TRAJECTORIES OF SELF-REPORTED AGGRESSION IN EARLY ADOLESCENCE: CONTRIBUTIONS OF INDIVIDUAL, FAMILY, COMMUNITY, AND MEDIA RISK FACTORS

by

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(Under the Direction of Randy W. Kamphaus)

ABSTRACT

This study identified trajectories of self-reported aggression among urban, diverse ethnic middle school students, using HLM; it was found that over a 3-year period overall aggression increased, verbal aggression increased, and physical aggression decreased. This study also examined the effects of multiple risk factors for aggression in four domains (the individual, family, community, and media) with three different methods. The first method testing the independent effects of each of the four domains without regard to the other three domains showed that nearly all the risk variables were positively associated with variability in the intercept of all aggression outcomes and some variables were negatively associated with variability in the slope of some aggression outcomes. The second method testing the unique effects of each of the four domains controlling for covariation with the other three domains revealed that most of the risk domains made unique contributions to the prediction of the development of all aggression outcomes. Among the four domains, the family context explained the largest amount of variance of all aggressive behaviors, suggesting the importance of family intervention for reducing aggression in early adolescence. The third method using a cumulative risk model demonstrated that the greater number of risk factors present predicted high initial

levels of overall, verbal, and physical aggression, and was associated with less increase or more decrease in all aggressive behaviors over time. Taken together, all three methods provide evidence that multiple risk factors at multiple levels exert influence on the growth of early adolescent aggression with varying degrees. Pros and cons of each of the three statistical models were discussed.

INDEX WORDS: Aggression, Trajectories, HLM, Early adolescence, Risk factors, Family, Community Violence, Media Violence

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A Dissertation Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2007

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August 2007

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CHAPTER 1

INTRODUCTION

Statement of the Problem

Although the overall rate of youth aggression has recently declined, it is still a major mental health concern in the United States (Catalano, 2005). Epidemiological studies conducted in the past few years demonstrated that aggression is a prevalent problem behavior among American adolescents (Eaton et al., 2006; Nansel et al., 2001; Whalen et al., 2005). For example, Whalen et al. reported that 31-53% of middle school students had ever carried a weapon and 50-66% of the students had ever been in a physical fight. They also showed that aggression and violence is one of the leading causes of illness and death among early adolescents.

Aggressive behavior is often accompanied by destructive consequences to both the victim and the perpetrator of the act. Victims of peer aggression suffer from psychological problems (e.g., depression) as well as physical illnesses (Brain, 1997; Hawker & Boulton, 2000). They also are likely to avoid going to school due to fear for their safety (Berthold & Hoover, 2000), which may result in lowering their grades or cause them to drop out of school. Likewise, aggressive children tend to experience academic failure and peer rejection, which lead them to be affiliated with delinquent peers and be involved in violence and drug use in childhood and adolescence (Moffitt, 1993). The impacts of childhood aggression may extend to adulthood in that highly aggressive children are at risk for crime, substance abuse, unemployment, divorce, and psychiatric problems in adulthood (Farrington, 2003). Further, aggressive behavior may lead to tragic results such as suicide and homicide (Orpinas & Horne, 2006).

During the middle school years, violent and delinquent acts increase dramatically (Moffitt, 1993) and highly aggressive adolescents are at risk for school dropout (Farrell, Sullivan, Esposito, Meyer, & Valois, 2005). To prevent aggression in early adolescence, many aggression and violence intervention programs have been implemented, but unfortunately, most of the programs have been deemed ineffective (U.S. Department of Health and Human Services, 2001). The lack of evidence of effectiveness can be partly attributed to the fact that programs are not frequently evidence-based (Tolan & Gorman-Smith, 2002). Tolan and Gorman-Smith suggested several lines of research that promote aggression intervention effects. As a matter of fact, the research literature has significantly grown with regard to risk for aggression; yet, there is relative lack of knowledge of the normal developmental course of aggression in adolescence. This kind of research is vitally important because it not only leads to an understanding of the deviant course of aggression but also provides a basis, against which aggression intervention programs can be evaluated. Given the need for conducting such basic research, this study investigated average trajectories of early adolescent aggression in relation to multiple risk factors at multiple levels.

Significance of the Study

Research on youth aggression has been plagued by conceptual and methodological inadequacies. Developmental systems theory posits that development is determined by the dynamic interactions between an individual and multiple contexts at multiple levels (Sameroff, 2000). Therefore, researchers should consider a variety of variables representing distal as well as proximal contexts. However, prior research had conceptual limitations by focusing on child variables or proximal contexts (e.g., family) and ignoring distal contexts (e.g., community); the omission of important variables may result in biasing the estimates of the variables included. In

addition, most prior studies of change showed methodological weaknesses in that they collected data at only one or two time points or failed to formulate an explicit model of change (Raudenbush & Bryk, 2002).

Despite an increase in applying statistical advances (e.g., multilevel growth modeling) to longitudinal aggression research in the last decade, the literature is still limited in the following areas. First, as described previously, most studies examined particular factors without considerations of other influences. Ample research identified a number of risk factors for aggression, yet, few studies addressed how the risk factors operate in conjunction with one another (e.g., Deater-Deckard, Dodge, Bates, & Pettit, 1998; Dodge & Pettit, 2003; Sameroff, Peck, & Eccles, 2004). A review of 10 relatively recent longitudinal studies revealed that many of the studies included a restricted range of risk factors. Specifically, four studies examined only sex effects (Bongers, Koot, van der Ende, & Verhulst, 2003, 2004; Broidy et al., 2003; Farrell et al., 2005; Stanger, Achenbach, & Verhulst, 1997), and one study examined the effects of sex, ethnicity, and SES (Aber, Brown, & Jones, 2003). Two studies looked at proximal contexts such as parents or peers in addition to child variables (Deković, Buist, & Reitz, 2004; Keiley, Bates, Dodge, & Pettit, 2000). Another two studies investigated the impacts of community structural characteristics in conjunction with parenting- or peer-related variables (Beyers, Bates, Pettit, & Dodge, 2003; Tolan, Gorman-Smith, & Henry, 2003). Lastly, one study looked at the influences of community violence and sex on aggression (Farrell & Sullivan, 2004). Given the restricted range of the risk factors examined, it is necessary to integrate knowledge of risk factors into research in order to understand how multiple risk factors operate together in the development of aggression.

Second, most prior research used measures of externalizing behaviors, failing to recognize aggression as a construct distinct from other problem behaviors, such as delinquency (e.g., Beyers et al., 2003). Although aggression is correlated with other externalizing problems, empirical evidence warrants a distinct model of development for aggression (e.g., Stanger et al., 1997). Even further, some researchers argued for subdividing aggression into distinguishable forms because of changes in the nature of aggressive expression with age (Dodge & Pettit, 2003; Nagin & Tremblay, 1999; Tremblay, 2000). Developmentally, it is expected that young children who lack verbal communication skills tend to use physical aggression; as verbal abilities develop children are likely to add verbal aggression; with an increase in social skills adolescents and adults may develop indirect aggression (i.e., relational aggression) (Björkqvist, Lagerspetz, & Kaukiainen, 1992). The need for differentiated forms of aggression is supported by empirical research. Cairns, Cairns, Neckman, Furguson, and Gariépy (1989) reported that physical aggression declined and relational aggression increased from Grades 4 to 9 among females. In addition, Loeber (1982) stated that patterns of aggression changed from preadolescence to adolescence in that the number of youths engaging in overt aggressive behavior decreased and the number of youths engaging in covert aggressive behavior increased. Research using measures of differentiated types of aggression allows for understanding respective developmental courses of different aggressive behaviors.

Third, in collecting data on youths' aggressive behavior the majority of the longitudinal studies reviewed relied on adult informants such as parents and teachers, and only a few studies used youths' self reports (e.g., Deković et al., 2004; Farrell et al., 2005). The information provided by different informants has varying reliability and validity (Edelbrock, 1986; Verhulst, Althaus, & Berden, 1987), and consequently, it is important to gather data from multiple

informants to achieve a complete picture of a youth's behavior. In fact, there is evidence that the developmental course of aggression differs depending on agents (Cairns et al., 1989; Keiley et al., 2000). The use of self-reports in examining the development of aggression is promising especially during adolescence when adolescents spend more time outside the home and parents may not know their adolescent's problem behaviors (Kuo, Mohler, Raudenbush, & Earls, 2000; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996).

Purpose of the Study

The purpose of this study was to describe average trajectories of self-reported aggression among urban, diverse ethnic middle school students, using hierarchical linear modeling. The literature on youth aggression has focused on White youths and relatively ignored minority youths; even prior studies investigating ethnicity effects were conducted on a small scale with a limited number of ethnic groups. In this vein, the present study can fill the gap as the use of large-scale datasets allowed for examining ethnic differences in the development of aggression, even among rarely studied ethnic groups.

In addition, overt aggression was of interest in this study as it is the most problematic aggressive behavior. Specifically, the present study aimed to examine trajectories of specific forms of overt aggression as well as trajectories of overall levels of overt aggression. Therefore, there were three aggression outcomes including verbal aggression, physical aggression, and overall overt aggression (i.e., combined verbal/physical aggression). The advantage of studying the development of different forms of aggression simultaneously is that it may provide insight into the continuity and discontinuity of aggression. Unfortunately, inconsistency exists in prior research on trajectories of overt aggression partly due to differences in informants, measures, etc.; there is a paucity of research using self-reports of overt aggression in early adolescence. In

the midst of the lack of consistency, theory and some empirical studies together seem to suggest age trends in aggression that as youths age aggression remains the same, physical aggression decreases, and verbal aggression increases (e.g., Loeber, 1982; Parke & Slaby, 1983; Tremblay et al., 1999). Accordingly, in the present study it was hypothesized that adolescents show the same level of overall overt aggression, decrease the level of physical aggression, and increase the level of verbal aggression during early adolescence.

Another purpose of this study was to examine multiple risk factors that may account for individual differences in the initial level and growth rate of overall, verbal, and physical aggression from an ecological perspective. There were four domains of risk factors representing the individual (sex, ethnicity, and academic achievement), family (family structure, parental monitoring, and parental attitude towards fighting), community (community violence), and media (TV watching and videogame playing). The effects of the risk factors were examined in three different ways for each aggression outcome.

The first approach was to test the independent effects of risk factors in each of the four domains, and it was hypothesized that each set of risk factors significantly predict the development of overall, verbal, and physical aggression. Hypotheses were generated below; however, they focused on the initial level of aggression because of the complexity of generating hypotheses regarding the growth rate of aggression.

- Individual Risk Factors: adolescents who are male, ethnic minority and low academic achievers are likely to show higher initial levels of aggression than their respective counterparts. (Not enough evidence has been accumulated regarding ethnicity effects; the current hypothesis about ethnic minority is more of a practical one, made to facilitate the examination of ethnicity differences in aggression);

- Family Risk Factors: adolescents who do not live with both biological parents and receive less parental monitoring and stronger parental support for fighting are likely to show high initial levels of aggression, when compared to their respective counterparts;
- Community Risk Factors: adolescents witnessing more community violence are likely to show higher initial levels of aggression than those witnessing less.
- Media Risk Factors: adolescents who spend more hours watching TV and playing videogames are likely to show higher initial levels of aggression than their respective counterparts.

In the second approach each of the four domains was examined with regard to the other domains. If the risk domains are redundant with one another, some of the domains would account for others. For example, family risk factors might influence or determine exposure to community violence and media violence; consequently, even if each of the community and media significantly predicts the course of aggression in isolation, they would not provide any unique variance to the prediction of aggression beyond the variance explained by the family domain. However, the multiple risk factors were thought to operate together to produce aggressive behavior, and it was hypothesized that all the four domains contribute unique incremental variance to the prediction of early adolescent aggression.

The third approach was to apply a cumulative risk model to studying of trajectories of adolescent aggression. The cumulative risk model posits that an increasing number of risk factors present is associated with more negative developmental outcomes. In the context of aggression development, it was predicted that the more risk factors an adolescent has, the greater likelihood he/she is aggressive.

Research Questions

This study sought to answer the following four research questions regarding trajectories of self-reported overall, verbal, and physical aggression among urban, diverse ethnic middle school students.

First, what are the average trajectories of overall, verbal, and physical aggression during early adolescence?

Second, does each of the four risk domains—individual, family, community, and media—predict the initial level and growth rate of overall, verbal, and physical aggression?

Third, does each of the four risk domains make a unique contribution to predicting the initial level and growth rate of overall, verbal, and physical aggression?

Fourth, does the number of risk factors present predict the initial level and growth rate of overall, verbal, and physical aggression?

CHAPTER 2

LITERATURE REVIEW

Aggression

Definition of Aggression

Aggression in contemporary psychology is value-laden in that aggressive behavior means social undesirability (Tremblay, 2000). To constitute aggression a behavior should include intent to harm that may bring negative consequences. Therefore, aggression is defined as intentional behavior that may cause physical or psychological harm to others (Orpinas & Horne, 2006). Often aggression is used interchangeably with violence and bullying. Violence refers to the intentional use of physical force against oneself, another person, or a group of people that may result in injury, death, deprivation, or psychological harm (Krug, Mercy, Dahlberg, & Zwi, 2002). Compared with violence, aggression does not necessarily involve a hostile physical act, and its effects are less severe. Bullying is a subset of aggression and characterized by imbalance of power and repetition. A victim is physically or psychologically weaker than a bully so unable to defend him/herself; the bully targets the victim multiple times (Orpinas & Horne).

The definition of aggression is a major problem in studying the development of aggression (Tremblay, 2000). Two opposite opinions have been proposed regarding defining aggression in research. One group of researchers extended the concept of aggression into the general concept of externalizing behavior or antisocial behavior (Menard & Elliott, 1994). The rationale is that aggressive acts often occur in the presence of other antisocial behaviors such as delinquency and substance abuse, and therefore, studying the comorbidity between aggression

and antisocial behavior may enhance an understanding of the etiology and course of aggression. The second group of researchers argued that those behaviors have distinct etiologies and developmental courses (e.g., Farrell, Kung, White, & Valois, 2000). On a narrower level, Tremblay suggested the need to identify different forms of aggression such as physical versus verbal aggression in studying trajectories. This is consistent with the recommendations made by Bandura (1973): "A high degree of specificity is required at the investigatory level because there is little reason to believe that the diverse activities subsumed under the omnibus label 'aggression,' though sharing some ingredients in common, have the same determinants" (p. 11). The idea of studying specific forms of aggression in longitudinal research also is supported by Patterson (1992) who stated that the mean level of antisocial traits is stable over time, while the forms change constantly.

Types of Aggression

A popular classification of aggressive behaviors is covert versus overt aggression. Covert aggression refers to any type of indirect aggression such as relational aggression. Relational aggression is defined as the intentional behavior to harm others' peer relationships, including spreading rumors, keeping others from liking a student, excluding someone from a group, etc. Overt aggression refers to any type of direct physical or verbal aggression. The former indicates an intentional physical act that may cause injury or harm, and its examples include hitting, punching, slapping, biting, kicking, shoving, and pushing. The latter indicates the intentional use of words that may cause psychological or emotional harm, and its examples include threatening physical harm, insulting, name calling, hassling, and encouraging others to fight (Orpinas & Horne, 2006).

Physical aggression and verbal aggression are distinct in terms of their developmental onsets and courses. Children start to be physically aggressive during infancy; then, as they learn to talk, physical aggression decreases and verbal aggression increases (Parke & Slaby, 1983; Tremblay et al., 1999). Moreover, research using a representative Canadian sample of more than 22,000 children from ages 0 to 11 years showed that the rate of physical aggression declined from ages 3 to 11 years, but indirect aggression increased from ages 4 to 8 years (Tremblay et al., 1996). Based on these findings, physical aggression is thought to be antecedent to verbal aggression (Tremblay, 2000).

Prevalence of Aggression

Several epidemiological studies have indicated that aggression is a prevalent behavior problem among adolescents in the United States. A middle school youth risk behavior survey revealed that 31-53% of students had ever carried a weapon. The median percentage of these students increased with higher grades—33% in the 6th grade, 37% in the 7th grade, and 41% in the 8th grade. The percentage of middle school students who had ever been in a physical fight ranged from 50% to 66%, and again students in higher grades showed the higher median percentage of the behavior (56% in the 6th grade, 59% in the 7th grade, and 65% in the 8th grade; Whalen et al., 2005).

The WHO Bullying Survey using a U.S. representative sample of 15,686 students in grades 6 – 10 revealed that 44% of the students reported being involved in some bullying. Bullying behavior was more prevalent among boys than among girls (53% and 37%, respectively) and among 6th graders than among 10th graders (46% and 36%, respectively). The survey provided similar prevalence rates regarding victimization: 41% of the students reported being bullied, and it occurred more frequently among boys than among girls (47% and 36%,

respectively) and among 6th graders than 10th graders (50% and 28%, respectively) (Nansel et al., 2001). In addition, the Youth Risk Behavior Survey with a U.S. representative sample of 13,953 students in high school showed that 36% of students (43% boys and 28% girls) had been in a physical fight during the 12 months prior to the survey. Among these students, 14% (18% boys and 9% girls) reported having been in a physical fight on school property. Also, 19% of students (30% boys and 7% girls) reported having carried a weapon, and 7% of these students (10% boys and 3% girls) reported having carried a weapon on school property. During the 12 months prior to the survey, 8% of students (10% boys and 6% girls) reported having been threatened or injured with a weapon on school property (Eaton et al., 2006).

Theories of Aggression

Several theories have been proposed to explain the origin of aggression or how aggression develops. Patterson (1982) developed the coercion theory based on his laboratory observations of the interactions between parents and their children referred for behavioral problems. According to Patterson, the escalation mechanism explains the dysfunctional interactions of families containing an aggressive child. In these families, it was observed that when one member of a dyad escalates the intensity of his or her aggressive behavior, the other member submits, withdraws, or reacts in a neutral to positive manner. Usually an aggressive child is prone to escalate in intensity very early during the interaction, and parents are less likely to escalate until second or third reaction in an episode. Child aggression is negatively reinforced by its functional value of terminating conflict; however, in the long run it increases the risk that the child is engaged in aggressive behaviors. Also, the risk of high aggression increases as the duration of the aversive interchange extends (Reid, Taplin, & Lorber, 1981). Snyder and Patterson (1995) stated that the effects of reinforcement in the development of aggression are reciprocal rather

than bi-directional in that both parents and children reinforce each other's aggressive behavior to deal with conflict.

The social learning theory stresses the importance of observational learning in acquiring aggressive behaviors (Bandura, 1973). Bandura and colleagues conducted several experiments in which they demonstrated that children learn aggressive behavior by observing aggressive models. Bandura, Ross, and Ross (1961) in the famous Bobo Doll experiment assigned preschool children into three groups: the first group of children saw a live adult model who showed distinctive verbal and physical aggressive behaviors towards a Bobo doll; a second group of children viewed an adult model that was not aggressive; and a third group of children did not observe any model. Then the children were interrupted during their play to make them feel frustrated, and subsequently, their aggressive behaviors were observed in a free play situation. The children who watched the aggressive model exhibited the distinct aggressive responses that they had observed, and were more aggressive than the other groups of children. In another study, Bandura, Ross, and Ross (1963) reported that the children who watched an aggressive model on films showed more aggression than those who observed a live aggressive model. Therefore, they concluded that exposure to mass media depicting aggressive scenes leads to aggressive behavior in children. Bandura (1965) carried out a study to see whether consequences of a model's aggressive acts influenced children's tendency to behave aggressively. There were three conditions: the model being rewarded, the model being punished, and the model receiving no consequence. The children in the reward or no consequence conditions exhibited more aggressive behaviors than the children in the punishment condition. However, when monetary incentives were offered for performing aggressive behaviors, children in all three conditions demonstrated the same level of aggression. This study nicely illustrated that although children

learn aggressive behaviors by observing other people, they still need consequences to actually demonstrate the learned behavior.

Information processing theory posits that cognitive processes play an important role in maintaining aggressiveness in children (Dodge, 1980). When encountering a potentially aggression-provoking event, children go through certain cognitive processes as follows. In the first phase, children gather information about the event from the environment (decoding). Then, they use the information to interpret the event in the light of their goals and past experience (interpretation). Third, they consider potential responses they can make in the situation (a response search). Fourth, they choose one response that seems optimal after evaluating each possible response (response decision). Finally, they make observable response for the selected one (encoding). Children develop general attributions about their own behavior and others based on information they extracted from social experiences. Then they use these attributions as templates for interpreting the environment and directing their behavior towards others accordingly (Dodge, 1980). Moreover, Dodge introduced the concept of hostile attributional bias, which means that aggressive children attribute hostile intents to the actions of other people especially in ambiguous situations. In his experimental study, Dodge exposed aggressive and nonaggressive boys to negative-outcome situations in which a peer acted with a hostile, a benign, or an ambiguous intent. Both aggressive and nonaggressive boys showed more aggression in the hostile-intent condition than in the benign-intent condition. The difference in the two groups, however, was found in the ambiguous-intent condition that aggressive boys interpreted the peer's intent as hostile, while nonaggressive boys interpreted the peer's intent as benign. In another study conducted by Dodge, Coie, Pettit, and Price (1990), juvenile delinquents watched videotapes that portrayed a scene that two boys interact and one of them experiences a negative

outcome; while viewing, the adolescents were asked to imagine that they were the one who experienced the negative outcome. When they were asked to describe the other boy's intent later, the more crimes the boys committed the more likely they were to interpret mean intent from the other boy in the scene.

It seems that different theories of aggression have not reached an agreement on the typical development of aggression yet. The social learning theory posits that aggression increases with age due to social influences such as TV violence. In contrast, Cairns (1979), and Tremblay and Nagin (2005) argued that aggression decreases as children age because they learn to control their emotions and behaviors and conform to social norms.

Development of Aggression

The development of aggression concerns the onset of aggressive behavior. Onset refers to the age at which an individual first starts to engage in a particular behavior that will persist for a relatively long period of time. Although there is evidence of aggressive behavior during infancy as early as 18 months (Shaw, Keenan, & Vondra, 1994), the onset of aggressive behavior is usually considered to be in the preschool years. Further, the form of aggressive behavior changes with age. In infancy, a bodily response is a main means of expressing infants' frustrations. Dawe (1934) observed the quarrels of 2 to 5 years old children during free playtime and reported that in most cases, they exhibited physical aggression such as pushing and shoving, which lasted 24 seconds on average. Physical aggression increases from 18 to 30 months of age, and remains the predominant manifestation of aggression during the preschool period. Yet physical aggression is gradually replaced by verbal and symbolic aggression during middle childhood partly because the development of language enables children to use verbal aggression to express their frustration and anger (Goodenough, 1931). Generally, aggressive acts are most frequent in the

preschool years and gradually decline with age (Cairns, 1979). In a naturalistic observation study with preschoolers and first- and second-graders, Hartup (1974) reported that the older children were less aggressive than the younger children.

The literature on adolescent aggression and antisocial behavior presents a mixed picture. Loeber (1982) reviewed both cross-sectional and longitudinal studies about physical aggression, and concluded that physical aggression declines in preadolescence and adolescence. However, Pellegrini and Bartini (2001) found that boys showed an initial increase in bullying during the transition to middle school, followed by a decline. It seems that violence and delinquency increase in adolescence (Moffitt, 1993). For instance, Cairns (1979) reported that the arrests for violent crime increase dramatically in early adolescence and peak at the ages of 17 and 18 then start decreasing in late adolescence. Similarly, in a study using data from the National Youth Survey of 1,725 youths, Elliott (1994) found that first-time offending rises sharply in the adolescent years and violent offenses increases dramatically from the age of 12 to 20. One should be careful in interpreting these statistics because an increase in the number of violent crimes committed by adolescents does not represent an increase in the number of violent adolescents (Patterson, 1992).

Why do violent acts increase during the transition from childhood to adolescence? It has to do with a host of physical, psychological, and social changes that adolescents experience. Physically, adolescents increase their physical strength and sexual desires, which lead them to behave in socially undesirable ways. Psychologically, adolescents experience changes in relationships with their parents. With improvements in their cognitive ability, they are able to see their parents as human beings and to question or criticize their parents as well as adult authority in general. They also seek to establish independence from their parents and develop their own

identities. In achieving the developmental task of independence, adolescents may be affiliated or want to be affiliated with aggressive peers because aggressiveness is thought to be indicative of independence (Moffitt, 1993). Research showed that both boys and girls increase their attraction to aggressive peers on the entry to middle school (Bukowski, Sippola, & Newcomb, 2000). In addition, adolescents reinforce one another's aggression within their peer group. The level of peer group aggressiveness significantly predicted individual adolescent's later aggression after controlling for initial levels (Espelage, Holt, & Henkel, 2003). Social dominance theory posits that individuals, especially males, use aggression as a means of establishing their dominance status in a new social group. Therefore, adolescents tend to increase aggression temporarily as transitioning to middle school, but once dominance is established they tend to decrease aggression because it is costly in terms of social consequences and seriousness of injury (Pellegrini & Bartini, 2001). Further, adolescents have unique beliefs that they are at the center of others' attention (imaginary audience) and that they are invincible and cannot be hurt or killed (Personal fable) (Papalia, Olds, & Feldman, 1999). Despite such changes, their status in society is still limited, and adolescents may resort to aggressive means to express their frustration and anger.

Aggression has negative impacts on other areas of development throughout childhood and adolescence. Aggressive behavior prevents youths from learning academic and social skills; consequently, aggressive youths are more likely to experience academic failure and peer rejection, which in turn lead them to be involved in other problem behaviors such as delinquency (Moffitt, 1993). Tremblay and colleagues (1996) showed aggressive kindergarten boys were at high risk for delinquency and other adjustment problems in early adolescence. Although aggression occurs with other externalizing problems especially during adolescence, research

demonstrated that aggression is a predictor of other problems. For example, Farrell and colleagues (2005) found that aggression in the 6th grade significantly predicted subsequent changes in drug use and delinquency in later grades, but drug use and delinquency in the 6th grade did not predict subsequent changes in aggression in later grades. Moreover, physical aggression per se during elementary school was a distinct predictor of violent and nonviolent delinquency during adolescence for boys (Broidy et al., 2003). The influences of childhood aggression extend to adulthood adjustment. Aggressive boys living in disadvantaged environments of London were more likely to commit crimes, be unemployed, divorce, abuse alcohol and other drugs, and have psychiatric problems in adulthood (Farrington, 1995). Stattin and Magnusson (1989) reported similar results in their longitudinal study with 1,027 Swedish children in a range of upbringing conditions. They found a strong relation between aggressiveness measured at ages 10 and 13 and adult delinquency defined as registered lawbreaking for both boys and girls.

Self-Reports and Externalizing Problems

It is well-known that the correlation between different informants on child behavior is low to moderate. In a meta-analytic study, Achenbach, McConaughy, and Howell (1987) reported that the average correlation of self with parent and teacher regarding child problem behavior was .25 and .20, respectively. However, two factors affect the degree of agreement between two agents. One factor is the age of children. Unfortunately, prior research on the age effects is equivocal. Achenbach and colleagues found that ratings were more consistent for children than for adolescents; yet, Cairns and colleagues (1989) showed an increase in agreement between teacher and self in assessing overt aggression beyond elementary school because children increase the ability to evaluate their problems as others do with age. The other factor is

the type of problems being assessed, and the research literature consistently demonstrated that agreement is higher for externalizing problems than for internalizing problems (e.g., Achenbach et al., 1987).

Empirical data support the validity of self-reports for assessing externalizing behavior problems, especially delinquency. Loeber, Green, and Lahey (1991) demonstrated that although self-ratings of hyperactivity and inattention were lower than parent- or teacher-ratings, no difference was found between self- and adult-ratings in reporting conduct problems. Moreover, Farrington (2003) showed that offenders based on self-reports overlapped those based on convictions; self-reported delinquency predicted later convictions, such as burglary, theft of and from vehicles, and drug use. The use of self-reports of externalizing problems is increasingly important in adolescence, compared to childhood. During the transition to adolescence, youths become more independent of their parents and spend more time with their peers outside the home. Because of the change in the relationship between parents and youth, parents may not be aware of their youth's serious problematic behaviors (Moffitt et al., 1996). Research showed that adolescents tend to report more aggression than parents (Pagani et al., 2004). Also, a longitudinal study following delinquent males for 40 years in England revealed that after the age of 14 years, the prevalence of offending based on self-reports was higher than that based on conviction (Farrington, 2003). Therefore, some researchers found self-reports more reasonable for investigating adolescence than parent-reports (Kuo et al., 2000).

Developmental Psychopathology and Aggression

Principles of Developmental Psychopathology

More than two decades ago developmental psychopathology was first proposed as a new approach to studying maladaptive behavior. According to Sroufe and Rutter (1984),

developmental psychopathology is defined as "the study of the origins and course of individual patterns of behavioral maladaptation" (p. 18). The most salient characteristic of developmental psychopathology is its emphasis on a developmental perspective on understanding maladaptive behavior. A medical model sees maladaptive behavior as a disease that resides within an individual, whereas developmental psychopathology views maladaptive behavior as evolving through the adaptational processes of individuals in their environments (Sroufe, 1997). Moreover, developmental psychopathology posits that the principles of normal, healthy development can be applied to abnormal development, and consequently, it promotes research focusing on adaptational development. Development is a lawful process, that is, there is coherence to an individual's developmental course governed by the self-stabilizing mechanism of the organism. Nevertheless, the notion of coherence does not exclude plasticity in development. This means that the link between earlier adaptation and later adaptation is complex and transformation is the rule (Sroufe & Rutter, 1984).

Although developmental change can occur at any level, developmental psychopathology typically concerns change at the individual level. When the individual is the unit of analysis, continuity and discontinuity refer to intraindividual change over time. This process is often confused with interindividual difference in intraindividual change (Lerner et al., 1996). Differences between individuals are called stability and instability: the former refers to maintenance in the relative standing of the individual with regard to the group over time, and is represented by correlations; the latter refers to alterations in the relative standing of the individual with regard to the group over time.

Empirical studies showed the stability of aggression during childhood and adolescence. In his review of 16 longitudinal studies, Olweus (1979) concluded that aggression is as stable as

intelligence, reporting an average correlation between early and later aggression of .63, which was higher (.79) when corrected for attenuation. In addition, Patterson (1992) found high stability (.92) of antisocial behavior in boys between ages 10 and 15. Other studies using broader constructs such as externalizing problems replicated the finding as well. For instance, Deater-Deckard and Dodge (1997) reported high year-to-year correlation coefficients in externalizing scores from Grades K to 6, which ranged from .66 to .78 for mother ratings and from .55 to .63 for teacher ratings. Correlations can be still high even when the absolute level of behavior changes over time. Patterson (1992) distinguished stability from continuity in investigating developmental changes in antisocial behavior with a cohort of boys aged 10 to 15. He found that although the mean level of antisocial behavior remained stable for the five-year period, there were changes in the forms and the intensity. Therefore, Patterson highlighted the importance of including the concept of time in developmental studies. Similarly, Sroufe (1997) and Sroufe and Rutter (1984) stated that continuity and discontinuity of behavior can be best addressed through longitudinal research, especially one involving developmental periods with significant biological, psychological, and social changes. In this vein, the study of early adolescence, characterized by multiple and profound changes, may provide a window into continuity and discontinuity in the development of behavior (Lerner et al., 1996).

Longitudinal Research on Aggression

Several investigations examined the developmental course of externalizing behavior among children and adolescents; these studies varied by outcome measures, age groups, and informants. Stanger and colleagues (1997) described average trajectories of aggression and delinquency as rated by parents with a Dutch sample of 2,600 children from ages 4 to 17 years. They found that aggression declined from ages 4 to 17, whereas delinquency declined from ages

4 to 10 and then increased until age 17. Using the same sample, Bongers and colleagues (2004) examined the development of aggression, opposition, property violations, and status violations (e.g., run away from home, truancy, skip school). They reported that aggression, opposition, and property violations decreased over time, while status violations increased over time. Furthermore, in a study following youths from middle childhood to early adolescence, Cairns and colleagues (1989) reported that there were sex differences in trajectories of aggressive behaviors in that boys persisted in physical aggression, while girls decreased physical aggression and increased relational aggression, and that the number of highly aggressive children decreased over the developmental period. Broidy and colleagues (2003) conducted a multi-site, cross-national study in which Canada, New Zealand, and the U.S. participated. They showed that aggression, especially physical aggression, as rated by teachers was stable or decreased from elementary school to early adolescence across the sites and the nations with the exception of one U.S. group of youths that increased physical aggression over time. Aber and colleagues (2003) presented somewhat different patterns of growth of aggression rated by teachers during the elementary school period: a positive change followed by a negative curvilinear change. Although those studies using teacher ratings shows inconsistency in the course of aggression, prior research using parent ratings clearly demonstrated declines in physical aggression during preadolescence and adolescence (Loeber, 1982). A difference in trajectories of externalizing behaviors by informants has been documented in the literature. Keiley and colleagues (2000) followed 405 children from grades K to 7 and found that mothers reported a decline in externalizing behaviors over time and teachers reported an increase over time. In addition to parent- and teacher-ratings of externalizing behaviors, self- reports of externalizing behaviors have been used especially in studies of adolescence. Deković and colleagues (2004) reported consistency in self-reported

delinquency during adolescence. Farrell and colleagues (2005) showed that self-rated aggression increased from grades 6 to 7, at which point it began to level off and decrease slightly in the 8th grade, whereas self-rated delinquency and drug use increased over time. In another study, Pellegrini and Bartini (2001) demonstrated that boys showed an initial increase in bullying from the spring of the 5th grade to the fall of the 6th grade, followed by a decrease by the end of the 6th grade.

As presented so far, the literature on developmental trajectories of aggression and externalizing behaviors presents conflicting patterns, which can be attributed to some extent to differences in the measure, informant, and age groups being studied. In the midst of the lack of consistency, however, studies using parents as the informant seem to provide a coherent picture of aggression declining over time (e.g., Stanger et al., 1997; Keiley et al., 2000).

Multiple Risk Factors for Aggression

Multiple Risk Factors and Aggression Research

Development is determined by dynamic transactions between an individual and his/her internal and external contexts. Consequently, the study of adolescent development should consider a variety of contexts in which the adolescent resides (Sameroff, 2000). One way of investigating the impact of context is through research on risk factors. Risk factors refer to characteristics of an individual or an environment that may increase the likelihood of the individual developing a certain problematic behavior. The importance of studying multiple risk factors simultaneously is well recognized among researchers. Wachs (2000) conducted a comprehensive review of the influences of biological, psychological, and social factors on development and concluded that not a single factor but the combination of factors is necessary to produce explanatory power. Caspi, Taylor, Moffitt, and Plomin (2000) wrote an exemplary paper

regarding the relative effects of multiple risk factors on development in which they examined how children's behavior problems measured at the age of 2 years are influenced by genetic effects, family-wide environment effects, child-specific effects, and neighborhood deprivation using a nationwide sample consisting of 1,081 pairs of monozygotic (MZ) and 1,061 pairs of dizygotic (DZ) twins. They reported that all factors are necessary to explain individual differences in children's behavior problems. The proportion of variance in behavior problems accounted for was 55% for genetic effects, 20% for family-wide environment, and 24% for child-specific environment; neighborhood deprivation accounted for 5% of the family-wide environmental effects, thus explaining 1% of the total population variation in behavior problems.

In the study of adolescent aggressive behavior, it is vitally important to consider multiple risk factors at multiple levels in order to understand the development of aggression fully. Deater-Deckard and colleagues (1998) proposed a multiple risk factor model, using 20 risk factors from child, family socioculture, parenting, and peer domains, for investigating externalizing behavior problems as reported by teacher, parent, and peers in middle childhood. They demonstrated that all of the domains contributed to the development of externalizing problems: the proportion of the variance in externalizing problems accounted for by each of the child, family socioculture, parenting, and peer without controlling for covariation with the other three domains was 7-24%, 4-11%, 10-20%, and 6-16%, respectively; the proportion of the unique variance explained by the child, family socioculture, parenting, and peer with regard to covariation with the other three domains was 4-19%, 1-4%, 2-6%, and 5-13%, respectively. The 20 risk factors when entered together into a model explained 36-45% of the variance in externalizing behavior problems. Although Deater-Deckard et al. highlighted the importance of including multiple risk factors in the model of aggression, they ignored the effects of distal contexts, such as media. Dodge and

Pettit (2003) suggested a more comprehensive model for studying conduct problems in adolescence, one that integrates a range of risk factors encompassing biological disposition, family, peers, and social institutions. Lastly, Sameroff and colleagues (2004) followed a group of students that came from middle-class families from early adolescence to early adulthood to examine the relative contributions of family, peer, school, and neighborhood contexts to conduct problems. They reported that regardless of developmental stages all contexts had a unique contribution except for neighborhood, which would have been influential as well if the sample had been more skewed in terms of SES.

Despite the general agreement on the importance of testing multiple factors, there is less agreement on statistical methods for analyzing data with a number of factors. The most popular method is regression analyses with numerous predictors, which allows for estimating the relative influence of each predictor and for retaining all the information on predictors. However, this approach may not be desirable if predictors are moderately to highly correlated to one another or if sample sizes are small (Burchinal, Roberts, Hooper, & Zeisel, 2000); some researchers found it impractical to enter a large number of variables into a model (e.g., Sameroff et al., 1987). Instead, a group of researchers (Sameroff et al., 1987; Sameroff, Seifer, Baldwin, & Baldwin, 1993) suggested a cumulative risk model in which the continuum of scores on each risk factor is dichotomized into the presence (1) or absence (0) of the risk and then the number of risk factors present is counted. The rationale behind the accumulative risk effects is based on empirical research indicating that youth problematic behaviors are associated with the number of risks present rather than with a particular risk factor (e.g., Rutter, 1979). In fact, risk factors tend to appear in clusters not in isolation; for example, an abused child is more likely to live in poverty with a single parent in a disadvantaged neighborhood, which has high rates of violence and crime

(Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Simply, the cumulative risk model assumes the more risk factors a youth has the greater likelihood he/she displays problematic behaviors of interest. This model has several advantages such as reducing data conveniently, translating the data into graphics easily, and eventually helping grasp the phenomena (Burchinal et al., 2000); however, it loses predictive power inevitably by categorizing and tallying predictors. In their 1993 paper on intellectual development, Sameroff et al. found that multiple regression analyses with 10 risk factors explained 50% of the variance in IQ at ages 4 and 13, whereas the composite risk score explained 34% and 37% of the variance in IQ at ages 4 and 13, respectively. They also found that the number of risk factors is more important than the pattern of risk factors in predicting children's intelligence. Further, Deater-Deckard et al. (1998) contrasted multiple regression analyses to cumulative risk indices, and reported the cumulative risk method had less predictive power, explaining 19-32% of the variance in externalizing behavior.

In understanding the effects of risk factors on the development of aggression, one should consider the following points. First, risk factors are theorized to interact with each other, yet, there is little evidence of interaction in the literature. Second, the predictive value of risk factors for aggression changes depending on developmental stages and other conditions. So the factors predicting child aggression may not be the same as the factors predicting adolescent aggression. For example, one of the most powerful risk factors in early childhood, low socioeconomic status, diminishes in importance as children age. Third, the factors predicting the onset of aggression may not predict increases or decreases of later aggression (U.S. Department of Health and Human Services, 2001). Given the possibility that different factors come into play depending on developmental stages, the literature review of this study focuses primarily on adolescent risk factors for aggression. The following sections present five domains of risk factors, including the

individual, family, peers, community, and media. The list of risk factors included is not exhaustive but prototypic.

Individual Risk Factors

One of individual risk factors for aggression is sex. Boys are at higher risk for developing aggressive behavior than girls. Several studies using normative or community samples consistently reported that boys exhibit higher initial levels of aggression than girls across informants and age groups (Bongers et al., 2004; Broidy et al., 2003; Deković et al, 2004; Farrell et al., 2005). The sex difference in externalizing behaviors is more obvious in clinical samples than in general samples (Achenbach, Howell, Quay, & Conners, 1991). In addition, prevalence research demonstrated that the rate of disruptive behavior disorders is far higher in boys than in girls (Mash & Dozois, 2003); however, this pattern seems to change in adolescence with an increasing rate of disruptive behavior disorders in girls (Hinshaw & Lee, 2003). It remains unclear whether the growth of aggression varies by sex. Farrell et al. (2005) reported no sex difference in change of aggression in early adolescence using self-reports of aggression; Bongers et al. (2003) reported boys showing a faster decreasing rate of aggression during ages 4 through 18, using parent ratings of aggression. The inconsistency in the findings may be due to differences in the measures or informants.

Temperament is the most well researched risk factor for externalizing behaviors among children and adolescents. Ample research has documented a link between temperament in infancy or preschool and later externalizing problems. Bates et al. (1991) found that difficult temperament measured at 6 months of age predicted externalizing problems at age 8. Bates, Pettit, Dodge, and Ridge (1998) demonstrated that retrospective ratings of temperament in infancy at age 5 were predictive of externalizing problems in middle childhood. Moreover, Caspi,

Henry, McGee, and Moffitt (1995) found that temperament, especially lack of control, measured by observers at the ages of 3 and 5 predicted later externalizing behaviors rated by parents and teachers at the ages of 9 and 11 and by parents at the ages of 13 and 15.

Since most aggression research was conducted using White children and adolescents, relatively little is known about whether ethnic differences exist in the development of aggression (Deater-Decker et al., 1998) and even prior studies testing ethnicity effects provided equivocal results. In a normative study, Achenbach and colleagues (1991) found that White children scored higher than other ethnic groups including Black, Hispanic, and Mixed/Other on aggressive behavior and externalizing behavior with a small magnitude (less than .8% of the variance accounted for by ethnicity). Deater-Decker et al. compared levels of externalizing behavior problems between Black and European American children, aged 5 to 10 years, as rated by teacher, mother, and peer using multi-site, community samples. They reported that Black children showed more externalizing behaviors than European American children in terms of teacher- and peer-ratings; however, the ethnic differences disappeared when SES was controlled for. Guerra, Huesmann, Tolan, Van Acker, and Eron (1995) pointed out that the overrepresentation of minority students in low SES is related to the overrepresentation of those children in externalizing problems. Because ethnicity effects disappear when other risk factors are taken into account, ethnicity can be thought of not as a risk factor but as a risk marker, indicating the presence of other risk factors such as living in poverty (U.S. Department of Health and Human Services, 2001). Constituting ethnicity as a risk variable seems to require further investigations.

Lastly, academic underachievement is conceptualized as an individual risk factor for youth aggression. The nature of the relation between academic achievement and aggression

differs depending on developmental stages. Until middle childhood the association between the two is explained by the comorbidity of Attention-Deficit/Hyperactivity Disorder (ADHD); however, in adolescence academic underachievement is clearly linked to aggression (Hinshaw, 1992). Aggression and academic underachievement seem to be intertwined: youths with poor academic achievement are likely to receive fewer positive reinforcements from teachers and parents, and aggressive youths are likely to receive more negative feedback from teachers and to experience their relationships with teachers as hostile or problematic (Orpinas & Horne, 2006).

Family Risk Factors

A variety of family risk factors for aggression has been studied, including adverse family structural characteristics (e.g., living with a single parent) (Achenbach et al., 1991), being born to a teenage (Morash & Rucker, 1989) or single parent (Ackerman, D'Eramo, Umylny, Schultz, & Izard, 2001), parental divorce (Amato, 2001), the presence of stressful life events (Abidin, Jenkins, & McGaughey, 1992), and parental stress and social isolation (Decter-Deckard, 1998). In addition to these variables, family socioeconomic status measured by income, parent occupation, and parent education level is considered one of the strongest risk factors for aggression in children and adolescents (Bradley & Corwyn, 2002). The influence of family poverty on youth aggression remains significant even after controlling for neighborhood poverty (Kupersmidt, Griesler, DeRosier, & Patterson, 1995).

Moreover, parental practices are associated with aggression during childhood and adolescence. The parental practices variables frequently studied are parent-child relationships, parental supervision and monitoring, and parental attitude towards aggression. The parent-child relationship factor originates from attachment theory, which posits that the early parent-child relationship has a long lasting influence on later development such as interpersonal relationships,

emotion, behavior, and cognition. Attachment theory explains the development of child aggression through three mechanisms. First, a child acts aggressively as a reaction to his/her unsatisfactory or frustrating relationship with the parent. Second, a child displays disruptive behavior to get the parent's attention. Third, a child who has formed an insecure relationship with the parent has a fear of building new relationships, and therefore, he/she uses aggressive behavior to drive away others (Greenberg, Speltz, & DeKlyen, 1993). Lack of parental supervision and monitoring is one of the best predictors of youths' later aggression and delinquency (Loeber & Stouthamer-Loeber, 1986). Studies reported parental monitoring significantly predicting the initial level and change of externalizing behaviors in adolescence. For example, Beyers and colleagues (2003) found that less parental supervision and less parental involvement were predictive of increases in externalizing behavior across time during early adolescence. Similarly, Laird, Pettit, Bates, and Dodge (2003) reported that the adolescent whose parents had more knowledge regarding his/her whereabouts and activities decreased delinquency and that the youth with higher levels of delinquency had parents with less knowledge. Parental monitoring increases youths' resistance to peer pressure to enact delinquent acts (Fridrich & Flannery, 1995); unmonitored youths are more likely to use their unsupervised time to interact with delinquent peers and to engage in delinquent acts (Patterson & Dishion, 1985). Consequently, parental monitoring may be particularly important for at-risk youths who are siblings of older delinquents, live with single parents, or live in disadvantaged neighborhoods (e.g., Pettit, Bates, Dodge, & Meece, 1999). Another important parental practices variable during adolescence is parental attitude towards aggression. Orpinas, Murray, and Kelder (1999) reported that adolescent perception of parental support for fighting explained most variance in aggressive behavior. In addition, family beliefs about aggression significantly predicted child aggression

beyond family SES (Guerra et al., 1995). A new approach to conceptualizing parental practices has been observed in the literature. Sameroff and colleagues (2004) viewed some of parental practices as control aspects of childrearing, and combined parental monitoring, decision-making styles, and rule enforcement into a single measure of family control. Their findings indicated that family control consistently exerted impacts on conduct problems from early adolescence to early adulthood.

In addition to the parental practices variables, harsh parental discipline is associated with youth aggression and externalizing behaviors. Harsh parental discipline was theorized to cause aggression and conduct disorder (Patterson, Reid, & Dishion, 1992) and proven to contribute to increases in externalizing problems in adolescence (Lansford, Criss, Pettit, Dodge, & Bates, 2003). Yet the relationship between harsh parental punishment and youth aggression seems complex, requiring further explanations (Coie & Dodge, 1998). Cohen and Brook (1995) stated that a youth's aggressive behavior may induce parental harsh punishment, which in turn may increase the youth's existing aggression. In addition, the effects of harsh physical punishment on youth aggression may be mediated by the affective relationship between parent and youth (Deater-Deckard & Dodge, 1997). Wasserman, Miller, Pinner, and Jaramillo (1996) reported that harsh parental punishment was confounded with parent-child conflict because when parent-child conflict was taken into account, the high level of harsh parental punishment was predictive of the low level of externalizing behaviors in children. Furthermore, the magnitude of the influence of parental discipline on aggression development may vary by culture, context, and sex (Deater-Deckard & Dodge, 1997).

In adolescence, family factors continue exerting influence on development; however, the effects of family on adolescent behavior decline and the effects of peers on adolescent behavior

increase (U.S. Department of Health and Human Services, 2001). The following section presents peer risk variables for youth aggression.

Peer Risk Factors

Aggressive youths are more likely to be rejected by their nonaggressive peers. Laboratory research demonstrated that aggression leads to rejection rather than rejection to aggression (Coie & Dodge, 1998). For example, Dodge et al. (1990) studied elementary school-aged boys in their initial encounters with peers and found that rejected boys in the unfamiliar situation displayed twice more aggression than average boys. In addition, peer rejection and aggression in childhood predict antisocial behavior and other adjustment problems in adolescence (Coie & Dodge, 1998). A longitudinal study using urban, Black youths from grades 3 through 10 reported that rejected-aggressive boys in the 3rd grade showed increases in antisocial behavior over time, while the other boys showed decreases over time (Coie, Terry, Lenox, & Lochman, 1995). Despite the evidence that aggression causes peer rejection, the peer rejection status increases aggression among boys who are initially aggressive. Research showed that peer rejection in kindergarten predicted increases in aggression in the 3rd grade, controlling for aggression in kindergarten. The prediction from peer rejection to later aggression may have been mediated by the hostile attribution bias of aggressive youths (Coie & Dodge, 1998).

As time goes on, aggressive youths may find it more difficult to associate with conventional peers for several reasons. First of all, once a youth's reputation as aggressive has been established, peers act accordingly. Dodge and Frame (1982) reported that non-aggressive youths attacked in ambiguous situations by a youth who had an aggressive reputation were more likely to attribute the behavior to the youth's internal dispositions and retaliate. Secondly, rejected youths may miss opportunities to learn and practice certain physical and psychological

skills that lead to prosocial behavior; consequently, they fall behind in those skills (Patterson et al., 1992). Lastly, since aggressive youths feel accepted by deviant peers, they become associated with non-conventional peers and eventually increase opportunities for further antisocial behavior (U.S. Department of Health and Human Services, 2001). The affiliation pattern with aggressive peers may be formed either through selective acceptance by aggressive peers or through selective exclusion by conventional peers. Interesting research is available regarding aggressive adolescents' friendship. A study conducted by Cairns, Cairns, Neckerman, Gest, and Gariépy (1988) showed that aggressive adolescents may be seen as unpopular or rejected in the social network as a whole, and yet, they still have best friendships in their deviant peer group. Moreover, Cairns and colleagues reported that in their antisocial peer group aggressive adolescents exchange coercive interactions and provide mutual support for aggressive behaviors. The deviant peer context seems to provide more modeling and reinforcement for diverse delinquent behaviors than the family context (Elliott, Huizinga, & Ageton, 1985). In a longitudinal study following antisocial early adolescents and their friendships for a year, Dishion, Andrews, and Crosby (1995) reported that these adolescents meet their friends in unstructured and unsupervised activities and that their friendships end shortly seemingly because of negative interactions within the friendship.

Community Risk Factors

An understanding of the influences of broader contexts such as school and neighborhood is vital in studying aggression during adolescence. Patterson (1992) stated that adolescence-onset aggression is a result of the effects of broader contexts beyond the family. Sameroff and colleagues (2004) argued that schools exert an important influence on the development of aggression especially during the middle school period. However, no risk factor from the school

domain has large or moderate effects on aggression (U.S. Department of Health and Human Services, 2001). Hence, this section focuses on neighborhood effects on development including aggression and externalizing behaviors.

Generally, studies of neighborhood effects on development question whether a deprived neighborhood matters beyond genetic liability; that is, do genetically vulnerable families tend to concentrate in poor neighborhoods? Caspi and colleagues (2000) disentangled environmental and genetic influences on children's behavior problems using a genetic design (i.e., a twin method). They reported that children in deprived neighborhoods had more behavior problems at age 2 than children in affluent neighborhoods and that the effect of neighborhood deprivation, although modest, was significant. In discussing these results, Caspi and colleagues stated that the neighborhood effects are likely to increase as children experience prolonged deprivation and when adolescents spend more time outside the homes and in the neighborhood. The history of research on neighborhood effects dates back to 1942 when Shaw and McKay investigated the negative influences of poor neighborhoods on youth conduct problem in urban settings. They examined neighborhood structural characteristics such as poverty, ethnic composition, and residential mobility and showed significant relations between these neighborhood variables and youth delinquency. Despite Shaw and McKay's impressive findings, additional research on community or neighborhood in development was rare until recently. There has been a renewed interest in neighborhood in the literature. For example, Leventhal and Brooks-Gunn (2000) revealed that neighborhood deprivation (low SES) influenced child adjustment negatively beyond the effects of individual and family risk factors.

In addition to neighborhood structural characteristics, research has focused on exposure to community violence in relation to child and adolescent adjustment. Lynch (2003) reported

significant associations between community violence and various adjustment problems among inner-city adolescents. Exposure to community violence increases externalizing behavior and promotes attitudes towards aggressive problem solving among children and adolescents (Buka, Stichick, Birdthistle, & Earls, 2001; Margolin & Gordis, 2000). Moreover, research showed that the degree to which children are exposed to violence differs by age and informant: children typically experience more violence as they age, and parents report less exposure to violence than children (Kuo et al., 2000; O'Keefe, 1997). Several theories provided explanations about the mechanisms through which witnessing violence impacts youth aggression. Contagion (or epidemic) models propose that neighbors' negative behavior in general has a strong impact on youth behavior (Jencks & Mayer, 1990). The social learning theory suggests that witnessing violence influences youths to learn new aggressive behaviors and reinforces their existing aggressive behaviors (Bandura, 1986). In addition, the social information processing theory posits that past experiences shape cognitive schemas, belief systems, and attitudes, which in turn influence youths' decision to act aggressively.

Media Risk Factors

Today children and adolescents are exposed to various media such as television, video games, and films. A national study revealed that the average hours an American child spends consuming media outside of school was 38 hours a week, which means about 5 1/2 hours a day (Roberts, Foehr, Rideout, & Brodie, 1999). Also, a national youth survey reported that across states 30% to 64% of middle school students watched television more than 3 hours per day (Whalen et al., 2005). Because television screens portray a substantial amount of violence, children and adolescents are exposed to violence on a daily basis through watching television programs (Donnerstein, Slaby, & Eron, 1994; Robbins, 2000). It was recommended that children

watch television no more than two hours a day. Within this time frame, Huston, Fairchild and Donnerstein (1992) estimated that by the time children finish elementary school, they will have witnessed 8,000 murders and over 100,000 other acts of violence. Also, by the time they are 18 years old, they will witness 200,000 acts of violence, including 40,000 murders.

Repeated exposure to media violence has several negative impacts on youths. First, media violence influences youths' attitudes, values, and behavior (Murray, 2000). Violence in the media conveys a message that aggression is appropriate and acceptable. For example, in children's cartoon shows "good guys" often use violence to achieve their goals and are rewarded. By observing others achieve desired goals through violent acts, youths may evaluate aggression positively and increase the likelihood that they engage in aggressive behavior. Second, observing violent scenes repeatedly desensitizes an individual's emotional reactions to aggression or increases tolerance for aggression in others (Anderson et al., 2003; Orpinas & Horne, 2006). MRI imaging research showed the neurological processes that might be related to the translation from observation to change in behavior. According to Murray (2001), although children know media violence is make-believe, the brain processes it as real and stores it in the same place where traumatic events are stored.

Numerous studies showed positive correlations between youths' television violence viewing and their aggressive behavior. Moeller (2001) found that the relationship between TV violence and aggression is small to moderate, accounting for 1-10% of the variability in aggressive behavior; Paik and Comstock (1994) conducted a meta-analysis study and reported a large effect size for the influences of television violence on aggression (d = .65). Significant correlations do not necessarily mean causal relations. As a matter of fact, researchers have debated whether viewing of violence on television causes youths' aggression. It seems that

empirical findings, especially from longitudinal research, support the *television causes aggression hypothesis* clearly (APA Council of Representatives, 1999). Huesman, Moise-Titus, Podolski, and Eron (2003) investigated the longitudinal relations between childhood exposure to TV violence and adult aggressive behavior. They reported a causal relation between the two for both males and females, which persisted even after controlling for confounding factors such as SES, intellectual ability, and parenting. In addition, Johnson, Cohen, Smailes, Kasen, and Brook (2002) showed that the amount of time spent watching television at the age of 14 predicted aggressive behavior assessed at the ages of 16 and 22, even after controlling for covariates including previous aggression, childhood neglect, family income, neighborhood violence, parental education, and psychiatric disorders. Yet Johnson and colleagues reported that television viewing in early adolescence did not predict later property crimes such as arson, vandalism, or theft.

While television has been of focus of criticism about media violence, other media such as videogames have been criticized for their violent content as well. To date, videogames are one of the most popular media for children and adolescents; the 80% of homes containing boys between 8 and 16 years of age have videogames (Battelle & Johnstone, 1993). Sherry (2001) commented that recently released violent videogames have increased the level of violence and become more popular among youths. In a meta-analytic study, Sherry reported that the overall effect size for videogame play on aggression was small (d = .30), which was smaller than the effect size for television violence, yet, the effect size was greater for videogames in which both fantasy and human characters were engaged in violence than for videogames containing sports-related violence. Interestingly, Sherry found that the effect size for violent videogames was negatively associated with time spent playing, controlling for age of participants and year of study. This

counterintuitive finding may indicate that an initial arousal level may drop off dramatically after extended play. Overall the literature reflects unclear evidence on whether playing violent videogames increases aggression. The association was significant for children (e.g., Cooper, 1986), but mixed for adolescents and adults (e.g., Anderson & Dill, 2000; Escobar-Chaves, Kelder, & Orpinas, 2002). Therefore, future research is much needed to clarify the relationship between engagement in violent videogames and increases in aggressive behavior.

CHAPTER 3

METHOD

Design

This study was a secondary data analysis using existing datasets collected from the Students for Peace project (Kelder et al., 1996). The Students for Peace project is a school-based intervention for preventing aggression among middle school students. Eight middle schools from an urban school district in Houston, Texas participated in the project and were randomly assigned to intervention or control conditions. The outcome study of the project revealed little to no intervention effects in reducing aggressive behaviors (Orpinas et al., 2000). For this reason, the present study did not consider intervention/control conditions in the analyses. The entire student body at the eight schools consisted of approximately 68% Hispanic, 17% Black, 9% White, 4% Asian, and 3% Other. Boys and girls were equally represented (50% each). The average percentage of adolescents who were considered at risk of dropping out was 51%; the average percentage of adolescents receiving free or reduced cost lunch was about 60%.

Passive parental consent was used for an annual student survey. The student survey design included both a cross-sectional and a cohort design, and was conducted in the spring of 1994, 1995, and 1996. Research staff administered the survey following standardized instructions to all adolescents who were present on the day of the survey and who consented to participate. The response rate was very high, reaching 90%. The survey was anonymous for adolescents in the cross-sectional design; however, adolescents in the cohort design were identified by name and birth date and had the option of completing the survey without

identification information. Approximately 9,000 adolescents were evaluated at each assessment. Over 90% of the adolescents who remained at their schools were resurveyed, but adolescents who moved away from their schools were not located. Among 3,294 6th grade students who completed a survey in 1994, the cohort design included 2,246 students (68%) who had at least one follow-up survey—48% for all three evaluations and 20% for one follow-up evaluation. A series of analyses were conducted to compare adolescents having only the baseline data to adolescents in the cohort sample in terms of several characteristics: the former showed significantly higher levels of aggression in the 6th grade than did the latter (t (3198) = 8.92, $p < .01$, $d = 5.09$); a significant sex difference was found that more boys and fewer girls were excluded than expected (χ^2 (1, $N = 3294$) = 12.91, $p < .01$); and a significant ethnicity difference indicated that more Black adolescents were excluded than expected (χ^2 (4, $N = 3294$) = 17.81, $p < .01$).

Participants

This study used a subsample from the cohort sample, which is comprised of the adolescents who provided complete information on predictors ($N = 1,671$). All predictors except for community violence were assessed in the 6th grade; community violence witnessed during the 6th grade was measured in the 7th grade. Comparison of adolescents who were in the cohort sample but excluded from the subsample and those who were included in the subsample showed no significant difference in aggression. However, there was a significant sex difference that more boys and fewer girls were excluded than expected (χ^2 (1, $N = 2246$) = 14.10, $p < .01$) and a significant ethnicity difference that more Hispanic, fewer Black, and fewer White adolescents were excluded than expected (χ^2 (4, $N = 2246$) = 25.37, $p < .01$). Following the baseline survey, 1,662 and 1,272 students remained in the project for assessments of grades 7 and 8, respectively.

The average ages of adolescents in the subsample in grades 6, 7, and 8 were 12.1 (*SD* = .76), 12.9 (*SD* = .77), and 13.9 (*SD* = .73), respectively. The subsample was comprised of 66% Hispanic, 19% Black, 9% White, 4% Asian, and 3% Other. Two sexes were almost equally represented (48% boys and 52% girls).

Measures

Aggression Outcome Measures

Aggression was measured by the Aggression Scale (Orpinas & Frankowski, 2001; see Appendix A), which is a self-rating of aggressive behavior for young adolescents. This scale consists of 11 items; adolescents are asked to indicate on a 7-point scale how many times they did a particular behavior during the seven days prior to the survey, including (0) *0 times*, (1) *1 times*, (2) *2 times*, (3) *3 times*, (4) *4 times*, (5) *5 times*, and (6) *6 or more times*. The time frame for the scale is limited to the last seven days to minimize recall bias. The total aggression score is a sum of all responses, ranging from 0 to 66. The Aggression Scale has adequate psychometric properties. The internal consistency reliability, as measured by Cronbach's α, was high (.88) and did not vary by sex, ethnicity, or grade level. The self-reported aggression scores were positively correlated with other self-reported measures including the number of fights, the number of injuries due to fights, and the number of days students carried a weapon; positively related to teacher ratings of aggression and other predictors of aggression such as alcohol use, marijuana use, low parental monitoring, and low academic achievement. In addition, exploratory and confirmatory factor analyses yielded two factors of Physical and Verbal Aggression (nine items) and Anger (two items) (Orpinas & Frankowski).

The original scale was modified to better suit the purpose of this study. The Anger factor was deleted from the scale because anger is thought of as an emotional state and not always

followed by aggressive acts (Robbins, 2000). Moreover, the Physical and Verbal Aggression factor was divided into physical aggression (four items; e.g., pushing, kicking) and verbal aggression (five items; e.g., name-calling, threatening to hurt or hit). As expected, the correlation between physical aggression and verbal aggression was somewhat high (.74), using 8,863 adolescents assessed at baseline in the Students for Peace project. Yet it was still decided to separate physical aggression from verbal aggression for two reasons. First, theory and empirical evidence on trajectories of aggressive behaviors provide support for the distinction between the two forms of aggression. Second, one of the goals of this study was to examine how the manifestations of aggression change over time, so aggression should be investigated at narrower levels.

In this study, there were three aggression outcomes including verbal, physical, and overall aggression (a combination of verbal and physical aggression). All aggression measures showed adequate internal consistency reliabilities as measured by Cronbach's α – .80 for verbal aggression; .77 for physical aggression; .87 for overall aggression – with the 8,863 adolescents. Further, year-to-year correlations of overall aggression scores were higher over the 1-year follow-up than over the 2-year follow-up (grades 6-7: r = .54; grades 7-8: r = .58; grades 6-8: r = .47). Despite the disadvantage of reducing the variability of the longer aggression scale, each of the aggression scores was divided by the number of items so they were comparable to one another. The scores ranged from 0 to 6, with higher scores indicating higher levels of aggression.

Individual Risk Measures

Sex

Adolescents were asked to indicate their sex, (0) *male* or (1) *female*, in the demographics section of the survey. (see Appendix B)

Ethnicity

In the demographics section of the survey different categories of ethnicity were given, including African American, White, Hispanic, Asian, Native American, and Other; adolescents were asked to mark one of these that applied to them. (see Appendix B) Native American or Other adolescents were combined and indicated as Other due to the small percentage of adolescents in each ethnic category.

Academic achievement

Academic achievement was measured by an adolescent's self-report on the school grades that he or she usually receives across subjects. Adolescents were asked to indicate their grades on a 4-point scale including (1) *A-B*, (2) *B-C*, (3) *C-D*, and (4) *D-F*. (Appendix B) The proportions of adolescents in each of the grades were approximately 50% *A-B*, 40% *B-C*, 8% *C-D*, and 2% *D-F*. The correlation of school grades between grades 6 and 7 using the sample of this study was .51.

Family Risk Measures

Family structure

Family structure was measured by one question, "The parents or guardians you live with most of the time are: mother and father, mother and stepfather, father and stepmother, only mother, only father, grandparents, or other adults." (Appendix B) Living with mother and father was coded as (0) *both biological parents*, and the remainder of the responses was coded as (1) *other family living*. In this study, 64% of the adolescents lived with both biological parents.

Parental monitoring

Parental monitoring was measured by two questions: "Do your parents/guardians let you come and go as you please?" and "When you are away from home, do your parents/guardians

know where you are and who you are with?" The response format was a 5-point scale including (1) *never*, (2) *rarely*, (3) *sometimes*, (4) *usually*, and (5) *always*. (Appendix C) Since the two questions were written in opposite directions, responses to the second question were reversed. Then scores were added and divided by the number of items; scores represented the mean value for items in the scale, where high scores indicated a lack of parental monitoring. The proportions of adolescents in each of the levels for the scale were approximately 67% *never*, 17% *rarely*, 10% *sometimes*, 3% *usually*, and 3% *always*; the majority of the students reported being supervised properly by their parents.

Parental attitude towards fighting

Parental attitude towards fighting was assessed on a 10-item scale, which was developed for the Students for Peace project. (Appendix D) The scale contains 10 statements of frequent parental sayings about fighting. Adolescents were asked "What do your parents/guardians tell you about fighting?" To each statement, adolescents responded (1) *yes* or (0) *no*. The scale includes five items that support fighting (e.g., "If someone hits you, hit them back") and five items that support peaceful alternatives to conflict (e.g., "If someone calls you names, ignore them"). After positive responses to statements of peaceful solutions were reversed, scores were summed ranging from 0 (strong support for peaceful alternatives) to 10 (strong support for fighting). Approximately 20% of the adolescents in this study obtained a score of 5 or above. The internal consistency of the scale was .81 (Orpinas et al., 1999).

Community Risk Measures

Community violence

Community violence was assessed as the amount of violence students had seen in their community (e.g., arrests, gangs, and stabbings) during the year prior to the survey. (Appendix E)

The measure consists of 9 items regarding various kinds of violence in the community. To each question, adolescents responded (1) *yes* or (0) *no*. Scores were calculated by summing all responses, ranging from 0 to 9. Higher scores indicate higher levels of exposure to community violence. Nearly all of the adolescents (94%) reported seeing more than one incidence of community violence. The internal reliability of the scores, as measured by Cronbach's α was .75 for a sample of 3,234 adolescents in the Students for Peace project.

Media Risk Measures

Television watching

Television watching was assessed by asking adolescents how many hours per day during the weekday they watch TV. Potential responses ranged from (1) *I don't watch TV*, (2) *less than an hour*, (3) *one or two hours*, (4) *two or three hours*, (5) *three or four hours*, and (6) *four or more hours*. More than one-third of the sample (38%) reported spending more than four hours per day watching TV, whereas only 3% of the sample reported not watching TV at all. The measure does not specifically ask the contents of TV programs they watch; however, given that much of today's TV programming is violent (Federman, 1998) it was considered a proxy measure of exposure to TV violence.

Videogame playing

Videogame playing was assessed by asking adolescents how many hours per day during the weekday they play videogames. Potential responses ranged from (1) *I don't play videogames*, (2) *less than an hour*, (3) *one or two hours*, (4) *two or three hours*, (5) *three or four hours*, and (6) *four or more hours*. Almost the half of the sample (46%) reported not playing videogames, while only 6% of the sample reported spending more than four hours per day playing videogames. Although the measure does not specifically ask the contents of videogames they

play, it was considered a proxy measure of violent videogame consumption because violence is prevalent in many videogames (Sherry, 2001).

Cumulative Risk Status

Cumulative Risk Status was calculated by dichotomizing the risk factors except for ethnicity as either (0) *absence of risk* or (1) *presence of risk*; the reason that ethnicity was excluded from risk calculation is because of the lack of evidence regarding ethnic differences in aggression (Deater-Decker et al., 1998). Thresholds for determining risk were based on the distribution of the particular instrument used, especially for continuous risk variables; the average of the thresholds was 25%. The dichotomized scores were then summed to calculate the number of risk factors present, ranging from 0 to 8. The proportions of adolescents in each of the cumulative risk status classifications were approximately 12% = *0*, 22% = *1*, 24% = *2*, 18% = *3*, 12% = *4*, 8% = *5*, 3% = *6*, 1% = *7* and 0% = *8*.

Statistical Analysis

The analysis was conducted using Hierarchical Linear Modeling (HLM) 6 (Raudenbush, Bryk, Cheong, & Congdon, 2004) with full maximum likelihood estimation used for all models. HLM has several advantages for longitudinal data analyses. First, it allows for identifying an explicit model of individual growth based on multiple data points. Second, it can incorporate missing data under the assumption that the data are missing at random (MAR); MAR occurs when the probability of missing a time point is independent of the missing data given the observed data. Third, spacing of time points across cases can be variable (Raudenbush & Bryk, 2002). Individual change can be represented through a two-level hierarchical model, in which multiple observations on each person are viewed as nested within the person: at Level 1 multiple observations on each individual are reflected by an individual growth trajectory, and at Level 2

the individual growth parameters become the outcome variables that may vary as a function of person-level characteristics. Despite the fact that the students were nested within schools, this study did not include a school level because of the small number of schools in the dataset (n = 8); the number of clusters should be at least 30. In addition, the limited number of observations per individual (i.e., three time points) only allows for adopting a linear individual growth model (Raudenbush & Bryk, 2002). Therefore, the present study employed a two-level linear model. Specifically, at Level 1, it is assumed that Y_{ti}, the observed status at time t for student i, is a function of a systematic growth trajectory plus random error, which is specified in Equation 1.

$$Y_{ti} = \pi_{0i} + \pi_{1i}\alpha_{ti} + e_{ti} \quad (1)$$

for i = 1, . . . , n subjects, where α_{ti} is a measure of time passage at time t for student i. α_{ti} was coded as 0 = 6th grade, 1 = 7th grade, and 2 = 8th grade, so one unit is one year. The intercept, π_{0i}, is the initial status of aggression for student i when α_{ti} = 0 (in the 6th grade). π_{1i} is the growth rate of aggression per one unit increase in α_{ti} (per year) for student i. The errors, e_{ti}, are independent and normally distributed.

The growth parameters are assumed to vary across individuals at level 2. It begins with the simplest person-level model (an unconditional model) as specified in Equation 2.

$$\pi_{0i} = \beta_{00} + \gamma_{0i}$$
$$\pi_{1i} = \beta_{10} + \gamma_{1i} \quad (2)$$

β_{00} is the mean initial status for adolescents in the sample, that is, the expected outcome of aggression in the 6th grade. β_{10} is the mean growth rate, that is, the expected change in aggression per year. β_{00} and β_{10} are called fixed effects; γ_{0i} and γ_{1i} are the random effects for the intercept and growth rate, respectively.

While the level-1 model remained the same as in Equation 1, person characteristics (predictors) were added to the level-2 unconditional model. In other words, variation in the growth parameters was modeled as a function of risk factors—the individual (sex, ethnicity, and academic achievement), the family (family structure, parental monitoring, and parental attitude towards fighting), the community (community violence), and the media (TV watching and videogame playing). In building models a predictor should be added at the same time to both the intercept and slope models; when there is a correlation between the intercept and slope entering a predictor into only one model will bias the estimates. In this study, a set of factors in one risk domain was entered together. Continuous predictors (e.g., parental monitoring) were grand-mean centered to ease the interpretations of their coefficients, whereas discontinuous predictors including sex, ethnicity, and family structure were dummy-coded using girls, White ethnicity, and both biological parents, respectively, as the comparison group. The use of White adolescents as a criterion group is conventional in the literature. In fact, it was attempted to investigate separate trajectories of verbal aggression for each of the ethnic groups to examine ethnic differences in predictors. Yet it turned out that random effects for slope in White and Asian ethnicity were insignificant; consequently, it was decided to use ethnicity as one of the predictors.

The level-2 conditional models were analyzed in three different ways for overall, verbal, and physical aggression. The first approach, addressing the independent effects of the risk factors

in each of the four domains (research question 2), provided an estimate of the variance explained by each set of risk factors without controlling for covariation with the other three sets of risk factors. Level-2 conditional models for the individual, family, community, and media were specified in Equations 3, 4, 5, and 6, respectively. As indicated earlier, all the risk factors from one domain were tested simultaneously.

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Male}) + \beta_{02}(\text{Black}) + \beta_{03}(\text{Hispanic}) + \beta_{04}(\text{Asian}) + \beta_{05}(\text{Other}) + \beta_{06}(\text{Academic Achievement}) + \gamma_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{01}(\text{Male}) + \beta_{02}(\text{Black}) + \beta_{03}(\text{Hispanic}) + \beta_{04}(\text{Asian}) + \beta_{05}(\text{Other}) + \beta_{06}(\text{Academic Achievement}) + \gamma_{1i} \quad (3)$$

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Other Family Living}) + \beta_{02}(\text{Parental Monitoring}) + \beta_{03}(\text{Parental Attitude towards Fighting}) + \gamma_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{01}(\text{Other Family Living}) + \beta_{02}(\text{Parental Monitoring}) + \beta_{03}(\text{Parental Attitude towards Fighting}) + \gamma_{1i} \quad (4)$$

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Community Violence}) + \gamma_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{01}(\text{Community Violence}) + \gamma_{1i} \quad (5)$$

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{TV Watching}) + \beta_{02}(\text{Videogame Playing}) + \gamma_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{01}(\text{TV Watching}) + \beta_{02}(\text{Videogame Playing}) + \gamma_{1i} \quad (6)$$

The interpretations of the growth parameters are provided below, using Equation 3 as an example.

For the intercept model of Equation 3,

- β_{00} is the initial status of aggression for an adolescent who is female, White, and of mean academic achievement.
- β_{01} is the expected difference in the initial status of aggression of boys compared with girls.
- β_{02} is the expected difference in the initial status of aggression of Black adolescents compared with White adolescents. β_{03}, β_{04}, and β_{05} are interpreted in the same way for Hispanic, Asian, and Other adolescents, respectively.
- β_{06} is the expected difference in the initial status of aggression for a one-unit increase in mean academic achievement.

For the slope model of Equation 3,

- β_{10} is the expected annual growth rate in aggression for an adolescent who is female, White, and of mean academic achievement.
- β_{01} is the expected difference in the annual growth rate in aggression for boys compared with girls.
- β_{02} is the expected difference in the annual growth rate in aggression of Black adolescents compared with White adolescents. β_{03}, β_{04}, and β_{05} are interpreted in the same way for Hispanic, Asian, and Other adolescents, respectively.
- β_{06} is the expected difference in the annual growth rate in aggression for a one-unit increase in mean academic achievement.

The second approach, examining the unique effects of the four domains (research question 3), provided an estimate of the variance accounted for by each set of risk factors with regard to covariation with the other three sets of risk factors. All the risk domains were entered together in the order of the individual, family, community, and media; a priori theoretical prediction was that proximal contexts have more influence on aggression development than distal contexts. The model being tested was specified in Equation 7 below.

$$\begin{aligned}\pi_{0i} = {} & \beta_{00} + \beta_{01}(\text{Male}) + \beta_{02}(\text{Black}) + \beta_{03}(\text{Hispanic}) + \beta_{04}(\text{Asian}) + \beta_{05}(\text{Other}) \\ & + \beta_{06}(\text{Academic Achievement}) + \beta_{07}(\text{Other Family Living}) \\ & + \beta_{08}(\text{Parental Monitoring}) + \beta_{09}(\text{Parental Attitude towards Fighting}) \\ & + \beta_{10}(\text{Community Violence}) + \beta_{11}(\text{TV Watching}) + \beta_{12}(\text{Videogame Playing}) + \gamma_{0i} \\ \pi_{1i} = {} & \beta_{10} + \beta_{01}(\text{Male}) + \beta_{02}(\text{Black}) + \beta_{03}(\text{Hispanic}) + \beta_{04}(\text{Asian}) + \beta_{05}(\text{Other}) \\ & + \beta_{06}(\text{Academic Achievement}) + \beta_{07}(\text{Other Family Living}) \\ & + \beta_{08}(\text{Parental Monitoring}) + \beta_{09}(\text{Parental Attitude towards Fighting}) \\ & + \beta_{10}(\text{Community Violence}) + \beta_{11}(\text{TV Watching}) + \beta_{12}(\text{Videogame Playing}) + \gamma_{1i} \end{aligned} \quad (7)$$

Lastly, the third approach investigated whether the number of risk factors present significantly predicted individual differences in the initial level and change of overall, verbal, and physical aggression (research question 4), as specified in Equation 8.

$$\begin{aligned}\pi_{0i} &= \beta_{00} + \beta_{01}(\text{Cumulative Risk Status}) + \gamma_{0i} \\ \pi_{1i} &= \beta_{10} + \beta_{01}(\text{Cumulative Risk Status}) + \gamma_{1i}\end{aligned} \quad (8)$$

For each of the three approaches, the proportion of the variance in the random effects from the unconditional model that were explained by a predictor or set of predictors was determined. This estimate provides a measure of the explanatory power of a given conditional model. As presented below, the proportion of variance explained is the difference between the total parameter variance (estimated from the unconditional model) and the residual parameter variance (based on the fitted model) relative to the total parameter variance. The estimates of the incremental variances explained by the Level 2 predictors were of particular interest.

Proportion of variance in γ_{ij} explained by the predictors in the conditional model =

$$\frac{\sigma^2_{ij}\,(\text{unconditional}) - \sigma^2_{ij}\,(\text{conditional})}{\sigma^2_{ij}\,(\text{unconditional})}$$

CHAPTER 4

RESULTS

Descriptive Statistics and Correlations among Variables

Table 1 provides the mean, standard deviation, range, and skewness values for continuous risk variables and aggression scores; for dichotomous risk variables such as sex, ethnicity, and family structure the proportion of participants and range are reported. The sample consisted of 48% boys and 52% girls and was characterized by diverse ethnicity including 66% Hispanic, 19% Black, 4% Asian, and 3% Other. For academic achievement, average adolescents reported receiving between *A*-*B* and *B*-*C* grades. More than one third of the sample (36%) lived in other family situations such as living with a single parent. The mean for parental monitoring was 1.58, indicating that average adolescents were monitored most of the time. The parental attitude toward fighting variable had a mean of 2.36, indicating a tendency toward peaceful alternatives, although with relatively large variation (*SD* = 2.47). Further, adolescents reported witnessing an average of four incidents of community violence. Adolescents also reported that they spent on average two or three hours per day during weekdays watching TV and less than an hour per day during weekdays playing videogames. In terms of cumulative risk status, average adolescents had 2.39 risk factors. Regarding aggression scores, adolescents reported low rates of overall, verbal, and physical aggressive behavior ranging from 1 – 2 times per week across time. Although there was little grade-related change in the sample means of all the aggression measures, verbal aggression showed slight increases and physical aggression showed slight declines over 3 years. Variability was similarly stable, ranging from 1.27 to 1.47, for all the

aggression outcomes. The test of normality tests the hypothesis that skewness is equal to zero. This test is so powerful that the hypothesis is likely to be rejected even though the variable may have a normal distribution. Because of this shortcoming, most researchers use "rules of thumb" that if levels of skewness are smaller than |2.0| the variable is normally distributed. Given the criterion of significance, all variables were normally distributed.

The correlations among variables except ethnicity (risk as well as aggression) are presented in Table 2. All the risk factors were significantly and positively correlated with one another, highlighting the importance of studying multiple risk factors simultaneously. In addition, almost all risk variables and cumulative risk status were significantly and positively correlated with all the aggressive behaviors assessed in grades 6 – 8. Overall the correlations ranged from low to moderate. Some patterns in the correlations over 3 years were noted: the correlations of aggression outcomes with boys tended to slightly increase over time, whereas the correlations of aggression outcomes with some other risk variables such as academic achievement, other family living, parental monitoring, parental support for fighting, TV watching, videogame playing, and cumulative risk status tended to slightly decrease over time. Sex is the only biological factor and seems to increase its influence on aggression as adolescents get older; the rest of the variables are time-specific or environmental factors and seem to lose their potency over time. One exception to the patterns was that community violence showed the highest correlations with aggression outcomes measured in the 7th grade, which may have to do with the fact that data on community violence was collected in the 7th grade. Further, year-to-year correlations between aggression scores ranged from .47 to .58 for overall aggression, from .46 to .58 for verbal aggression, and from .39 to .50 for physical aggression with a tendency to diminish as a time interval increases.

Model Testing

The following sections describe four sets of models designed to address the four research questions proposed in this study. For each aggression outcome, the four sets of models included: (a) an unconditional model estimating average developmental trajectories of aggression for the entire sample during the middle school years, not controlling for person-level characteristics; (b) a series of conditional models estimating the independent effects of each of the four risk domains (the individual, family, community, and media) on the initial status and growth rate of aggression; (c) a series of conditional models estimating the unique influences of the four risk domains on the initial status and growth rate of aggression; (d) a conditional model estimating the effects of cumulative risk status on the development of aggression.

Unconditional Models

Results of the unconditional models of overall, verbal, and physical aggression showed significant intercepts ($\beta = 1.22$, 1.15, and 1.31, each $p < .001$, respectively) and slopes ($\beta = 0.04$, $p < .05$, $\beta = 0.11$, $p < .001$, and $\beta = -0.05$, $p < .01$, respectively). (see Unconditional column in Tables 3 – 5) This means that average middle school students increased overall aggression as well as verbal aggression over time, and decreased physical aggression over time; yet, these were minor changes. As shown in Figure 1, differentiated developmental courses of these aggressive behaviors were identified. Verbal aggression was lowest in grade 6 and became highest in grade 8 due to the faster increasing growth rate; the opposite was true for physical aggression which was highest in grade 6 and became lowest in grade 8 with the decreasing growth rate; overall aggression remained intermediate with the smallest absolute value of the growth rate throughout the middle school years. Moreover, there was significant unexplained variation around the intercept and slope parameters for overall, verbal, and physical aggression all at the *p* value

of .001: for intercept, χ^2 (1670) = 2881.48, 2696.62, and 2749.17, respectively; for slope, χ^2 (1670) = 2251.27, 2191.67, and 2202.88, respectively. Therefore, it was necessary to model the growth parameters by adding person-level variables in order to understand the developmental course of adolescent aggression adequately.

The correlations between the intercepts and the slopes for overall, verbal, and physical aggression were negative and moderate in size (-.51, -.61, and -.44, respectively). This result means that for overall and verbal aggression, characterized by positive change, adolescents with lower initial status tended to increase at a faster rate than adolescents with higher initial status; for physical aggression, marked by negative change, adolescents with lower initial status tended to decrease at a faster rate than adolescents with higher initial status.

Independent Effects of Risk Domains

A series of analyses were conducted to model individual differences in growth trajectories by each of the individual, family, community, and media risk domain. (see Tables 3 – 5) Each set of risk factors was tested simultaneously without controlling for the other three domains. The following sections report results by risk domains.

The individual risk domain

The testing of individual risk factors revealed that boys showed higher initial levels of overall and physical aggression (β = 0.19 and 0.21, each $p < .05$, respectively) and faster increases in overall and verbal aggression than did girls (β = 0.09, $p < .05$ and β = 0.15, $p < .01$, respectively). Compared with White adolescents, Black adolescents reported higher initial levels of overall, verbal, and physical aggression (β = 0.77, $p < .001$, β = 0.66, $p < .01$, and β = 0.92, $p < .001$, respectively); Hispanic adolescents reported higher initial levels of overall and physical aggression (β = 0.30, $p < .05$ and β = 0.49, $p < .01$, respectively). Yet Asian or Other adolescents

did not differ from White adolescents in intercept. Despite these differences in intercept, ethnicity did not predict differences in the growth rate of any aggression outcomes with the exception that Black adolescents reported less increase or more decrease in physical aggression over time ($\beta = -0.17$, $p < .05$). Moreover, lower academic achievement was significantly associated with higher initial levels of overall, verbal, and physical aggression ($\beta = 0.41$, 0.46, and 0.35, each $p < .001$, respectively); and with less increase or more decrease in overall and verbal aggression over time ($\beta = -0.08$, $p < .01$ and $\beta = -0.12$, $p < .001$, respectively). It is noted that the positive slope could even become negative depending on the range of values of a predictor, and therefore, a negative predictor effect is usually interpreted that higher values of a predictor result in less increase or more decrease in the outcome (D. Bandalos, personal communication, March 20, 2007). The individual risk factors together accounted for 13-14% of the variance in initial status, and 3-10% of the variance in growth rate. (see Individual Risk column in Tables 3 – 5) Furthermore, it is worth noting that the slopes of all the aggression outcomes became insignificant when individual risk factors were entered into the models. Additional analyses were run to see which individual risk variable was driving the change with only one of the predictors added at a time. Results of the analyses suggested that sex led to the non-significance of the slope of overall and verbal aggression, and that ethnicity led to the non-significance of the slope of physical aggression.

The family risk domain

All of the family risk factors significantly related to individual differences in initial status in that other family living, lower parental monitoring, and stronger parental support for fighting were associated with higher initial levels of overall, verbal, and physical aggression (other family living: $\beta = 0.30$, $p < .001$, $\beta = 0.28$, $p < .01$, and $\beta = 0.33$, $p < .001$, respectively; parental

monitoring: β = 0.21, 0.18, and 0.24, each $p < .001$, respectively; parental attitude towards fighting: β = 0.26, 0.27, and 0.25, each $p < .001$, respectively). Although other family living did not predict differences in slope, less parental monitoring significantly predicted more declines in physical aggression over time (β = -0.05, $p < .05$) and stronger parental support for fighting significantly predicted less increase or more decrease in overall and verbal aggression and more decrease in physical aggression (each β = -0.05, $p = .001$). The family risk domain explained 44-48% of the variance in intercept, and 12-17% of the variance in slope. (see Family Risk column in Tables 3 – 5) In addition, it was found that the slope coefficient for physical aggression became insignificant with family factors added; additional analyses revealed that not a single predictor but a combination of predictors, especially family structure and parental monitoring, drove the change.

The community risk domain

Higher rates of community violence significantly predicted higher initial levels of overall, verbal, and physical aggression (β = 0.20, 0.20, and 0.21, each $p < .001$, respectively), accounting for 14-16% of the variance in the intercept. Community violence was not significantly associated with variation in the growth rate of any aggression outcomes; only 1% of the variance in the slope of overall aggression was explained by community violence, but it was not statistically different from zero variance. (see Community Risk column in Tables 3 – 5)

The media risk domain

Each of more hours spent watching TV and more hours spent playing videogames significantly predicted higher initial levels of overall, verbal, and physical aggression, all at the p value of .001 (TV watching: β = 0.16, 0.17, and 0.14, respectively; videogame playing: β = 0.22, 0.17, and 0.29, respectively). While TV watching was not associated with variation in change,

more hours of videogame playing was significantly associated with less increase or more decrease in overall aggression ($\beta = -0.03$, $p < .05$) and more decrease in physical aggression ($\beta = -0.05$, $p < .001$) during the middle school years. The media risk factors together accounted for 11-19% of the variance in intercept and 3-7% of the variance in slope. (see Media Risk column in Tables 3 – 5)

In summary, each set of factors significantly predicted variability in the initial status of overall, verbal, and physical aggression. Specifically, all the risk variables were significantly associated with individual differences in intercept in the expected direction, with the exception that boys did not differ from girls in terms of the initial status of verbal aggression. Among the ethnic groups, only Black and Hispanic adolescents showed higher initial levels of aggression than White adolescents. Moreover, variability existed in the risk domains predicting individual growth rates. Factors in the individual or the family domain significantly predicted differences in the slope of all aggression outcomes; the community domain did not predict variability in change of any aggression outcomes; and factors in the media domain were significantly predictive of individual growth rates of overall and physical aggression. A relatively small number of risk variables significantly related to variability in slope, all of which except sex showed negative effects during early adolescence. Overall, almost all risk domains contributed to the prediction of the development of aggression. The family domain explained the largest variance in the growth parameters (more variance explained in intercept than in slope), while the community or media domain explained a small amount of variance especially in slope.

Unique Effects of Risk Domains

A series of models of the unique influences of the four risk domains on the development of aggression were tested. All the risk domains were entered together; the effects of one risk

domain were assessed, controlling for the other three risk domains. Results from the best models (see Media Risk column in Tables 6 – 8) indicated that factors in all the risk domains significantly predicted individual differences in the intercept of overall, verbal, and physical aggression in the expected direction. The results also revealed that the individual, family, and community risk factors were significantly associated with variability in the growth rate of overall, verbal, and physical aggression and that the media risk factors were significantly associated with variability in the growth rate of physical aggression. The following sections present the unique effects of the four domains.

For the individual domain, although no sex differences were identified in the initial status of any aggression outcomes, boys showed faster increases in overall, verbal, and physical aggression from grades 6 to 8 than did girls ($\beta = 0.14$, $p < .001$, $\beta = 0.18$, $p < .001$, and $\beta = 0.09$, $p < .05$, respectively). Figure 2 illustrates growth trajectories of overall aggression by sex. Black adolescents reported significantly higher initial levels of overall and physical aggression than White adolescents ($\beta = 0.34$, $p < .05$ and $\beta = 0.47$, $p < .01$, respectively; see Figure 3), but did not differ from White adolescents in terms of the growth rate of any aggression forms. Hispanic, Asian, or Other adolescents were not significantly different from White adolescents in the growth parameters of aggression. Moreover, lower academic achievement was significantly associated with higher initial status of overall, verbal, and physical aggression ($\beta = 0.19$, $p < .01$, $\beta = 0.24$, $p < .001$, and $\beta = 0.13$, $p < .05$, respectively), and with less increase or more decrease in overall and verbal aggression over time ($\beta = -0.06$, $p < .05$ and $\beta = -0.09$, $p < .01$, respectively).

With regard to the family domain, other family living condition significantly predicted higher initial levels of overall and physical aggression ($\beta = 0.16$ and 0.20, each $p < .05$, respectively), but did not predict the growth rate of any aggression forms. Lack of parental

monitoring was significantly associated with higher initial levels of overall, verbal, and physical aggression (β = 0.17, $p < .001$, β = 0.15, $p < .01$, and β = 0.19, $p < .001$, respectively), and with less increase or more decrease in overall and physical aggression over time (β = -0.04, $p < .05$ and β = -0.06, $p < .01$, respectively). Similarly, stronger parental support for fighting significantly related to higher initial status of overall, verbal, and physical aggression (β = 0.21, $p < .001$, β = 0.23, $p < .001$, and β = 0.19, $p < .001$, respectively) and to less increase or more decrease of overall, verbal, and physical aggression (β = -0.05, -0.06, and -0.05, each $p < .001$, respectively).

Regarding the community domain, adolescents who witnessed higher rates of community violence reported higher intercepts and faster increases in overall, verbal, and physical aggression (for intercept: β = 0.08, 0.08, and 0.09, each $p < .001$, respectively; for slope: β = 0.03, $p < .001$, β = 0.03, $p < .01$, and β = 0.03, $p < .001$, respectively). For the media domain, more hours spent watching TV significantly predicted higher initial levels of overall, verbal, and physical aggression (β = 0.12, $p < .001$, β = 0.13, $p < .001$, and β = 0.10, $p < .01$, respectively), but did not predict differences in the growth rate of any aggression outcomes. In addition, more hours spent playing videogames was significantly associated with higher initial levels of overall and physical aggression (β = 0.08, $p < .01$ and β = 0.16, $p < .001$, respectively), and with faster decreases in physical aggression (β = -0.04, $p < .01$).

All of the risk domains explained unique variance in individual differences in the intercept of all aggression outcomes: 13-14% for the individual domain, 34-38% for the family domain, 1% for the community domain, and 3-6% for the media domain. These risk domains also made a unique incremental contribution to predicting variability in the slope of all aggression outcomes: 3-10% for the individual domain, 8-12% for the family domain, 1-2% for

the community domain, and 1-4% for the media domain. It should be noted, however, that the media effects on slope were insignificant for overall and verbal aggression so the amount of variance explained was not statistically different from zero. Overall, the family domain explained the largest variance in intercept and slope; more variance was explained in intercept than in slope. Some risk factors including academic achievement, parenting variables, and videogame playing consistently had negative slope effects (less increase or more decrease depending on the values of a risk factor), whereas others including sex and community violence had positive slope effects (more increase).

Black adolescents' trajectories

Given Black adolescents reporting higher initial levels of overall and physical aggression, it was decided to estimate separate trajectories of these aggressive behaviors only for Black ethnicity to better understand risk variables that might be particularly relevant for this group. Results of the modeling are reported in Table 9. The unconditional models showed significant initial status of overall and physical aggression ($\beta = 1.65$ and 1.73, each $p < .001$, respectively) and a decline of physical aggression over 3 years ($\beta = -0.12$, $p < .05$); change of overall aggression was insignificant. The correlation between intercept and slope was negative and moderate for both overall and physical aggression (-.41 and -.42, respectively), suggesting that Black adolescents with lower initial status tended to decrease aggression at a faster rate than did those with higher initial status. In addition, there was significant unexplained variation around the intercept and slope parameters for overall and physical aggression all at the p value of .001: for intercept, $\chi^2(310) = 610.80$ and 562.56, respectively; for slope, $\chi^2(310) = 420.37$ and 421.23, respectively. Consequently, it was necessary to model the growth parameters by adding

person-level variables in order to understand the developmental course of aggression among Black adolescents properly.

Results from the conditional models are as follows. For the individual domain, despite no sex differences in intercept, boys reported faster increases in overall aggression over time than did girls (β = 0.19, $p < .05$); lower academic achievement significantly predicted higher initial levels of overall aggression (β = 0.31, $p < .05$). For the family domain, other family living was significantly associated with higher initial levels of overall and physical aggression (β = 0.45 and 0.53, each $p < .05$, respectively). Stronger parental support for fighting was significantly associated with higher initial levels of overall and physical aggression (β = 0.32 and 0.31, each $p < .001$, respectively) and faster decreases in overall and physical aggression over time (each β = -0.10, $p < .001$). Interestingly, parental monitoring did not predict growth parameters at all. Regarding the community domain, higher rates of community violence were only predictive of less decrease or more increase in overall aggression over time (β = 0.04, $p < .05$). Lastly, from the media domain, more hours of TV watching was significantly predictive of higher initial levels of overall and physical aggression (β = 0.20 and 0.19, each $p < .01$, respectively), but not predictive of change; videogame playing did not predict any of the growth parameters. The proportion of the variance in intercept accounted for by the multiple risk factors was 49% for physical aggression and 51% for overall aggression; the proportion of the variance in slope accounted for by the multiple risk factors was 40% for physical aggression and 47% for overall aggression.

Cumulative Risk Model

The testing of cumulative risk effects revealed that the models were marked by the significant intercept of overall, verbal, and physical aggression at the p value of .001 (β = 1.22,

1.14, and 1.31, respectively) and by the significant linear change of overall and verbal aggression ($\beta = 0.04$, $p < .05$ and $\beta = 0.11$, $p < .001$, respectively). (see Table 10) The greater number of risk factors present significantly predicted higher initial levels of overall, verbal, and physical aggression all at the p value of .001 ($\beta = 0.42$, 0.41, and 0.43, respectively). (see Figure 4) The greater number of risk factors present was also significantly associated with less increase or more decrease in overall, verbal and physical aggression ($\beta = -0.05$, $p < .001$, $\beta = -0.04$, $p < .001$, and $\beta = -0.06$, $p < .01$, respectively) from grades 6 to 8 (see Figures 5 – 7). Cumulative risk models accounted for 35-39% of the variance in intercept and 3-10% of the variance in slope.

CHAPTER 5

DISCUSSION

Adolescent aggression has received much research attention especially in the area of intervention. Dramatic increases in violence and delinquency during middle school years indicate the importance of preventing such behaviors among early adolescents. Unfortunately, most of the existing intervention programs for reducing aggression lack evidence of effectiveness, and therefore, the design of interventions should be based on empirical research as well as theory. In this vein, this study was aimed at identifying average trajectories of different types of self-reported aggression (overall, verbal, and physical aggression) among urban, diverse ethnic middle school students, using HLM. This study was also designed to examine the effects of multiple risk factors in four domains (the individual, the family, the community, and the media) that prior research had indicated predict aggression, with three different methods including the independent testing of each of the four domains, the conjoint testing of the four domains, and the cumulative risk model.

Descriptive Statistics and Correlations among Variables

The sample of early adolescents reported relatively low rates of overall, verbal, and physical aggression. On average the adolescents displayed each of the aggressive behaviors 1-2 times a week; 68% of the adolescents reported each of the aggressive behaviors 0-3 times a week. These results seem reasonable given that the sample was drawn from the general student body that had participated in school-wide interventions. Correlations of aggression scores over time were somewhat consistent with the literature on the stability of aggression. Specifically, the

average year-to-year correlation of overall aggression was .53. In addition, the significant correlations between risk factors provide evidence of interconnectedness of variables within a single context and between different contexts. Yet the correlations were low to moderate, excluding the possibility of redundancy among the variables and supporting the uniqueness of the variables. The finding that all risk factors were significantly and positively correlated with all aggressive behaviors across time with small to moderate magnitudes suggests that the development of adolescent aggression cannot be explained by a single risk factor. Together these findings support the necessity of simultaneous testing of multiple risk factors in adolescent aggression research.

Average Trajectories of Aggression

The test of unconditional models addressing the course of overall, verbal, and physical aggression among early adolescents (research question 1) partially supported the hypothesis that over a 3-year period overall and verbal aggression increased, and physical aggression decreased. The distinct trajectories of the aggressive behaviors imply developmental transformation in aggression (Cairns et al., 1989) and warrant the subdivision of aggression into distinguishable forms. Change in manifestations of aggression can be thought of in light of language development. Prior research attributes the fact that physical aggression peaks during the preschool years and decreases thereafter to an increase in the ability to communicate (Tremblay, 2000); consequently, physical aggression tends to be replaced by verbal aggression with age. Another possible explanation is that through socialization processes adolescents are reinforced for expressing their negative feelings in a more indirect, socially acceptable way and punished for direct, harmful behavior. Overall, the development of early adolescent aggression is characterized by minor change rather than absolute change in mean levels of aggression.

Recently, research has focused on alteration in trajectories per se as a measure of intervention effects (e.g., Aber et al., 2003). If an intervention is effective, changes in trajectories toward positive outcomes should be greater than naturally occurring changes. Given this knowledge, the finding of the normal course of adolescent aggression provides a basis on which intervention effectiveness can be determined.

Effects of Multiple Risk Factors

Whether and how the course of overall, verbal, and physical aggression differed by multiple risk variables, representing the individual, family, community, and media domain, was examined in three statistically different ways. Results of the first method addressing the independent effects of each of the four domains (research question 2) supported most of the hypotheses: nearly all the risk variables significantly predicted variability in the intercept of all aggression outcomes in the expected direction; yet, no sex difference was found in the intercept of verbal aggression, and some ethnicities such as Asian and Other did not differ from White ethnicity in the intercept of all aggressive behaviors. The relationship between risk variables and slope was different. Only five variables (sex, Black ethnicity, parental monitoring, parental attitude towards fighting, and videogame playing) significantly predicted variability in the slope of some aggression outcomes, and all of the variables except sex showed negative effects on change during the middle school years. The findings that the influences of those risk factors on intercept and slope had different signs make sense given the negative relationships between intercept and slope. Stated differently, adolescents with lower initial levels of aggression increased at a faster rate than adolescents with higher initial levels of aggression; variance between the groups of adolescents became smaller over time. This may suggest that adolescents who showed low aggression in the 6th grade are more likely to increase aggression in the

subsequent years by imitating their aggressive peers as aggression is thought of as independence and that adolescents who exhibited high aggression in the 6th grade have less need to act aggressively in later grades especially when they already established social dominance in the group. Some of the negative slope effects are contradictory to prior research findings and need to be replicated. The risk factors with negative slope are time-specific or environmental factors, and they seem to lose their potency over time as they were measured at baseline. However, in interpreting the current results, it is important to be mindful that despite the statistical significance, the slope coefficients were so small that there was no substantial impact. While the research literature does not provide a definite answer to whether change of aggression varies by sex, this study found that boys reported faster increases in overall and verbal aggression than did girls. Further, each of the four domains showed more statistical power in explaining variability in intercept than in slope, which may be related to the fact that risk variables were assessed in the 6th grade. Testing of risk factors in isolation can be useful when research focuses on finding new factors affecting outcomes of interest; however, it inevitably ignores covariation with other risk factors so it may not be desirable, especially when knowledge of risk factors has been well established.

The aforementioned problem with the first method led to the second method that examined multiple risk factors simultaneously (research question 3). Results of the second method revealed that all four domains made significant unique contributions to the prediction of the development of overall, verbal, and physical aggression with the exception that the media domain was not predictive of variability in the slope of verbal and overall aggression. Overall, there is little evidence that some developmental contexts are redundant. Most importantly, this study demonstrates that ignorance of the empirical fact that risk factors covary results in biasing

of estimates. Some of the significant effects of risk factors estimated independently became insignificant after controlling for covariation with other risk factors.

For the individual domain, the sex differences in initial levels of overall and physical aggression were no longer significant after controlling for the family domain; although most prior research reported sex differences in the means of aggression, the current finding indicates the possibility that sex effects are compounded with other contextual factors. Yet boys showed faster increasing rates of all aggressive forms than did girls even after controlling for the other three domains. In the case of ethnicity Hispanic ethnicity was no longer different from White ethnicity in the intercept of overall and physical aggression after controlling for the family domain and the community domain, respectively. Black ethnicity showed higher initial levels of all aggressive behaviors than White ethnicity even after the other domains were controlled; yet, Black ethnicity no longer differed from White ethnicity in the slope of physical aggression after the family domain was controlled. Caution should be exercised in interpreting the ethnicity effects because of the compounding effects of SES. However, the findings suggest variability in the development of adolescent aggression among ethnic groups, calling for an increase in awareness of ethnic diversity in aggression research. Consistent with prior research showing a clear association between academic achievement and aggression in adolescence, academic achievement showed robust relationships with the development of all aggressive behaviors, except for the slope of physical aggression, even after the other domains were controlled; while the literature implies bidirectional relations between the two variables, these current findings do not seem to support the theory that academic underachievement leads to later aggression. For the family domain, all risk variables were found to be strongly associated with aggression after controlling for the other domains. For the community domain, community violence was

significantly predictive of initial levels of all aggressive behaviors both before and after controlling for the other domains; interestingly community violence was not predictive of the slope of any of the aggressive behaviors when tested independently, but became significantly predictive of increases in all aggressive behaviors with a small magnitude after the other domains were controlled. As for the latter finding, it is usually expected to be the opposite, but it is possible for independently insignificant coefficients to become significant when a covariate is considered (G. Palardy, personal communication, March 5, 2007). For the media domain, TV watching still significantly predicted variation in the intercept of all aggressive behaviors after controlling for the other contexts; TV watching did not predict variation in changes in any of the aggressive behaviors in either the first or the second method, which is not in support of the notion that TV violence increases later aggression. Videogame playing was still significantly predictive of initial levels of all aggressive behaviors and significantly associated only with decreases in physical aggression after the other domains were controlled. There is no clear evidence of violent videogames increasing adolescent aggression, and the current finding does not seem to suggest that more hours of videogame playing lead to an increase in aggression.

The problem with the use of the restricted number of risk factors can be also seen in the comparison of the proportion of variance accounted for by each of the four domains between the first and the second approach. To begin with, both approaches were similar in that the variance explained in intercept was larger than the variance explained in slope. However, the variance accounted for by the four domains except the individual domain was reduced, especially in the intercept, after controlling for covariation of risk factors in the second method. Among the four risk domains, the family domain accounted for the largest variance of all aggression outcomes in both the first and the second method: for intercept an average of 46% and of 36%, respectively,

and for slope an average of 15% and of 10%, respectively. The strong family influence suggests the need for family intervention in an effort to reduce aggression in early adolescence. The other three domains including the individual, community, and media explained similar variance in intercept when tested independently (on average 14%, 15%, and 15%, respectively), but the community and the media domain showed considerable reductions in the variance accounted for in intercept after controlling for covariation with other variables (on average 1% and 4%, respectively). The three domains also contributed small variance to the prediction of change of aggression: the individual domain accounted for on average 7% of variance in both methods, the community domain accounted for almost zero variance in the first method and on average 2% of variance in the second method, and the media domain accounted for almost equally small variance in both methods (an average of 3% in the first method and an average of 2% in the second method). Overall, the community and the media contexts accounted for small amounts of variance compared to the individual and the family contexts. This pattern is consistent with the conceptualization of these two domains as distal contexts that are thought to have less influence on development than are proximal contexts.

Although the use of multiple risk factors offers certain advantages such as teasing out the influence of each variable, some may prefer reducing them into a single variable, that is, the number of risk factors present. The third approach using a cumulative risk model (research question 4) showed that the greater number of risk factors present significantly predicted higher initial status of overall, verbal, and physical aggression as expected, but was significantly associated with less increase or more decrease in all the aggressive behaviors. Again, the negative effect of the cumulative risk status on slope is congruent with the negative correlation between intercept and slope. Moreover, it is interesting to compare the analyses of the

cumulative risk model to the analyses of multiple risk factors (i.e., the second approach) because they represent two different ways of handling multiple predictors. The multiple risk factors method contributed more variance to the prediction of the development of adolescent aggression than did the cumulative risk method (for intercept 53-57% and 35-39%, respectively; for slope 20-22% and 3-10%, respectively). The superior performance of the multiple risk factors model is not surprising given that it allows for more variability in predictors, which in turn produces more power. Despite this obvious statistical advantage, the use of regression analyses with multiple predictors can be potentially problematic especially when predictors are highly correlated with one another and the sample size is small. Fortunately, these statistical issues did not apply to this study. However, the cumulative risk model in this study was useful for providing a convenient way of understanding the relationship between aggression development and risk. Therefore, it is recommended that researchers carefully compare pros and cons of the two methods in determining a statistical method of analyzing multiple variables.

In sum, the emphasis on transactional processes of a diversity of contexts in development has led to research examining the effects of multiple contexts on the development of adolescent aggression. Accordingly, this study investigated a broad range of proximal and distal contexts, which had been rarely tested together in prior research. All three models used in this study provide evidence that multiple risk variables at multiple levels exert influences on the growth of adolescent aggression with varying degrees; especially the multiple risk factors model demonstrates the relative contributions of the contexts to the prediction of aggression development. While nearly all of the risk factors functioned well in terms of predicting variability in the initial level of aggression, only a few of them seemed adequate for predicting future worse outcomes (i.e., more aggression).

Limitations and Future Research

There are several limitations of this study that should be addressed. Despite the broad range of risk factors examined, other important contexts such as peers and schools were not investigated mostly due to their unavailability or inadequacy in the dataset. In early adolescence the peer group becomes very important as a main source of support, and family influences wane. Based on the research literature, it seems reasonable to expect the development of adolescent aggression to be influenced to some extent by peer aggressiveness, school norms about aggression, bonding to school, etc. in addition to the risk factors examined in this study (e.g., Hawkins et al., 2000). In addition, this study did not directly address the potential interactions between risk factors, and it is possible that some risk factors may be a proxy for, mediate, or moderate some other risk factors (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). Much theoretical and empirical work should guide future research to investigate such complex relationships between risk factors, which will shed light on the processes of the development of aggressive behavior. Further, although this study took advantage of the wealth of risk research, it was unable to embrace the growing literature on protective factors for adolescent aggression as a result of utilizing existing datasets. Protective factors have been found to explain a unique amount of variance in youth behavior, independent of risk factors (e.g., Bush & Lengua, 2005). Therefore, it is desirable to examine protective factors for adolescent aggression, which can in turn inform the design of interventions for reducing aggression and increasing positive behaviors in adolescence. Moreover, this study was limited to examining change in overt aggressive expressions over time and did not investigate how transformation of aggressive behavior can occur between overt and covert aggression (relational aggression). Given the literature suggesting that relational aggression becomes more popular with age and causes a great deal of

emotional distress, it will be important to study the course of relational aggression in relation to the course of verbal and physical aggression in early adolescence.

The sample used for this study represented urban, diverse ethnic adolescents in the Southern region of the United States so caution should be exercised in generalizing the current findings to other groups of adolescents such as rural or suburban populations. As a solution to the limited generalizability, which is commonly associated with research, a multi-site study is often considered desirable. The fact that adolescents who were aggressive, male, or Black in the 6th grade were more likely to drop out of the longitudinal follow-up should be taken into account in interpreting the current findings of trajectories of aggression. In another word, the trajectories found in this study may look different if the high risk group of adolescents had been included. Yet it is usually challenging to conduct longitudinal research using high-risk children and adolescents. Further, because of the small number of Asian and Other adolescents in the sample, it is necessary to replicate the findings using larger samples of these ethnic groups of adolescents.

The few number of measurements available in the dataset (i.e., three waves) only allowed for linear growth modeling, which, however, may not represent what was in the data accurately. In order to obtain more accurate estimates of growth it is recommended that future research collect more than three data points, possibly extending to later adolescence. Some important considerations should be given to aspects of the design of data collection. In this study, data on risk and aggression were gathered only through a single agent (adolescents) and method (survey). Consequently, it was impossible to examine potential biases caused by the use of a sole informant and method. Although self-rating is highly relevant to studying adolescent aggression, the findings of this study should be replicated by future studies using multiple informants such as teachers, parents, and peers and multiple methods such as official records and direct observations.

Moreover, some of the risk measures need to be improved with regard to their psychometric properties because the quality of measurements is closely related to statistical power. For example, the parental monitoring scale was made up of two items, which is less likely to produce favorable variability. On a domain level, some of the contexts need to be represented better. The community domain measured by only one variable (i.e., community violence) should be conceptualized broadly using multiple measures including both structural and process variables of community. Media violence was inferred from proxy measures, and should be assessed by direct measures of exposure to media violence in future research. Overall, it is suggested to develop sophisticated measures for assessing risk factors for adolescent aggression in an effort to ensure the quality of research.

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Table 1. Descriptive Statistics for Risk factors and Aggressive Behaviors

	M	*SD*	Range	Skewness
Individual				
1. Male sex[a]	.48		0 – 1	
2. Black ethnicity[a]	.19		0 – 1	
3. Hispanic ethnicity[a]	.66		0 – 1	
4. Asian ethnicity[a]	.04		0 – 1	
5. Other ethnicity[a]	.03		0 – 1	
6. Academic Achievement	1.62	0.71	1 – 4	0.98
Family				
7. Other family living[a]	.36		0 – 1	
8. Parental monitoring	1.58	0.99	1 – 5	1.87
9. Parental attitude toward fighting	2.36	2.47	0 – 10	0.99
Community				
10. Community violence	3.99	2.29	0 – 9	0.24
Media				
11. TV watching	4.44	1.52	1 – 6	-0.52
12. Videogame playing	2.12	1.42	1 – 6	1.41
Cumulative risk model				
13. Cumulative risk status	2.39	1.65	0 – 8	
Overall aggression				
14. Grade 6	1.24	1.27	0 – 6	1.38
15. Grade 7	1.32	1.28	0 – 6	1.17
16. Grade 8	1.26	1.31	0 – 6	1.29
Verbal aggression				
17. Grade 6	1.23	1.39	0 – 6	1.37
18. Grade 7	1.40	1.42	0 – 6	1.06
19. Grade 8	1.39	1.49	0 – 6	1.17
Physical aggression				
20. Grade 6	1.25	1.33	0 – 6	1.32
21. Grade 7	1.22	1.32	0 – 6	1.37
22. Grade 8	1.10	1.31	0 – 6	1.45

[a] Dichotomous variables: means represent proportions of participants.

Table 2. Correlations among Variables

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Individual																	
1. Male	.14**	-.03	.12**	.19**	.12**	-.02	.29**	.48**	.16**	.17**	.20**	.16**	.18**	.21**	.13**	.12**	.14**
2. Achieve	—	.08**	.16**	.22**	.20**	.01	.10**	.38**	.20**	.20**	.11**	.19**	.17**	.08**	.19**	.20**	.14**
Family																	
3. Other family		—	.05*	.08**	.14**	.08**	.03	.37**	.12**	.11**	.05	.10**	.10**	.04	.13**	.10**	.07*
4. Monitor			—	.32**	.21**	.04	.16**	.48**	.29**	.17**	.20**	.26**	.17**	.18**	.29**	.15**	.19**
5. Attitude				—	.31**	.12**	.27**	.58**	.49**	.32**	.29**	.46**	.30**	.27**	.46**	.29**	.28**
Community																	
6. Violence					—	.09**	.17**	.50**	.34**	.45**	.34**	.31**	.40**	.29**	.34**	.44**	.34**
Media																	
7. TV						—	.24**	.36**	.23**	.19**	.18**	.22**	.20**	.19**	.20**	.14**	.13**
8. Videogame							—	.54**	.26**	.20**	.20**	.21**	.18**	.19**	.29**	.20**	.18**
Cumulative risk																	
9. Risk								—	.49**	.40**	.37**	.45**	.38**	.34**	.48**	.36**	.34**
Overall aggr																	
10. Grade 6									—	.54**	.47**	.95**	.52**	.47**	.91**	.48**	.39**
11. Grade 7										—	.58**	.52**	.95**	.57**	.48**	.90**	.50**
12. Grade 8											—	.45**	.56**	.95**	.43**	.51**	.91**
Verbal aggr																	
13. Grade 6												—	.53**	.46**	.74**	.42**	.35**
14. Grade 7													—	.58**	.43**	.72**	.44**
15. Grade 8														—	.41**	.45**	.74**
Physical aggr																	
16. Grade 6															—	.47**	.39**
17. Grade 7																—	.50**
18. Grade 8																	—

* $p < .05$. ** $p < .01$ (two-tailed).

Table 3. Model Estimates for Growth Trajectories of Adolescent Overall Aggression by Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.22***	0.04	0.78***	0.14	1.11***	0.047	1.21***	0.04	1.22***	0.04
Male			0.19*	0.08						
Black vs. White			0.77***	0.17						
Hispanic vs. White			0.30*	0.15						
Asian vs. White			-0.11	0.25						
Other vs. White			0.28	0.29						
Academic Achievement			0.41***	0.06						
Other family living					0.30***	0.08				
Parental monitoring					0.21***	0.04				
Parental attitude for fighting					0.26***	0.02				
Community violence							0.20***	0.02		
TV watching									0.16***	0.03
Videogame playing									0.22***	0.03
Model for growth rate										
Mean growth rate	0.04*	0.02	0.06	0.06	0.06**	0.02	0.04*	0.02	0.04*	0.02
Male			0.09*	0.04						
Black vs. White			-0.12	0.07						
Hispanic vs. White			-0.06	0.06						
Asian vs. White			-0.04	0.11						
Other vs. White			0.01	0.13						
Academic Achievement			-0.08**	0.03						
Other family living					-0.07	0.04				
Parental monitoring					-0.03	0.02				
Parental attitude for fighting					-0.05***	0.01				
Community violence							0.01	0.01		
TV watching									-0.01	0.01
Videogame playing									-0.03*	0.01
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.22	2881.48 (1670)***	1.05	2720.46 (1664)***	0.63	2325.47 (1667)***	1.03	2712.43 (1669)***	1.03	2696.48 (1668)***
Growth rate	0.12	2251.27 (1670)***	0.11	2224.18 (1664)***	0.10	2178.21 (1667)***	0.11	2267.06 (1669)***	0.11	2242.04 (1668)***
Level-1 error	0.68		0.68		0.67		0.67		0.67	
Proportion of Variance Explained										
Initial status	—		.14		.48		.16		.16	
Growth rate	—		.07		.17		.01		.03	

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 4. Model Estimates for Growth Trajectories of Adolescent Verbal Aggression by Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.15***	0.05	0.84***	0.16	1.05***	0.05	1.14***	0.04	1.15***	0.05
Male			0.17	0.09						
Black vs. White			0.66**	0.18						
Hispanic vs. White			0.16	0.16						
Asian vs. White			-0.10	0.27						
Other vs. White			0.00	0.32						
Academic Achievement			0.46***	0.06						
Other family living					0.28**	0.09				
Parental monitoring					0.18***	0.05				
Parental attitude for fighting					0.27***	0.02				
Community violence							0.20***	0.02		
TV watching									0.17***	0.03
Videogame playing									0.17***	0.03
Model for growth rate										
Mean growth rate	0.11***	0.02	0.06	0.07	0.13***	0.02	0.11***	0.02	0.11***	0.02
Male			0.15**	0.04						
Black vs. White			-0.07	0.08						
Hispanic vs. White			-0.02	0.07						
Asian vs. White			-0.03	0.12						
Other vs. White			0.11	0.15						
Academic Achievement			-0.12***	0.03						
Other family living					-0.07	0.04				
Parental monitoring					-0.02	0.02				
Parental attitude for fighting					-0.05***	0.01				
Community violence							0.01	0.01		
TV watching									-0.01	0.01
Videogame playing									-0.01	0.02
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.33	2696.62 (1670)***	1.14	2555.15 (1664)***	0.74	2250.02 (1667)***	1.15	2560.00 (1669)***	1.18	2580.09 (1668)***
Growth rate	0.14	2191.67 (1670)***	0.12	2146.87 (1664)***	0.12	2137.80 (1667)***	0.14	2202.80 (1669)***	0.14	2192.66 (1668)***
Level-1 error	0.85		0.85		0.84		0.84		0.85	
Proportion of Variance Explained										
Initial status		—		.14		.45		.14		.11
Growth rate		—		.10		.12		—		—

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 5. Model Estimates for Growth Trajectories of Adolescent Physical Aggression by Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.31***	0.05	0.71***	0.16	1.19***	0.05	1.30***	0.04	1.31***	0.04
Male			0.21*	0.09						
Black vs. White			0.92***	0.18						
Hispanic vs. White			0.49**	0.16						
Asian vs. White			-0.14	0.27						
Other vs. White			0.61	0.31						
Academic Achievement			0.35***	0.06						
Other family living					0.33***	0.09				
Parental monitoring					0.24***	0.04				
Parental attitude for fighting					0.25***	0.02				
Community violence							0.21***	0.02		
TV watching									0.14***	0.03
Videogame playing									0.29***	0.03
Model for growth rate										
Mean growth rate	-0.05**	0.02	0.04	0.07	-0.03	0.02	-0.05*	0.02	-0.05**	0.02
Male			0.03	0.04						
Black vs. White			-0.17*	0.08						
Hispanic vs. White			-0.11	0.07						
Asian vs. White			-0.04	0.12						
Other vs. White			-0.11	0.14						
Academic Achievement			-0.04	0.03						
Other family living					-0.07	0.04				
Parental monitoring					-0.05*	0.02				
Parental attitude for fighting					-0.05***	0.01				
Community violence							0.01	0.01		
TV watching									-0.02	0.01
Videogame playing									-0.05***	0.01
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.32	2749.17 (1670)***	1.15	2618.25 (1664)***	0.74	2297.65 (1667)***	1.11	2615.64 (1669)***	1.06	2547.46 (1668)***
Growth rate	0.12	2202.88 (1670)***	0.12	2190.40 (1664)***	0.10	2133.10 (1667)***	0.12	2219.18 (1669)***	0.11	2173.96 (1668)***
Level-1 error	0.84		0.84		0.84		0.83		0.84	
Proportion of Variance Explained										
Initial status		—		.13		.44		.16		.19
Growth rate		—		.03		.17		—		.07

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 6. Model Estimates for Growth Trajectories of Adolescent Overall Aggression Using Multiple Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.22***	0.04	0.78***	0.14	1.00***	0.14	1.04***	0.14	1.09***	0.14
Male			0.19*	0.08	-0.05	0.08	-0.06	0.08	-0.10	0.08
Black vs. White			0.77***	0.17	0.47**	0.16	0.44**	0.15	0.34*	0.15
Hispanic vs. White			0.30*	0.15	0.12	0.13	0.09	0.13	0.07	0.13
Asian vs. White			-0.11	0.25	-0.03	0.23	0.08	0.23	0.09	0.22
Other vs. White			0.28	0.29	0.02	0.27	-0.02	0.27	-0.02	0.26
Academic Achievement			0.41***	0.06	0.21***	0.06	0.18**	0.06	0.19**	0.05
Other family living					0.21**	0.08	0.17*	0.08	0.16*	0.08
Parental monitoring					0.19***	0.04	0.17***	0.04	0.17***	0.04
Parental attitude for fighting					0.25***	0.02	0.23***	0.02	0.21***	0.02
Community violence							0.09***	0.02	0.08***	0.02
TV watching									0.12***	0.03
Videogame playing									0.08**	0.03
Model for growth rate										
Mean growth rate	0.04*	0.02	0.06	0.06	0.02	0.06	0.05	0.07	0.04	0.07
Male			0.09*	0.04	0.14***	0.04	0.13**	0.04	0.14***	0.04
Black vs. White			-0.12	0.07	-0.05	0.07	-0.08	0.07	-0.07	0.07
Hispanic vs. White			-0.06	0.06	-0.02	0.06	-0.05	0.06	-0.05	0.06
Asian vs. White			-0.04	0.11	-0.06	0.11	-0.03	0.11	-0.04	0.11
Other vs. White			0.01	0.13	0.07	0.13	0.04	0.13	0.04	0.13
Academic Achievement			-0.08**	0.03	-0.04	0.03	-0.05*	0.03	-0.06*	0.03
Other family living					-0.06	0.04	-0.07	0.04	-0.07	0.04
Parental monitoring					-0.04	0.02	-0.04*	0.02	-0.04*	0.02
Parental attitude for fighting					-0.05***	0.01	-0.06***	0.01	-0.05***	0.01
Community violence							0.03***	0.01	0.03***	0.01
TV watching									-0.01	0.01
Videogame playing									-0.02	0.01
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.22	2881.48 (1670)***	1.05	2720.46 (1664)***	0.59	2278.17 (1661)***	0.57	2268.78 (1660)***	0.52	2217.41 (1658)***
Growth rate	0.12	2251.27 (1670)***	0.11	2224.18 (1664)***	0.09	2152.47 (1661)***	0.09	2151.63 (1660)***	0.09	2145.98 (1658)***
Level-1 error	0.68		0.68		0.67		0.67		0.67	
Proportion of Variance Explained										
Initial status		—		.14		.52		.53		.57
Incremental variance in intercept		—		—		.38		.01		.04
Growth rate		—		.07		.19		.20		.22
Incremental variance in slope		—		—		.12		.01		.02

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 7. Model Estimates for Growth Trajectories of Adolescent Verbal Aggression Using Multiple Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.15***	0.05	0.84***	0.16	1.07***	0.15	1.11***	0.15	1.15***	0.15
Male			0.17	0.09	-0.07	0.09	-0.08	0.09	-0.08	0.09
Black vs. White			0.66**	0.18	0.35*	0.17	0.33	0.17	0.24	0.17
Hispanic vs. White			0.16	0.16	-0.03	0.15	-0.06	0.15	-0.08	0.15
Asian vs. White			-0.10	0.27	-0.02	0.25	0.09	0.25	0.09	0.25
Other vs. White			0.00	0.32	-0.25	0.30	-0.29	0.30	-0.27	0.29
Academic Achievement			0.46***	0.06	0.26***	0.06	0.23***	0.06	0.24***	0.06
Other family living					0.18*	0.09	0.14	0.09	0.13	0.09
Parental monitoring					0.17***	0.05	0.15**	0.05	0.15**	0.04
Parental attitude for fighting					0.26***	0.02	0.24***	0.02	0.23***	0.02
Community violence							0.09***	0.02	0.08***	0.02
TV watching									0.13***	0.03
Videogame playing									0.02	0.03
Model for growth rate										
Mean growth rate	0.11***	0.02	0.06	0.07	0.03	0.07	0.06	0.07	0.05	0.07
Male			0.15**	0.04	0.19***	0.04	0.18***	0.04	0.18***	0.04
Black vs. White			-0.07	0.08	0.00	0.08	-0.03	0.08	-0.03	0.08
Hispanic vs. White			-0.02	0.07	0.02	0.07	-0.01	0.07	-0.01	0.07
Asian vs. White			-0.03	0.12	-0.05	0.12	-0.03	0.12	-0.03	0.12
Other vs. White			0.11	0.15	0.17	0.14	0.13	0.14	0.14	0.14
Academic Achievement			-0.12***	0.03	-0.08**	0.03	-0.09**	0.03	-0.09**	0.03
Other family living					-0.06	0.04	-0.07	0.04	-0.07	0.04
Parental monitoring					-0.02	0.02	-0.03	0.02	-0.03	0.02
Parental attitude for fighting					-0.05***	0.01	-0.06***	0.01	-0.06***	0.01
Community violence							0.03**	0.01	0.03**	0.01
TV watching									0.00	0.01
Videogame playing									0.00	0.02
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.33	2696.62 (1670)***	1.14	2555.15 (1664)***	0.68	2205.37 (1661)***	0.67	2191.73 (1660)***	0.63	2159.64 (1658)***
Growth rate	0.14	2191.67 (1670)***	0.12	2146.87 (1664)***	0.11	2098.03 (1661)***	0.11	2095.28 (1660)***	0.11	2092.84 (1658)***
Level-1 error	0.85		0.85			0.845			0.84	
Proportion of Variance Explained										
Initial status		—		.14		.49		.50		.53
Incremental variance in intercept		—		—		.35		.01		.03
Growth rate		—		.10		.18		.20		.21
Incremental variance in slope		—		—		.08		.02		.01

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 8. Model Estimates for Growth Trajectories of Adolescent Physical Aggression Using Multiple Risk Domains

	Unconditional		Individual Risk		Family Risk		Community Risk		Media Risk	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level										
Mean initial status	1.31***	0.05	0.71***	0.16	0.90***	0.15	0.94***	0.15	1.02***	0.15
Male			0.21*	0.09	-0.02	0.09	-0.04	0.08	-0.12	0.09
Black vs. White			0.92***	0.18	0.61*	0.17	0.58**	0.17	0.47**	0.17
Hispanic vs. White			0.49**	0.16	0.31*	0.15	0.28	0.15	0.26	0.15
Asian vs. White			-0.14	0.27	-0.06	0.25	0.06	0.25	0.09	0.25
Other vs. White			0.61	0.31	0.34	0.29	0.32	0.29	0.30	0.29
Academic Achievement			0.35***	0.06	0.15*	0.06	0.12*	0.06	0.13*	0.06
Other family living					0.25**	0.09	0.21*	0.09	0.20*	0.09
Parental monitoring					0.23***	0.04	0.20***	0.04	0.19***	0.04
Parental attitude for fighting					0.24***	0.02	0.22***	0.02	0.19***	0.02
Community violence							0.10***	0.02	0.09***	0.02
TV watching									0.10**	0.03
Videogame playing									0.16***	0.03
Model for growth rate										
Mean growth rate	-0.05**	0.02	0.04	0.07	0.01	0.07	0.04	0.07	0.02	0.07
Male			0.03	0.04	0.07	0.04	0.07	0.04	0.09*	0.04
Black vs. White			-0.17*	0.08	-0.11	0.08	-0.14	0.08	-0.12	0.08
Hispanic vs. White			-0.11	0.07	-0.07	0.07	-0.10	0.07	-0.10	0.07
Asian vs. White			-0.04	0.12	-0.06	0.12	-0.04	0.12	-0.05	0.12
Other vs. White			-0.11	0.14	-0.05	0.14	-0.09	0.14	-0.09	0.14
Academic Achievement			-0.04	0.03	0.00	0.03	-0.01	0.03	-0.01	0.03
Other family living					-0.06	0.04	-0.07	0.04	-0.07	0.04
Parental monitoring					-0.05*	0.02	-0.06**	0.02	-0.06**	0.02
Parental attitude for fighting					-0.05***	0.01	-0.05***	0.01	-0.05***	0.01
Community violence							0.03**	0.01	0.03***	0.01
TV watching									-0.02	0.01
Videogame playing									-0.04**	0.02
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.32	2749.17 (1670)***	1.15	2618.25 (1664)***	0.70	2263.20 (1661)***	0.68	2258.80 (1660)***	0.60	2198.63 (1658)***
Growth rate	0.12	2202.88 (1670)***	0.12	2190.40 (1664)***	0.11	2125.92 (1661)***	0.10	2125.43 (1660)***	0.10	2114.47 (1658)***
Level-1 error	0.84		0.84		0.84		0.83		0.83	
Proportion of Variance Explained										
Initial status		—		.13		.47		.49		.55
Incremental variance in intercept		—		—		.34		.01		.06
Growth rate		—		.03		.15		.16		.20
Incremental variance in slope		—		—		.11		.02		.04

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 9. Model Estimates for Growth Trajectories of Overall and Physical Aggression of Black Adolescents

	Overall Aggression				Physical Aggression			
	Unconditional		Conditional		Unconditional		Conditional	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*	β	*SE*
Model for initial level								
Mean initial status	1.65***	0.11	1.38***	0.19	1.73***	0.12	1.36***	0.20
Male			0.00	0.21			0.11	0.22
Achievement			0.31*	0.14			0.20	0.16
Other family living			0.45*	0.20			0.53*	0.22
Parental monitoring			0.04	0.11			-0.02	0.12
Parental attitude for fighting			0.32***	0.05			0.31***	0.05
Community violence			0.05	0.05			0.05	0.05
TV watching			0.20**	0.07			0.19**	0.07
Videogame playing			-0.05	0.07			0.01	0.07
Model for growth rate								
Mean growth rate	-0.02	0.05	-0.02	0.08	-0.12*	0.05	-0.05	0.09
Male			0.19*	0.09			0.08	0.10
Achievement			-0.08	0.07			-0.03	0.07
Other family living			-0.16	0.09			-0.18	0.10
Parental monitoring			-0.01	0.05			-0.01	0.06
Parental attitude for fighting			-0.10***	0.02			-0.10***	0.02
Community violence			0.04*	0.02			0.04	0.02
TV watching			-0.04	0.03			-0.05	0.03
Videogame playing			0.04	0.03			0.04	0.03
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	1.88	610.80 (310)***	0.93	469.10 (302)***	1.83	562.56 (310)***	0.93	457.34 (302)***
Growth rate	0.16	420.37 (310)***	0.08	374.61 (302)**	0.17	421.23 (310)***	0.10	388.96 (302)**
Level-1 error	0.73		0.73	0.92		0.92		
Proportion of Variance Explained								
Initial status		—		.51		—		.49
Growth rate		—		.47		—		.40

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 10. Model Estimates for Growth Trajectories of Adolescent Aggression Using a Cumulative Risk Model

	Overall Aggression		Verbal Aggression		Physical Aggression	
Fixed Effect	β	*SE*	β	*SE*	β	*SE*
Model for initial level						
Mean initial status	1.22***	0.04	1.14***	0.04	1.31***	0.04
Cumulative risk	0.42***	0.02	0.41***	0.03	0.43***	0.03
Model for growth rate						
Mean growth rate	0.04*	0.02	0.11***	0.02	-0.05	0.02
Cumulative risk	-0.05***	0.01	-0.04**	0.01	-0.06***	0.01
Random Effect	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)	*Variance Component*	χ^2 (*df*)
Initial status	0.74	2427.39 (1669)***	0.87	2350.93 (1669)***	0.81	2359.58 (1669)***
Growth rate	0.11	2225.94 (1669)***	0.13	2180.56 (1669)***	0.11	2167.32 (1669)***
Level-1 error	0.68		0.85		0.84	
Proportion of Variance Explained						
Initial status		.39		.35		.39
Growth rate		.06		.03		.10

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed)

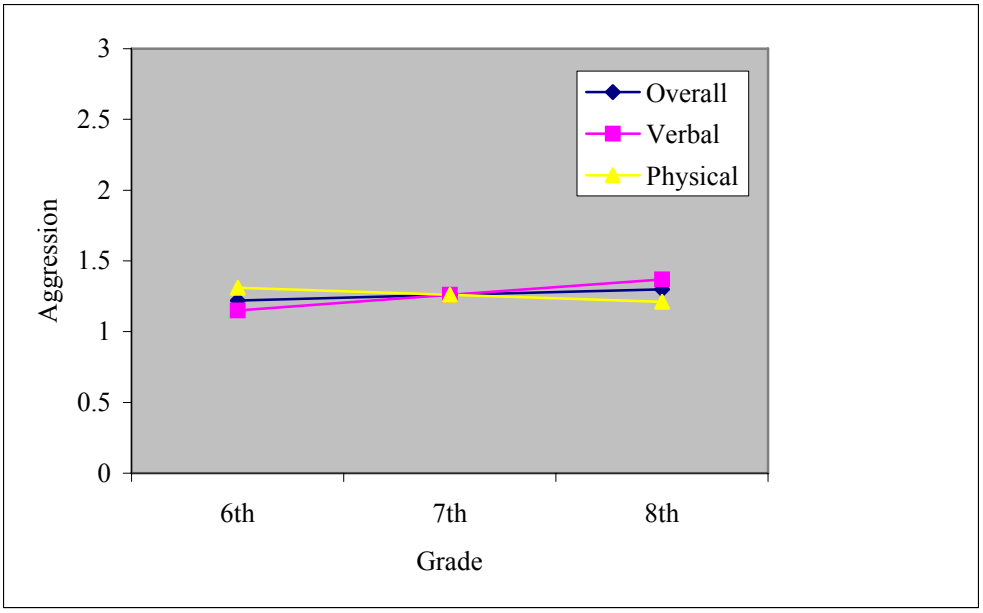

Figure 1. Unconditional growth trajectories of overall, verbal, and physical aggression

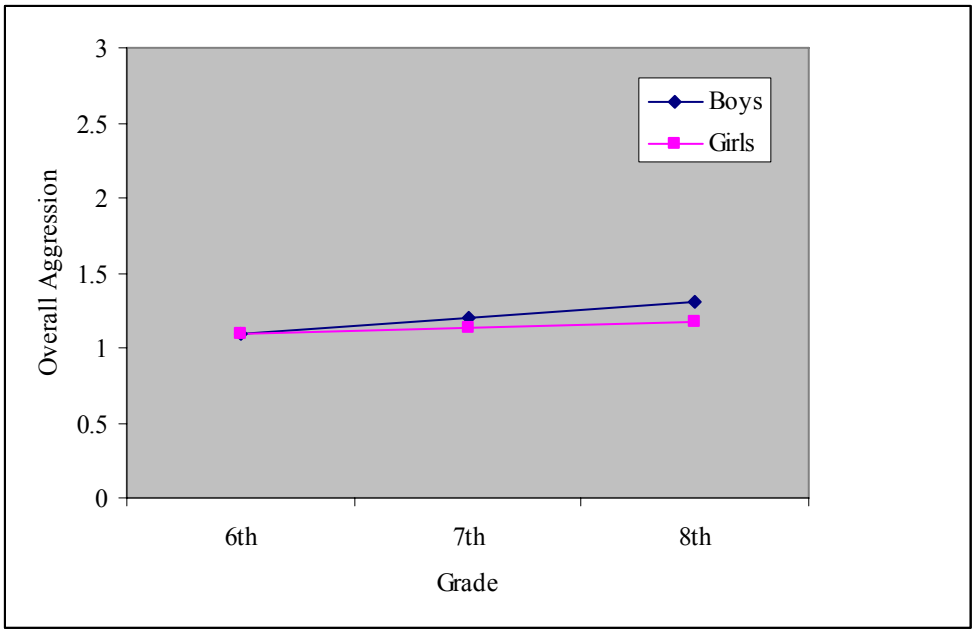

Figure 2. Growth trajectories of overall aggression by sex

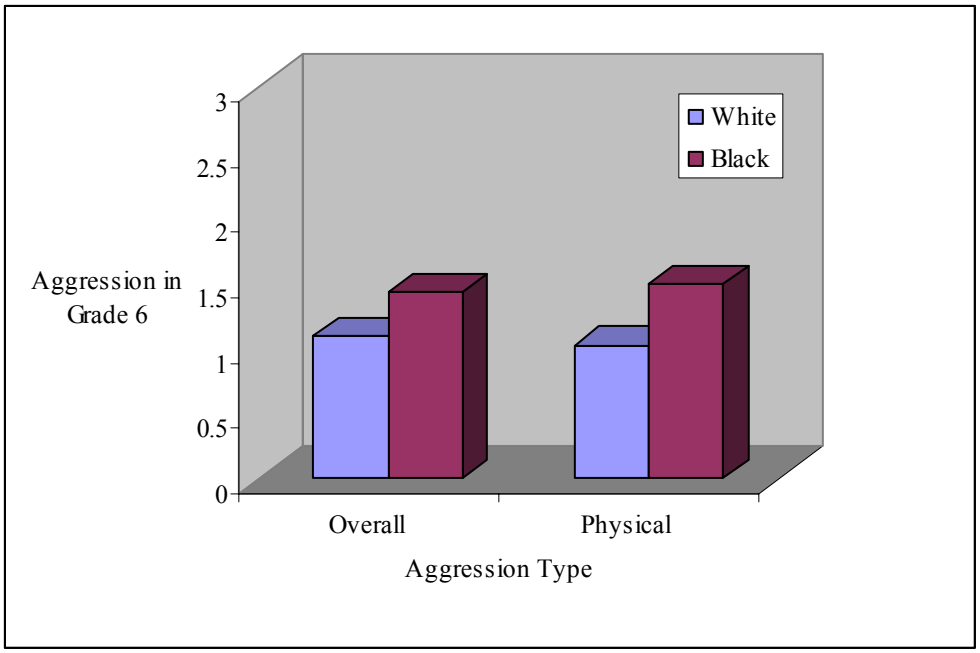

Figure 3. Mean differences in the initial status of overall and physical aggression between White and Black adolescents

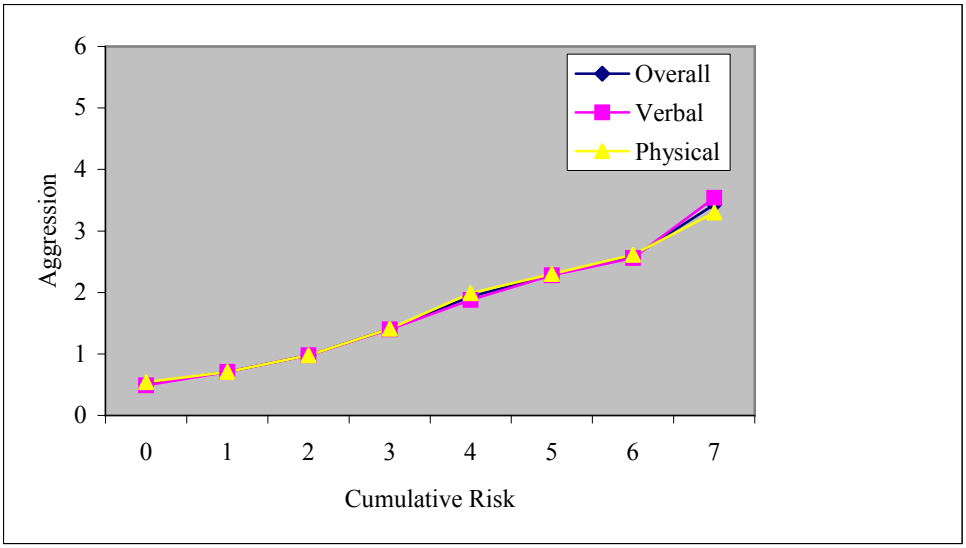

Figure 4. Baseline overall, verbal, and physical aggression by cumulative risk status

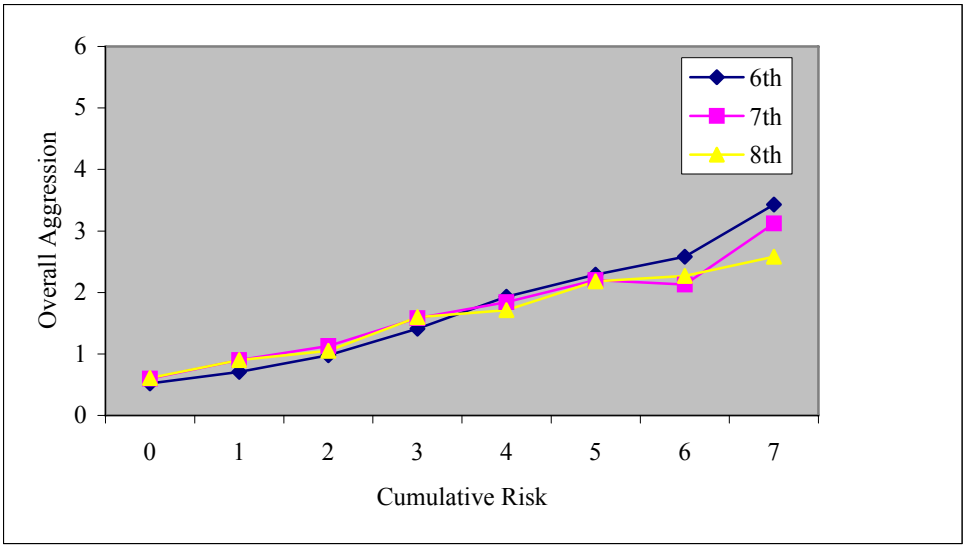

Figure 5. Means of overall aggression from grades 6 to 8 by cumulative risk status

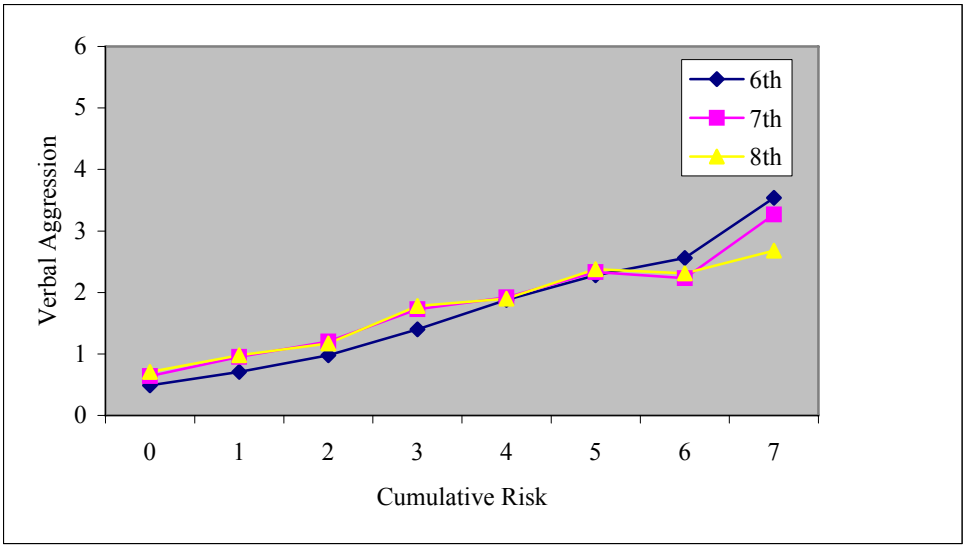

Figure 6. Means of verbal aggression from grades 6 to 8 by cumulative risk status

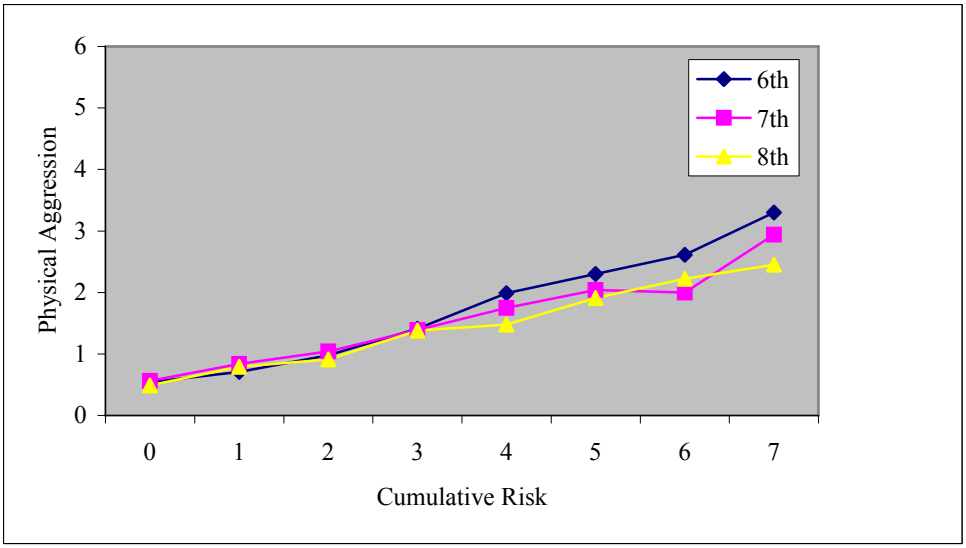

Figure 7. Means of physical aggression from grades 6 to 8 by cumulative risk status

Appendix A

Aggression Scale*

(* *Note*. Anger items were excluded from the original Aggression Scale.)

Please indicate how many times you did each of the following behaviors during the past 7 days.

0 - *0 times*; 1- *1 times*; 2 - *2 times*; 3 - *3 times*; 4 - *4 times*; 5 - *5 times*; 6 - *6 or more times*

Item	Response						
1. I teased students to make them angry.	0	1	2	3	4	5	6
2. I fought back when someone hit me first.	0	1	2	3	4	5	6
3. I said things about other kids to make other students laugh.	0	1	2	3	4	5	6
4. I encouraged other students to fight.	0	1	2	3	4	5	6
5. I pushed or shoved other students.	0	1	2	3	4	5	6
6. I slapped or kicked someone.	0	1	2	3	4	5	6
7. I called other students bad names.	0	1	2	3	4	5	6
8. I threatened to hurt or to hit someone.	0	1	2	3	4	5	6
9. I got into a physical fight because I was angry.	0	1	2	3	4	5	6

Appendix B

Demographics

Question	Response
1. What grade are you in?	6th, 7th, 8th
2. How old are you?	10, 11, 12, 13, 14, 15, 16, 17
3. Are you a boy or girl?	1=Boy, 2=Girl
4. How do you describe yourself?	1=African American, 2=White, 3=Hispanic, 4=Asian, 5=Native American, 6=Other
5. What kinds of grades do you usually get?	1=A-B, 2=B-C, 3=C-D, 4=D-F
6. Parents or guardians you live with most of the time?	1=mother and father, 2=mother and stepfather, 3=father and stepmother, 4=only mother, 5=only father, 6=grandparents, 7=other adults

Appendix C

Parental Monitoring

Item	Response				
1. Do your parents/guardians let you come and go as you please?	never	rarely	sometimes	usually	always
2. When you are away from home, do your parents/guardians know where you are and who you are with?	never	rarely	sometimes	usually	always

Appendix D

Parental Attitude Towards Fighting

What do your parents/guardians tell you about fighting?

Item	Response	
1. If someone hits you, hit them back.	yes	no
2. If someone calls you names, hit them back.	yes	no
3. If someone calls you names, call them names back.	yes	no
4. If someone calls you names, ignore them.	yes	no
5. If someone asks you to fight, hit them first.	yes	no
6. If someone asks you to fight, you should try to talk you way out.	yes	no
7. You should think the problem through, calm yourself, talk out.	yes	no
8. If a student asks to fight, tell a teacher.	yes	no
9. If you can’t solve problem talking, then fight.	yes	no
10. No matter what, fighting is not good.	yes	no

Appendix E

Community Violence

Did you see the following violence in your community during the past year?

Item	Response	
1. Arrest	yes	no
2. Drug deals	yes	no
3. Someone beaten up	yes	no
4. House broken into	yes	no
5. Stabbing	yes	no
6. Shooting	yes	no
7. Gun at home	yes	no
8. Gangs in neighborhood	yes	no
9. Gun pulled	yes	no