	94	6
Loss of close tie	284	17
Aversive interaction not close tie	129	8
Treated by not close tie	11	7

For threat, each event was originally coded on one of six original categories: 1) threat related to failure, 2) threat related to rejection or negative evaluation by others, 3) threat of loss of close tie, 4) threat of physical harm to self, 5) threat of loss of desired activities, and 6) threat of loss of possessions or money. Based on the number of events with no ratings for threat (22%) and the original category definitions (Table 9), it became apparent that there was no category for *threat to other*, and this could account for the number of events with no threat rating.

Table 9

Frequencies for Original Threat Categories

Type of Threat	Frequency	Percent (%)
Failure	258	15
Loss of activities	426	25
Loss of other	389	23
Loss possessions	194	11
Physical harm	228	13
Rejection	410	24

These two areas, *happens to other* and *happens to child*, represent conceptual overlap between locus and threat. The original locus categories all represent loci external to the child, and the original threat categories primarily represent threats to the child. Because of the conceptual overlap, I considered the two areas of categorization together, and then determined how to partition them based on the reasons explained below.

I first considered the number of events with ratings on more than one category within an area, as discussed earlier. For both areas, the majority of events had one or no ratings (for locus, 85%; for threat, 75%). These findings supported the idea that there were relatively few events with multiple ratings within each of these areas. This suggests that locus and threat might better be characterized as multiple category variables with mutually exclusive categories. I then looked more closely at both locus and threat to better understand how to treat events with more than one rating as well as to determine if any of the categories should be combined. Finally, I created a series of rules that allowed me to assign the events to one category per event.

I began with locus, and first ran series of chi-square tests to determine how to treat an event with more than one locus rating (Table 10). I determined if the association was significant, and then used the phi coefficient to determine if the relationship was

positive or negative. A large number of the associations were significant, but there was a negative relationship between the two categories. A negative phi coefficient implies that having one category of locus predicts not having the other category. Therefore, even though the association is significant, the categories could not be combined due to the negatively predictive relationship.

Table 10

Phi Coefficients from Chi-Square Analysis for Locus Ratings

<u>Second Locus Rating</u>	<u>First Locus Rating</u>					
	Happened to close tie	Aversive interaction close tie	Treated by close tie	Loss of close tie	Aversive interaction not close tie	Treated by not close tie
Happened to close tie	--	-0.17**	-0.10**	0.17**	-0.23**	-0.21**
Aversive interaction close tie		--	0.20**	0.03	<-0.01	-0.03
Treated by close tie			--	0.08**	-0.03	-0.01
Loss of close tie				--	-0.10**	-0.07**
Aversive interaction not close tie					--	0.20**
Treated by not close tie						--

* = p < 0.05
 ** = p < 0.01

I then revisited the frequencies of events across the six categories (Table 8). The events were not evenly distributed across the six categories, and ranged from 6 to 43% of

the events within a given category. The relatively small number events in some of the categories indicated that it might be useful to combine some of the categories together.

Based on the small number of events in the different categories (Table 8), the chi-square results (Table 10) were used as evidence to support the combination of two existing categories into a new category. The relationships between *aversive interaction with close tie* and *treated by close tie*, and *aversive interaction with not close tie* and *treated by not close tie* were both significant and had positive phi coefficients. *Aversive interaction with close tie* and *treated by close tie* thus were combined into one category: *interaction with close tie*. *Aversive interaction with not close tie* and *treated by not close tie* were combined into one new category: *interaction with not close tie*. *Loss of close tie* was significantly related to both *happened to close tie* and *treated by close tie*, and the phi coefficients were positive. In this instance, one could understand how a positive relationship could exist between loss and the other two variables, but it seemed important to keep the categories separate in order to gain more information about the event.

As noted earlier, after reviewing the definitions of the loci, it became apparent that there was no rating for if the event happened to the child and did not involve social interaction. There were 545 events with no rating for locus (32%). All of the events without a locus rating were assigned to the category *happens to child*. After creating *happens to child*, I had five categories with more evenly distributed frequencies (Table 11). As discussed earlier, there was conceptual overlap between threat and locus for the categories of *happens to child* and *happens to other*. I therefore turned my attention to threat to help me understand how best to treat these two categories in my analyses.

Table 11

Frequencies for Locus as a Multinomial Variable

Type of Locus	Frequency	Percent (%)
Interaction with close tie	151	13
Interaction with not close tie	199	17
Loss of close tie	284	24
Happens to child	545	46
Missing	556	--

The six original types of threat were *failure*, *loss of activities*, *loss of other*, *loss of possessions*, *physical harm* and *rejection*. In order to determine how to handle an event that was assigned to more than one category, I ran a series of chi-square tests comparing each type of threat to each of the other types of threat (Table 12). While the chi-square test was significant for the majority of combinations, very few combinations also had a positive phi coefficient.

Table 12

Phi Coefficients from Chi-Square Analysis for Threat Ratings

Second Threat Rating	First Threat Rating					
	Failure	Loss of activities	Loss of other	Loss possessions	Physical harm	Rejection
Failure	--	-0.03	-0.20**	-0.13**	-0.14**	0.11**
Loss of activities		--	-0.10**	0.14**	0.09**	0.03
Loss of other			--	-0.17**	-0.16**	-0.17**
Loss possessions				--	-0.08**	-0.14**
Physical harm					--	0.01
Rejection						--

* = $p < 0.05$
 ** = $p < 0.01$

As noted earlier, 75% of the events had less than two threat ratings. The small number of events with multiple ratings was an important criterion in deciding to simplify threat from an area of categorization to one variable. To help simplify threat, I examined the initial frequencies across the six types of threat (Table 9). Unlike domain and locus, all of the threat categories had reasonable frequencies (11-25%). This indicated that it might not be necessary to combine categories.

I examined the distribution of events across the six categories and the chi-square results to determine if there was other evidence that any of the categories should be combined. For the three combinations of threat categories that had significant associations and a positive phi coefficients (*failure and rejection, loss of activities and loss of possessions, loss of activities and physical harm*), it is possible that one event could be rated for both types of threat. However, the areas were distinct enough conceptually that it did not make sense to combine any of the categories. In addition, there were no categories with fewer than 10% of the events, thus no categories were so small as to create difficulty with analysis.

As previously mentioned, 22% of the events had no threat rating. After examining the threat categories, I determined that the threat ratings primarily pertained to threats to the child. To test this hypothesis, I examined the locus and domain ratings for the events that did not have a threat rating. The majority of the events were rated either *happens to other* on locus or fell into a domain that involved events that happened to someone besides the child. I created a new category, *threat to other*, based on ratings from both domain and locus. After the addition of this new category, 104 events were left with no rating, as compared to 370 beforehand. Adding the new variable increased

the number of events with more than one rating to 40%. This led to a new total of seven threat variables (Table 13).

Table 13

Frequencies for Threat as a Multinomial Variable

Type of Threat	Frequency	Percent (%)
Failure	129	8
Loss of activities	90	6
Loss of other	67	4
Loss possessions	22	1
Physical harm	151	9
Rejection	345	21
Threat to other	805	50

At this point, it became necessary to consider threat and locus together because they both included very similar categories. By definition, the threat rating of *threat to other* overlapped with the locus category of *happened to other*. *Threat to other* accounted for 50% of the threat events, and was therefore a significant source of threat. In addition, the locus category of *happened to child* overlapped with the majority of the threat categories that involved threat to the child. The overlap with *happened to other* was a greater cause for concern because the locus and threat categories were nearly identical, which could cause problems with analysis.

I examined the areas of overlap between categories in locus (Table 14) and threat (Table 15) in more detail. For locus, *happened to other* accounted for almost all of the overlap in ratings for events. This overlap implies that *happened to other* is a very broad code that incorporates interaction and loss, thus creating conceptual overlap between the different locus categories. For threat, *threat to other* accounted for approximately 40% of the overlap. This implies many of the events in threat are uniquely *happen to other*, while

in locus, *happens to other* has a great deal of overlap with the other codes. I decided that it was more important to keep *threat to other* as a threat category because it was a more unique predictor than *happened to other* was for locus. Because of the amount of overlap with *happened to other* and the other locus categories, many of the events now had only one rating. The loss of *happened to other* as a locus category meant that there were now a number of events (n = 556) with no rating for locus. This change meant that locus now had four categories and threat had seven.

Table 14

Overlap in Locus Ratings

# overlap %	Interaction with Close Tie	Interaction with Not Close Tie	Loss of Close Tie	Happened to other
Interaction with Close Tie	--	14 (0.82%)	44 (2.57%)	37 (2.16%)
Interaction with Not Close Tie		--	10 (0.58%)	183 (10.68%)
Loss of Close Tie			--	12 (0.70%)
Happened to other				--

Note. By definition, there was no overlap between happened to child and any other locus rating.

Table 15

Overlap in Threat Ratings

# overlap %	Failure	Loss activity	Loss other	Loss possessions	Physical harm	Rejection	Happened to other
Failure	--	57 (3%)	7 (>1%)	4 (>1%)	5 (>1%)	91 (5%)	3 (>1%)
Loss activity		--	67 (4%)	81 (5%)	79 (5%)	112 (7%)	158 (9%)

Loss other	--	6 (>1%)	12 (>1%)	42 (2%)	295 (17%)
Loss possessions		--	12 (>1%)	15 (>1%)	158 (9%)
Physical harm			--	58 (3%)	24 (1%)
Rejection				--	65 (4%)
Happened to other					--

The final step was to make two multiple category variables with mutually exclusive categories, which was a conceptual decision for both locus and threat. To do this, I used the results from the cross-breaks for locus (Table 14) and threat (Table 15) to determine a series of rules to assign an event to one category when it had more than one rating. I created a series of rules in order to create one multinomial variable for threat and one for locus. The rules determined a hierarchy of event ratings, so that in case of two ratings, the rating that was deemed more informative was used.

For locus, *happened to child* was deemed the least informative because it was created to capture any event without a rating. In addition, by definition there was no overlap between *happened to child* and the other three variables. Therefore, if an event was rated on both *happened to child* and another threat variable, the event was assigned to the other threat variable. *Loss of close tie* was deemed to be the most informative conceptually. Thus, any event with two ratings, for which was *loss of close tie*, was assigned to *loss of close tie*. *Interaction with close tie* was deemed more informative than *interaction with not close tie*; thus for any event rated on both, the event was assigned to

interaction with close tie. This resulted in a multinomial variable with four categories for locus, instead of the original area of categorization with six binary variables.

For the threat ratings, I used the frequencies of overlap between types of threat to help create the rules for assignment to a single category (Table 15). *Happened to other* was deemed the least informative category; therefore, whenever there was overlap between that and another threat category for an event, the event was assigned to the other type of threat. *Failure* was deemed to be the most informative event, as it could potentially cause some of the other threats (e.g., *rejection, loss of activities*). Whenever *failure* overlapped with another threat type, the event was coded for *failure*. *Physical harm* was deemed the next most important as it was harmful to the child's person. This was followed by *rejection* because it was emotionally meaningful. Next was *loss of activity*, followed by *loss of other*, then *loss of possessions*. *Loss of other* was rated less highly here than in locus because it is already captured to some extent in locus, and the only variable it overlapped with a great deal was *happens to other*, which had the lowest priority rating. The other threats, e.g. *loss of activity* or *failure*, could easily result in the *loss of other*. These rules were used to create a multinomial with seven categories for threat out of the original six, binary variables for the area of categorization.

Independence/dependence. The final area of categorization I explored was independence/dependence. Each event was assigned only one rating for independence/dependence. Past researchers have typically chosen to make it a binary variable instead of a categorical variable (e.g., Rudolph & Hammen, 1999). The original, categorical distributions are in Table 16.

Table 16

Frequencies for Categorical Independence/Dependence

Independence/dependence rating	Frequency	Percent (%)
1 (completely independent)	824	48
2	251	15
3	280	16
4	161	9
5 (completely dependent)	210	12

The events were not evenly distributed across the five categories (9-48%). They were heavily weighted towards being completely independent, and the more dependent categories contained few events. I decided to follow the convention of the binary rating for independence/dependence, in part because the number of events in each group would be larger (Table 17). In order to create the binary variable, events with a score of one or two were assigned to the category of independent, while events with a score of three or higher were assigned to be dependent.

Table 17

Frequencies for Binary Independence/Dependence

Independence/dependence rating	Frequency	Percent (%)
Independent	1075	62
Dependent	651	38

Model-based Analyses

Once I finalized the categories, I examined the relationship between the categories. Each of the 1,735 events now was rated on four different categorical variables. To determine if the four variables were independent or if there were relationships among them, I first ran a series of chi-square tests to determine the

relationship between each pair of variables (Table 18). All of the relationships were strong and significant.

Table 18
Chi-square Results and Phi Coefficient Values for the Categorical Variables

	Domain	Variables		
		Locus	Threat	Ind./dep.
Domain	--	0.76**	0.88**	0.44**
Locus		--	0.81**	0.38**
Threat			--	0.58**
Ind./dep.				--

* = $p < 0.05$
** = $p < 0.01$

If the variables were independent of each other, it would have been necessary to create a 5 x 6 x 4 x 2 matrix to characterize variation in event type resulting in a 4-way table with 240 cells. However, since the four variables were significantly associated, this indicates that there is a great deal of overlap between them. I determined the frequencies for each two-way combination of variables: domain by locus (Table 19), domain by threat (Table 20), domain by independence/dependence (Table 21), locus by threat (Table 22), locus by independence/dependence (Table 23), and threat by independence/dependence (Table 24). The tables highlight the areas of overlap between the different variables.

Table 19
Frequency of Overlap between Domain and Locus

Locus	Domain (n)					
	Education	Parents	Work/ finance	Other relationships	Health	Crime & legal
Interaction close tie	19	79	1	39	9	4
Interaction not close tie	133	5	1	38	1	21
Loss close tie	13	34	6	178	25	26
Happened to child	289	30	13	53	111	45

Table 20
Frequency of Overlap between Domain and Threat

Threat	<u>Domain (n)</u>					
	Education	Parents	Work/ finance	Other relationships	Health	Crime & legal
Failure	126	0	0	3	0	0
Loss of activities	54	25	0	7	2	2
Loss of other	5	4	0	42	0	16
Loss possessions	1	2	8	1	0	10
Physical harm	28	10	0	23	77	9
Rejection	200	46	0	65	20	14
Threat to other	2	106	186	214	200	93

Table 21
Frequency of Overlap between Domain and Independence/Dependence

Ind./Dep.	<u>Domain (n)</u>					
	Education	Parents	Work/ finance	Other relationships	Health	Crime & legal
Independent	151	103	187	254	227	142
Dependent	307	102	9	122	89	21

Table 22
Frequency of Overlap between Locus and Threat

Threat	<u>Locus (n)</u>			
	Interaction close tie	Interaction not close tie	Loss close tie	Happened to child
Failure	1	1	1	126
Loss of activities	23	13	4	50
Loss of other	5	0	55	7
Loss possessions	2	5	1	14
Physical harm	17	48	4	82
Rejection	73	113	31	128
Threat to other	25	10	183	53

Table 23
Frequency of Overlap between Locus and Independence/dependence

Ind./Dep.	<u>Locus (n)</u>			
	Interaction close tie	Interaction not close tie	Loss close tie	Happened to child
Independent	35	59	222	271
Dependent	115	138	61	273

Table 24

Frequency of Overlap between Threat and Independence/Dependence

Ind./Dep.	Failure	Loss of activities	Loss of other	<u>Threat (n)</u>			
				Loss possessions	Physical harm	Rejection	Threat to other
Independent	49	17	44	15	70	86	705
Dependent	80	73	23	7	78	258	96

The significant overlap between the variables indicates that there are more parsimonious ways to look at the relationships between the variables, and I should be able to reduce the dimensionality. This led me to try to create a single variable with multiple classes using LCA, as opposed to four variables.

Latent class analysis. LCA is used to determine whether multivariate data can be represented by an underlying categorical variable with one or more classes. This allows one to predict class membership because a case is either in a class or not in the class; this is in contrast to factor analysis, where the underlying factors are considered to be continuous (Lazarfeld & Henry, 1968; Goodman, 1974).

In LCA, one first specifies a model with a particular number of classes. LCA uses the specified number of classes to estimate parameter values for that model using maximum likelihood estimation procedures (ML) (Lazarfeld & Henry, 1968; Goodman, 1974). Once the analysis is complete for that particular number of classes, the results can be examined for model fit. There are a variety of statistics generated during the analysis, many of which can be used to analyze model fit. Two frequently used statistics are the Bayesian Information Criterion (BIC) and entropy. The BIC is a parsimony index, and is based on the loglikelihood value. A lower BIC indicates a more parsimonious

model, and is recognized as the best of the parsimony indicators (Li & Nyholt, 2001). Entropy provides a measure of the level to which the latent classes are distinct from one another; the closer the entropy is to one, the more stable the solution (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993).

The BIC and entropy measures are used to identify the number of classes best able to characterize the data. One first estimates a one class solution, and then continues to estimate new models with increasing number of classes until the BIC stops decreasing and begins to increase again. This strategy was used here.

The data set used in this study included many cases where multiple events were identified for each individual. As a result, events within individual were not likely to be independent of each other. In order to adjust for this potential lack of independence, I used the complex sampling option in MPLUS, which adjusts for any correlation between events at the case level while creating classes at the event level. The complex sampling option is comparable to a multilevel model; the problem with multilevel data is that there are associations across higher levels (e.g., by case), which could mean that the data at lower levels (e.g., event) are not independent of each other (Muthèn & Muthèn, 1998-2007). Running a single level analysis at the lower levels will work, and would provide acceptable parameters. However, the estimated standard error (SE) is not necessarily accurate in that situation because the data does not meet the assumptions of a single level model that residual errors are independent and normally distributed. Because of multiple events per individual case, the single level assumptions might be violated. By using the complex modeling option in MPLUS, the SE is adjusted at the event level based on correlations at the case level.

It is theoretically possible to have two levels of classes in the analysis: one at the case level and one at the event level. However the distribution of events within children was highly skewed, with most children having few events, and a small number having several events. This suggested that the data would not allow for meaningful clustering of children into classes. Therefore, I chose to run the analysis with one level of classes at the event level but adjusted for any correlations at the child level through the complex sampling option.

I ran a series of LCA analyses in MPLUS to determine the underlying class structure that best described my data. The variables included in the analyses were independence/dependence (binary), locus (four category multinomial), threat (seven category multinomial), and domain (six category multinomial). I estimated a series of models, each with a different number of classes, ranging from one to seven. The fit indices of these models are found in Table 25.

Table 25

Bayesian Information Criterion, Free Parameters, and Entropy Values for Latent Class Analysis at T1

Class	BIC	Free parameters	Entropy
1	15983	15	n/a
2	14169	31	0.90
3	13848	47	0.89
4	13662	63	0.86
5	13534	79	0.88
6	13515	95	0.85
7	13539	111	0.84

The results indicated that a six-class solution provided the best fit for the data because the BIC was lower than the seven-class solution. I ran the analysis both with and

without the complex modeling option, and the results were very similar for both methods. The class structure was the same, and the BICs were within 5 points of each other. The similarity of the BIC values indicates that the correlation between events at the case level did not have a large effect on the fit of the class structure. The MPLUS program also provides empirical Bayes estimates of probabilities that a particular event fits within each class, as well as an estimate of the most probable class for each event. Table 26 shows the probability that an event belongs to more than one class at T1. The high probability values indicate this is unlikely that an event belongs to another class besides the one to which it was assigned.

Table 26

Estimated Probabilities for Belonging to More Than One Class at T1

Secondary Class Assignment	Primary Class Assignment					
	1	2	3	4	5	6
1	0.97	>0.01	0.01	>0.01	>0.01	>0.01
2	0	0.86	0.02	0	0.12	0
3	0.04	>0.01	0.85	0.02	0.04	0.05
4	>0.01	>0.01	0.02	0.87	0.11	>0.01
5	>0.01	0.04	0.01	0.08	0.87	>0.01
6	0.02	>0.01	0.01	>0.01	>0.01	0.97

These Bayes estimates of probabilities also can be used to assign events to classes, and the resulting categorical variable can be associated with event ratings in order to describe how classes differ. The results of this analysis are presented in Table 27.

Table 27

Frequency of Categories of Events in Each Class.

Category	Variable	Class					
		1	2	3	4	5	6
Domain	1 (Education)	294 (96%)	2 (1%)	16 (8%)	3 (1%)	0 (0%)	143 (73%)
Domain	2 (Parents)	0 (0%)	0 (0%)	116 (55%)	2 (>1%)	87 (14%)	0 (0%)
Domain	3 (Work + finances)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	196 (33%)	0 (0%)
Domain	4 (Other relationships)	8 (3%)	0 (0%)	68 (32%)	236 (92%)	32 (5%)	35 (18%)
Domain	5 (Health)	0 (0%)	139 (97%)	8 (4%)	0 (0%)	173 (29%)	1 (>1%)
Domain	6 (Crime/legal + neighborhood)	7 (2%)	2 (1%)	2 (1%)	16 (6%)	119 (20%)	1 (>1%)
Locus	1 (Interaction close tie)	1 (>1%)	0 (0%)	132 (68%)	1 (>1%)	15 (8%)	2 (1%)
Locus	2 (Interaction not close tie)	1 (>1%)	0 (0%)	1 (>1%)	0 (0%)	13 (7%)	184 (94%)
Locus	3 (Loss close tie)	2 (>1%)	2 (2%)	26 (13%)	179 (97%)	66 (36%)	9 (5%)
Locus	4 (Happens to Child)	302 (99%)	115 (98%)	35 (18%)	5 (3%)	88 (48%)	0 (0%)
Threat	1 (Failure)	129 (48%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Threat	2 (Loss activity)	41 (15%)	2 (2%)	33 (16%)	0 (0%)	0 (0%)	14 (8%)
Threat	3 (Loss other)	2 (>1%)	0 (0%)	6 (3%)	59 (23%)	0 (0%)	0 (0%)
Threat	4 (Loss possessions)	1 (>1%)	0 (0%)	2 (1%)	0 (0%)	18 (3%)	1 (>1%)
Threat	5 (Physical harm)	0 (0%)	83 (65%)	18 (9%)	0 (0%)	0 (0%)	50 (27%)

Threat	6 (Rejection)	97 (36%)	14 (11%)	110 (55%)	4 (2%)	0 (0%)	120 (65%)
Threat	7 (Happens to other)	0 (0%)	29 (23%)	32 (16%)	192 (75%)	551 (97%)	1 (>1%)
Ind./dep.	Independent	114 (37%)	71 (49%)	21 (10%)	224 (87%)	590 (97%)	55 (28%)
Ind./dep.	Dependent	196 (63%)	75 (51%)	188 (90%)	33 (13%)	20 (3%)	139 (72%)
Totals		309 (18%)	143 (8%)	210 (12%)	257 (15%)	607 (35%)	196 (11%)

Note. The second line of numbers in each row represents the frequency of that type of event within the category (e.g., domain).

To provide more insight into the nature of the event classes, I then used the class membership variable in conjunction the with event prototype rating to determine the most frequently occurring event prototypes within each class (Table 28). I included approximately the top 50% of events within each class. Classes one, two, four and six had a small number of events that accounted for half of the total events in the class, while classes three and five had more events.

Table 28

Most Frequently Occurring Events within Class at T1

Class	Event code	Label	Number	Frequency within class (%)
1	6.01	Child takes exams	95	31
1	6.02	Child receives results of exams	86	28
2	60.01	Accident (child)	52	35
2	62.01	Physical illness or condition (child)	17	12
2	20.01	First menstruation	11	7
3	85.03	Disciplinary crisis or punishment of child by parent or cohabiting partner	48	23
3	85.02	Major argument between child and parent or cohabiting partner	23	11
3	81.01	Parent starts new romantic relationship	11	5
3	85.05	Violence between parents or cohabiting partners	11	5
3	84.01	Major argument between parents or cohabiting partners	9	4
3	91.03	Breakdown in relationship between child and friend	9	4
4	90.03	Decrease in interaction with friend	50	23
4	113.04	Death of adult close tie, ENCR, or relative	34	13
4	112.03	Pet is lost or dies	33	13
5	18.05	Crucial wage earner (CWE) fired or laid off	107	18
5	69.04	Physical illness plus hospital	46	8
5	69.05	Operation	42	7
5	18.1	Other (not CWE) fired or laid off	37	6
5	33.02	Change of residence for child	21	3
5	69.01	Other has accident	21	3
5	56.01	Other is a victim of offense against person	14	2
5	18.15	Any other (including CWE) resigns but does not start new job	12	1
5	56.07	Other has court attendance, prison sentence, prison release	12	1
6	3.01	Child has problems or is bullied by classmates	54	28
6	6.03	Child suspended	43	22

Class one contained the second largest number of events (18%). The events fell within the *education* domain, *happened to the child*, and included *failure*, *rejection*, and

loss of activity as threat types. The majority of the events (2/3) were dependent on the child's behavior. This class could be conceptualized as events that happened to child and are school-related. The majority of the events are dependent. The most commonly occurring events within this class were the child taking exams (31%) or receiving results of exams (28%) (Table 28). Losing privileges or being rejected could be a secondary consequence of the other events at school. The size of this class indicates that children experienced a large number of school-related stressors.

The second class was the smallest class (8%); it includes events from the *health* domain. These events both *happened to child* and *happened to other*, and included the threat of *physical harm*. Of the events in this class, only 27 events were identified as *happened to other* (18%). The events were approximately evenly distributed between independent and dependent events. Based on this class, health-related events represent their own form of stress, whether they happen to the child or a significant other and regardless of whether they were independent or dependent. The most frequently occurring prototype events were: the child had an accident (35%), the child had a physical illness or condition (12%), and first menstruation (7%).

Class three was the fourth largest class at T1, containing 12% of the total events. The events are in both the *parent* and *other relationships* domains and consist of *interactions with a close tie*. They carry a threat of *rejection*, *loss of activity*, and *happen to other*. The majority of the events are dependent. This class appears to represent stressful events within relationships. This would explain why the majority of the events are dependent; by definition, relationship related events are always coded as dependent. The presence of multiple types of threat indicates that regardless of what the relationship

difficulty is, problems within the relationship represent a distinct category of stressful events. A disciplinary crisis or punishment of the child by a parent or cohabiting partner (23%), major argument between child and parent or cohabiting partner (11%) and parent starting a new romantic relationship (5%) were the most prevalent events in this class.

The fourth class is the third largest at T1 (15% of events), and it consists of events in the *other relationships* domain. These events involve the *loss of a close tie*, carry threats of *happens to other* and *loss of other*, and primarily were independent of the child. This class contains events related to losing a person or relationship, although not a parental relationship. The most frequently occurring events in this class were decrease in interaction with friend (23%), death of adult close tie, ENCR, or relative (13%), and pet is lost or dies (13%).

Class five is the largest class and contains 35% of the total events at T1. This class appears more heterogeneous, containing events from the *parent*, *work*, *health*, and *crime/legal/neighborhood* domains. These events involved the *loss of a close tie* and *happened to the child* as well as *happened to other*. The events also included a threat of *loss of possessions*. The majority of the events were independent of the child. This class could be conceptualized as events that happen to significant others in the child's life, and consequently impact the child in some way. This class contained all of the work-related events. All of the children in the sample had a parent who was recently unemployed, so the job loss events are in this domain. However, there were events from the health and neighborhood domains, so job loss events are not the only events in this class. The crucial wage earner was fired or laid off (18%), other besides the child was hospitalized (8%),

and other had an operation (7%) were the three most commonly occurring events in this class.

Finally, the sixth class is the second smallest at T1 (11%), and it includes events in the *education* and *other relationships* domains. These events primarily included *interactions with not a close tie*, and resulted in threats of *rejection* and *physical harm*. Approximately 2/3 of the events were dependent. While these events are within the education domain, they appear to be relationships that occur at school, and primarily relationship with a not close tie. These events carried high threats of rejection and physical harm, and could be related to cliques, teasing, or bullying. The two most frequently occurring events in this class were the child has problems or is bullied by classmates (28%) or is suspended (22%).

Tests of generality. For the tests of generality, I wanted to determine if the class structure varied for the following potential moderator variables: gender, age, SES, and ethnicity. In order to run the analyses, I first converted these variables into binary indicators, to allow model tests to compare parameters across groups. Gender was already binary: male versus female. Regarding age, I used the median age of 11 years to split the cases into two approximately equal groups (less than or equal to 11, and greater than 11). For SES, I used the average education of the parents as a proxy, a continuous variable. I divided the cases into two groups: high school education or less versus more education than high school as this distinction was conceptually meaningful. Regarding ethnicity, which originally had three groups (Caucasian, African-American, and other), I created two groups of Caucasian and minority as these were the most conceptually distinct, even though the groups were uneven in size.

To perform the moderator analyses, I conducted a series of two-group analyses in MPLUS, using the binary moderating variables to create the two groups. To perform the two-group analysis, I ran two separate LCA analyses using the parameter estimates from the original LCA six-class solution for both. In the first round, I set all of the parameters in the two groups to be equal. I then re-ran the two-group analysis, but this time I allowed the parameters to vary between the two groups. Based on the results from the two analyses, I used the log likelihood values to calculate the difference in log likelihood values. This allowed for a direct test of model differences, given that the value -2 times the log likelihood has an approximate chi-squared distribution. For this test, a significant value indicates that the class structure does vary by group.

None of the findings were significant (Table 29). These findings indicate that the class structure at T1 does not vary based on gender, age, SES or ethnicity.

Table 29

Results of moderator analyses

Variable	-2LL	d.f.	p-value
Gender	76	90	0.85
Age	94	90	0.37
SES	90	90	0.48
Ethnicity	80	90	0.77

Replication. Once the model was established with the T1 data, I conducted analyses to determine if the model structure was the same at T3. The T3 data was collected approximately one year after the T1 data, and consisted of 1,112 events from 179 families. I ran another two-group analysis in LCA to determine if time of data collection impacted the class structure. As with the moderator analyses, I created the two-group model using the parameters from the six-class solution at T1. I ran the

analysis twice, once with the parameters set equal and once when they were freed with time point as my moderating variable. I used the log likelihood values to test whether models differed. The results were significant (d.f. = 90, $p = <0.001$).

Thus, there is a significant difference in group membership between T1 and T3, which indicates that the class structure is not consistent over time.

As a consequence of determining that the class structure was not consistent between T1 and T3, I ran an exploratory LCA with the complex sampling option to determine the class structure at T3. Based on the BIC and entropy values, a five-class solution provided the best fit for the data (Table 30).

Table 30

Bayesian Information Criterion, Free Parameters, and Entropy Values for Latent Class Analysis at T3

Class	BIC	Free parameters	Entropy
1	9893	15	n/a
2	8549	31	0.90
3	8348	47	0.86
4	8230	63	0.81
5	8220	79	0.86
6	8251	95	0.88

The relationship between the empirical Bayesian estimates of probabilities that particular event fits within a class and the estimate of the most probable class for each event can be used to determine the probability than an event belongs to another class besides that to which was assigned. The probability values were generally very high (>0.90); however, they were lower for class one (0.81). The higher the relationship, the more likely the event is best captured by that one class.

Table 31

Average Latent Class Probabilities for Most Likely Latent Class Membership (row) by Latent Class (Column) at T3

Secondary Latent Class Assignment	<u>Primary Latent Class Assignment</u>				
	1	2	3	4	5
1	0.81	0.02	0.18	>0.01	0
2	0.05	0.92	>0.01	>0.01	0.02
3	0.06	0.02	0.90	0.02	>0.01
4	>0.01	0.02	>0.01	0.95	0.03
5	0	0	>0.01	0.02	0.97

The Bayesian estimates of probabilities were used to assign events to classes, and then I determined the association between the resulting categorical variables and the four event ratings variables in order to determine how the classes differed (Table 32).

Table 32

Frequency of Categories of Events in Each Class at T3

Category	Variable	<u>Class</u>				
		1	2	3	4	5
Domain	1 (Education)	0 (0%)	0 (0%)	0 (0%)	355 (92%)	90 (83%)
Domain	2 (Parents)	44 (11%)	51 (53%)	9 (7%)	17 (4%)	1 (<1%)
Domain	3 (Work + finances)	29 (8%)	0 (0%)	14 (11%)	0 (0%)	3 (3%)
Domain	4 (Other relationships)	139 (36%)	39 (40%)	0 (0%)	13 (4%)	13 (12%)
Domain	5 (Health)	125 (32%)	5 (5%)	70 (56%)	0 (0%)	0 (0%)
Domain	6 (Crime/legal + neighborhood)	51 (13%)	2 (2%)	32 (26%)	0 (0%)	2 (2%)
Locus	1 (Interaction close tie)	9 (5%)	57 (69%)	0 (0%)	0 (0%)	22 (20%)

Locus	2 (Interaction not close tie)	5 (3%)	0 (0%)	3 (3%)	3 (<1%)	87 (79%)
Locus	3 (Loss close tie)	152 (88%)	36 (31%)	0 (0%)	0 (0%)	1 (<1%)
Locus	4 (Happens to Child)	6 (4%)	0 (0%)	111 (97%)	333 (99%)	0 (0%)
Threat	1 (Failure)	0 (0%)	0 (0%)	0 (0%)	142 (48%)	0 (0%)
Threat	2 (Loss activity)	1 (>1%)	1 (1%)	5 (5%)	66 (22%)	13 (12%)
Threat	3 (Loss other)	9 (2%)	5 (5%)	5 (5%)	0 (0%)	0 (0%)
Threat	4 (Loss possessions)	1 (0.3%)	4 (4%)	10 (20%)	0 (0%)	1 (>1%)
Threat	5 (Physical harm)	0 (0%)	5 (5%)	46 (44%)	0 (0%)	24 (22%)
Threat	6 (Rejection)	0 (0%)	52 (55%)	7 (7%)	88 (30%)	68 (64%)
Threat	7 (Happens to other)	371 (97%)	27 (29%)	32 (31%)	0 (0%)	1 (>1%)
Ind./dep.	Independent	379 (98%)	6 (6%)	85 (67%)	104 (31%)	14 (13%)
Ind./dep.	Dependent	9 (2%)	91 (94%)	42 (33%)	230 (69%)	95 (87%)
Totals		388 (35%)	97 (9%)	125 (11%)	385 (35%)	109 (10%)

Note. The second line of numbers in each row represents the frequency of that type of event within the category (e.g., domain).

In addition, I used the original prototype rating of the event in conjunction with the class variable to determine the most frequently occurring events for each class (Table 33). I included approximately the top 50% of events within each class. Classes one, two, and three had a greater number of different types of events that fit these criteria, which classes four and five included fewer events, all from the same domain.

Table 33

Most Frequently Occurring Events within Class at T3

Class	Event code	Label	Number	Frequency within class (%)
1	90.03	Decrease in interaction with friend	42	11
1	69.05	Other has operation	31	8
1	69.04	Other has physical illness plus hospital	29	7
1	112.03	Pet is lost or dies	26	7
1	69.03	Other has physical illness	21	5
1	18.05	Crucial Wage Earner fired or laid off	17	4
1	113.04	Death of adult close tie, ENCR, or relative	15	4
1	84.01	Major argument between parents or cohabiting partners	12	3
2	85.02	Major argument between child and parent or cohabiting partner	14	14
2	85.03	Disciplinary crisis or punishment of child by parent or cohabiting partner	14	14
2	91.03	Breakdown in relationship between child and friend	13	13
2	85.05	Violence between child and parent or cohabiting partner	6	6
2	93.01	Child is bullied by friends or peers outside of school	5	5
3	60.01	Child has accident	23	18
3	62.01	Child has physical illness or condition	16	12
3	33.02	Change of residence for child	10	8
3	65.03	Child has outpatient contact for assessment and/or treatment of behavioral/emotional condition	8	6
3	42.01	Child's loss or damage of possessions due to theft, fires, etc.	5	4
3	51.01	Child is victim of property offense	5	4
3	64.01	Child has operation	5	4
4	6.01	Child takes exams	109	32
4	6.02	Child receives results of exams	96	29
5	6.03	Child suspended	39	35
5	3.01	Child has problems or is bullied by classmate	18	16
5	4.01	Child has interaction problems or is criticized by teacher	17	15

Class one and class five each contained 35% of the events, making them the two most populated classes at T3. The events in class one spanned many domains including all of the domains except *education*, with the most events falling into *health* and *other relationships* domains. The majority of the events involved *loss of a close tie* and *threat to other*, and were independent of the child's behavior. This class included a very diverse group of events that shared the characteristics of happening to others and involving loss. The most frequently occurring events in this class were a decrease in interaction with a friend (11%), another person having an operation (8%), or another person being hospitalized (7%). This is the class that had the smallest relationship in table 31, indicating that it was harder to predict which events best fit in this class.

Class two was the smallest class at T3 (9%), and included events from the *parents* and *other relationships* domains. The loci were *interaction with close tie* and *loss of close tie*. The threats involved were *rejection* and *happens to other*, and the vast majority of the events were *dependent*. This class represents relationship stressors with both parents and others. The most frequently occurring events in this class were a major argument between child and cohabiting partner (14%), disciplinary crisis or punishment of child by parent or cohabiting partner (14%), and breakdown in relationship between child and friend (13%).

Class three was the third largest class at T3 (11%). The events were primarily in the *health* and *crime & legal* domains, and *happened to child*. The class included *physical harm*, *happens to other*, and *loss of possessions* as threats, and two-thirds of the events were independent of the child's behavior. This class could be conceptualized as being generally health-related, and it includes any threats to health within the community.

The most commonly occurring events in this class were the child has an accident (18%), child has a physical illness or condition (12%), and change of residence for the child (8%).

Class four, as noted earlier, was tied for having the most events at T3 (35%). These events were primarily in the *education* domain and happened to the child. The events included threats of *failure*, *rejection*, and *loss of activity*. Two-thirds of the events were dependent upon the child's behavior. This class represents events that are school-related and happen to the child. The two most frequent events within this class were the child takes exams (32%) and the child receives results of exams (29%).

Class five had the second smallest number of events at T3 (10%). The events were primarily in the *education* domain but involved some *other relationship* events. The majority of the events involved *interactions with not close ties*, though some were with close ties. *Rejection* and *physical harm* were the two most prevalent threat types, and the majority of the events were dependent. The most frequently occurring events in this class were the child is suspended (35%) and the child has problems or is bullied by a classmate (16%).

Detailed comparison of T1 and T3. The class structure at T1 (six class solution) was found to be significantly different than the class structure at T3 (five class solution). The classes for each time point were described in detail earlier in the results section. It is helpful to examine the differences in the class structures at the two time points.

Considered together, some of the classes are nearly identical at the two time points, while others are not as similar. Class one at T1 (18% of events) and class four at T3 (35%) are very similar; they contain academic events that are non-interpersonal.

While the relative frequency of the events is different at the two time points (18% vs. 35%), the actual number of events was similar (309 at T1, 385 at T3). Class six at T1 (11%) and class five at T3 (10%) are nearly identical in content and frequency. These events are related to peer relationships at school that are generally not with a close tie. The similarities between these two pairs of classes across both time points indicate that these are more stable types of events that children experience.

The other classes do not overlap as neatly across time points. Class three at T1 (12%) and class two at T3 (9%) are very similar, and they both contain events related to conflict within relationships. Class two at T3 contains more loss events than the class at T1. Class one at T3 (35%) appears to be most similar to class five at T1 (35%) as both are related to events that happen to others. However, class one at T3 contains more loss-related events than class five at T1. Class four at T1 (15%) contained loss-related events, and there is not a comparable class at T3. Instead, loss events appear to be divided into class one (*happens to other*) and class two (*conflict*) at T3, with the majority of the loss events (80%) falling into class one. Class two at T1 (8%) and class three at T3 (9%) are similar in that they contain health-related events. However, class three at T3 also contains events that fall into the *crime, legal, and neighborhood* domain. Events in this domain were concentrated in class five (*happens to other*) at T1. The main types of events were the same across both time points (*health, legal/crime, loss, conflict, happens to others, academic problems, peer problems*), but how they formed classes differed across the two time points.

Finally, it is possible that the participants at the two time points varied on demographic characteristics. There were 24 fewer participants at T3 as compared to T1.

At T3, there were 99 males and 80 females. Regarding ethnicity, the sample at T3 had 76 Caucasian children, 78 African-American children, and 24 whose ethnicity was coded as “other.” At T3, 96 of the families were two-parent families while 83S were single-parent families. The means for SES, average internalizing t-score and mean externalizing t-score were the same at T3 as T1. I conducted a series of chi-squared tests of distribution to determine if the proportions within each group had changed over time, and the results were not significant. This indicates that the sample did not vary significantly on gender, ethnicity, family status, SES, or psychopathology across the two time points; therefore, although there were 24 fewer participants at T3, their departure did not significantly change the composition of the participants who remained in the study.

Exploratory factor analysis. Exploratory Factor Analysis (EFA) is used to determine if there is an underlying factor structure. EFA uses continuous latent variables in the analysis, and each factor is dimensional. Factor analysis results in one or more factors representing continuous scales. The analytic plan laid out a series of exploratory factor analyses to determine the underlying factor structure of my data. However, EFA did not work with my data. I received a variety of error messages when I ran the analyses. Originally, I started with all of the variables in binary forms. I received error messages because of the empty cells when domains were crossed. I then proceeded to run the analyses with threat, domain, and locus all defined as multinomials. The program was unable to run EFA with more than two factors due to the small number of variables included in the analysis.

After receiving the error messages, I explored the data structure in more detail to better understand why EFA did not work with the data. I examined how the different

variables overlapped with one another: domain by locus, domain by threat, and locus by threat. The matrices for these different combinations contained a large number of cells that were empty or had very few events (less than 1% of the total) (Table 34). The zero-cells are problematic for EFA because EFA calculates loglikelihoods, which are impossible to calculate if there are cells with zero-frequencies. The large number of cells with less than 1% of the total in a 2x2 matrix, indicates that there is a large chance that in a 3x3 matrix, many of these cells would become zeros. The inability to calculate the loglikelihoods explains the error messages when trying to use EFA. While sometimes zero cells can be handled with complex modeling that substitutes another number for zero, at this time, there is no program that is able to do this substitution for EFA (L. Muthen, personal communication, 2/11/08). The current version of MPLUS is also unable to conduct EFA with multinomial variables, as was done with the LCA modeling described earlier.

Table 34

Summary of Zero Cells in Cross-Category Frequencies

Variables		Total cells	Total 0	% 0	Total >1%	% >1%
Domain	Locus	24	0	0	7	29
Domain	Threat	42	10	24	25	60
Locus	Threat	28	1	4	12	43

Mixture model analysis. Based on the fact that EFA was not possible with the data, the mixture model was deemed inappropriate for the data because MPLUS would encounter similar difficulties handling the cells with a zero-frequency. In addition, there is no conceptual underlying dimension that might be better captured using a mixture model. The mixture model might not be appropriate for use with multinomial data

because it is hard to conceptualize how a continuous variable would fit with categorical data of the type studied here.

Chapter 4: Conclusion

In this section, I will begin by reviewing the results in light of my research questions. I will then interpret my findings and discuss possible reasons for my results. Next, I will discuss limitations of this study. I will end with a discussion of theoretical, research, and practical implications of the findings.

Review of Research Questions

- 1) Is there evidence of higher-order structure when the four stressor constructs are considered together?

Yes, there is evidence of a higher-order structure when the four constructs (domain, locus, threat, and independence/dependence) are considered together. At T1, there is evidence for a six-class solution.

- 2) If there is evidence of higher-order structure, is it stable or does it vary across gender, age, ethnicity, or SES of the child, or across reporter (child versus parent)?

The six-class solution at T1 does not vary across gender, age, ethnicity or SES of the child. Reporter was not considered due to the coding of the variable.

- 3) Is there evidence that any pattern of higher-order structure found in the first wave of data will replicate in the follow-up data collected one year later?

There is partial but not complete replication across the two time points.

Interpretation of Findings

Stability over sample characteristics. The results from the analyses indicate that at T1, the classes represent distinct categories of stressors that are stable for children within

the age range, and across gender, SES, and ethnicity. It is helpful to consider these classes of events in light of the existing literature to better understand the findings. This section will focus primarily on the T1 class structure, and the next section will explore reasons for the differences between the T1 and T3 findings.

Within the events that occur at school, there were two distinct classes of events: academic-related events with a threat of failure and relationship events with non-close ties. These distinctions held true at both time points. It is worthwhile to note that these two classes of events are independent of each other; therefore, the specific threat makes a difference in the type of stress incurred even within the same context (school). This highlights the importance to taking into account more than one aspect of the stressor (e.g., domain). Together, these events account for 29% of the stressors at T1, indicating that children experience a large number of school-related stressors.

The school-related relationship events primarily involved non-close-ties, and could be characterized as interpersonal stressors, a distinction used in previous literature. The most frequently occurring events within the class indicated that these events were most likely to be related to being bullied or suspended. Interpersonal stressors have been found to place the child at-risk for both internalizing and externalizing behaviors (Liu et al., 2000; Little & Garber, 2004). Other researches specifically found that interpersonal events predict depression (Daley et al., 1997). In particular, girls are more likely to be impacted negatively by interpersonal events; however, boys are more likely to be impacted negatively by events that occur within the school domain (Larson & Ham, 1999). It is possible that while the overall class structure did not vary by gender, the effects on outcomes might vary.

The other category of school-related events were academic and non-interpersonal in nature, although they carried threat for both failure and rejection. The most frequently occurring events in this domain at both time points were taking an exam or receiving the results of an exam. School failure has been linked to variety of negative outcomes. School failure and peer rejection place children at risk for externalizing behavior (Petit, 2004) and high school failure or dropping out (Newcomb et al., 2002). In addition, externalizing behavior has been linked to non-interpersonal and chronic stress (Rudolph et al., 2000; Liu et al., 2000); the events in this class could be characterized as both non-interpersonal and chronic. This connection to externalizing behavior particularly holds true for boys (Little & Garber, 2004), and, as stated in the previous paragraph, boys are more negatively impacted by stressors within the school domain (Larson & Ham, 1999). The previous research indicates that while both boys and girls experience these stressors, they tend to lead to more negative outcomes for boys. The existing research has not necessarily made the distinction between the two types of school events found here (academic versus interpersonal). While many might think that these two types of events would co-occur, the data do not support that.

At both time points, the largest class was independent of the child and happened to others; these were primarily non-interpersonal events. The large number of events in this class highlights the importance of considering the locus of the stressor for children. Events that do not happen to the child still represent a significant source of stress. Locus has not received much attention in the literature, and events that happen to significant others in the child's life need to be accounted for when considering stressors the child experiences. Because children are still dependent on adults in their lives, it follows that

events that impact their parents would have an impact on the children. The events also represent sources of threat for the child because the child could lose possessions, have to move or quit participating in an activity. In addition, an increase in stress for parents can lead to disrupted parenting, which places children at-risk for externalizing behavior (Patterson et al., 1987). Parental stress has also been linked to an increase in the child's overall psychopathology (Wickrama et al., 2005) and, more specifically, depression (Grant et al., 2003).

Two of the classes at T1 pertain to relationships and are therefore interpersonal; however, they differ from each other. One of the classes of events consists of events related to loss, while the other is related to conflict. The independence of these two classes again highlights the importance of considering other factors, such as threat and locus, in addition to domain to truly understand the context of the event.

The first relationship-related class contains events in which the child lost a close tie. Two of the three most prevalent events in this class were related to death of a close tie (not a parent) or a pet, but the most frequently occurring event was a decrease in interaction with a friend. The loss of important relationships can have significant mental health consequences. Both Williamson et al. (2005) and Sandler et al. (1992) found that loss predicted depression, and Sandler et al.'s (2005) findings found that separation in particular predicted depression.

The second relationship-related class consisted of interactions with close ties and a threat of rejection. The two most prevalent events in this class were related to conflict with a parent or cohabiting partner, either in the form of a disciplinary crisis or an

argument. Other prevalent events included conflict with peer close ties as well. Sandler et al. (1992) found that conflict predicted externalizing behavior.

The final class of stressors at T1 included health-related events; it could be categorized as non-interpersonal. The most prevalent events included the child having an accident or a physical illness or condition. Overall, these events primarily happened to the child. The events in this class were a combination of independent and dependent events as well, thus whether or not the child was responsible for the health concern, the type of stress was similar. This was the smallest class of stressors at T1 and the third smallest at T3. This could be in part because daily hassles would not qualify. The research regarding the impact of health problems in children has not been viewed through a life events lens; rather, the research tended to focus on the effects of coping with a particular illness (e.g., diabetes). Chronic, non-interpersonal events have been linked to externalizing behaviors, thus it is plausible this could be one outcome (Rudolph et al., 2000). It is also plausible that the data reflect the lower prevalence of these types of events for children of this age, relative to other kinds of events.

Relevance for age group. Another important point to consider is why these classes of stressors are relevant for this particular age of children. The sample ranged from 8 to 15 years old, and the mean age was 11. At T3, the sample was one year older. The age range included in the sample represents a significant period of change when the child enters puberty and adolescence. This transition represents an increased drive for independence, and with that comes a decrease in reliance on parents and increase in the influence of peers. One might hypothesize that the class structure would vary by age with older children having more peer- and fewer parent-related events. However, the class

structure did not differ significantly by age; however, because the sample spanned seven years, there were fewer children in any particular age, possibly making it more difficult to identify age-related effects. Loss of relationships and rejection were the two biggest relationship-oriented threats. The events included major stressors and not daily hassles; as a result, many peer-oriented events were not included. Very few romantic relationship events met criteria for inclusion at T1; as a result, specific probes for these events were dropped from the interview protocol at T3.

While peers grow in importance as the child grows older, parents continue to play a significant role in their child's life. As children attempt to gain a greater level of independence, parents often have to set more limits. This can result in a greater number of arguments and disciplinary events, two very prevalent events within the conflict-related class of events. In addition, events that happened to others represented the largest class of events, and the majority of these events happened to the parent.

Finally, school is where children spend a large portion of their time, regardless of their age. The results indicate that both academics and relationships with peers and teachers at school play a large role in children's lives. School is often the first place where children have more opportunities to interact with their peers and begin to form those relationships outside of their families. As children leave elementary school and enter middle school, their school experience changes as they no longer work with one teacher, but instead changes classes frequently. This period has been found to be stressful for children, and could add to any existing peer or academic stress (Robinson, Garber, & Hilsman, 1995).

Stability over time. While the findings at T1 were significant across various sample characteristics, the model varied significantly between T1 and T3, indicating that the class structure was different at the two time points. The exploratory LCA at T3 indicated that a five-class solution best characterized the data, as compared to the six-class solution at T1. The biggest difference across the class structures at the two time points were that loss events and events in the *crime, legal, and neighborhood domain* were sorted into different classes at the two time points. The class that consisted of loss events at T1, was therefore redistributed across two other classes at time two (*happens to other* and *conflict*). Events in the *crime, legal, and neighborhood* domain were redistributed to the *health-related* class at T3, whereas they were primarily in the *happens to other* class at T1. It is helpful to consider possible reasons for why the class structure might have changed across the two time points.

One possible reason is that there were fewer respondents (T1 = 203, T3 = 179) and fewer events at T3 (T1 = 1735, T3 = 1112). The mean number of events at T1 was 8.5, while it was 6.2 at T3. The sample only decreased by 24. It appears that the difference in the number of events at the two times ($n = 623$) is related more to the decrease in events per person (2.3) over time than the decrease in the sample ($n = 24$). This decrease in events could make a difference when modeling classes because fewer events make estimates of smaller classes more unstable.

Another possible reason is because of the difference in financially related events at T1 versus T3. At T1, there were 196 events in the work and finance domain, whereas at T3, there were only 46 financially-related events. The sample recruited families for T1 in which one parent recently lost a job, therefore the families likely experienced a higher

number of work- and finance-related stressors than a normal sample. At T3, one year after the recruitment phase, the same families did not have as many work-related stressors. At both time points, there was a class of events for *happened to other*; however, the proportion of types of stressors in this class changed over time. At T3, the majority of the loss-related events were re-classified into this class (152 loss events), whereas at T1, there was a separate class for loss-related events (179 loss events). The two classes at T1, *loss* and *happened to other*, were both primarily independent. *Happened to other* (n = 607) consisted of events that spanned many domains, and their primary threat code was *happens to other* (551 events). Of the *loss-related* events (n = 257), 75% carried the primary threat of *happens to other*, while their primary locus code was *loss of close tie*. At T3, the *happened to other* class (n = 388) was much smaller than the combination of the two class from T1, although it proportionally still accounted for 35% of the total events, as did the *happened to other class* at T1. The majority of the events (97%) carried a primary threat of threat to other, and 39% involved the loss of a close tie.

At T3, there were fewer events per individual (2.3 less than T1) as well as fewer financially-related events. It is possible that many of the families with an unemployed parent at T1 had found a new job by T3, thus explaining the decrease in financially-related events. Sandberg et al. (1998) found that children whose parents were unemployed experienced more independent stressors. Because fewer parents were unemployed, it is possible that they experienced fewer independent stressors overall. The decrease in the number of independent stressors overall could have lead to the combination at T3 of the two different classes of independent stressors, *happened to other* and *loss-related*, from T1. This would create a more parsimonious model because it

had fewer classes. It could be that the T3 model is more reflective of a general sample because the majority of the parents were employed again by T3.

The other difference between the models at the two time points was that many of the events in the *crime, legal, and neighborhood* domain were placed in the *health-related* class at T3, whereas the majority of events at T1 fell into the *happened to other* class. The events in the *health-related* class at T3 primarily *happened to child*, whereas the events in the *happened to other* class at T1, by definition, happened to someone besides the child. At T1, there were 163 events in this domain (9% of total), while at T3, there were only 77 (7% of total events). There are a number of reasons for why these events could have been distributed differently across the two time points. One possibility is that as the children grew older, they spent more time outside the home and parental supervision, and therefore experienced more events in the neighborhood. Another possibility is that there were fewer overall events at T3 because the families' lives stabilized after the parents found a new job. This decrease in events meant that they were better characterized by another class.

Limitations

There are a number of limitations of this study based on the characteristics of people recruited into the study, the events included, and the types of analyses supported by the data. Regarding the sample, participants were recruited from the unemployment office. Because all of the families had one parent who had lost a job at T1, the sample is not normative. As discussed earlier, this could be one reason why the class structure was not exactly the same at T3. It would be interesting to perform similar analyses with data

from a random sample as well as a sample higher in clinical symptoms to see if the class structure varied.

Another sample-related limitation was the age range included in the sample. The sample at T1 included children ranging in age from 8 to 15 years, and the T3 data was collected one year later. This means there was a broad range of ages relative to the number of participants in the study, which impacts the ability to determine age-related differences in events. In addition, the data at T3 was collected only one year later, which means there was not much time for the sample to mature and possibly experience different types of events. Having a larger sample with more data points spread across more years as well as a bigger age range would help provide more information about any possible developmental changes as the children age. However, the findings that age did not moderate the class structure suggest that this limitation may not be as much of a problem, at least within this age group.

An additional limitation related to the different results at T1 as compared to T3 is that the T3 dataset only contained a subset of participants from T1. It is possible that the subset who did not continue at T3 differed in some significant way from the sample at T1, and that might explain the difference in results across time.

Another sample-related limitation is related to the ability to generalize the findings. The sample was composed primarily of Caucasians and African-Americans. Therefore, it is possible that the findings might not extend to other cultural or ethnic groups.

Finally, the events included in the data were restricted by their severity threshold such that only events with a threat rating of moderate or severe were included in the analyses. This study focused on significant life events and did not include daily hassles. As a result,

very few romantic events reached the threshold necessary to be included. In addition, many peer relationship events might not have reached threshold. This means that growing influence of peers was not necessarily captured at the event level, but it might have been if daily hassles were included. This could potentially impact the class structure.

Implications

Theoretical. Utilizing LCA to determine the underlying class structure of stressful events helps to advance our understanding of the types of events that children are most likely to experience. Once the results are replicated with a larger sample than spans more ages, it might help to integrate the stress literature with developmental theory to understand how stressors change as children age (if they do).

Additionally, as noted in the introduction, Dohrenwend (2006) highlights the importance of context when studying stressful events. These findings demonstrate the importance of gathering sufficient information about the stressor at the time of data collection. Once the contextual information is gathered, it allows researchers to better understand any possible higher-order constructs that help characterize stressful events.

Research. These findings highlight a number of exciting new research directions. One need is to replicate the findings with other samples, both a random sample and perhaps a sample with a higher level of psychopathology. This would allow researchers to better understand the general child population's experience of stressful events, and if that differs and how so from a sample with unemployed parents and a sample experiencing more psychopathology. As noted earlier, it would be helpful to increase the sample size to include more children at all of the different age groups in order to better understand any possible age-related differences. Increasing the diversity of ages included

in the sample to include younger children and older adolescents would also prove useful to gather an idea of how stressful events change over the course of the child's development. Examining the impact of the reporter of the stressful event on class structure would also be useful.

A final area of future research is to determine the relationship between the classes and future outcomes. It is possible that these new classes of stresses might more accurately predict outcomes than past research. The past findings were reviewed earlier, and while there was some consensus within area of categorization (e.g., independence/dependence), there will little to no research linking the four areas of categorization. Earlier in the discussion section, I hypothesized possible links between classes and outcomes based on the existing literature. While there was no apparent difference in class difference based on the moderating variables, it is possible that outcomes could vary by moderating variables. For instance, males might be more likely to react to the academic, non-interpersonal events with externalizing behavior, while females might be more likely to respond to interpersonal conflict with depression.

Practical. The results of this study have practical implications as well. By providing information about the types of stressful events that all children face, this creates an opportunity for institutions that work with children to identify better those children experiencing these classes of stressors and intervene appropriately. Because the sample was not extreme in their levels of psychopathology, this also indicates that the classes of stressors might more closely match those experienced by a random sample.

As discussed earlier in the discussion section, different types of stressors might predict different mental health outcomes, which would then require different

interventions. A more accurate assessment of event contexts could help to match interventions with particular needs of children facing particular stressful contexts. One can consider the possible interventions that might prove the most beneficial for each type of stressor, based on the six classes identified at T1. The types of intervention would vary by level (targeted versus global), focus of intervention (e.g., increase pro-social skills), outcomes being monitored (e.g., grades), and participants (e.g., child versus family). Specific intervention programs should be researched to determine what has been proven to be effective in the literature.

One group to target would be children currently experiencing or at-risk for academic failure. As mentioned earlier, academic failure places children at risk for a number of negative outcomes, therefore it is important to intervene. These children would best be reached through a targeted intervention, where children would be identified by teachers. The focus of the intervention would be to increase academic performance. To achieve this, ideally teachers would work with the children and their parents to strengthen study skills and identify areas of strengths and weakness in order to obtain the appropriate resources for the child, such as testing for learning disabilities or finding a remedial reading tutor. The children's grades and classroom performance would be monitored to determine the effectiveness of the interventions. One existing program for elementary school students is the Raising Healthy Children (RHC) program (Catalano et al., 2003). The program works with teachers and parents to increase children's prosocial and academic skills. This program has been found to increase academic performance and commitment to school, as well as decrease antisocial behavior.

A second group of children in the school setting are children currently experiencing relationship problems at school. This group includes bullies, victims, and bully-victims. These children could be reached in targeted interventions; however, targeted interventions are hard to implement because teachers cannot always identify who is experiencing relationship problems. In addition, it can be difficult to have a group with both victims and bullies present. Therefore, implementing global interventions at the school level to increase empathy and pro-social skills could prove most helpful (HRSA, 2008). This helps to change the school culture. In addition, school staff should be trained in prevention, and aggressive behaviors need to be appropriately and consistently enforced. Parents should be made aware of the focus on bullying prevention and any changes in school rules. If necessary, the children who are bullying or being bullied could be referred for individual therapy. Intervening early can help prevent school violence and an increase bullying. One example is the Olweus Bullying Prevention Program (Olweus, 2004), which uses school-wide, classroom and individual components to target bullying.

A third group is children who have recently experienced loss. Parents and school staff should be made aware of the impact of loss and monitor possible warning signs for emotional or behavioral changes. This group would best be served by a targeted invention because only some children experience loss at any given time. The children could either receive individual or group therapy, and the focus would be processing their emotions and grief in a healthy way. If the community has experienced a high level of loss due to neighborhood violence, war, or natural disaster, a community-level or school-wide intervention might be more appropriate. Sandler et al. (1992) developed a theory-based

intervention for dealing with the loss of a caretaker, the Family Bereavement Program (FBP), that has demonstrated positive outcomes for both children and caregivers.

A fourth group of children are those experiencing relationship problems. Because most children will experience difficulties and conflict within interpersonal relationships at some point, a global intervention at the school- or community-level that focuses on conflict-resolution and communicating emotions effectively would be helpful. In addition, it would be helpful to work with parents to discuss setting limits and disciplining their child as their children enter adolescence. If it becomes clear that there is a high level of conflict in some families, family therapy might be most appropriate. Therapies such as Parent-Child Interaction Therapy (Herschell, Calzada, Eyberg, & McNeil, 2002) or the Incredible Years program (Webster-Stratton, 1992) could be used to decrease the negative emotions in family communication

A fifth group would focus on children whose families are coping with stressful situations. In some communities, this might be more targeted whereas in other communities, it might be more prevalent and require a global intervention. The children's behavioral and emotional symptoms should be monitored to determine any change in emotional functioning that might indicate a need for individual therapy. The school or community should identify the families and help them access the necessary supports and resources through a social worker or other social service agencies. Family-level stressors frequently lead to an increase in parental conflict; therefore, family therapy could prove particularly useful to address any changes in family functioning.

The final group of children is those coping with health problems. This would best be treated by a targeted intervention. Part of the intervention would involve helping

families access the appropriate resources. Psycho-education for the family about dealing with long-term health problems, such as diabetes, might be helpful as well. Specific interventions would vary based upon the health problem (e.g., diabetes, cancer), such as the Surviving Cancer Completely Intervention Program (SCCIP) (Kazak et al., 1999). Adults who interact with the child should be made aware of the child's condition as well as any warning signs that the child's health is deteriorating in order to monitor the child's well-being.

By making institutions that work with children, such as schools, aware of these major categories of stressful events, they can identify children who may be experiencing stressors earlier. Once the children are identified, necessary interventions can be implemented and the child's emotional and behavioral symptoms can be monitored to determine if further intervention is necessary. Many of these stressors are best dealt with at a more universal level; therefore, many schools should consider adding these areas into their curriculum.

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