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Social Support, Parent Stress, And Child Aggression: A Longitudinal Model Of Family Ecology

Jill B. Lubansky
University of South Carolina

SOCIAL SUPPORT, PARENT STRESS, AND CHILD AGGRESSION: A LONGITUDINAL MODEL OF FAMILY ECOLOGY

by

Jill B. Lubansky

Bachelor of Arts
University of Wisconsin-Madison, 2000

Bachelor of Arts
Metropolitan University of Denver, 2005

Master of Arts
University of South Carolina, 2010

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Accepted by:

Patrick S. Malone, Major Professor

Kate Flory, Committee Member

Kimberly J. Hills, Committee Member

Matthew J. Irwin, Committee Member

Cheryl L. Addy, Vice Provost and Dean of the Graduate School

Abstract

In the last few decades, treatment of problem behaviors in children and adolescents has targeted the entire family rather than more traditional methods that targeted the individual child. This approach is rooted in family systems and other ecological research and theory. The social sciences have maintained a long history of inquiry into the relations among social support, stress, and psychopathology. However, few of these inquiries include child outcomes, such as behavior problems, as the psychopathological outcome. Even fewer studies have utilized longitudinal models that have the capacity to accurately reflect the developmental process of stress and psychopathology. In the current study, I conducted a secondary data analysis to analyze data from 585 families collected for the Child Development Project. I analyzed the process of parental stress, measured by a major life events index, as well as the process of child behavior problems, measured by the Aggressive Behaviors subscale of the Externalizing scale of Achenbach's Child Behavior Checklist. Finally, I incorporated perceived social support as the predictor of child aggression and as a moderator of the relation between parental stress and child aggression in order to test the stress buffering and main effects hypotheses. I was unable to support the hypothesis that social support would have a main effect on aggression. Due to empirical underindentification, I was unable to estimate a model that included social support as a buffer between stress and aggression. The investigation did, however, reveal noteworthy results regarding the type of longitudinal models which best fit the stressors construct and the aggression con

struct. Results of this study support the specification of aggression and life events stressors via autoregressive latent trajectory models.

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Chapter 1

Introduction

Social support is likely an important resource that contributes to the resilience of families and the ability of parents to address and prevent behavior problems in children. It has been demonstrated to play an important role in preventing and reducing stress. The utilization of social support is often conceptualized as an important coping strategy. Most research in this area has examined the benefits of social support for individuals due to its potential effects on stress as well as its potential effects on mental health outcomes related to stress. The current study proposes to expand on the existing body of research by examining relations among social support and stress within the context of the family unit rather than single individuals. Specifically, the model proposed in this study was utilized to examine whether low levels of social support predict high levels of parents' stress and children's behavior problems. Additionally, I examined models designed to test whether social support buffers the effect of parents' stress on child behavior problem outcomes. A noteworthy strength of the models estimated in the current study is that they include trajectories of parents' stress and trajectories of child behavior problems measured over a period of 10 years. A longitudinal model, such as this, allows for an investigation of the relations between the processes of two constructs; in light of the dynamic nature of many psychological constructs, including aggression and stress, this is a key strength of the current investigation.

Family Ecology

Traditional conceptualizations of psychological treatment target the individual. However, over the last several decades, a large body of theory and research stemming from Bronfenbrenner (1977) and family systems theorists (e.g., Bowen, 1978; Haley, 1959) has questioned the comprehensiveness and utility of such a conceptualization. Bronfenbrenner offered an inclusive theory detailing individuals' ecosystems and the dynamic interactions within and between ecosystems. In essence, he made it difficult to ignore the contexts (e.g., family, neighborhood, work, school) in which individuals develop.

Early family systems theorists emphasized the importance of the family ecology, specifically, in the development and treatment of psychological disorders. Bowen (1978) developed a broad theory of family systems with an emphasis on the interactions of family members and the effects that interactions between two family members had on third family members. He theorized that the family, as a system, reacts to stressful situations and that the system adapts as a whole. He also emphasized the importance of social support as a resource that is useful in facilitating healthy adaptation to crises and other stressors.

Haley (1959) is often credited with the first attempt to conceptualize a psychiatric disorder within the context of the family. His work involved families of people with schizophrenia. Traditionally, schizophrenia was thought of as an organic disorder within an individual. However, Haley challenged traditional views of schizophrenia and psychological treatment by proposing that symptoms of schizophrenic persons are exacerbated or even created by problems stemming from interactions between family

members and the person with schizophrenia. He developed a problem solving approach to therapy in which identifiable problems stemming from the family environment were addressed in order to alleviate and ameliorate symptoms associated with schizophrenia.

Initial work in family systems therapy primarily involved adult psychopathology. However, a continually growing body of research supports the utility of family ecology theory in its application to child and adolescent psychology. For example, a large body of evidence supports the use of a family approach to treatment and therapy in myriad child related concerns including obesity (Rodearmel et al., 2006), developmental delays (Rickards, Walstab, Wright-Rossi, Simpson, & Reddihough, 2009), and diabetes treatment adherence (Wysocki et al., 2006).

Behavior Problems in the Context of Family Ecology

Therapy and interventions designed to ameliorate child behavior problems are no exception to this development in psychological research. A large body of research supports the effectiveness of the family approach to the treatment of child behavior problems (Gardner, Shaw, Dishion, Burton, & Suplee, 2007; Martinez & Forgatch, 2001; McMahon, Long, & Forehand, 2010) emphasizing the fundamental influence of family context on child development. In support of this notion are a number of observational and etiological studies that model the influence of family on the development of child and adolescent behavior problems. For example, Fergusson, Horwood, and Nagin (2000) identified four trajectory groups of youth varying in degree of criminal behavior in a sample of 900 children, birth to 18 years of age. Fergusson and colleagues demonstrated that family adversity predicted membership in all trajectory groups except the non-

offenders group. Furthermore, they reported that the extent of offending was related to poor family functioning. Maughan, Pickles, Costello, and Angold (2000) studied adolescents ages 9 to 13 and demonstrated that aggressive and non-aggressive conduct problems were associated with family adversity. In a longitudinal investigation of the effects of divorce on boys' and girls' behavior problems in a sample of 356 children, Malone, Lansford, Castellino, Berlin, Dodge, Bates, and Pettit (2004) found that boys who were in middle school at the time their parents divorced demonstrated an increase in externalizing behavior problems during the year of their parents' divorce. In the year following the divorce, these boys demonstrated a decrease in behavior problems that resulted in levels below baseline levels. Laucht and colleagues (2000) compared children born with and without obstetric complications as well as children with and without family adversity risk factors. They reported that the impact of family adversity was greater than the impact of obstetric complications with regard to a number of child outcomes, including aggression, as measured by Achenbach's Child Behavior Checklist (CBCL; 1991). In each of these studies the family environment is a key component to the development of aggression. Similarly, I investigated the role of the family environment, specifically parent social support and parent stress, in the etiology and maintenance of aggression.

Stress among Parents

Stress is an important construct in the family ecology of child behavior problems. Low levels of stress contribute to an environment in which parents can draw on the resources (e.g., social support) needed to support positive parenting efforts. High levels

of stress in the family system may limit opportunities for drawing on resources as well as limit parents' abilities to effectively utilize personal resources (e.g., problem solving, creativity used to develop preventative strategies). Furthermore, in times of high tension and stress, parents may utilize ineffective strategies (e.g., yelling, hitting, excessive time-outs) for the purpose of conserving time and energy in the short term. The utilization of ineffective parenting strategies can potentially lead to two complementary, undesirable outcomes. When parents are employing ineffective strategies, they are not teaching children constructive social skills (e.g., social problem solving) that foster positive development and behavior. Second, when employing ineffective strategies, parents are modeling behaviors (e.g., aggressive behavior) that tend to be conceptualized as problem behaviors when demonstrated by children and adolescents.

Initial theories of stress were rooted in medical research. The term "stress" was first utilized in psycho-biological research by Hans Selye (Rosch, 1999). Selye, a researcher and endocrinologist, proposed a concept (later labeled "stress") that resulted as a nonspecific response from varied types of stimuli (e.g., extremely cold temperatures; 1936). He demonstrated a great deal of evidence that supported his theory that stress, when experienced excessively, could lead to physical illness and disease. Over the next several decades, researchers collectively established a convincing body of evidence supporting the notion that stress is one factor that causes and exacerbates physical illness and disease (see Cassel for review of the literature, 1976). Out of this research grew a body of literature examining the effects of stress on psychological variables. Most of the research in this area illustrates the effect of stress on a nonspecific variable such as well-being (Burke & Weir, 1977; Martin & Ickovic, 1987; Schwartzberg & Dytell, 1988) or

nonspecific psychological distress (Ystgaard, Tambs, & Dalgard, 1999). Other psychological outcome variables commonly examined as outcomes of stress include depression (Billings & Moos, 1985; Cohen & Hoberman, 1983; Lehman, Wortman, & Williams, 1987; Moos, Schutte, Brennan, & Moos, 2005; Webster-Stratton & Hammond, 1988) and schizophrenia (Tessner, Mittal, & Walker, 2011; Zubin & Spring, 1977). Though a clear link between stress and psychological well-being or disorder appears to exist, the process involving the effects of stress on psychological outcomes may depend, in part, on the conceptual and operational definitions of stress. It is widely accepted that stress is both a popular topic and plays an important role in the etiology of many psychological disorders. It is also widely believed that stress is a difficult concept to define. There are myriad definitions of stress and stress related concepts. No single definition is unanimously accepted as a comprehensive description; however, Lazarus and Folkman's definition is commonly accepted as a general characterization of stress in a broad sense. Lasarus and Folkman (1994) write, "Psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well being" (p. 19). For the purposes of this study, I utilized Lazarus and Folkman's definition of stress.

Like the term, "stress," the term "stressor" is not easily defined. Oftentimes, the term "stressor" is used synonymously with the term, "stress." Some prefer to distinguish between the two terms. For example, a stressor is commonly conceptualized as an environmental event that triggers subjective feelings of stress for one or more individuals. For the purpose of the current study, I used this definition of stressor and I treated stress and stressors as distinct, but related concepts.

The difficulties in defining stress have led to the development of a multitude of measures designed to assess stress. Each measure consists of different types of operational definitions for stress. Two of the most commonly utilized operational definitions are discussed here. The first type consists of items pertaining to major life events (stressors). The second type consists of items pertaining to daily or minor hassles (stressors). The two are not mutually exclusive; however, when utilized in research studies, they offer differing insight into human behavior.

Many forms of major life events measures have been developed in the last century. According to Cohen and Wills (1985), life events are usually measured with an index in the form of a checklist. A prototype for this type of measure is Holmes and Rahes' Social Adjustment Rating Scale (1967). This type of scale is conceptualized as a proxy for stress. Total scales on such measures represent the cumulative impact of life events such as job loss or change in residence. Major life events measures have been found to be useful when examining the direct effects of stress and the buffering effects of social support (Cohen & Wills, 1985). Therefore, I utilized this type of measure to examine the research questions in the current study.

Because a second type of operational definition, a daily hassles measure, has been frequently used to examine relations between stress and social support, a brief discussion of this measure follows. These measures usually serve as indexes of cumulative stress experienced from minor hassles, such as work-related deadlines, experienced commonly or frequently. Daily hassles indexes have been shown to be useful when examining direct effects of stress on wellbeing, psychological distress, or physical illness. Wu and Lam (1983) reported that levels of daily hassles were inversely related to daily health, daily

mood, and overall health status. DeLongis, Coyne, Dakof, Folkman, and Lazarus (1982) compared the putative effects of daily hassles on health outcomes with the putative effects of major life events on health outcomes. The researchers demonstrated that daily hassles were more strongly correlated with physical health and that daily hassles served to explain most of the variance associated with major life events measures. Kanner, Coyne, Schafer, and Lazarus (1981) compared the effects of daily hassles and uplifts on psychological symptoms with the effect of life events stress on psychological symptoms. Each measure was administered once per month for 10 consecutive months. They concluded that the daily hassles and uplifts measure was more appropriate for predicting psychological outcomes than a major life events measure; however, the authors did not convey that these findings are, in part, due to measurement error. The number of major life events occurring in a month is fairly low for most participants. Therefore, it would be difficult to find correlations between stress and well being that are significantly different from zero.

Both life events measures and daily hassles measures are useful instruments; however, they serve different purposes and permit for the investigation of different research questions. Daily hassles are best utilized in research examining short term and direct effects of stress on functioning. Major life events, on the other hand, are useful for investigating long term effects of stress on functioning. Furthermore, major life events measures allow for the examination of potential buffering effects of social support. Because the current study aims to examine buffering effects of social support as well as direct effects of stress over a period of approximately ten years, a life events measure has been employed in the current study.

The findings and effects of stress depend not only on the operational definition of stress, but also on personal cognitive processes of the individual or family experiencing the stressor. According to the process model of stress and coping, a stressor is only stressful if it as appraised as such by the person or persons experiencing the stressor (Lazarus, 1966; Lazarus & Folkman, 1994). The role of appraisal may play a part at two points within the process. First, an event occurs and the person appraises whether the event is indeed a stressor. Second, if the event is deemed a stressor, the person then appraises which coping resources are available and which of the available resources are most suitable for addressing the stress. In addition to the importance of appraisal in the process of stress and coping, Lazarus and Folkman (1994) emphasize that management of stress is a continuous process. This process is dynamic and it is expected that, over long periods of time, there are numerous intervals in which adjustments are required. Although the current study did not include appraisal processes comprehensively, it included social support, a variable that is thought to have an important impact on the coping and appraisal process.

Social Support as a Coping Resource

Theory and empirical evidence support the idea that social support is one of the most salient and important resources for coping with stress and maintaining psychological well-being (Kessler, Price, & Wortman, 1985). It has long been assumed that social support interventions have a substantial impact on physical and mental health. In support of this idea is a large body of research including observational studies and social support intervention studies. Social support has been shown to improve outcomes for patients with breast cancer (McLean, 1995), increase compliance with prescribed

medications (Haynes, Wang, & de Mota Gomes, 1987), and improve self-care and diabetes outcomes in patients with diabetes (van Dam, van der Horst, Knoops, Ryckman, Crebolder, & van den Borne, 2005). Social support interventions have also been shown to affect mental health and promote well-being. Cooke, McNally, Harrison, and Newman, (2001) reported that social support led to positive psychological outcomes for caregivers of people with dementia. Mead, Lester, Chew-Graham, Gask, and Bower (2010) reported improvements on measures of depression for those receiving emotional support, a subtype of social support. Particularly relevant to family ecology research is the work conducted by MacLeod and Nelson (2000) in which they demonstrated that increases in social support influenced family wellness and prevention of child maltreatment.

The 1960s, 1970s and 1980s mark incredibly prolific periods of time for theoretical articles, research articles, and critical reviews dedicated to the relation between social support and stress (Cobb, 1976; Cohen, 1988; Cohen & Wills, 1975, Lazarus & Folkman, 1994; Kessler, Price & Wortman, 1985). Three important themes arose from these decades of work: 1) there was an apparent desire for theory that would organize the mixed results with regard to buffering effects of social support on psychological well-being and distress, 2) the process model of stress and coping was particularly relevant for the conceptualization of the relations among stress, social support, and psychological well-being or distress, and 3) clarification of social support definitions and measurement were vital for clarifying the mixed findings supporting and refuting the buffering hypothesis.

With regard to theory, two lines of thought began to dominate discourse in the social support literature (Cohen & Wills 1985). The first line of thought

was that social support had a direct effect on the well-being and mental health of individuals. This idea is known as the main effects hypothesis. The second line of thought was that social support serves as a moderator of the impact of stress on mental health in times of crisis or high stress (Cohen & Wills, 1985; Cobb, 1976; Kessler, Price & Wortman, 1985). This idea is referred to as the buffering effect hypothesis. These two theories are not mutually exclusive; however mixed findings regarding the buffering hypothesis have led some to question the role of social support in the amelioration of stress outcomes.

McConnell, Breitkreuz, and Savage (2010) investigated main effects and buffering effects hypotheses to learn more about the relations among presumed financial stress, social support and child psychological difficulties. They concluded that the main effects hypothesis was supported, but that the buffering effect hypothesis was not. Similarly, Hanson (1986) reported a main effect of social support (as well as SES and religiosity) on the mental and physical health of parents and children.

It is unclear whether lack of support for the buffering effect hypothesis stems from true null effects, low power to find moderation effects, or both. In addition to potentially inadequate power, it appears that findings indicating significant buffering effects may rely on the particular operational definition of stress in a given study. With the use of life events measures, Cohen and Hoberman (1983) and Wilcox (1981) reported support for the buffering effect hypothesis. For a comprehensive review on the topic, refer to Cohen (1988). It appears that, when daily hassles measures are used in studies, the buffering effect hypothesis is rarely, if ever, supported.

The second evident theme in the social support and stress literature is that the process model of stress and coping offers great utility for explaining the relations among social support, life events stress, and psychological outcomes (Lazarus & Folkman, 1984, Cohen & Wills, 1985). As explained previously, the process model posits that appraisal plays an important role during two stages upon one's experience of a stressful event. First the event occurs, such as job loss, and the person appraises the stress attached to the event. If the person deems the event as stressful, the event is then regarded as a stressor. This is one place in which social support may potentially intervene. Depending on the type and availability of social support, the social support resource may have an impact on how the event is appraised. If the event is perceived as a stressor (in the presence or absence of social support), the person experiencing the stress is faced with the challenge of appraising their coping resources. At this stage, social support may once again serve to intervene and moderate the effect of stress on psychological outcomes (Cohen & Wills, 1985). Though this model was originally designed to describe the process of stress and coping in individuals, it can be extended to the process of stress and coping within the family. For example, if a stressor is appraised as stressful, parenting strategies may be negatively impacted leading to adverse behavioral outcomes in children. Additionally, social support may serve as a buffer to the negative impact of stress on parenting, allowing parents to regain or maintain effective parenting strategies in the context of major stressors.

The third relevant theme in the social support literature is that there has been, and still is, a need for clear definitions of social support and social support measures. A number of definitions, typologies, and dimensions have been offered in the literature for

the purposes of providing a useful nomenclature from which to organize findings and work within. The next section details some of the more influential and useful terms for the purposes of organization of the social support literature.

Social Support

Social support is commonly conceptualized along three dimensions. The first is that of structure versus function. Structure refers to the existence or number of social relationships one maintains (Cohen & Wills, 1985). Examples of social support variables that represent structure include number of close friends, total social network size, density of social network, and marital status. Function refers to the type of behaviors involved in supportive exchanges. Several labels for various types of functions exist in the social support literature with a fair amount of overlap with regard to labels and operational definitions. For the purposes of Cohen and Wills' (1985) review, they categorized various functions into four categories. I refer to this nomenclature due to its thoroughness and its parsimony. The four categories outlined in their review include esteem support, instrumental support, informational support, and social companionship. Esteem support includes types of social support variables labeled elsewhere as emotional support and expressive support. A discussion with a friend about difficulties related to a recent divorce may offer a person a sense of emotional support. Instrumental support is often referred to as tangible support, financial support, and material support. One example of instrumental support would be diapers given to new parents. Informational support is support that facilitates the conceptualization of and coping with events perceived as stressful. Informational support may be derived from experiences in which one receives advice or counseling. Social companionship is the type of support derived

from time spent engaging in activities with others. For example, a person may have a sense of companionship support through experiences gained by belonging to a book club. Examples of other labels used for this type of support are belongingness and community involvement. The social support measure utilized in the current study was designed to tap into the structure (or size) of participants' social support networks rather than assessing various functions of participants' social support networks.

The second dimension useful for clarifying social support definitions and measures is that of the specific versus global dimension. Specific measures differentiate the various types of functions. These types of measures may be especially useful when analyzing the utility of support for a specific type of stressor. For instance, it may be most useful to analyze the effect of esteem support for problems for which an apparent information based solution is impractical (e.g., terminal cancer). An important note about functional support measures is that they are rarely conceptualized as independent constructs. These functions are rarely offered or accepted independently in natural settings (Cohen & Wills, 1985). Furthermore, there is empirical evidence that functional support categories are highly correlated regardless of the typology utilized by the researcher (Starker, 1986). Therefore, global measures which group functions together are appropriate for assessing social support. Generally, a scale score is calculated to represent overall satisfaction with social support (Cohen & Wills, 1985). The social support measure utilized in the current study is a global measure of satisfaction with one's sources of social support.

The third dimension of social support commonly referred to in the literature is the received versus perceived dimension. Received support is typically

represented by counts of various types of support that were received. Perceived support is a self-report assessment of quality of support. A fair amount of empirical evidence and theory supports the use of perceived rather than received support. With their model of mutual exchange, Shumaker and Brownell (1984) have proposed that perceived support has a stronger influence on the effect of social support. Cohen and Hoberman (1983) provide support for the use of perceived support instead of received support and Wilcox (1981) demonstrated that buffering effects were stronger for measures that assessed quality of support rather than quantity of support. The idea that perceived support is more important than received support is consistent with the process model of stress and coping (Lazarus, 1966; Lazarus & Folkman, 1984). The appraisal of available coping resources is likely to be affected by perceptions of social support regardless of the receipt of social support; however the converse is not necessarily true. The social support measure used in the current study assesses perceived support rather than received support.

Family Ecology of Stress, Social Support, and Behavior Problems

Theoretical Models

A number of family ecology models detailing the relations among stress, social support, and child/adolescent outcomes have been proposed over the last several decades. Some are less than parsimonious, while others are very specific, precluding generalizations or utility in the general psychological literature. However, there are a number of important commonalities among many of these models. The following section gives a brief overview of three of the models that are perhaps most relevant to the family ecology of children with behavior problems.

McCubbin and Patterson (1983) proposed a model of family stress in which social support has a buffering effect on the association between stress and stress outcomes. Family ecology, social support, and appraisal are essential features of this model. This theory posits that the onset of stress (conceptualized as stemming from a chronic stressors or major life events) affects individual family members as well as the family as a unit. Stress interacts with available resources, such as social support, present in the context that surrounds the family ecology. These resources may serve to buffer the effects of stress, thereby reducing the negative impact of stressors on the family unit.

Crnic, Friederich, and Greenberg (1983) proposed a family ecology model of stress and coping as it applies to families of children with intellectual difficulties. The model was designed to include all family members (e.g., parents of children with intellectual difficulties, siblings of children with intellectual difficulties, and children with intellectual difficulties) as well as interactions among family members. Additionally, this model proposes to explain varied types of adaptation that occur in response to perceived stress associated with the demands of caring for a child with intellectual difficulties. Crnic, Friederich, and Greenberg's model conceptualizes the family ecology within the context of a larger ecosystem which consists of resources, such as social support. These resources are thought to moderate the effects of stress on family adaptation leading to resilience or negative outcomes.

Armstrong, Birnie-Lefcovitch, and Ungar (2005) proposed an elaborate model rooted in theory and empirical evidence to explain the development and resilience of children in families with a child with serious emotional problems. Essential components to this model are parental social support, family well-being, quality of parenting, and the

development of child behavior. This model posits that social support acts as a protective factor with regard to effects of stressors on family well-being, and child competency and resilience. The model proposes that social support affects family and child outcomes via main effects and buffering effects. Additionally, this theoretical model treats parenting quality as a mediator. My statistical models examined in the current investigation are complementary to Armstrong's model and include both direct and interaction effects. However, due to the complexity of the statistical model of interaction effects, quality of parenting was not modeled as the proposed mediator or mechanism by which parenting stress affects child outcomes.

There are a number of important commonalities among these three theoretical models as well as the model proposed in the current study. First, each of these models appears to have roots in family systems theory and/or Bronfenbrenner's theory, acknowledging the importance of conceptualizing the family as a unit within a broader ecological context. Second, social support appears to have a major role as a potential coping resource in each model. Third, the effect of social support is proposed to have a buffering effect on outcomes manifested in individual family members as well as the family as a unit. Fourth, stemming from the process of stress and coping model (Lazarus & Folkman, 1984), appraisal or related cognitive factors are posited to play an important role in the stress and coping process.

Empirical Evidence

Recent interest in the family ecology of stress, social support, and child outcomes is apparent, as evidenced by a number of recent articles examining various relations among these variables. However, the definitions of parent's stress are narrow. Typically,

only one type of stress is studied. Most commonly, parenting stress (e.g., Abidin, 1997, Bagner et al, 2009, McConnell, Breitkreuz, and Savage, 2010), stress resulting financial hardship (e.g., Lee, Lee & August, 2011) and daily hassles stress (e.g., Crnic & Booth, 1991). The current study aimed to investigate the effects of a broad definition of stress in order to examine how families operate within a broad family ecology context.

There appears to be a relative dearth of longitudinal research investigating the constructs of interest in the current study. Commonly, researchers mistakenly refer to pretest-posttests as longitudinal research. Generally, pretest-posttest studies involve two waves of data collection. In contrast, an essential feature of a longitudinal design is the collection of three or more waves of data (Singer & Willet, 2003). Despite the common mislabeling of pretest-posttest designs, these studies offer important insight into the relations between parents' stress and child outcomes. For example, Early, Gregoire, and McDonald (2002) collected two waves of data from 164 children with serious emotional disorders. The researchers modeled parent child interactions with the use of a cross lag model. The model specified cross lag relations between a child variable consisting of Externalizing score, Internalizing score and Total Competence score from the CBCL (Achenbach, 1991) and a parent variable, a measure of stress, pleasure, and responsibility in 13 life areas. They reported a significant transactional effect such that parental stress predicted child outcomes and, in turn, child outcomes predicted parental stress.

One example of a longitudinal model investigating parent stress and child outcomes was identified in the existing literature; however, no social support variable was specified in this cross lag model consisting of seven waves of data collection (Neece,

Green, & Baker, 2012). The researchers demonstrated significant cross lag effects between parenting stress and the total score on the CBCL across time in a sample of 237 families. The child variable employed was the total score on the CBCL (Achenbach, 1991) and the parenting stress variable was measured with the PSI (Abidin, 1997), a more narrow definition of stress than examined in the current investigation. An important feature of the current study is that child aggression, a broad range of parent stressors, and the relations between these two constructs was investigated longitudinally over a ten year period.

The Current Study

The model investigated is different from prior studies in a number of important ways. First, the parent stress variable was constructed from a major life events measure, which is, according to theory and empirical evidence, more conducive to the investigation of buffering effects. Second, I specified a longitudinal model appropriate for the investigation of the effects of negative life events, which are likely to change fairly drastically over a period of 10 years, but would be unexpected to change very much for any given family over a much shorter time frame (e.g., 2 years). In addition, I focused on problem behavior as measured by the aggression scale of the CBCL (Achenbach, 1991). I utilized three types of structural equation models to find the models most appropriately matched to theory and the sample data. I utilized autoregressive models, latent growth models, and a hybrid consisting of the two, referred to as an autoregressive latent transition model.

The aims of this study were to analyze models that reflect relations between parent life events stress and children's behavior problems separately as well as the

association between these two constructs over a 10 year period of time. The focus of the study was to answer both substantive and methodological research questions. Commensurate with the family ecology models of stress and parenting as well as the use of the life events measure of stress, I predicted that the stress buffering hypothesis and the main effect hypothesis would be supported by the data. Specifically, I predicted that (1) strong social support would predict low levels of behavior problems, indicating a main effect and (2) that social support would serve as a buffer to stress and moderate the effects of parental stress on children's behavior problems.

The methodological aims of the paper were to identify the longitudinal model that best fit the aggression trajectory, the longitudinal model that best fit the stressors construct, and the longitudinal model that best fit the relations among the aggression and stressors constructs. I predicted that (1) the aggression construct would fit an autoregressive latent trajectory model (ALT) best, (2) the stressors construct would be most suitably modeled with a latent trajectory model, and (3) that a dual process model of the aggression and stressors constructs would be most appropriately modeled with the addition of cross lag parameters indicating that stressors at time T would predict aggression at time T +1 (Figure 1.1).

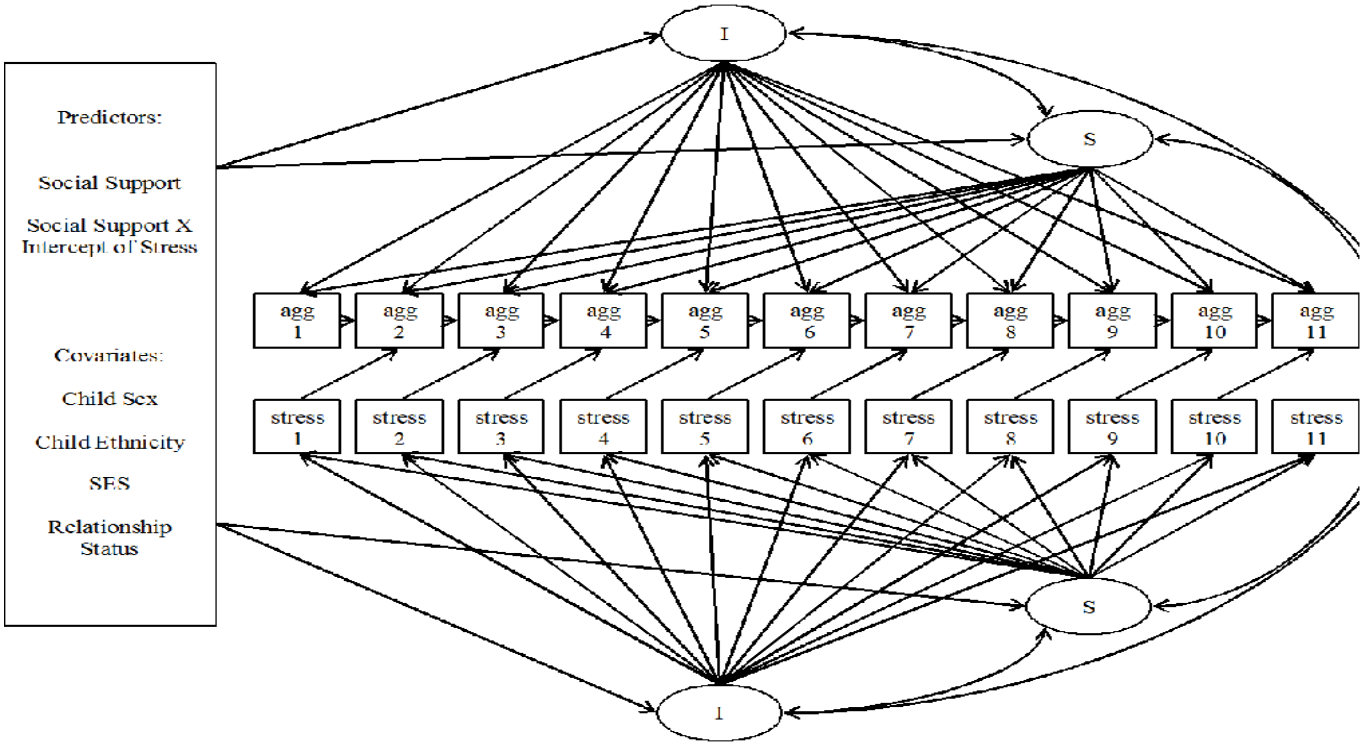

Figure 1.1 Structural Model of Parent Social Support, Aggression, and Major Life Events Stress

Chapter 2

Method

Participants

The Child Development Project is a longitudinal, prospective study of family and child development (Dodge, Bates, & Pettit, 1990). A primary aim of the project is to examine children's social development in particular. The vast number of constructs on which data has been gathered allow for comprehensive investigations of children's social development. Data has been gathered on the sociocultural contexts of the children and families in the sample as well as personal variables related to life experiences and biological dispositions (Center of Child and Family Development, 2014). Parents from 585 families completed a series of questionnaires and interviews which were administered annually at the beginning of each school year. Participants from two cohorts entering Kindergarten in 1987 and 1988 at three sites, (Knoxville, TN, Nashville, TN, and Bloomington, IN) were selected via a multistep process. First, schools were chosen based on their kindergarten registration procedures. Students were then randomly selected from schools conducting onsite registration. The current investigation included data collected from parents during their children's projected grades from Kindergarten through the 11th grade. All grade variables are proxies for age. In other words, the grade level represents the expected grade level and does not account for situations in which

children repeated or skipped grades. It was assumed that all participants in the 11th grade were under the age of 18, whereas this was most likely not the case for all participants in 12th grade. The 11th grade was chosen as the endpoint because aggressive behavior likely has different social and legal consequences for minors and adults. Therefore, aggressive behavior demonstrated at these two stages in life could represent different constructs.

Approximately 75% of the families who were randomly selected from schools at the three sites agreed to participate in the study (Pettit, Bates, & Dodge, 1997). Approximately 48% of the original child participants were girls. Eighty-one percent of the children were European American, 17% were African American, and the other 2% consisted of children whose parents endorsed descriptors other than these two ethnic group categories. The average score on the Hollingshead four factor index was 39.59 (SD= 13.96). Age of mother and age of father were reported for 28 % and 22% of the sample, respectively. The range of mothers' age reported was 21-43 (M=31.23, SD=4.98) and the range of fathers' age was 22-54 (M=33.77, SD=5.58).

Measures

Problem Behaviors

Mothers completed the Child Behavior Checklist annually (CBCL; Achenbach, 1991). In order to examine an extensive period of child development, only parent reports were utilized in the current investigation. Data were gathered from teacher and youth reports; however the number of years in which these reports were collected did not allow for descriptions of an extensive period of child development. To describe trajectories of children's problem behaviors from grades 1-11, I utilized the 15 of the 18 Aggressive Behavior subscale items of the Externalizing Scale from the parent report measure. Three

of the items (numbers 3, 89, and 97) were removed due to empty cells in the bivariate frequency tables. Although externalizing behaviors is a multidimensional construct, only the Aggressive Behavior subscale was used in the current analysis. Due to the complexity of the proposed structural equation model, only the one dimension could have been used. If the Externalizing scale were used, the model would have become a second-order model, which would have increased the complexity of the model greatly. Such an endeavor was beyond the scope of the current project and would have increased the probability that the models would not have converged during the analysis stage. Each of the items composing the Aggressive Behavior subscale were rated on a three point scale representing the following responses: "not true of," "somewhat or sometimes true," "very true or often true." Example items include, "threatens others" and "gets in fights." The Aggressive Behavior subscale has a high degree of internal consistency (α=.94) and test-retest reliability over 12 months (r =.82) and 24 months (r =.82; Achenbach & Rescorla, 2001).

A large body of evidence substantiates the validity of the Externalizing scale and the Aggressive Behavior subscale. Achenbach (1966) demonstrated support for the clinical relevance of the internal-external dichotomization of symptoms and provided support for the appropriateness of loading the Delinquent Behavior and Aggressive Behavior factors onto the Externalizing factor. In a 14-year follow-up study of 1,578 children ages 4-16, Hofstra, Van der Ende, and Verhulst (2002) found a strong correlation between externalizing behaviors in childhood as reported by parents and disruptive disorders at the time of the follow-up. In a sample of 231 children and adolescents aged 6-16 years, high scores on the Aggressive Behavior subscale predicted a

number of DSM III-R categories including Oppositional Defiant Disorder, Conduct Disorder, Attention Deficit Disorder, and an aggregate category of disruptive behaviors (Kasius, Ferdinand, van den Berg, & Verhulst, 1997).

Major Life Events Stress

The major life events stress measure consists of 18 items inquiring about parents' experiences with specific major life events stressors. Parents reported the number of stressors experienced in the last year. Only parents completed these measures for the Child Development Project. This measure is similar to other major life events stressors checklists, including the commonly used Holmes and Rahe Stress Scale (1967). In a comparative study examining the validity of various methods of measurement of stress, Mcgrath and Burkhart (1983) determined that stress is best measured via the use of a life events checklist, similar to the measure utilized by the Child Development Project, in which respondents are asked to report the number of negative stressors experienced in the last year.

I excluded five of the items from the measure originally designed by the Child Development Project due to potential confounding relations with the social support predictors. The five items removed inquire about changes in significant relationships with others (e.g., close family member death). An index score was constructed from the thirteen remaining major life events items (e.g., financial difficulties, job loss). Index scores ranged from 0-13 in any given year for each participant. This index was used to model a trajectory of life events stress measured annually from grades 1-11. A reproduction of the items incorporated in the major life events index is included in the appendix (see Figure A.1).

Social Support

I constructed the social support scale score from 11 close-ended questions on the Changes and Adjustments Questionnaire which was designed for the purposes of the Child Development Project. This questionnaire was first administered upon child participants' entrance into 1st grade and was treated as a time-invariant predictor. Parent participants reported their perceptions of the quality of support they had received in the last year from 13 types of sources (e.g., parents, siblings, and therapists). The first two questions were excluded from the total scale score because these items inquire about spousal support. Romantic relationship status was included in the model as a covariate, allowing for statistical control of this variable as well as an examination of the relation between relationship status and child behavior. Response options used to describe varying levels of social support include: "does not apply," "hardly at all," "some help," good help," and "great help." Numbers 0-4 represent the levels of support. I constructed the total social support scale scores by adding the ratings from 11 items allowing for a range of 0-44. Social support scores signify quality as well as size of participants' social support networks, representing a continuum of global satisfaction with perceived support. Low scores indicate minimal satisfying social support and high scores indicate large networks of substantial social support. Scores in the middle range indicate moderate satisfaction. Moderate satisfaction may result from different combinations of size and quality. For example, participants who associate with many sources of social support that are perceived as somewhat helpful may have similar scores to participants who have few sources which are greatly helpful; both possibilities represent the mid-range of satisfaction with one's social support system. The advantages of using this type of score

are that the scale includes multiple dimensions of social support and the social support variable is treated as a continuous variable, which lends more statistical power to the analysis than it would if it were treated as a discrete variable. A reproduction of the social support portion of the Changes and Adjustments Questionnaire is included in the appendix (see Figure A2). Test-retest coefficients for CDP participants social support scores across the 10 measurement occasions are rather low, ranging from r = .36-.51. This indicates that social support does vary a fair amount over a 10 year period of time. However, the internal consistency of the social support measure is moderately high as indicated by a Cronbach Alpha score of .86. This indicates that perceived social support in one area (e.g. social support from parents) is a fairly strong indicator of perceived social support in all other areas of one's social life including, for example, social support from clergy, neighbors, and friends.

Covariates

I included four covariates in the structural models in order to control for confounding variables, statistically. These variables include sex of child, parent reported socioeconomic status as measured by Hollingshead four factor SES index, ethnicity of child, and parent relationship status at time of child's birth. Due to the small percentage of participants reporting ethnicities other than African American or European American, ethnicity was coded as African American or non-African American. During the first wave of data collection, caregivers reported the relationship status they held at the time the target child was born. The parent relationship status variable was dichotomized in order to identify a group of parents who were living with a significant other ("partner support") and a group of parents who were living without a significant other ("no partner support").

All covariates were measured during the first waves of data collection, upon children's entrance into Kindergarten.

Power Analysis

Power analysis is often regarded as an important step in most research studies. There are two primary purposes for conducting power analyses a priori. The first purpose is to identify the minimum sample size required in order to detect a predetermined effect size. The second purpose is to identify the minimum potential effect size that can be identified with the available sample size. Neither of these purposes applied to the present study. Because the current investigation was a secondary data analysis, the sample size was unalterable. Second, due to the large number of parameters estimated in the proposed model, power analyses conducted for the purpose of determining potential effect sizes would have been unwieldy and would most likely have lead to convoluted results.

Plan for Analysis

The final longitudinal model I estimated was an autoregressive latent trajectory model (ALT) which specified dual processes. The ALT is a hybrid model that combines components of an autoregressive model and a latent growth trajectory model (Bollen & Curran, 2004). ALT offers the capacity to model relations among variables across time as do autoregressive models and latent growth trajectory models. However, the advantage offered by the use of the ALT is, potentially, the capacity to model more information which may be more consistent with relevant theory. For example, ALTs allow for the investigation of autoregressive effects which are modeled to represent the entire sample while also allowing for investigations of individual trajectories as offered by the latent growth trajectory model. An ALT has the potential to yield information about the slope

and intercept of individual and group trajectories as well as reciprocal effects modeled in autoregressive models and autoregressive components. The prototypical ALT specifies the process as related to one variable. However, a variation of this model is a dual process model which specifies the process as related to two separate variables as well as the relations between the two processes (McArdle, 2001). An important feature of the dual process model is that it may include two different types of processes or two similar processes. For example, depending on a given theory, it may be most appropriate to model the relations between an autoregressive model and an ALT model or it may be most appropriate to model the relations between two ALT models. Following the steps outlined by Bollen and Curran, I analyzed the data in three stages.

First, with the use of Mplus 7.1 (Muthén & Muthén, 2012), I estimated, separately, the unconditional models for externalizing behaviors and life events stress. The aim at this stage was to determine the model that best fits theory and the data. I tested measurement invariance of aggressive behaviors across the 11 measurement occasions. Because the item responses are ordinal, I employed a categorical confirmatory factor analysis (CCFA). To determine if the model was measurement invariant, I compared a model specifying noninvariance to a model specifying invariance in which item thresholds and factor loadings were constrained to be equal across time. Goodness of fit indices of the nested models were compared to determine whether and to what degree the aggression construct was measurement invariant.

Once measurement invariance was supported (by the analysis and theory), I estimated autoregressive parameters. Beginning with the model of aggression, I compared the model with autoregressive terms to the model without autoregressive terms

via a difference test. I conducted a series of difference tests to compare the possible forms (e.g., linear, curvilinear) of the trajectory of externalizing behaviors beginning with the model best supported by theory. As is well accepted in SEM literature, the criteria for good fit were established via a comparative fit index (CFI) or similar statistic (e.g., TLI) of .95 or higher, a Root Mean Square Error of Approximation (RMSEA) of .05 or lower, and a standardized root mean squared residual (SRMR) of .08 or lower (Hu & Bentler, 1999). For categorical variables, weighted root mean squared residual (WRMR) is appropriate in place of SRMR; a WRMR statistic below 1.0 is indicative of good fit (Yu, 2002). Although a non-significant chi square statistic may be used as an indicator of good fit, chi square is very sensitive to estimates demonstrating slight deviations from sample statistics when sample sizes are large. Therefore, significant chi square statistics alone do not preclude interpretations of good fit when sample sizes are large. I analyzed the unconditional model of stress in much the same way as aggressive behaviors with one exception. Because the life events stress measure is an index (i.e., a tally of events endorsed), it was unnecessary to test for measurement invariance. The co-occurrence of stressful life events was expected to vary unsystematically across measurement occasions.

In the second stage of the analysis, I estimated the bivariate unconditional model. I combined the model of externalizing behaviors with the model of life events stress by adding cross lag parameters. This step allowed for the estimation of parameters that represent the influences of each life events stress variable on the aggression variable across time. For example, the model included parameters indicating that life events stress at time two impacts externalizing behaviors at time three. Residual

covariances within measurement occasion were included in order to model the correlations between life events stress and aggression. In this same model, I specified covariates (parent ethnicity, parent age, relationship status, and child sex). Beginning with the model best supported by theory, I tested the cross lag assumptions via difference tests. The cutoffs recommended by Hu and Bentler (1999) apply to this series of tests as well. Once the best fitting model was established, I began the third and final stage of analysis.

In the third stage of analysis, I estimated the structural model by including the time invariant substantive predictor, social support, as well as the interaction effect of social support and stress on child aggression. This stage was intended to allow for the testing of the main effects and buffering hypotheses.

Chapter 3

Results

Missing Data

Missing data due to attrition and incomplete responding within measurement occasion were assumed to be missing at random (MAR; Little & Rubin, 1987). Missing data were handled primarily via a maximum likelihood estimator. Unconditional stress models were estimated using maximum likelihood (ML). The conditional model was estimated with maximum likelihood (MLR) due to the inclusion of categorical indicators and a predictor that allowed for the testing of an interaction effect. All other models were estimated with weighted least squares, mean- and variance-adjusted (WLSMV), allowing for unbiased estimates of parameters associated with the categorical indicators. In WLSMV estimation, Mplus employs ML for part of the missing data handling procedure under an assumption that the data are missing at random (MAR); however, for categorical outcomes, missingness is a function of observed predictors, but not the observed outcome (MARX; Muthén & Muthén, 2010). Refer to Table 3.1 for percentage of missing data; percentages of missing data for all variables ranged from 0 to 33 percent.

Measurement Invariance

In the first phase of the analysis, I conducted a confirmatory factor analysis for the purposes of testing measurement invariance of the ordinal response options

constituting the aggression construct. In order to test this, I first compared unconditional models, models without predictors, to test configural invariance. This step allowed me to assess the amount of invariance in the measure over time. In other words, this step was used to test whether the meaning of the construct was consistent over time. This was accomplished by first specifying a model in which the measurement parameter estimates for the construct was free to vary across time. I did this by allowing the thresholds of the indicators and factor loadings of the indicators to vary freely across measurement occasions. Overall, the fit of the model is adequate (X^2 (13,310, N=585) = 16459.31, p = 0.000; CFI = .91; RMSEA =.02 (90% CI = .021-.022); WRMR = 1.419). The significant chi square statistic is likely a product of the large sample size. The CFI indicates adequate fit and the RMSEA indicates good fit. The WRMR is not ideal, as it is above 1.0; however, Yu suggests that if well-established measures of fit (e.g. RMSEA and CFI) indicate good fit, than WRMR statistics above 1.0 may be overlooked (2002). Yu explains that the use of WRMR leads to over-rejection of models with eight or more measurement occasions.

I then compared the model with freely varying thresholds and loadings with a model in which the thresholds were held constant and the factor loadings were fixed to equality across time (X^2 (13,600, N=585) = 16419.53, p = 0.000; CFI = .92; RMSEA =.02 (90% CI = .018-.021); WRMR = 1.491). Again, the overall model fit was adequate. The chi-square difference test indicated that the model specifying measurement invariance worsened model fit (X^2 (290, N=585) = 373.77, p = 0.001). Statistics representing factor loadings on the aggression construct are summarized in Table 3.2. In order to examine the degree of measurement invariance, I investigated the measurement

invariance or noninvariance of each item. I compared the baseline model with separate models specifying measurement invariance for each item. For any model in which specifying noninvariance of an item worsened fit, I examined the differences in the threshold and loading parameters as an assessment of effect size of the noninvariance. The local noninvariance of the items is relatively minimal, stemming from only a fraction of thresholds for three items. The partial noninvariance of the three items (demands attention, destroys own things, destroys others' things) is apparent with maturation of the participant. Due to the small degree of noninvariance within few items, the noninvariant model was used as the basis for all subsequent models containing the aggression trajectory. As described in the plan for analysis, the testing of measurement invariance was not necessary for the models specifying the trajectory of the stress index.

Univariate Models

In the second phase of analysis, I compared three types of univariate longitudinal models (latent trajectory model, autoregressive model, autoregressive latent trajectory model) to determine which type of model best fit the data for each of the key constructs. Because these models are not nested, it is not possible to conduct a significance test to determine which model fits the data best. However, it is possible to examine the fit indices to determine how each model fits the data. This process was conducted separately for the aggression and stress constructs. Tables summarizing the fit indices of the aggression models (Table 3.3) and stress models (Table 3.4) are included in the appendix.

Aggression Models

First, I estimated an autoregressive model. Using the confirmatory factor analysis model specifying measurement invariance, I added parameters allowing each measurement occasion of aggression to be predicted by the previous measurement occasion. This autoregressive model fit the data adequately (X^2 (13,645, N=585) = 16410.25, p = 0.000; CFI = .92; RMSEA =.02 (90% CI = .018-.020); WRMR = 1.51). In the next step, I examined the fit if the latent trajectory model (Figure 3.2.1). The latent trajectory model fits the data adequately X^2 (13,651, N=585) = 16,568.50, p = 0.000; CFI = .92; RMSEA =.02 (90% CI = .019-.021); WRMR = 1.54). It appears that the latent trajectory model provides a sufficient representation of aggression.

The third type of model I estimated was an autoregressive latent trajectory (ALT) model, consisting of components of both the latent trajectory model and autoregressive model. This model allows for simultaneous inclusion of growth trajectories and autoregressive parameters. Furthermore, variations of this model were examined in order to determine whether autoregression parameters contributed to model fit, and subsequently, whether these parameters

were best specified as equal across time or varying across time. The ALT model with varying autoregression parameters fit the data best (X^2 (13641, N= 585) = 16401.90, p = 0.000; CFI = .92; RMSEA =.02 (90% CI = .018-.020); WRMR = 1.50). Chi-square difference tests were conducted to determine which of the variations in autoregression parameter specification was most appropriate. A summary of these comparisons is presented in Table 3.5.

Fit indices, chi-square fit tests, and theory support the use of the ALT model with autoregressive parameters free to vary rather than the latent trajectory model, the autoregressive model, or variations of the ALT in which autoregressive parameters are constrained. Therefore, this model was included as the component in the subsequent bivariate models representing the aggression construct.

Unconditional Univariate Stress Models

Following the same procedure I followed for the aggression models, I examined the best fitting model for the stressors construct. The latent trajectory model fits the data poorly according to each fit index X^2 (61, N=585) = 400.68, p = 0.000; CFI = .70; RMSEA =.10 (90% CI = .091-.110); SRMR = .12). It appears that the latent trajectory model does not provide a sufficient representation of major life events stressors.

I specified parameters indicating that each measurement occasion of the stressors construct was predicted by the previous measurement occasion. This autoregressive model did not fit the data adequately (X^2 (45, N=585) = 345.93, p = 0.000; CFI = .78; RMSEA =.12 (90% CI = .106-.130); SRMR = 0.20, AIC = 14, 646.27).

The autoregressive latent trajectory model with freely varying autoregression parameters appears to have adequate fit (X^2 (61, N=585) = 400.68, p = 0.000; CFI = .92; RMSEA =.02 (90% CI = .018-.020); WRMR = 1.50). This model appears to be more appropriate for representing life events stressors than either the latent trajectory model or the autoregression model. Refer to Table 3.4 for a summary of model fit of each type of model. The ALT with freely varying autoregression parameters fit the data significantly better than the ALT model with autoregression parameters constrained

to zero (X^2 (10, N= 585) = 203.59, p=0.000) and the ALT model with autoregression parameters constrained to equality (X^2 (9, N= 585) = 168.26, p=0.000). A summary of comparisons between ALT models is presented in Table 3.5.

Bivariate Models

In the third phase of the analysis, I combined the univariate models of aggression and stress to specify the bivariate models. First, I estimated an unconditional model in order to test whether cross lags improved model fit. Specifically, I examined whether relations among each measurement occasion of stress (T) and the corresponding aggression measurement of the following year (T + 1) were significant. The bivariate model specifies covariances among each of the trajectory components, including the slopes and intercepts for both aggression and stressors. Second, I included the social support predictor and the moderating variables (social support X stress growth parameters) to test direct and interaction effects. Summaries of the growth factor means, variances, and covariance are provided in Tables 3.6 and 3.7.

Unconditional Bivariate Autoregressive Latent Trajectory Models

Unconditional models do not include predictors. However, it is acceptable to include covariates which are not substantively relevant predictors in the first stages of structural equation modeling. I combined the ALT model of aggression with the ALT model of life events stressors. A chi-square difference test did not support the inclusion of cross lag parameters in which stress at time T predicted aggression at time T+1 (X^2 (10, N= 585) = 12.21, p=0.271). The model without cross lags was accepted as the more suitable model X^2 (16503, N= 585) = 19040.43, p = 0.000; CFI = .92; RMSEA =.02 (90%

CI = .016-.018); WRMR = 1.40). A summary of fit statistics associated with the bivariate model with covariates is presented in Table 3.5.

Bivariate Structural Model

Conditional Bivariate Autoregressive Latent Trajectory Model

The final model I estimated was a bivariate autoregressive latent trajectory model in which I included social support, a predictor with substantive relevance, in addition to the control variables. The primary difference between the final model and the unconditional model is the addition of the substantive predictor, social support. As indicated in the previous paragraph, the cross lags between the two processes were modeled most appropriately when constrained to zero. Autoregressive parameters were free to vary across waves for the aggression construct as well as the stressors construct. The fit of the model was adequate and similar to the fit of the ALT models estimated in earlier stages of analysis X^2 (16673, N= 585) = 19165.92, p = 0.000, RMSEA =.02 (90% CI = .018-.019); WRMR = 1.40. A summary of fit statistics associated with the conditional bivariate model is presented in Table 3.8.

Effect of Social Support on Aggression

Social support did not predict the level of aggression, (b= -0.001(.01), p=0.708. Similarly, social support did not predict the rate of change in aggression (b= 0.000(.01), p=0.805). Parameter estimates of the associations between growth factors and covariates/predictors are presented in Table 3.9. The model is diagrammed in Figure 3.2.

Buffering Effect of Social Support Relation between Stress and Aggression

The model which included the interaction term between social support and stress did not yield interpretable parameter estimates. I attempted extensive alternative parameterizations of the model; however the excessive computational times and numerous failed attempts to obtain interpretable results suggest that the model is empirically underidentified. There are numerous reasons that may contribute to underidentification of any given model. For example, a given sample size may not be large enough for the number of unknown parameters included in the model and/or correlations among key variables may be low. Bollen (1989) discusses empirical underidentification extensively.

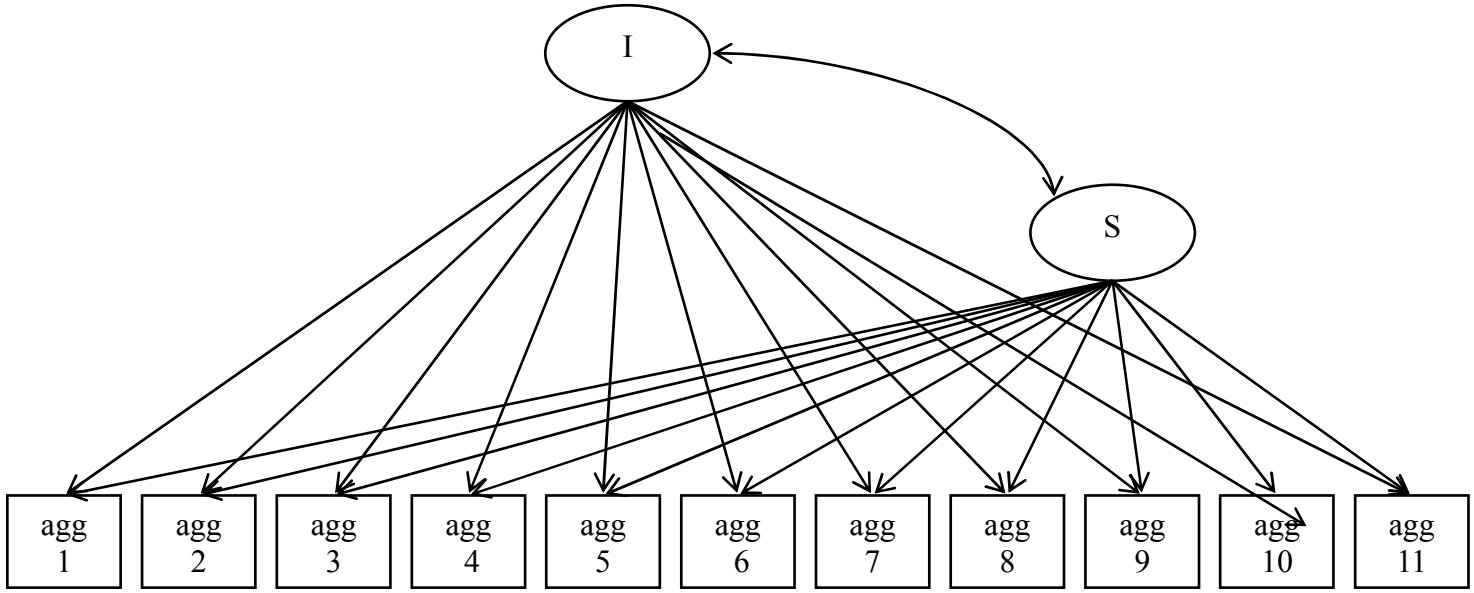

Figure 3.1 Latent Trajectory Model of Aggression

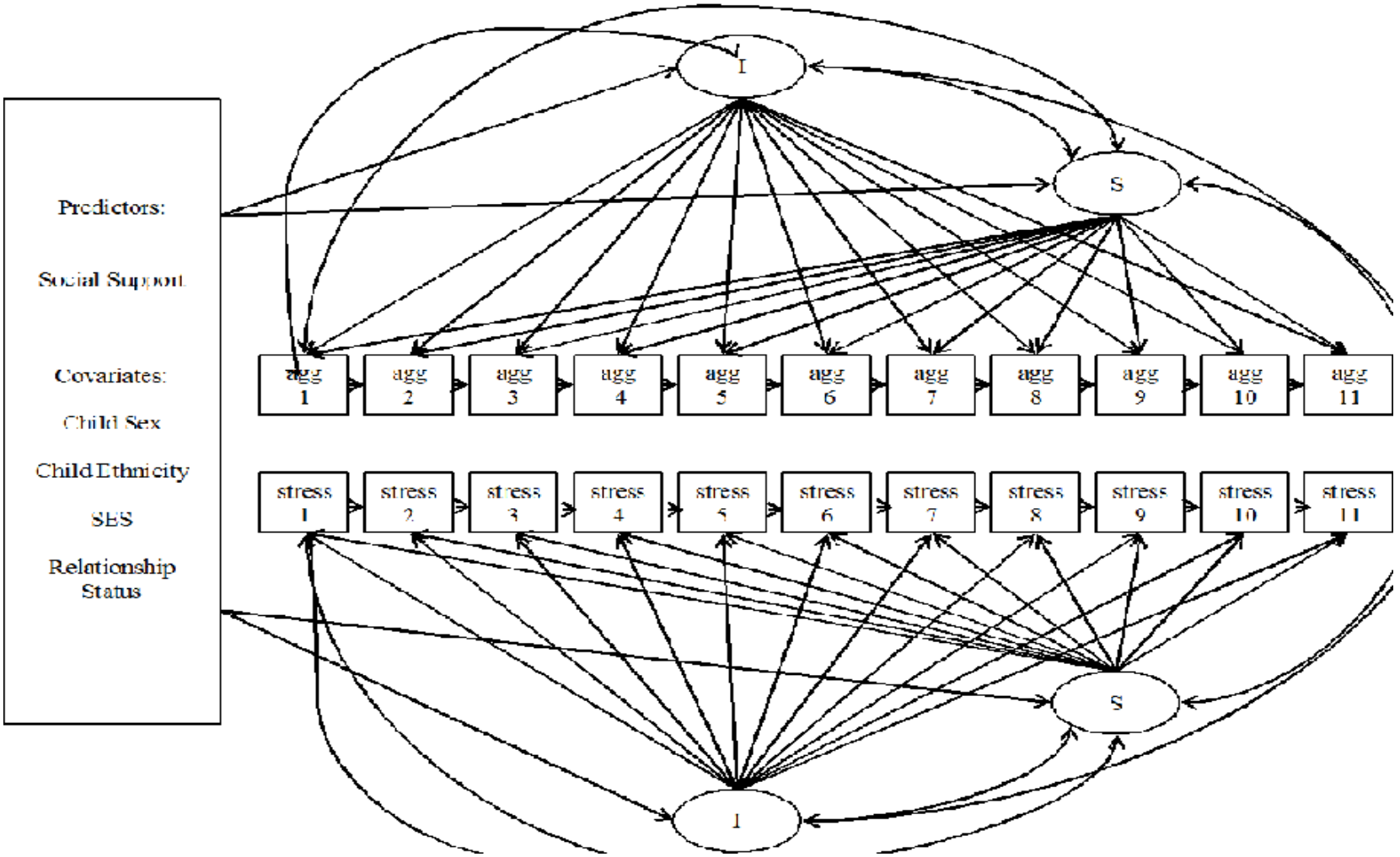

Figure 3.2 ALT Model of Parent Social Support, Aggression, and Major Life Events Stressors

Table 3.1

Summary of Correlations, Means, and Standard Deviations

Variable	1	2	3	4	5	6	7	8	9
1. SES	----								
2. male	-0.051	----							
3. Black	-0.399	----	----						
4. partner	0.388	-0.022	-0.428	----					
5. social support	0.067	0.004	-0.095	0.127	----				
6. stress grade 1	-0.169	-0.054	-0.011	-0.025	0.086	----			
7. stress grade 2	-0.162	-0.061	-0.031	-0.036	0.077	0.537	----		
8. stress grade 3	-0.179	0.010	0.051	-0.063	0.009	0.394	0.477	----	
9. stress grade 4	-0.097	-0.018	0.040	-0.022	0.042	0.398	0.415	0.486	----
10. stress grade 5	-0.243	0.024	0.090	-0.078	-0.047	0.279	0.439	0.440	0.437
11. stress grade 6	-0.226	-0.001	0.086	-0.091	-0.027	0.380	0.416	0.413	0.468
12. stress grade 7	-0.056	-0.047	-0.001	-0.053	-0.057	0.308	0.329	0.302	0.425
13. stress grade 8	-0.080	-0.006	0.039	-0.091	0.011	0.203	0.221	0.211	0.260
14. stress grade 9	-0.262	0.057	0.093	-0.135	0.041	0.311	0.354	0.377	0.324
15. stress grade 10	-0.195	0.006	0.080	-0.108	-0.023	0.309	0.283	0.303	0.328
16. stress grade 11	-0.122	0.101	0.048	-0.071	-0.015	0.247	0.363	0.271	0.283
17. aggression grade 1	-0.211	-0.010	-0.014	-0.070	-0.023	0.308	0.324	0.307	0.382
18. aggression grade 2	-0.198	-0.085	0.010	-0.024	0.062	0.294	0.330	0.300	0.355
19. aggression grade 3	-0.205	-0.063	0.039	-0.010	0.030	0.253	0.292	0.351	0.329
20. aggression grade 4	-0.211	-0.043	0.040	-0.132	-0.035	0.263	0.303	0.399	0.399
21. aggression grade 5	-0.250	-0.092	0.043	-0.055	-0.032	0.158	0.264	0.329	0.387
22. aggression grade 6	-0.183	-0.128	-0.007	-0.115	0.001	0.229	0.296	0.253	0.288
23. aggression grade 7	-0.233	0.018	0.069	-0.133	-0.028	0.223	0.285	0.304	0.334
24. aggression grade 8	-0.195	-0.035	0.101	-0.154	-0.013	0.145	0.185	0.238	0.277
25. aggression grade 9	-0.268	-0.001	0.131	-0.189	-0.023	0.167	0.231	0.207	0.239
26. aggression grade	-0.241	0.015	0.126	-0.180	-0.064	0.143	0.206	0.191	0.199
27. aggression grade	-0.222	0.006	0.157	-0.237	-0.067	0.112	0.160	0.187	0.190
M	39.590	----	----	----	14.291	1.939	1.966	1.930	1.822
SD	13.960	----	----	----	6.958	1.699	1.712	1.814	1.664
Missing data	0.027	0.000	0.000	0.019	0.141	0.162	0.203	0.192	0.279

Variable	10	11	12	13	14	15	16	17	18
10. stress grade 5	----								
11. stress grade 6	0.554	----							
12. stress grade 7	0.347	0.482	----						
13. stress grade 8	0.231	0.347	0.450	----					
14. stress grade 9	0.393	0.400	0.411	0.394	----				
15. stress grade 10	0.319	0.399	0.343	0.333	0.578	----			
16. stress grade 11	0.322	0.321	0.322	0.276	0.391	0.473	----		
17. aggression grade 1	0.213	0.236	0.218	0.234	0.228	0.214	0.239	----	
18. aggression grade 2	0.177	0.209	0.248	0.206	0.296	0.233	0.193	0.641	----
19. aggression grade 3	0.208	0.223	0.187	0.226	0.261	0.270	0.237	0.668	0.710
20. aggression grade 4	0.270	0.336	0.308	0.221	0.298	0.295	0.213	0.603	0.670
21. aggression grade 5	0.360	0.292	0.251	0.194	0.197	0.224	0.235	0.613	0.655
22. aggression grade 6	0.263	0.331	0.268	0.211	0.257	0.288	0.245	0.508	0.517
23. aggression grade 7	0.288	0.331	0.358	0.273	0.318	0.322	0.342	0.542	0.584
24. aggression grade 8	0.235	0.209	0.241	0.284	0.237	0.267	0.222	0.494	0.485
25. aggression grade 9	0.223	0.178	0.286	0.242	0.317	0.334	0.310	0.440	0.444
26. aggression grade	0.239	0.192	0.220	0.224	0.302	0.410	0.321	0.382	0.410
27. aggression grade	0.278	0.200	0.170	0.209	0.283	0.290	0.289	0.421	0.428
M	1.802	1.873	1.925	2.401	1.726	1.724	3.141	6.213	5.747
SD	1.716	1.852	1.590	3.323	1.718	1.805	1.904	4.736	4.702
Missing data	0.309	0.221	0.248	0.289	0.332	0.313	0.246	0.180	0.229

Variable	19	20	21	22	23	24	25	26	27
19. aggression grade	----								
20. aggression grade	0.702	----							
21. aggression grade	0.687	0.717	----						
22. aggression grade	0.638	0.648	0.672	----					
23. aggression grade	0.675	0.706	0.736	0.716	----				
24. aggression grade	0.608	0.639	0.633	0.660	0.775	----			
25. aggression grade	0.589	0.508	0.578	0.635	0.721	0.738	----		
26. aggression grade	0.533	0.467	0.565	0.645	0.644	0.667	0.801	----	
27. aggression grade	0.493	0.496	0.555	0.543	0.660	0.681	0.713	0.743	----
M	5.691	5.642	5.492	5.411	5.880	5.738	4.908	4.732	4.932
SD	5.113	4.990	5.182	4.911	4.865	4.907	5.195	5.119	5.130
Missing data	0.203	0.284	0.327	0.234	0.233	0.289	0.311	0.306	0.246

Table 3.2

Summary of Factor Loadings on Aggression

Note. Although the loadings were constrained to be equal in the measurement and structural models, the range for each standardized loading is provided because of variation in the observed variances over time.

Scale	Standardized Loading (Range)	SE
Mean to others	0.683-0.802**	0.03
Demands attention	0.626-0.736**	0.03
Destroys own things	0.650-0.781**	0.03
Destroys others' things	0.697-0.891**	0.03
Disobedient at home	0.677-0.798**	0.03
Disobedient at school	0.656-0.770**	0.03
Gets in fights	0.636-0.747**	0.03
Attacks people	0.616-0.724**	0.03
Screams a lot	0.664-0.780**	0.03
Stubborn, sullen	0.640-0.752**	0.03
Mood changes	0.596-0.686**	0.03
Sulks	0.584-0.679**	0.03
Teases a lot	0.564-0.663**	0.03
Temper	0.735-0.864**	0.03
Loud	0.695-.816**	0.03

**$p<.01$

Table 3.3

Univariate Aggression: Model Fit of Autoregressive, Latent Trajectory, and Autoregressive Latent Trajectory (ALT) Models of Aggression

Fit Statistic	Auto-regressive	Latent Trajectory	ALT Free AR Parameters	ALT Equal AR Parameters	ALT Zero Constrained AR Parameters
Chi-Square	X^2 (13645, N= 585) = 16410.25, p = 0.000	X^2 (13651, N= 585) = 16568.50, p = 0.000	X^2 (13641, N= 585) = 16401.90, p = 0.000	X^2 (13650, N= 585) = 16403.05, p = 0.000	X^2 (13651, N= 585) = 16568.50, p = 0.000
CFI	.92	.92	.92	.92	.92
RMSEA	.02 (90% CI = .018-.020)	.02 (90% CI = .019-.021)	.02 (90% CI = .018-.020)	.02 (90% CI = .018-.020)	.02 (90% CI = .019-.021)
WRMR	1.51	1.54	1.50	1.51	1.54

Table 3.4

Univariate Life Events Stressors: Model Fit of Autoregressive, Latent Trajectory, and Autoregressive Latent Trajectory (ALT) Models of Life Events Stressors

Fit Statistic	Auto-regressive	Latent Trajectory	ALT Free AR Parameters	ALT Equal AR Parameters	ALT Zero Constrained AR Parameters
Chi-Square	X^2 (45, N=585) = 345.93, p = 0.000	X^2 (61, N=585) = 400.68, p = 0.000	X^2 (51, N=585) = 197.09, p = 0.000	X^2 (60, N=585) = 355.35, p = 0.000	X^2 (61, N=585) = 400.68, p = 0.000
CFI	.78	.76	.90	.80	.76
RMSEA	.12 (90% CI = 0.106 0.130)	.10 (90% CI = .091-.110)	.07 (90% CI = .062-.083)	.10 (90% CI = .085-.104)	.10 (90% CI = .091-.110)
SRMR	0.20	0.12	0.09	0.11	0.12
AIC	14646.27	17956.89	17773.30	17913.57	17956.89

Table 3.5

Tests of Joint Contribution of Autoregressive and Cross Lag Parameters

	Alternative Model	Nested Model	Chi-Square Difference Test	Interpretation
Univariate Aggression	ALT with AR Constrained to Zero	ALT with AR Free to Vary	X^2 (10, N= 585) = 66.57, p=0.000*	Autoregressive parameters improve model fit significantly.
	ALT with AR Constrained to Zero	ALT with AR Free to Vary	X^2 (9, N= 585) = 24.622, p=0.003*	Autoregressive parameters which are free to vary improve model fit significantly.
Univariate Stress	ALT with AR Constrained to Zero	ALT with AR Free to Vary	X^2 (10, N= 585) = 203.59, p=0.000	Autoregressive parameters improve model fit significantly.
	ALT with AR constrained to equality	ALT with AR Free to Vary	X^2 (9, N= 585) = 168.26, p=0.000	Autoregressive parameters which are free to vary improve model fit significantly.

Bivariate (Aggression and Stress)	ALT with Cross Lags Constrained to Zero	ALT with Cross Lags Free to Vary	X^2 (10, N= 585) = 12.21, p=0.271*	Cross lag parameters do not improve model fit.

*Robust Chi-Square Difference Test

**See Figure 3.2 for details of structural model.

Table 3.6

Summary of Growth Factor Means, Variances, and Covariance of the Bivariate Unconditional Model

Parameter	Estimate	SE
Unconditional Model Means		
Aggression Intercept	Fixed to zero	-----
Aggression Slope	-0.005	0.020
Stressors Intercept	2.186**	0.265
Stressors Slope	-0.072	0.063
Unconditional Model Variances		
Aggression Intercept	0.138**	0.037
Aggression Slope	0.002**	0.001
Stressors Intercept	0.521**	0.075
Stressors Slope	0.003	0.003
Unconditional Model Covariances (Correlations)		
Aggression Intercept and Slope	0.007* (0.443)	0.004
Stressors Intercept and Slope	-0.015 (-0.484)	0.016
Aggression and Stressors Intercepts	0.141**(0.518)	0.024
Aggression and Stressors Slopes	0.003**(0.667)	0.001

**p=0.01

*p=0.05

Table 3.7
Summary of Growth Factor Means, Variances, and Covariance of the Bivariate Conditional Model

Parameter	Estimate	SE
Conditional Model Means		
Aggression Intercept	Fixed to zero	-----
Aggression Slope	0.004	0.021
Stressors Intercept	2.109**	0.277
Stressors Slope	-0.098	0.063
Conditional Model Variances		
Aggression Intercept	0.142**	0.034
Aggression Slope	0.002**	0.001
Stressors Intercept	0.466**	0.069
Stressors Slope	0.003	0.003
Conditional Model Covariances (Correlations)		
Aggression Intercept and Slope	0.007* (0.397)	0.004
Stressors Intercept and Slope	-0.028 (-0.798)	0.015
Aggression and Stressors Intercepts	0.125** (0.488)	0.022
Aggression and Stressors Slopes	0.002** (0.661)	0.001

**p=0.01
*p=0.05

Table 3.8

Bivariate Aggression and Life Events Stressors: Model Fit of Autoregressive Latent Trajectory (ALT) Models of Aggression and Stress

Fit Statistic	Unconditional ALT (with covariates) Free Cross Lags	Unconditional ALT (with covariates) Cross Lags Fixed to Zero	Conditional ALT with Covariates and Predictors**
Chi-Square	X^2 (16,493, N= 585) = 19036.14, p = 0.000	X^2 (16503, N= 585) = 19040.43, p = 0.000	X^2 (16503, N= 585) = 19165.92, p = 0.000
CFI	.92	.92	.92
RMSEA	.02 (90% CI = .016-.018)	.02 (90% CI = .016-.018)	.02 (90% CI = .016-.019)
WRMR	1.40	1.40	1.40

Table 3.9

Summary of Aggression and Stressors Coefficients

Variables	Coefficient	SE
Aggression Intercept regressed on:		
Site	-0.005	0.03
Cohort	-0.029	0.04
SES	-0.010**	0.00
Ethnicity	-0.120	0.07
Sex	-0.046	0.04
Partner	-0.057	0.06
Social Support	-0.001	0.01
Aggression Slope regressed on:		
Site	0.004	0.00
Cohort	-0.006	0.01
SES	0.000	0.00
Ethnicity	0.001	0.012
Sex	-0.022	0.01
Partner	-0.022	0.11
Social Support	0.000	.01

Stressors Intercept regressed on:		
Site	-0.083	0.05
Cohort	0.119	0.08
SES	-0.015**	0.00
Ethnicity	-0.203	0.13
Sex	-0.020	0.09
Partner	-0.057	0.12
Social Support	0.003	0.01
Stressors Slope regressed on:		
Site	0.004	.69
Cohort	0.063**	0.00
SES	0.001	0.31
Ethnicity	-0.006	0.83
Sex	0.024	0.12
Partner	-0.024	0.32
Social Support	0.000	0.76

**$p<.01$

Chapter 4

Discussion

The substantive aims of this study were to examine the direct effects and buffering effects hypotheses (within the family context) regarding the effects of social support on psychological maladjustment (particularly aggression). Congruent with an extensive body of research on the association between social support and psychological well being or maladjustment in individual children, adolescents, and adults (Cooke, McNally, Harrison, and Newman, 2001; Dasgupta, 2013; Hamama, & Ronen-Shenhav, 2012; Price, & Wortman, 1985; McLean, 1995; Mwansisya, et al., 2013), I hypothesized that parent reported social support would have a direct effect on child aggression. I was unable to support the hypothesis that high levels of social support would be associated with low levels of aggression.

A large body of research also supports the supposition that social support buffers the negative impact of stress on psychological distress in the individual, particularly when negative life events measures are employed in study designs (Cohen & Wills, 1985). However, this study was unable to answer whether social support serves as a buffer to aggression within a family ecology model because the model including the interaction effect could not be estimated. The inability to estimate the interaction

parameters may be due to an absence of relations among social support, stress, and child aggression within the family context. However, it would be premature to discontinue investigation into the relations among these constructs within the framework of family ecology theory.

There are a number of notable limitations to this study that may have precluded the discovery of evidence supporting the primary hypotheses. The most detrimental limitations likely involve measurement error associated with the social support measure. A common downfall of secondary data analysis is that researchers are limited to use of measures and operational definitions that are often less than ideal for new research questions. The social support measure in this study is an example of this limitation. It is possible that the social support measure lacked the sensitivity needed for the current investigation. Sensitivity may have been further decreased by the exclusion of items inquiring about the support of spouses. Similarly, due to potential dependence between life events stressors and social support, items on the stressors inventory were removed if the items were related to loss or changes in social support (e.g., death of close family member). The revised life events stressors may also have lacked the sensitivity required for the detection of an association between stressors in a given year and aggression in the following year.

Similarly, the child behavior problems measure may be too narrow a construct to capture effects of parents stress on children's behavior. For example, a more expansive measure of the child behavior problems construct, such as the delinquency scale of the CBCL, may be more strongly associated with parental stress. However, the delinquency

scale of the CBCL was not included in the problem behavior construct for the sake of parsimony and model convergence. Additionally, local noninvariance of some of the thresholds of three of the items may have served to weaken model fit to some extent and therefore introduce small degrees of bias in the parameter estimates.

Another limitation is that a time invariant measure of social support was utilized rather than multiple measurements throughout the complete period of data collection. Prior to statistical analysis, the assumption was that social support was adequately stable throughout the 10-year period modeled by the stressors and aggression constructs. However, as indicated in the Method section, the test-retest reliability coefficients corresponding to the social support measure over the 10-year period was low. The current study may have gained a fair amount of power by the inclusion of a social support trajectory, allowing for the inclusion of a time-varying conceptualization of social support. However, this was not included in the current model due to practical issues related to structural equation modeling. The probability of a model (with sample size of 585) converging and yielding significant results would have been greatly decreased with the inclusion of a third trajectory.

A third limitation is the nature of the sample. The convenience sample of 585 families appears to have been adequate for the investigation of direct effects as well comparison of the three different types of models (ALT, latent trajectory model, and autoregressive model). However, the sample size does not appear to have been large enough for the investigation of the buffering effect hypothesis. Interactions typically require a great deal more power than direct effects. However, due to the findings that

neither the direct effect nor indirect effect hypotheses were supported, it is unlikely that utilization of a different sample alone would have been sufficient for the detection of these effects. Rather, a larger, more representative sample as well as more sensitive measures would most likely need to be incorporated in combination for the detection of a buffering effect. In contrast, the sample has a number of strengths, mainly in the way of its wealth of measurement. It would be difficult to find a larger, more representative sample with such detail regarding family related variables.

The fourth limitation is that the current model assumes that parenting quality is the mediating factor between stressors and child aggression. Again, this element was not modeled in the current study due to complexity of the structural equation model and modest sample size. Though it may not be necessary or possible to measure, simultaneously, every aspect of a given theory via structural equation modeling (as is the case with multiple regression or any other technique), it may be necessary to investigate this mediation relationship further before it can be reliably assumed in moderation analyses.

Though this study does not provide evidence supporting the substantive hypotheses, it does offer insight into the bivariate theoretical model of aggression and stress as well as the univariate models of aggression and stress. A substantial body of research demonstrates that life events stressors predict psychological well-being (Cohen & Wills, 1985) within individuals. However, this relation has yet to be established in the context of the family (e.g., parent-reported stress and child aggression). The current study investigated the presences of this association in a non-clinical sample of youth (ages 5-

17). Contrary to my hypotheses, parent-reported life events stressors did not predict levels of parent-reported child aggression in the following year.

Though not commonly utilized in psychological research, autoregressive latent transition models potentially offer opportunities for researchers to more accurately model theoretical relations (Bollen & Curran, 2004). It appears that negative life events stress, aggression, and the association between these two constructs may best be modeled via autoregressive latent transition models rather than simpler latent trajectory models or autoregressive models. Until the last decade, it was generally accepted that latent trajectory models and autoregressive models are mutually exclusive (Bollen & Curran, 2004). However, Curran and Bollen (2001; Bollen & Curran, 2004) have described how the two models can be combined into one model, the autoregressive latent trajectory model. This hybrid model may be useful for more accurately modeling theory in any number of areas. The current study supports these assertions by offering three examples. As hypothesized, the ALT is the most suitable fit for the aggression construct. This finding is consistent with work citing both the adequacy of fit of latent trajectory models (Brame, Nagin, & Tremblay, 2001; Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2011) and autoregressive models (Huesmann, Dubow, & Boxer, 2009; Zimmer-Gembeck, Geiger, & Crick, 2005) with longitudinal data on aggression. To the author's knowledge, no study demonstrating an ALT model of aggression has been published. The current study lends support to the notion that aggression may be best conceptualized as a model in which the previous year of aggression levels predicts the following year of aggression

levels, as is consistent with autoregressive models, and the slopes and intercepts of individual aggression trajectories may vary substantially across individuals.

Similar to findings regarding aggression, negative life events stressors may be most suitably estimated with ALT models. This finding was contradictory to hypotheses established prior to analyses. Due to a great deal of research based on models conceptualized without autoregressive parameters among waves of life events stressors (Feng & Yi, 2012; Johnson, Whisman, Corley, Hewitt, & Rhee, 2012; Wills, Sandy, & Yaeger, 2002), I conjectured that the life events stressors would not be suitably modeled with autoregressive parameters. However, the current study supports the idea that earlier measurement occasions of stressors do in fact predict levels of negative life events stressors one year later beyond the variance predicted by the continuity modeled with the trajectory parameter. After an extensive literature search, I found only one study which was consistent with this finding (Watson, Gardiner, Hogston, Gibson, Stimpson, Wrate, & Deary, 2009). Further investigation utilizing longitudinal methods with more broadly representative samples may serve to explain whether a true autoregressive relationship among measurement occasions of stressors exists.

Also contradictory to hypotheses, the latent trajectory model fit the negative life events stressors poorly. This finding is inconsistent with longitudinal research on stress (Feng & Yi, 2012; Johnson, Whisman, Corley, Hewitt, & Rhee, 2012; Wills, Sandy, & Yaeger, 2002). However, it is not inconsistent with the finding that the ALT model is the most suitable fit for the data in the current study. Again, further investigation, utilizing

longitudinal methods, are needed to confirm this finding in other samples. To the author's knowledge, no study examining stressors within an ALT framework has been published.

Finally, the bivariate autoregressive latent trajectory model is an adequate fit for the modeling of the longitudinal relationship between life events stressors and aggression. Again, to the author's knowledge, no studies modeling this relationship via autoregressive latent trajectory models have been published. The current study lends support for the potential utility offered by further investigation of the relations between constructs such as stress and aggression with the use of more flexible models (e.g., the autoregressive latent trajectory model).

The key implication derived from the current study is that the ALT model may be an especially important model to the aggression and stressor research, and may be underutilized. Both the aggression and stress constructs examined in the current study were not adequately specified with two of the more common longitudinal methods in psychological research. The model fit of the latent trajectory model (or equivalent model with autoregressive parameters fixed to zero) was improved significantly with the addition of autoregressive parameters. The data in the univariate stress model poorly fit the latent trajectory model and the autoregression models. These models, according to the current study, are not suitable for yielding interpretable coefficients representing relations among the variables. However, the ALT, according to fit statistics indicating adequate fit, is suitable for producing interpretable results relating to the relations among variables in the model. Additionally, the ALT may serve to increase power necessary to find true relations among variables for constructs that are best modeled via the ALT or model with

similar level of flexibility. (e.g., McArdle, 2009; McArdle & Hagimaki, 2001). An important note regarding the ALT models is that the first measurement occasion is typically treated as predetermined. In other words, the first measurement occasion is not treated as a variable that is predicted by other variables in the model; however, it serves as a predictor of the succeeding measurement occasion. Therefore, the estimates associated with the lagged values between measurement occasions are consistent, allowing for an uncomplicated interpretation of the estimates. The ALT cannot be directly compared to the latent trajectory model nor the autoregressive model. However, if constraining relevant parameters to zero in each model, creating special forms of the latent trajectory and autoregressive models, a difference test can be used to compare these models to the ALT model in which the parameters are not constrained to zero. In the latent trajectory model, the Bollen and Curran, have revealed a potential solution to inadequate model fit of latent trajectory models and autoregressive models with regard to some psychological research. The current study exemplifies how a construct (aggression) may be more suitably fit for an ALT model than a latent trajectory model or autoregressive model alone and how a second construct (life events stressors) could not be studied via the latent trajectory or autoregressive models alone. In order to study the stressors construct employed in the current study, the ALT model must be specified. These conclusions may be relevant to any number of psychological constructs. It appears that the ALT model, or models with similar flexibility (e.g., dual change score model, McArdle & Hagamaki, 2001), may be used to gain more accurate results on longitudinal studies that have been published and may serve to provide more power to studies in which model fit was poor among latent trajectory and autoregressive models.

The findings and limitations of the current study prompt a variety of recommendations for future directions in the areas of family ecology research and structural equation modeling. First, little is known about the direct and indirect effects of social support within a longitudinal framework. It is recommended that future research examine these hypotheses to determine whether these hypotheses are supported over long periods of time and longitudinally (utilizing more than two measurement occasions). This recommendation pertains to research examining the proposed relations both within the individual as well as family ecology. Different from pre-post tests, the use of longitudinal methods would serve to rule out significant findings resulting from measurement error.

Additionally, I recommend that future research continue to examine the proposed relations within the family ecology framework. However, it may be necessary to use more sensitive measures. One option would be to increase the number and variety of items of the social support and stressors measures. Another option would be to use a different type of social support measure. It is possible that more narrowly defined types of social support which are more closely associated with the immediate family context (e.g. support from romantic partner) would be more strongly correlated than general social support from outside the immediate family system. A third option for improving the measures would be to treat social support as time varying rather time invariant. Including a trajectory of social support in conjunction with stress and aggression trajectories may not allow for the examination of the buffering hypothesis, but would likely allow for an examination of the direct effect hypothesis.

Finally, it is recommended that mediation models be examined to determine whether parenting quality does in fact mediate relations between life events stressors and child aggression. There is some evidence that this is the case (Lee, Lee, August, 2011); however this study did not include longitudinal data. Again, longitudinal analyses are essential for parsing out measurement error. Furthermore, longitudinal analyses serve a special purpose in that they may serve to inform prevention and intervention practitioners and researchers as to which relations among constructs sustain over time.

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Appendix A: Measures

Figure A1. Items included in the major life events portion of the Changes and Adjustments Questionnaire.

What kind of changes and adjustments has your family had in the past year?
Please circle yes (1) or no (0) for each item

	no	yes
a. moved	0	1
b. major repairs/remodeling to home	0	1
c. severe and/or frequent illness for child	0	1
d. accidents and/or injuries for child	0	1
e. other medical problems for child	0	1
f. medical problems for close family members	0	1
g. death of close family member*	0	1
h. death of other important person*	0	1
i. divorce and/or separation for you and your husband/wife*	0	1
j. parent and child were separated (due to illness, divorce, work, etc.)	0	1
k. money problems	0	1
l. legal problems	0	1
m. problems and conflicts with relatives*	0	1
n. birth of a baby	0	1

o. problems at school for child	0	1
p. problems at work for parents	0	1
q. loss of a job	0	1
r. remarriage or marital reconciliation*	0	1

Note. *items will be excluded in index used in analyses.

Figure A2. Social support instructions and items from the Changes and Adjustments Questionnaire. Only items c-m will be used in the analysis.

Please tell us about the kind of help and support you have had from others in the past year. Please circle the number that best describes the support and help you received from each person.

	does not apply	hardly at all	some help	good help	great help
a. husband	0	1	2	3	4
b. wife	0	1	2	3	4
c. parents	0	1	2	3	4
d. in-laws	0	1	2	3	4
e. brother/sister	0	1	2	3	4
f. friends	0	1	2	3	4
g. neighbors	0	1	2	3	4
h. clergy or minister	0	1	2	3	4
i. older children	0	1	2	3	4
j. other relatives	0	1	2	3	4
k. social service agencies	0	1	2	3	4
l. counselor or therapist	0	1	2	3	4
m. your child's school	0	1	2	3	4

Please use this space to tell us about any other people who were helpful who were not listed above and tell us how helpful they were (1, 2, 3, or 4, as above).

n. _____ ___

o. _____ ___