Georgia State University
ScholarWorks @ Georgia State University

Psychology Dissertations | Department of Psychology

5-3-2007

Trajectories of Pure and Co-Occurring Internalizing and Externalizing Problems from Age 2 to Age 12: Findings from the NICHD Study of Early Child Care

Kostas Andrea Fanti
Georgia State University

Follow this and additional works at: http://scholarworks.gsu.edu/psych_diss

Recommended Citation
Fanti, Kostas Andrea, "Trajectories of Pure and Co-Occurring Internalizing and Externalizing Problems from Age 2 to Age 12: Findings from the NICHD Study of Early Child Care" (2007). *Psychology Dissertations.* Paper 29.

This Dissertation is brought to you for free and open access by the Department of Psychology at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Psychology Dissertations by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact scholarworks@gsu.edu.

TRAJECTORIES OF PURE AND CO-OCCURRING INTERNALIZING AND EXTERNALIZING PROBLEMS FROM AGE 2 TO AGE 12: FINDINGS FROM THE NICHD STUDY OF EARLY CHILD CARE

by

KOSTAS ANDREA FANTI

Under the Direction of Christopher C. Henrich

ABSTRACT

According to previous research, internalizing and externalizing problems tend to be comorbid or co-occur at different ages in development (Angold, Costello, & Erkanli, 1999). The question that this dissertation addresses is how and why internalizing and externalizing problems, two disorders that represent separate forms of psychopathology, co-occur in children. This is an important question for the developmental psychopathology perspective because an appreciation of the concept of co-occurrence is essential for explaining the development and taxonomy of internalizing and externalizing psychopathology, and for understanding the etiology and course of these symptoms (Achenbach, 1990). Attempts to explain co-occurrence have proposed that co-occurring psychopathology might represent distinct, meaningful syndromes (Angold & Costello, 1992; O'Connor et al., 1998), and in support of this idea, evidence of the existence of pure and co-occurring internalizing and externalizing problems has been found (Keiley et al., 2003). However, no previous study has identified heterogeneous developmental patterns of pure or combined internalizing and externalizing problems within a dynamic framework by taking trajectories of change into account.

This dissertation uses data from the NICHD study of Early Child Care to explore the co-occurrence between internalizing and externalizing problems from age 2 to 12 with the use of Latent Class Growth Analysis. The sample included 1232 children (52% male). Different groups of children exhibiting low/normative, pure internalizing, pure externalizing, and co-occurring internalizing and externalizing problems across the 10 year period were identified. The higher risk groups deviated from the low/normative group in terms of antecedents, SES risk, medical risk, difficult temperament, and home environment. Moreover, children who exhibited pure moderate externalizing problems, and children who exhibited chronic externalizing problems, with and without co-occurring internalizing problems, engaged in more risky behaviors and were more likely to have friends who also engaged in risky behaviors. Furthermore, the pure chronic externalizing group and the groups scoring high on internalizing problems, with and without co-occurring externalizing problems, were more asocial with peers. Finally, children exhibiting chronic co-occurring externalizing and internalizing problems were more excluded by peers in comparison to the rest of the sample's population.

INDEX WORDS: Internalizing problems, Externalizing problems, Co-occurrence, Comorbidity, Latent Class Growth Curve Analysis, Socio-economic-status, Early medical problems, Difficult temperament, Home environment, Cognitive deficiencies, Trajectories

TRAJECTORIES OF PURE AND CO-OCCURRING INTERNALIZING AND EXTERNALIZING PROBLEMS FROM AGE 2 TO AGE 12: FINDINGS FROM THE NICHD STUDY OF EARLY CHILD CARE

by

KOSTAS ANDREA FANTI

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

In the College of Arts and Sciences

Georgia State University

2007

Copyright by
Kostas Andrea Fanti
2007

TRAJECTORIES OF PURE AND CO-OCCURRING INTERNALIZING AND EXTERNALIZING PROBLEMS FROM AGE 2 TO AGE 12: FINDINGS FROM THE NICHD STUDY OF EARLY CHILD CARE

by

KOSTAS ANDREA FANTI

Major Professor: Christopher C. Henrich
Committee: Gabriel P. Kuperminc
Roger Bakeman
Gregory Jurkovic

Electronic Version Approved:

Office of Graduate Studies
College of Arts and Sciences
Georgia State Univeristy
May 2007

Acknowledgements

Thanks to my primary advisor, Christopher Henrich, and to the remainder of my 4-person committee, Gabriel Kuperminc, Roger Bakeman, and Gregory Jurkovic, for their mentorship.

Thanks to Christopher Henrich and Roger Bakeman for their teachings on statistics.

Thanks to Christopher Henrich, Gabriel Kuperminc, Paul Frick, and Eric Vanman for helping me with my research ideas.

Thanks to my lab partner, Kathryn Brookmeyer for her perspective.

Thanks to my wife to be, my family, and friends for their support.

TABLE OF CONTENTS

AKNOWLEDGMENTS…… iv

LIST OF TABLES……. vii

LIST OF FIGURES…… viii

CHAPTER

1 INTRODUCTION…… 1

Theoretical and methodological approach…….. 3

Development of externalizing problems……..... 6

Development of internalizing problems……..……... 10

Co-occurrence between externalizing and internalizing problems …... 12

2 CURRENT STUDY…… 15

Antecedents……. 18

Early adolescence outcomes.…….……. 20

3 METHOD……..…… 21

Participants……..…… 21

Procedures..……. 23

Measures……. 23

4 ANALYSES AND RESULTS……..……. 29

Analyses…….. 29

Results……..... 38

Descriptive statistics…… 39

Externalizing problem trajectories……..…….. 41

Internalizing Problems Trajectories…….…….. 45

Joint occurrence…….……..... 49

Antecedents…….……..... 53

Outcomes…….…… 60

5 DISCUSSION…….…….. 64

Development of externalizing problems……...…….. 64

Development of Internalizing problems……...…….. 67

Developmental pathways of pure and co-occurring problems...…… 68

Demographic differences…… 70

Antecedents related to co-occurrence or their pure counterparts…..….. 71

Outcomes related to pure and co-occurring problems….…… 73

Informing taxonomy...……..... 75

Strengths, Limitations, and Future directions..…… 79

Implications…….……..... 84

Implications for developmental psychopathology……... 88

REFERENCES…….…… 90

List of Tables

Table 1. Means, Standard Deviations (SD), Ranges, and Internal Reliabilities for Externalizing and Internalizing Problems……...……... 40

Table 2. Model Fit Statistics for Externalizing Problems…… 42

Table 3. Unstandardized Growth Factor Parameter Estimates and Standard Errors (SE) for Externalizing Problems…… 44

Table 4. Group break down by Gender and Ethnicity for Externalizing Problems …… 45

Table 5. Model Fit Statistics for Internalizing Problems……. 47

Table 6. Unstandardized Growth Factor Parameter Estimates and Standard Errors (SE) for Internalizing Problems……. 48

Table 7. Group Break Down by Gender and Ethnicity for Internalizing Problems…… 49

Table 8. Initial group Probabilities of Pure and Co-occurring Problems (N = 1223)..... 51

Table 9. Final Probabilities of Pure and Co-occurring Problems (N = 1223)…..……... 51

Table 10. Group Break Down by Gender and Ethnicity for the Final Groups.....…… 54

Table 11. Means and Standard Deviations (SD) of the Study's Variables…… 55

Table 12. Means and 95% Confidence Intervals (CI) for Antecedents Based on the Final Groups (N=1223).....…… 56

Table 13. Multinomial Logistic Regression Analyses Comparing the Higher Risk Groups to the Low-normative Group in terms of Antecedents (N=1223)..…… 57

Table 14. Means (CI) for Outcomes Based on the Final Groups (N=1223)……..… 61

Table 15. ANCOVA analyses Comparing the Higher Risk Groups to the Low-normative Group (N=1223)……... 62

List of Figures

Figure 1. LCGA analysis……...……... 32

Figure 2. Joint occurrence analysis……...…… 37

Figure 3. Quadratic growth model for externalizing problems …… 41

Figure 4. Final LCGA model for externalizing problems……..…… 43

Figure 5. Quadratic growth model for internalizing problems.……. 46

Figure 6. Final LCGA model for internalizing problems.……. 48

Chapter 1 - Introduction

The development of internalizing and externalizing problems is of key interest to psychologists and psychiatrists because these symptoms detrimentally affect a considerable number of children, adolescents, and adults (Anderson, Williams, McGee, & Silva 1987; Caspi, Moffitt, Newman & Silva, 1998; Gilliom & Shaw, 2004). Internalizing problems are intrapersonal in nature and appear in the form of withdrawal, anxiety, fearfulness, and depression, whereas externalizing problems are interpersonal in nature and take the form of hyperactivity, aggression, defiance, and destructive behavior (Achenbach, 1991-1992; Campbell, 1995). Internalizing and externalizing symptoms may develop as early as the second year of life (Gilliom & Shaw, 2004). Once established, as early as childhood, these symptoms tend to be stable across development placing the individual in a developmental pathway of academic difficulties, peer problems, negative interactions with parents, delinquency and other negative outcomes (Coie & Dodge, 1998; Fergusson, Lynksey, & Horwood, 1996; Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003; Kovacs & Devline, 1998; Parker & Asher, 1987; Youngstrom, Findling, & Calabrese, 2003). Furthermore, early emotional and behavioral problems have been found to precede child, adolescent, and adult psychopathology, and therefore it is of great importance to identify children at risk for high and continuous internalizing and externalizing problems early in development (Caspi et al., 1998; Gilliom & Shaw, 2004; Moffitt, 1993).

A question that remains unanswered in the literature is how and why internalizing and externalizing problems, two disorders from different diagnostic classes representing separate forms of psychopathology, co-occur in children (Oland & Shaw, 2005). According to previous research, internalizing and externalizing problems tend to be comorbid at different ages in development, suggesting that co-occurrence is the rule and not the exception for problem

behaviors and emotions (Achenbach, 1993; Angold, Costello, & Erkanli, 1999; Caron & Rutter, 1991; Gilliom & Shaw, 2004; Keiley et al., 2000; Lilienfeld, 2003; Youngstrom, Findling, & Calabrese, 2003). Thus, an appreciation of the concept of co-occurrence is essential for explaining the development and taxonomy of internalizing and externalizing psychopathology, and for understanding the etiology and course of these symptoms (Achenbach, 1990; Angold & Costello, 1993; Caron & Rutter, 1991; Hinshaw, 2002; Lilienfeld, 2003; Loeber & Keenan, 1994; Rutter, 1997).

The present study addresses the co-occurrence question by investigating how individual children deviate from normal development and follow trajectories of pure or co-occurring internalizing and externalizing problems. Furthermore, to understand the expression of pure or co-occurring internalizing and externalizing problems during adolescence, this study examines how the differential trajectories of behavioral and emotional problems are related to early adolescent outcomes, such as delinquency and behaviors with peers. In addition, to understand the processes associated with the different subgroups of individuals, the current study examines how antecedents, including child, family, and environmental and medical risk factors, forecast the development of pure or co-occurring trajectories of behavioral and emotional problems.

The theoretical and methodological approach used by the current study to examine co-occurrence will be discussed first. Information will then be provided on the development of internalizing and externalizing problems because it is essential to understand the development of these symptoms separately in order to better understand their co-development. Finally, the co-occurrence between internalizing and externalizing problems will be addressed.

Theoretical and methodological approach

The present study investigates the development of internalizing and externalizing problems from infancy to early adolescence using developmental psychopathology as a conceptual framework (Cicchetti, 1984; Kuperminc, & Brookmeyer, 2006; Moffitt, 1993; Rutter & Sroufe, 2000; Sroufe & Rutter, 1984). This approach combines questions about developmental change and psychopathology, and therefore integrates research and theories from developmental psychology, such as the methods and approaches used by developmental psychologists to investigate longitudinal change, and research and theories from psychiatry or clinical psychology, such as the classification system used by psychiatrists to identify individual differences in psychopathology (Rutter & Sroufe, 2000; Sroufe & Rutter, 1984). In addition, central to the developmental psychopathology approach is the belief that the study of psychopathology can inform our understanding of normal development and, conversely, that the study of normative development may shed light on the etiology and course of psychopathology (Cicchetti, 1984).

According to Rutter and Sroufe (2000) there are three key issues in developmental psychopathology. The first key issue is the understanding of causal processes and the realization that most mental disorders are not due to single linear causes, but to the complex interplay of multiple genetic and environmental risk and protective factors. Furthermore, based on the same key issue, it is important to take into account individual differences when investigating how causal processes affect the course of disordered behavior. The second key issue is the investigation of processes and mechanisms of development, taking into account that the mechanisms of causation may involve dynamic processes over time, with several routes to the same outcome. The last key issue is the understanding of the link between normal development

and psychopathological development, taking into account variations and individual differences in normative and psychopathological outcomes. Therefore, developmental psychopathology is concerned with individual differences in the origins, course, and outcomes of normative and psychopathological developmental processes (Cicchetti, 1984; Hinshaw, 2002; Kuperminc, & Brookmeyer, 2006; Sroufe, 1997; Sroufe & Rutter, 1984).

Even though the developmental psychopathology approach has advanced the understanding of the development of maladaptive and adaptive behaviors, one of the remaining major research challenges is the idea of co-occurrence (Rutter & Sroufe, 2000). Findings on co-occurrence are important for developmental psychopathology because these findings can have implications for the validity of classification systems and treatment (Angold & Costello, 1993; Keiley et al., 2003; Rutter & Sroufe, 2000). Furthermore, findings on factors related to co-occurrence can have implications for etiological theories, since risk factors associated with one disorder might in fact be risk factors for another disorder (Angold & Costello, 1993; Rutter & Sroufe, 2000).

One of the main reasons behind the limited understanding of co-occurrence is the unavailability of appropriate analytic methods. Based on the previous key issues (Rutter & Sroufe, 2000), to investigate co-occurrence within the developmental psychopathology tradition, analytic methods need to be able to (1) take into account individual differences and possibly identify different classes of children exhibiting either pure or co-occurring psychopathology, (2) investigate both normative and pathological development to understand the link between them, (3) investigate the course of co-occurrence within a dynamic framework by taking trajectories of change into account, and (4) consider the origins and outcomes of co-occurrence. A new analytic method that can take all of these components into account is a person oriented methodology

known by some researchers as Latent Class Growth Analysis (Muthén, 2000; Muthén & Muthén, 2006), and by others as the semiparametric group based trajectory approach (Nagin, 1999; Nagin & Tremblay, 2001). Because this approach investigates heterogeneity in terms of latent classes, it will be referred to as Latent Class Growth Analysis (LCGA).

LCGA can identify heterogeneous trajectories representing latent classes of children by modeling a mixture of distinct multivariate normal distributions. Children within each class have similar growth curve patterns. Therefore, this statistical model allows for the identification of different subgroups of individuals who show homogeneous developmental trajectories of the target behavior (Muthén & Muthén, 2006; Nagin, & Land, 1993). Furthermore, this approach can relate the entire longitudinal course of two behaviors, and therefore provides the capacity for the joint estimation of trajectory models across the entire period of observation (Muthén, 2000; Nagin & Tremblay, 2001).

Hence, LCGA first identifies heterogeneous classes within each behavior of interest based on their distinct developmental courses and then joins these differential trajectories to investigate co-occurrence. Therefore, the first step is the identification of different latent classes for externalizing and internalizing problems, and the second step is to determine which groups of individuals follow trajectories of normative, pure, or co-occurring internalizing and externalizing problems. In addition, identifying heterogeneous classes of individuals is important for the investigation of antecedents and outcomes (Muthén, 2007). Therefore, after the identification of the different latent classes, individual, familial, medical, and environmental antecedents during the first two years of life will be investigated to identify possible factors that might place children at higher risk for exhibiting high pure or combined internalizing and externalizing

problems. In addition, delinquent and peer behavior outcomes at age 12 will be included in the analyses to identify the higher risk groups in terms of early adolescent negative outcomes.

Development of externalizing problems

Before investigating the joint occurrence of internalizing and externalizing problems, it is important to understand the development of the two separately. Externalizing problems appear early in development in the form of physical aggression, temper tantrums, defiant, irritable, and argumentative behaviors, and these behaviors increase in intensity during the second year of life (Campbell, 1995; Caplan, Vespo, Pedersen, & Hay, 1991; Tremblay, 2000). Physical aggression and other externalizing behaviors are often used by toddlers to solve conflicts with peers or playmates, and with the development of cognitive abilities and the skills to regulate emotions, externalizing problems decrease and diminish over the course of development (Bakeman & Brownlee, 1982; Cote, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002; Loeber, Tremblay, Gargon, & Charlebois, 1989; Tremblay, 2000). According to the normative development of externalizing problems, by school entry most children are prosocial and cooperative (Tremblay, 2000).

During the first years of life there are very few gender differences in the rates of behavioral problems (Keenan & Shaw, 1997; Prior, Smart, Sanson, & Oberklaid, 1993). Hitting, biting, and temper tantrums during toddlerhood decrease in frequency after the second year of life for both boys and girls (Park & Slabby, 1983). Furthermore, girls outgrow their tendency to exhibit oppositional and aggressive behavior earlier than boys (Richman, Stevenson, & Graham, 1982), and by about 4 to 5 years of age, gender differences in externalizing problems emerge with boys engaging in more aggressive acts and being more impulsive and proactive (Maccoby & Jacklin, 1980; Smith & Green, 1974). This change in externalizing problems severity has been attributed to girls being more cognitively mature compared to boys (Keenan & Shaw, 1997).

During school entry, boys externalizing problems are 10 times higher for those of girls (Offord, Boyle, & Racine, 1991).

Even though the majority of children follow the normative development of externalizing problems, there is a subgroup of individuals who do not outgrow the temper tantrums and the defiant, irritable and argumentative behavior that characterizes the second year of life, and exhibit chronic externalizing problems (Lahey, Waldman, & McBurnett, 1999; Loeber, Tremblay, Gargon, & Charlebois, 1989; Moffitt, 1993; Patterson, 1995). This group of individuals was identified using samples of boys and has been called the life-course persistent group (Moffitt, 1993; Patterson, 1982). Boys who follow a life-course persistent trajectory of externalizing problems account for only 5 to 7% of the population, but they might be responsible for the majority of crimes committed (Moffitt, 1993; Patterson, 1982).

In addition, studies using the LCGA method to investigate heterogeneity in the course of externalizing problems identified more than two groups of individuals exhibiting chronic, moderate desisting, high desisting, and low externalizing problem trajectories, and those differences have been found as early as the second year of life for both boys and girls (Broidy et al., 2003; Loeber & Hay, 1997; Nagin, Farrington, & Moffitt, 1995; Nagin & Tremblay, 1999; NICHD Early Child Care Research Network, 2004; Tremblay et al., 1999; Shaw et al., 2003). The majority of these studies suggest that there is a group of individuals exhibiting low levels of externalizing problems early in development that declines over time, which is consistent with the normative development of externalizing problems. These studies further suggest that most of the children with moderate or high scores early in development exhibit decreases in externalizing problems after the preschool years. Moreover, a small group of individuals who exhibit chronic externalizing problems across time was identified (Broidy et al., 2003; Cote et al., 2002; Moffitt,

1993; Nagin & Tremblay, 1999). The chronic externalizing problem group represents a minority of the population and follows a high and consistent trajectory of aggression and conduct problems (Broidy et al., 2003; NICHD Early Child Care Research Network, 2004; Shaw et al., 2003). Therefore, the chronic group identified by studies with the use of LCGA might be the same group as the life course persistent group identified by Moffitt (1993) and Patterson (1982).

In terms of gender, research suggests that the developmental course of externalizing problems is similar for boys and girls (NICHD Early Child Care Research Network, 2004). However, girls have been found to exhibit lower mean levels of physical aggression, and girls in the chronic aggression group scored lower than boys in the chronic aggression group (Broidy et al., 2003).

Antecedents influencing the development of externalizing problems

Researchers are increasingly focusing on the development of chronically aggressive individuals and trying to understand why some people become more violent compared to the majority of the population (Coie & Dodge, 1998). The life course persistent group was found to be affected by prenatal and perinatal medical risks, and those problems were found to be related to infant neuropsychological risk (Brennan, Hall, Bor, Najman, & Williams, 2003; Day, Richardson, Goldschmidt, & Cornelius, 2000; Moffitt, 1993; Overpeck & Moss 1991). Neuropsychological deficits can then impair the child's cognitive abilities and can also result in a difficult temperament, and early deficiencies in cognitive functioning and difficult temperament can set an individual to a pathway of exhibiting chronic externalizing problems (Bates, Pettit, Dodge, & Ridge, 1998; Fergusson, Lynksey, & Horwood, 1996; Lynam, Moffitt, & Stouthamer-Loeber, 1993; Moffitt, 1990, 1993).

In addition, the familial context into which a child is born is just as important as the child's temperamental and cognitive characteristics. Socioeconomic status, parental education, and parental marital status at birth were found to be amongst the strongest predictors of later externalizing problems (Ackerman, D'Eramo, Umylny, Schultz, & Izard, 2001; Bradley & Corwyn, 2002). Furthermore, longitudinal studies provided evidence that children at risk for developing early chronic externalizing problems are at higher risk for being born into family adversity, such as negative, low warmth, and hostile parenting (Belsky, Hsieh, & Crnic, 1998; Campbell, Pierce, Belsky, Woodworth, & Crnic, 1996; Moffitt, 1993; Shaw, Owens, Vondra, Keenan, & Winslow, 1996; Spieker, Larson, Lewis, Keller, & Gilchrist, 1999). Moreover, the additive effects of both negative temperamental characteristics and negative parenting were found to maintain and exacerbate externalizing problems (Dodge & Pettit, 2003; Lahey et al., 1999; Moffitt, 1993; Patterson, Capaldi, & Bank, 1991; Patterson, Reid, & Dishion, 1992).

Outcomes associated with the development of externalizing problems

As mentioned, chronically aggressive individuals are highly delinquent and commit the majority of crimes in society (Moffitt, 1993; Patterson, 1982). Studies using the LCGA method have linked the severity of aggression to higher levels of delinquency during adolescence with the chronic group being the more delinquent (Broidy et al., 2003; Nagin & Tremblay, 1999). Individuals exhibiting high rates of externalizing problems also tend to affiliate with delinquent peers during adolescence, which might contribute to their risky behaviors (Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988; Dishion, Andrews, & Crosby, 1995; Fergusson, Lynksey, & Horwood, 1996). In addition, highly aggressive children cannot establish positive relationships with their peers because of their difficult temperament and behavioral problems, and children

exhibiting high externalizing problems are usually rejected by their peers (Moffitt, 1993; Patterson, 1982; Coie, Lochman, Teery, & Hyman, 1992).

Development of internalizing problems

Between ages 1 and 2 internalizing problems appear in the form of withdrawal, anxiety, and sad affect (Campbell, 1995). Internalizing problems gradually increase after the age of two and remain relatively common across the life span (Cantwell & Baker, 1989; Kaslow, Brown, & Mee, 1994; Vasey, Crnic, & Carter, 1994). Improvements in cognitive abilities enable the child to self-reflect and to remember and anticipate negative or depressive events. Because of this, cognitive maturation has been related to normative increases in internalizing problems (Kaslow, Brown, & Mee, 1994; Kovacs & Devline, 1998; Vasey, Crnic, & Carter, 1994). During the first years of life there are few gender differences in the rates of emotional problems (Keenan & Shaw, 1997; Offord et al., 1991; Prior, Smart, Sanson, & Oberklaid, 1993). However, during the transition to adolescence, girls show more severe and increase rates of internalizing problems compared to boys (Angold & Rutter, 1992; Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Keiley et al., 2003). Furthermore, girls are twice as likely to exhibit anxiety and depression during adolescence (Youngstrom et al., 2003).

Similar to the chronic externalizing group, a high risk group that exhibits internalizing problems early in development has been identified, and epidemiological studies suggest prevalence rates of 4 to 5% for this group during childhood (Harrington, 1994; Rutter, 1986) and 5 to 22% during adolescence (Brooks-Gunn & Petersen, 1991; Verhulst, 1995). Moreover, evidence suggests that there is a group of children exhibiting high internalizing problems continuously from childhood to adolescence (Duggal, Carlson, Sroufe, & Egeland, 2001). Unfortunately, compared to the externalizing problems literature, little is known about the

development of internalizing problems early in life (Keiley et al., 2000), and no previous study has used the LCGA method to investigate the development of internalizing problems.

Antecedents influencing the development of internalizing problems

Environmental risk factors, such as low familial socio-economic status, have been shown to be associated with increased levels of internalizing symptoms (McLeod & Shanahan, 1996). Furthermore, exposure to a negative familial context has been associated to a higher risk for exhibiting continuing internalizing problems across development (Duggal, Carlson, Sroufe, & Egeland, 2001). Additionally, as with the development of externalizing problems, negative cognitive processes, irritability and difficult temperament have been found to be related to the development of internalizing problems (Bates et al., 1998; Cicchetti & Toth, 1998; McCauley, Mitchell, Burke, & Moss, 1988; Rothbart & Bates, 1998; Rubin & Mills, 1991; Turner & Cole, 1994), and the additive effects of temperamental difficulties and unsupportive caregiver environment were found to be the most influential for high rates of internalizing problems (Cicchetti & Toth, 1998; Rubin & Mills, 1991).

Outcomes associated with the development of internalizing problems

Individuals exhibiting internalizing problems are often unable to form good peer relationships and they usually act negatively with peers (Hogue & Steinberg, 1995; Oland & Shaw, 2005). Furthermore, children and adolescents exhibiting high internalizing problems remain distant from peers and are more likely to engage in isolative behaviors and social withdrawal (Coie & Dodge, 1998). Because of these isolated behaviors, children who exhibit internalizing problems do not affiliate with delinquent peers, and therefore they are at lower risk for exhibiting risky behaviors (Oland & Shaw, 2005). This finding lead researchers to suggest that anxiety and depression in the absence of externalizing problems may serve as a protective

factor against later externalizing problems, for being affiliated with delinquent peers, and for engaging in risky behaviors (Fite, Colder, & O' Connor, 2006; Ialongo et al., 1996).

Co-occurrence between externalizing and internalizing problems

It has been noted that different psychopathological syndromes tend to be positively correlated with one another, and individuals who are high in one syndrome tend to score at average or high levels in other symptoms as well (e.g. Achenbach, Conners, Quay, Verhulst, & Howell, 1989). These findings suggest that comorbidity between different syndromes is highly probable. Furthermore, epidemiological studies provided evidence that internalizing and externalizing problems tend to co-occur at different ages in development (Achenbach, 1993; Angold, Costello, & Erkanli, 1999; Caron & Rutter, 1991; Gilliom & Shaw, 2004; Keiley et al., 2000; Lilienfeld, 2003; Youngstrom, Findling, & Calabrese, 2003). In addition, studies using latent growth modeling suggest that individuals who score continually high or increase over time in either internalizing or externalizing problems also tend to remain elevated or to increase in the other domain (Gilliom & Shaw, 2004; Keiley et al., 2000). This finding indicates that there is possibly a group of individuals who score continually high on both internalizing and externalizing problems.

Furthermore, in trying to explain co-occurrence, it has been proposed that co-occurring psychopathology might represent distinct, meaningful syndromes, and that co-occurrence can be regarded as a single diagnostic entity (Angold & Costello, 1992; Lilienfeld, 2003; O'Connor et al., 1998). In support of this idea, evidence of the existence of pure internalizing and externalizing problems and co-occurring internalizing and externalizing problems has been provided by previous research using confirmatory factor analysis (Keiley et al., 2003; Reitz, Dekovic, & Meijer, 2005) and clinical cutoff scores (Epkins, 2000; Evans & Frank, 2004;

Youngstrom, Findling, & Calabrese, 2003). Based on these findings, the present study expects to identify children at risk for pure externalizing problems, pure internalizing problems, and co-occurring internalizing and externalizing problems.

Additionally, it is possible that one disorder increases the risk for the other, and therefore internalizing disorders might play a causal role in the development of externalizing disorders, and externalizing disorders in the development of internalizing disorders (Lilienfeld, 2003). For example, externalizing problems might result in social failures, such as peer rejection, which might result in the expression of co-occurring internalizing problems (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999; Keiley et al., 2003; Patterson & Stoolmiller, 1991). Furthermore, feelings of personal distress, which are related to internalizing problems, may result in the expression of co-occurring externalizing problems (Lemerise & Arsenio, 2000). Therefore, the co-occurrence between internalizing and externalizing problems may result from a cycle of reciprocal causation between these problems (Lilienfeld, 2003; Oland & Shaw, 2005).

Antecedents and co-occurrence

Even though co-occurrence can be thought of as a distinct syndrome, shared environmental, individual, and genetic risk factors have been proposed to account for the presence of co-occurring disorders (Angold & Costello, 1993; Klein & Riso, 1993; Lilienfeld, 2003; O'Connor et al., 1998). Therefore, internalizing and externalizing disorders may be due to the same underlying causal factors, and these common features can distinguish children exhibiting internalizing and externalizing disorders from children exhibiting normative levels of these disorders (Klein & Riso, 1993; Lilienfeld, 2003; Rutter, 1997). Furthermore, these common features could also account for co-occurring internalizing and externalizing problems because co-occurrence might be the result of a greater number or heightened levels of risk

factors compared to pure internalizing or externalizing problems (Ge, Best, Conger, & Simons, 1996; Keiley et al., 2003; Klein & Riso, 1993; Lilienfeld, 2003; Rutter, 1997).

As shown in the previous sections, both internalizing and externalizing problems are affected by the family's socio-economic status, difficult temperament, negative parenting, and cognitive deficiencies, and therefore these factors represent common features characterizing both internalizing and externalizing problems. These common variables could account for the co-occurrence between the two symptoms, with the co-occurrence between internalizing and externalizing problems being represented by these overlapping risk factors and causal processes (Klein & Riso, 1993; Rutter, 1997). Research that tested this claim found that pure and co-occurring internalizing and externalizing problems are affected by similar developmental processes, although children with co-occurring internalizing and externalizing problems were found to differ from pure internalizing and externalizing problems in that they experienced the highest level of risk factors (Epkins, 2000; Ge, Best, Conger, & Simons, 1996; Keiley et al., 2003; Lilienfeld, 2003; Milan, Pinderhughes, & The Conduct Problems Prevention Research Group, 2006; Renouf, Kovacs, & Mukerji, 1997). More specifically, longitudinal studies suggest that children with co-occurring compared to pure internalizing and externalizing problems experience more disadvantaged familial environment in terms of socio-economic-status (SES), have higher levels of difficult temperament, and experience higher levels of negative parenting, such as harsh discipline, hostility, and low warmth and nurturing parenting (Keiley et al., 2003; Ge et al., 1996).

Outcomes and co-occurrence

In terms of outcomes, previous research has suggested that co-occurrence may be related to the severity of psychopathology, and that individuals with co-occurring problems may be

more functionally impaired and have more maladaptive developmental outcomes compared to cases with pure internalizing or externalizing problems (Kovacs, 1997; Nottleman & Jensen, 1995; Oland & Shaw, 2005). More specifically, children with co-occurring internalizing and externalizing problems were found to face more negative developmental outcomes, in terms of peer relationships and delinquency, when compared to children with pure externalizing or internalizing problems (Loeber & Keenan, 1994; Miller-Johnson, Lochman, Coie, Terry, & Hyman, 1998; Newman, Moffitt, Caspi, & Silva, 1998; Oland & Shaw, 2005; Rudolph, Hammen, & Burge, 1994). Furthermore, adolescents with co-occurring internalizing and externalizing symptoms are more likely to affiliate with friends who are involved with delinquent acts and risky behaviors (Talbott & Flemming, 2003). Therefore, children exhibiting co-occurring internalizing and externalizing problems are expected to be at higher risk for acting negatively with peers, engaging in risky behaviors, and having friends who engage in risky behaviors.

Chapter 2 - Current study

The developmental psychopathology framework has been incorporated to investigate the development of emotional and behavioral problems. This framework conceives of development as an active dynamic process and is concerned with the time course of psychopathology for different groups of individuals (Cicchetti, 1984; Cicchetti & Rogosch, 1996; Kuperminc & Brookmeyer, 2006; Rutter & Sroufe, 2000; Sroufe & Rutter, 1984). Following the developmental psychopathology perspective, the current study investigates how individual children deviate from normal development and follow trajectories of pure internalizing problems, pure externalizing problems, or co-occurring internalizing and externalizing problems from age 2 to 12 within a

person centered framework (Bergman & Magnusson, 1997; Hinshaw, 2002; Nagin & Tremblay, 1999, 2001; Richters, 1997).

It is imperative to initiate the investigation of the development of behavioral and emotional problems during infancy because the identification of children at risk for high and continuous internalizing and externalizing problems early in development is important for determining the onset and course of psychopathology (Gilliom & Shaw, 2004; Hill, 2002; Hinshaw, 2002; Moffitt, 1993). Additionally, the use of a person centered methodology to investigate the differential trajectories of internalizing and externalizing problems is important because these methods enable researchers to identify subgroups of individuals exhibiting psychopathology (Bergman & Magnusson, 1997; Hinshaw, 2002; Nagin & Tremblay, 1999, 2001; Richters, 1997). The LCGA method estimates growth curves for each individual, and then assigns each individual into a trajectory group (Muthen & Muthen, 2006; Nagin, 1999). In addition, because an individual's problem behaviors and emotions might increase or decrease over time in a non-linear fashion and because nine data points are available in the data used for this study, a quadratic growth curve was included (e.g. Broidy et al., 2003; Shaw et al., 2003).

Moreover, the focus is on both pure and co-occurring internalizing and externalizing problems because the ability to identify subgroups of individuals in different trajectories of distinct or combined internalizing and externalizing problems may lead to changes in how childhood psychological problems are classified (Achenbach, 1993; Keiley et al., 2003; Oland & Shaw, 2005; Sroufe, 1997). Within these groups, children exhibiting normative, pure externalizing problems, pure internalizing problems, and chronic co-occurring problems are expected to be identified. The identification of these groups might suggest that children in the life-course persistent group (Moffitt, 1993), are actually a group of individuals exhibiting severe

externalizing problems who can be differentiated based on the levels of internalizing problems they exhibit. The same is true for the chronic internalizing problem group (Duggal, Carlson, Sroufe, & Egeland, 2001) because findings are expected to suggest that individuals exhibiting chronic internalizing problems can be differentiated based on the levels of externalizing problems they exhibit. The following paragraphs present the hypotheses for the development of internalizing and externalizing problems separately, and for the development of distinct and combined internalizing and externalizing problems.

Hypothesis: Developmental trajectories of externalizing and internalizing problems

For both externalizing and internalizing problems, groups of children who exhibit normative growth as well as non-normative growth are expected to be identified. The groups of children representing the majority of the sample's population and who also follow a course similar to the normative growth described by previous research will be considered to belong in low or normative risk groups (Krol, De Bruyn, & Van Den Bercken, 1995). The groups scoring higher than the rest of the sample's population and who also represent a minority of the sample will be considered to be at risk groups. For both internalizing and externalizing problems the higher risk group is expected to be the group scoring continually high on each of these symptoms. These groups are expected to account for a minority of the sample's population as indicated by previous research (Duggal, Carlson, Sroufe, & Egeland, 2001; Moffitt, 1993). Furthermore, groups exhibiting moderate levels of externalizing and internalizing problems are expected to be identified.

Hypothesis: Co-occurring trajectories of internalizing and externalizing problems

After testing the individual trajectories of externalizing and internalizing problems, the investigation will proceed to test whether internalizing and externalizing problems tend to co-

occur. A high risk group exhibiting chronic co-occurring internalizing and externalizing problems, and high risk groups exhibiting pure externalizing and pure internalizing problems are hypothesized to be identified. The majority of children are expected to be identified in the low-normative internalizing and externalizing problems groups forming a low risk group. In comparison to the higher risk groups, the low-normative group is expected to display relatively low levels of problem behaviors and emotions across time. Additionally, groups exhibiting moderate co-occurring problems, and pure moderate externalizing and internalizing problems are expected to be identified.

Antecedents

Another main focus of the developmental psychopathology perspective has to do with the origins of psychopathology (Cicchetti, 1984; Kuperminc & Brookmeyer, 2006; Rutter & Sroufe, 2000). The antecedent environmental and individual factors may help to differentiate between normative, pure, and co-occurring internalizing and externalizing problems (Angold & Costello, 1993). Furthermore, linking antecedents to psychopathology is very important because it has the power to inform early interventions (Keiley et al., 2000; Gilliom & Shaw, 2004).

Initially, all the high risk groups will be compared to the low-normative group (Achenbach, Conners, Quay, Verhulst, & Howell, 1989) and specific comparisons between the chronic co-occurring group and the pure problem groups will be conduced. Of specific interest are the children exhibiting co-occurring chronic externalizing and internalizing problems because these children are at higher risk for being affected by environmental and individual risk factors in comparison to the pure problem groups (Keiley et al., 2003; Ge et al., 1996).

Previous research has suggested the importance of investigating how child characteristics and environmental factors influence developmental processes (e.g. Lansford et al., 2006), and the

present study investigates how early difficult temperament, positive home environment, and cognitive functioning, controlling for demographics, familial SES and prenatal and perinatal medical problems, influence the developmental trajectories of pure and co-occurring internalizing and externalizing problems. The early medical problems risk index and the family's SES risk are included as control variables. Those variables are seen as general stressors that might place an individual in a trajectory of behavioral and emotional problems, with the more risks being related to the chronic co-occurring problems group (Keiley et al., 2003). In addition, gender is included as a control variable because males and females differ in the continuity and change of behavioral and emotional problems (Broidy et al., 2003; Keenan & Shaw, 1997). Finally, ethnicity is included as a control variable because youth from minority and majority cultures have been found to differ in the levels of internalizing and externalizing problems they exhibit (e.g. Dodge, Pettit & Bates, 1994; Garisson et al., 1990; Kuperminc, Blatt, Shahar, Henrich, and Leadbeater, 2004; Nottleman & Jensen, 1995).

Hypotheses:

Studies have linked early temperament, cognitive abilities, and the familial environment created by caregivers to pure and co-occurring internalizing and externalizing problems (Epkins, 2000; Ge, Best, Conger, & Simons, 1996; Keiley et al., 2003; Lilienfeld, 2003; Milan et al., 2006; Renouf, Kovacs, & Mukerji, 1997). Early severe deficiencies in cognitive functioning, difficult temperament, and negative familial environment are expected to set a child on the course of a pathway exhibiting chronic externalizing and internalizing problems from infancy up to early adolescence. Children in the pure internalizing and externalizing groups are expected to experience milder forms of negative familial environment, cognitive dysfunction, and difficult temperament. Furthermore, early difficult temperament is expected to be more strongly related to

membership in the pure externalizing group compared to the pure internalizing group (Rothbard & Bates, 1998). In addition, it is hypothesized that children who score low on difficult temperament, who come from a positive family environment, and who have normal cognitive functioning will belong in the low-normative trajectory group.

Early adolescence outcomes

Finally, the investigation proceeded to analyze how the differential trajectory groups are related to children's behaviors with peers and delinquency during early adolescence. According to the developmental psychopathology approach, following a course of negative developmental pathways, such as chronic internalizing and externalizing problems, can be associated with an increased likelihood of later failures (Sroufe, 1997). Of specific interest are the individuals exhibiting co-occurring chronic externalizing and chronic internalizing problems because these children are more prone to maladjustment, such as delinquency and negative behaviors with peers (Oland & Shaw, 2005).

Hypotheses:

Membership in the different pure or co-occurring classes is expected to have different early adolescent consequences. Children in the chronic co-occurring group compared to children in the pure behavioral and emotional problem groups are expected to show more negative peer behaviors, to be more delinquent during early adolescence, and to socialize with more deviant peers (Kovacs, 1997; Nottleman & Jensen, 1995; Oland & Shaw, 2005). Therefore, the severity of early adolescence outcomes can also distinguish between children who follow trajectories of co-occurring internalizing and externalizing problems from those who follow trajectories of pure externalizing and internalizing problems. Furthermore, if the hypotheses are supported, the combination of high internalizing and externalizing problems might act as a risk factor or as a

precursor of the most serious delinquency during adolescence and of exhibiting the worse problem behaviors with peers. In addition, children in the pure externalizing problems group are expected to be more at risk to exhibit early adolescence delinquency and to be associated with deviant peers compared to the pure internalizing problems group. Finally, the normative groups are expected to be the least delinquent and to engage in positive behaviors with peers.

In sum, children representing the minority of the sample are expected to be identified in the high risk groups, including the co-occurring problems group, the pure internalizing group, and the pure externalizing group. Children representing the majority of the sample are expected to be identified in the low-normative problem groups. The identification of these subgroups of individuals in different trajectories of distinct or combined internalizing and externalizing problems may have important implications for the taxonomy of problem behaviors and emotions (Achenbach, 1993; Keiley et al., 2003; Oland & Shaw, 2005; Rutter, 1997; Sroufe, 1997). Furthermore, the findings may relate the severity of individual and familial antecedent factors to individuals who are at higher or lower risk for exhibiting pure or co-occurring problem behaviors and emotions. Finally, the investigation expects to identify outcomes that might characterize individuals who follow chronic or moderate levels of problem behaviors and emotions.

Chapter 3 - Methods

Participants

The present study used data from the NICHD Study of Early Child-Care. Participants were recruited from different hospitals across10 locations in the United States. A total of 8,986 women gave birth during the sampling period (January of 1991 and November of 1991) across the different locations, and 60% (5,416) of those women agreed to be conducted for a telephone interview. 56% (3,015) of the women who agreed to participate were selected based on

conditional random sampling. The conditional random sampling procedure was used to assure that the sample was representative of single mothers, ethnic minority, and low maternal education. From this sample participants were excluded if (a) mothers were younger than 18 at the time of the child's birth, (b) families were planning to move before the completion of the study, (c) children were born with disabilities or remained in the hospital more than seven days postpartum, and (d) mothers could not communicate sufficiently in English (http://secc.rti.org). Because of these criteria the NICHD sample might represent a lower risk group. However, participants were recruited to ensure demographic diversity in terms of financial status, ethnicity, maternal education, and maternal marital status. 1,525 families were selected as eligible, but only 1,364 completed the home interview when the infant was 1 month old, and these families comprised the final sample of the study. Therefore, 161 families from the original sample did not participate in the study. The study's final sample was diverse in terms of gender (53% male), minorities (24% were minorities), maternal education (11% of the mothers had not completed high school), and marital status (14% were single). The average family income was 3.6 times the poverty threshold. The final sample was similar to the original sample (1,525) in terms of maternal education, percentage in different ethnic groups, and presence of a husband/partner in the household (NICHD Early Child Care Research Network, 2004).

The trajectory analyses for the current study were based on 1232 children (52% male) whose mothers completed the Child Behavior Check List (CBCL) at least two times out of nine. The sample used for the current study was diverse in terms of ethnicity, 77.5% were White, 6% were of Hispanic descent, 11.7% were African American, 1.3% were Asian, and 3.5% represented other minority groups. A dichotomous variable representing the majority group (77.5%) and the minority groups (22.5%) was created to be included in the analysis as a control

variable. Moreover, 70% of the sample's population reported that their income was above the poverty threshold with a mean annual income of $67,310; 20.4% scored below the poverty threshold at some point during data collection but not continuously with a mean annual income of $25,362; 9.6% scored below the poverty threshold continuously during data collection with a mean annual income of $12,641. Furthermore, 10% of the mothers had not completed high school and 21% were single.

Procedures

Data were collected from birth to age 12. The NICHD study used multiple informants, including mothers, fathers, other caregivers, teachers, the study's children, and the children's peers. Furthermore, the NICHD study used multiple methods, including observations, interviews, and surveys. In the present study interviews with the mothers which took place during home visits were used for information in terms of the child's gender, ethnicity, the family's socio-economic-status (SES) risk index, and the medical risk index. Mother reports were used to construct the trajectories of externalizing and internalizing problems. Antecedents were based on interviews, assessments, self-reports, and observations. Early adolescent outcomes were based on questionnaires completed by teachers, mothers, the study's children, and friends of the study's children. Additional details on the procedures for data collection and instruments used are documented in the NICHD Study of Early Child-Care Manuals of Operation (http://secc.rti.org).

Measures

Mother's ratings of externalizing and internalizing problems. Mothers rated participants' externalizing and internalizing problems at 2, 3, 4.5, 6, 7, 9, 10, 11, and 12 years of age with the Child Behavior Checklist (CBCL; Achenbach, 1991a, 1992). The child's age was chosen as the unit of analysis because the assessments were a good representation of children's age. For

example, the CBCL data were collected from all children when the children were exactly 24 months of age. There are two versions of the CBCL: the preschool version for children ages 2-3 which includes 99 items and the school-age version for children ages 4-18 which includes 113 items. Both versions measure internalizing and externalizing problems, although some items vary to capture developmental changes. For the present study items that appear on both versions of the CBCL were used to maximize comparability over time, following previous research (Gilliom & Shaw, 2004). Nine items were used to measure externalizing problems ("Can't sit still, restless, or hyperactive," "Cruel to animals," "Destroys his own things," "Destroys things belonging to his family or others," "Disobedient," "Doesn't seem to feel guilty after misbehaving," "Gets in many fights," "Physically attacks people," and "Temper tantrums or hot tempered"). Six items were used to measure internalizing problems ("Too fearful or anxious," "Self-conscious or easily embarrassed," "Shy or timid," "Unhappy, sad, or depressed," "Withdrawn, doesn't get involved with others," and "Worries"). Mothers rated how descriptive each item was of the child's usual behavior now or within the past 6 months on a three-point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true), and raw sum scores were used in the study's analysis. The CBCL has been used extensively for research with children and adolescents, and both externalizing and internalizing subscales have shown adequate internal consistency and reliability. The Cronbach's alphas for externalizing problems ranged from .73 to .79, and for internalizing problems from .58 to .70 for the current study.

Risk indexes

Items indicating early familial SES and medical risk were dichotomized into 0 (no risk) or 1 (risk). The items with a score of 1 were summed to indicate an overall risk score. Data on all

items were collected before 24 months of age, and therefore they predated the measures of externalizing and internalizing problems used in the trajectory analyses.

Prenatal and postnatal medical risks index. Interviews with the mother during the first and sixth month after birth were used to establish any health problems the mother had during pregnancy and any perinatal infant health problems during the first and sixth month of age. Infant health problems included: ear infection, number of medical visits, injuries, and serious illnesses or disabilities that can possibly affect the study child's development. Furthermore, mothers reported whether they smoked during and after pregnancy and whether they or the infants were exposed to smoking by others (passive smoking). Smoking by the mother or others was included as a risk factor because the respiratory health of young children is affected adversely by exposure to environmental tobacco smoke, especially during pregnancy and the first year of life (Overpeck & Moss 1991). A score of one was given if any perinatal or birth complications were reported by the mother, and those scores were added to the medical risk index. The lowest score was zero and the highest possible score was 6.

Familial SES Risk index. A socioeconomic risk index was created reflecting mothers' reports of family finances, maternal marital status, and maternal education (Henrich, Schwab-Stone, Fanti, Jones, & Ruchkin, 2004). According to research, these variables are each risk factors for both internalizing and externalizing problems (e.g. Anderson et al., 1989). Mothers reported the family's income from the first month to 24 months, and an income-to-needs ratio was calculated from the U.S. Census Bureau tables as the ratio of family income to the appropriate poverty threshold for each household size and number of children under 18. The scores were averaged from 1 to 24 months, and families below the poverty threshold received a score of one. In addition, during a home interview after the study's child was born, mothers were

asked whether they were married and if/or the father was living with them in the same household. During the same interview, mothers also reported their educational level. A score of one was given if the mother reported a low educational level (lower than high school) or if the mother was a single parent. The scores on the SES index ranged from 0 to 4.

Antecedents

Three antecedents were included in the present study - child temperament, child cognitive functioning, and familial environment. All antecedents were collected before 24 months and therefore predated the measures of externalizing and internalizing problems used in the trajectory analyses.

Early difficult temperament. Temperament was assessed during the first and sixth month of age with the Early Infant Temperament Questionnaire (EITQ; Care & McDevitt, 1978; Medoff-Cooper, Carey & McDevitt, 1993). At the one- and six-month home visit mothers were asked to respond to 38 items (rated on a one- to six-point scale from "almost never" to "almost always"). All items were developmentally appropriate for young infants. The items provide scores on five subscales: activity, adaptability, approach, mood, and intensity. Furthermore, the combination of the items in each scale is a good representation of an overall temperament scale. The stability from 1 to 6 months was good, $r = .77$, $p < .001$, and therefore an average difficult temperament factor based on both assessment periods was created. The difficult temperament scale used for the current study was the average score of all the items from the first and sixth month collection. Internal consistency coefficients for the final difficult temperament scale was .69.

Cognitive developmental status. The revised Bayley (BSID-II; Bayley, 1993) was administered at 15 and 24 months to measure the child's early cognitive functioning. The Bayley

Mental Development Index (MDI) is the most widely used measure of cognitive developmental status for children in the first two years of life. It assesses memory, learning, and problem solving; sensory perceptual acuity and discriminations; early verbal communication; and the ability to form generalizations and classifications. Correlation of this instrument with the Stanford-Binet IQ at 24, 27, and 30 months is reported at .57. The overall standardized score was based on the average of the 15 month assessment and the 24 month assessment. This variable was used as an indicator for the child's early cognitive functioning. The stability from 15 to 24 months was good, $r = .80$, $p < .001$.

Family environment. The quality and quantity of the social and physical resources and of support and stimulation in the child's home environment was assessed using the HOME Inventory Infant/Toddler version (Bradley, Mundfrom, Whiteside, Casey, & Barrett, 1994; Caldwell & Bradley, 1984) during 6 and 15 months. The Infant/Toddler version of the Inventory is aimed for use during infancy (birth to age three). The HOME is a semistructured interview and observational procedure designed to describe the stimulation and responsiveness of mothers, their involvement with and acceptance of their children, the availability of play and learning materials, and the organization and variety of the physical environment (Caldwell & Bradley, 1984). An example of an interview item is: the family has a fairly regular and predictable daily schedule for the child, and an example of an observational item is: the house has at least one full shelf of books. Each item is scored in a binary fashion (yes/no), and the information used to score those items is obtained during the course of the home visit by means of observation and parent semi-structured interview. The HOME provides an appraisal of the child's overall "home life" and higher HOME scores indicate more enriched and positive home environments. For the present study the subscales were added together to get an overall variable for the sixth month

period and an overall variable for the fifteenth month period. The stability from 6 to 15 months was good, $r = .72$, $p < .001$, and therefore the 6 and 15 month overall variables were averaged to reflect a positive home environment. The internal consistency coefficient for the final composite scale was $\alpha = .77$.

Outcome measures at Sixth grade:

Risky behavior. The Risky Behavior Protocol (Conger & Elder, 1994) questionnaire has three sections completed by the mother, the study child, and a friend of the study's child. Mothers completed a 30-item questionnaire. The study's children and their friends each completed 38 identical items that measure: "things your friends do" (19 items), and "things you do" (19 items). The questions ask whether the child or friend experiments with weapons, cigarettes, alcohol, or drugs. One total risk taking score for the children was created based on the mother reports. The child self reports and the friend reports resulted in a variable for delinquency committed by friends and another variable for delinquency committed by the child. The Cronbach's alpha for the mother reported overall risk taking score was .71, for the overall risk taking score committed by the child was .73, and for the overall risk taking score committed by friends was .82.

Child Behavior with Peers at grade 6. The Child Behavior Scale (Ladd & Profilet, 1996; Kochenderfer & Ladd, 1996) was used to measure the children's peer-related behaviors and was completed by mothers and teachers. It consists of 37 items measuring aggression, prosocial behavior with peers, asocial behavior with peers, exclusion by peers, bullying, and victimization. Children's behaviors with peers were rated on a 3-point scale (0 = not true, 1 = sometimes true, 2 = often true). The two scales, used in this study based on the combined score between the mother and teacher reports, are *asocial* with peers, e.g. talking to peers (10 items, $\alpha = .87$), and *excluded*

or rejected by peers, e.g. peers' attempts to exclude children from participation in classroom social activities (8 items, $\alpha = .91$).

Chapter 4 – Analyses and Results

Analyses

Analyses proceeded in five stages. In the first stage, a quadratic growth curve analysis in Mplus 4.2 (Muthén & Muthén, 2006) was conducted to investigate the average trajectories for externalizing and internalizing problems. In the second stage, Latent Class Growth Analysis (LCGA) in Mplus was used to identify distinct groups of individual trajectories separately for externalizing and internalizing problems. In the third stage, the joint probabilities were derived from a mixture model including the individual trajectories derived from the LCGA analysis and multivariate groups were identified. In the fourth stage, multinomial logistic regressions in SPSS were performed to identify early child and family characteristics that distinguished membership in the identified groups. In the fifth stage, Analysis of Covariance (ANCOVA) was used to compare the different trajectory groups in terms of 6th grade outcomes.

Average trajectory of externalizing and internalizing problems over time

Single-class latent quadratic growth curve modeling was used to investigate the normative development of internalizing and externalizing problems, and identify the average intercept and average linear and quadratic slope for externalizing and internalizing problems. This type of growth model uses a polynomial function to model the relationship between the behavior under investigation and age (McArdle & Bell, 2000; Muthén, 2001; Singer & Willett, 2003). The function takes the form (Singer & Willett, 2003)

$$y_{tt} = \alpha_o + \beta_1 Age_{tt} + \beta_2 Age^2_{tt} + \varepsilon$$

where $y_{\iota t}$ is a latent variable which characterizes the level of externalizing or internalizing problems for participant ι at time t. As seen from the equation, the analysis is based on a quadratic growth curve. For the present study the unit of time was years of age, following previous studies which conducted growth analyses based on the same data (NICHD Early Child Care Research Network, 2004). $Age_{\iota t}$ is participant ι's age at time t, $Age^2_{\iota t}$ is the square of participant ι's age at time t, and ε is a disturbance assumed to be normally distributed. The model's coefficients, β_1, and β_2, determine the average shape of the trajectory, and α_o is the intercept. For this type of analysis the intercept, linear and quadratic slope are assumed to take on a normal distribution (Hedeker & Gibbons, 1994). The residual intercept, linear, and quadratic slopes were also used to suggest whether there is variability in terms of the initial levels of the variables and in terms of change over time.

Patterns of externalizing and internalizing problems over time

The development of different groups of externalizing and internalizing problems was investigated using LCGA, which identifies heterogeneous groups by modeling a mixture of distinct multivariate normal distributions. This approach is useful in identifying how different groups of people who share some common characteristic develop over time. Heterogeneity of trajectory groups is data-driven based on estimation of individual growth curves for each child. Children within each group are assumed to be homogeneous in respect to their developmental patterns, and within group differences are thought of as less informative than between group differences.

Similarly to hierarchical and latent growth curve modeling, LCGA uses a polynomial function to model the relationship between an attribute, in this case externalizing or internalizing

problems, and age (Nagin, 1999; Nagin & Tremblay, 1999; Kreuter & Muthén, 2006; Muthén, 2001; Roeder et al., 1999). The function takes the form (Nagin, 1999):

$$y_{\iota t}^{j} = \beta^{j}_{o} + \beta^{j}_{1}Age_{\iota t} + \beta^{j}_{2}Age^{2}_{\iota t} + \varepsilon$$

where $y_{\iota t}^{j}$ is a latent variable which characterizes the level of externalizing or internalizing problems for participant ι at time t given membership in group j. $Age_{\iota t}$ is participant ι's age at time t, $Age^{2}_{\iota t}$ is the square of participant ι's age at time t, and ε is a disturbance assumed to be normally distributed with zero mean and constant variance. The model's coefficients, β^{j}_{o}, β^{j}_{1}, and β^{j}_{2}, determine the shape of the trajectory. The coefficients are superscripted by j to denote that they are not constrained to be the same across j groups and are free to vary, which allows for cross-group differences in the shape of developmental trajectories. Therefore, the absence of constraints captures mixtures of developmental trajectories in the population and also allows each group's trajectory to have a distinct shape. Furthermore, the model does not permit individual variability in the intercepts or slopes within classes, and children within a class share a single trajectory of change over time. Therefore, the random effects for intercept slope and quadratic term are set to zero within class. Figure 1 is another way to demonstrate the LCGA approach (Muthén & Muthén, 2006). The intercept, linear slope, and quadratic term are based on the different time points of internalizing or externalizing problems. The intercept indicates the average of the problem behavior at age 2. Furthermore, as shown in the figure the intercept, linear and quadratic terms are used to classify children into different classes.

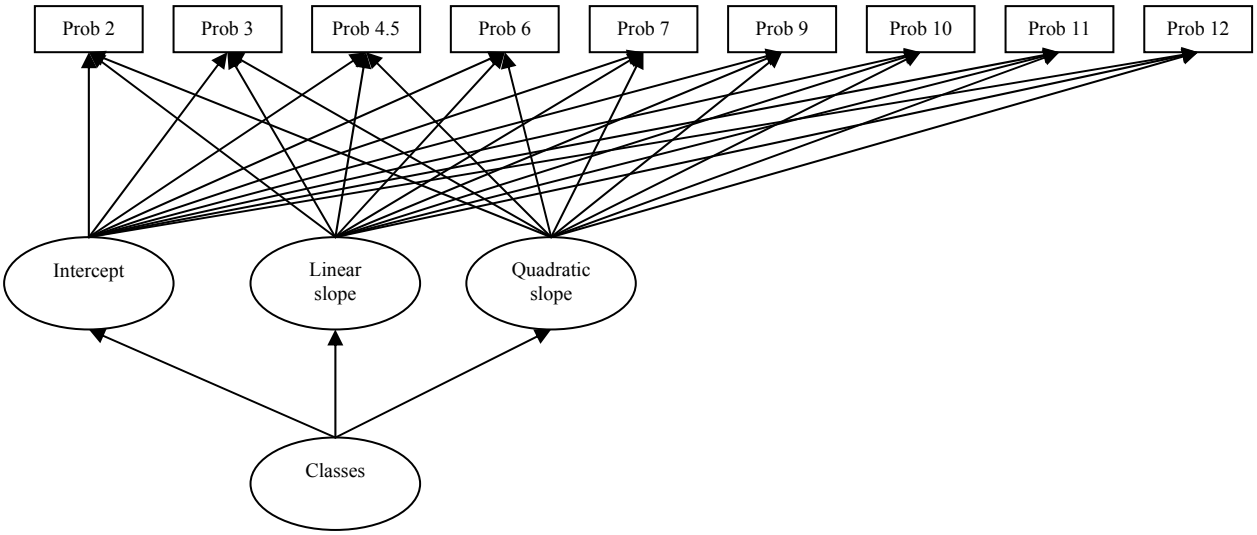

Figure 1. LCGA analysis.

The CBCL variables were specified in the model as count variables because they represent a count of the number of externalizing or internalizing behaviors weighted by frequency of occurrence from 0 to 2 (NICHD Early Child Care Research Network, 2004). Furthermore, because all the variables were highly skewed with a large number of zeros at each time point, a zero inflated Poison (ZIP) model was used (Hall, 2000; Kreuter & Muthén, 2006; Lambert, 1992; Nagin & Land, 1993). This model is a two-class mixture model. The ZIP model estimates a zero class, including the children scoring zero, and a non-zero class, including the children with random zeros or who score higher than zero at different time points. If a child is in the non-zero class, the probability of a zero count is expressed as a poisson distribution. However, if a child is in the zero-class, a zero count has a probability of one. An example would be criminal behavior (Kreuter & Muthén, 2006; Nagin & Land, 1993). The majority of the population does not engage in any criminal behavior and therefore these individuals belong in the zero class of the ZIP model. Furthermore, there are some individuals who sometimes engage in criminal behavior, and these individuals are considered to have random zeros and belong in

the non-zero class of the ZIP model. Additionally, there are other individuals who always engage in some criminal behavior and others who always engage in high criminal behavior, and these groups of individuals also belong in the non-zero class of the ZIP model.

The LCGA model estimation in Mplus results in two outputs. The first is the shape of the trajectory for each group, which is based on the parameter estimates. The second one is the posterior probability of group membership, which estimates the probability of each child in the sample belonging to each of the trajectory groups. In addition, Mplus accommodates missing data by using full information maximum likelihood, and children with incomplete assessments do not have to be dropped from the analysis (Muthén & Muthén, 2006).

Model Fit

The model fit statistics used are the Lo, Mendel, Rubin (LMR) statistic and the Bayesian Information Criterion (BIC). Both of these statistics are used because they provide information about different aspects of model fit. The LMR statistic complements the BIC because the BIC tends to favor more parsimonious models compared to the LMR (Muthén & Muthén, 2006).

The BIC is usually used for LCGA models because it can be applied to nonnested models. The BIC, like all information criterion indices, is a goodness-of-fit measure that incorporates various penalties for model complexity, such as the number of parameters in the model (D'Unger, Land, McCall, & Nagin 1998; Kass & Raftery, 1993; Schwartz, 1978). The BIC is based on a maximization of a log likelihood function. If L is the maximized log likelihood, p is the number of free parameters in the model, and N is the number of cases, the BIC can be written as follows (Schwartz, 1978):

$$\mathrm{BIC} = -2 \log L + p \log(N),$$

with a smaller value indicating a better fit. The BIC does a good job in identifying the true model in large samples, but the BIC is biased in small samples by choosing models that are too simple (Barron and Cover, 1991).

In addition, because the BIC criterion tends to favor models with fewer classes by penalizing for the number of parameters (Bauer & Curran, 2004; Wiesner & Windle, 2004), a likelihood statistic based on the sum of chi-square distributions was used. However, the usual likelihood ratio chi-square difference test can only be applied to compare nested models with the same number of classes, and therefore this type of test cannot be applied to mixture modeling with different number of classes (Lo, Mendel, Rubin, 2001; Muthén, 2003). Lo, Mendell, and Rubin adjusted the likelihood ratio test in order to be used in mixture modeling, to compare models with different number of classes, and to enable the comparison of non-nested models. Therefore, in the current study the Lo, Mendel, Rubin (LMR) fit statistic was used to compare mixture models with different number of latent classes (Lo, Mendel, Rubin, 2001; Muthén, 2003). The LMR statistic tests $k - 1$ classes against k classes. Therefore, it can be considered as a likelihood ratio test between models with different number of latent classes. A significant chi-square value ($p < .05$) indicates that the $k - 1$ class model has to be rejected in favor of the k-class model. A non-significant chi-square value ($p > .05$) suggests that a model with one fewer class is preferred. For example, in the case where 2- and 3-class models are compared, the null hypothesis states that a random sample was drawn from a mixture distribution with two classes, and the alternative hypothesis states that the sample has been drawn from a mixture distribution with 3-classes.

Furthermore, attention should be given to the shape and location of the different estimated class trajectories to indicate whether each latent class is distinct and whether the latent

classes identified are meaningful (Kreuter & Muthén, 2006; Nagin and Tremblay, 2001). Moreover, Nagin and Tremblay (2001) indicated that the addition of a new group to the model might result in the splitting of a larger group into two smaller groups with similar trajectories, which is not informative. Therefore, when inspection of the graphs suggested that a model with more classes indicated the existence of similar classes of small theoretical importance, the model with fewer and distinct classes was preferred.

Finally, the posterior probabilities and the entropy value were taken under consideration to indicate whether the classes in the final model were distinct (Jedidi et al., 1997). Posterior probabilities determine the most likely class for each child. For a classification in a specific class to be reliable, children must have high posterior probabilities for belonging to a specific class and low posterior probabilities for belonging to the other classes. Furthermore, the average posterior probabilities can be used to check for the precision of classification and therefore indicate the degree to which the classes are distinguishable. In addition, the entropy value, which is a standardized summary measure based on the posterior class membership probabilities derived from each model, was used to judge the classification accuracy of placing participants into classes and the degree of separation between classes (Muthén, 2000; Ramaswamy et al., 1993). Entropy can be represented as follows (Ramaswamy et al., 1993):

$$E_K = 1 - (\Sigma_i \Sigma_k - p_{ik} \ln p_{ik}) / n \ln k$$

where p_{ik} is the estimated conditional probability for individual i in class k, and n is the sample size. Entropy can range from zero to one, and a higher entropy value is preferred because it indicates clear classification and greater power to predict class membership. Furthermore, entropy is a function of the number of classes, which suggest that a model with as many classes as observations would have an entropy value of one.

Joint probabilities

In the third part of the analysis, the internalizing and externalizing groups identified with LCGA were entered in a joint mixture model in Mplus to investigate for joint probabilities between the two types of symptoms (Nagin & Tremblay, 2001; Muthén, 2000). The joint model, which is a generalization of LCGA, provides joint probabilities that assign membership in trajectory groups across behaviors (Nagin & Tremblay, 2001). The joint probabilities place each child in either a co-occurring group or a group characterized as higher in one behavior and lower in the other. In Mplus, the intercept, linear and quadratic terms derived from the final latent classes for internalizing and externalizing symptoms were entered to specify different classes. For example, to specify a chronic co-occurring group, the intercept, linear and quadratic term from the high internalizing group and the intercept, linear and quadratic terms from the high externalizing group were combined to specify one joint class. Therefore, children who share common growth parameters for both high internalizing and high externalizing problems were identified in the chronic co-occurring class.

Thus, the joint analysis is based on the same principles as LCGA and assigns group membership taking into account longitudinal change over time (Muthén, 2000). Figure 2 demonstrates how this approach works. After identifying the classes based on the intercept, linear and quadratic terms for internalizing and externalizing problems, the same growth parameters are used to combine the different classes derived for internalizing and externalizing problems (Muthén, 2000). As shown in the figure, this model uses all longitudinal measurements and links the two behaviors of interest across the entire period of observation. Furthermore, this type of procedure is preferred over simple cross-tab analysis because it is based on latent classes and also provides posterior probabilities (Muthén, 2000; Nagin & Tremblay, 2001), which can be

used to measure entropy and also to indicate which groups exhibit low probability. In short, this analytical approach enables the identification of specific groups of individuals based on the combined level of problem behaviors and emotions they exhibit over time.

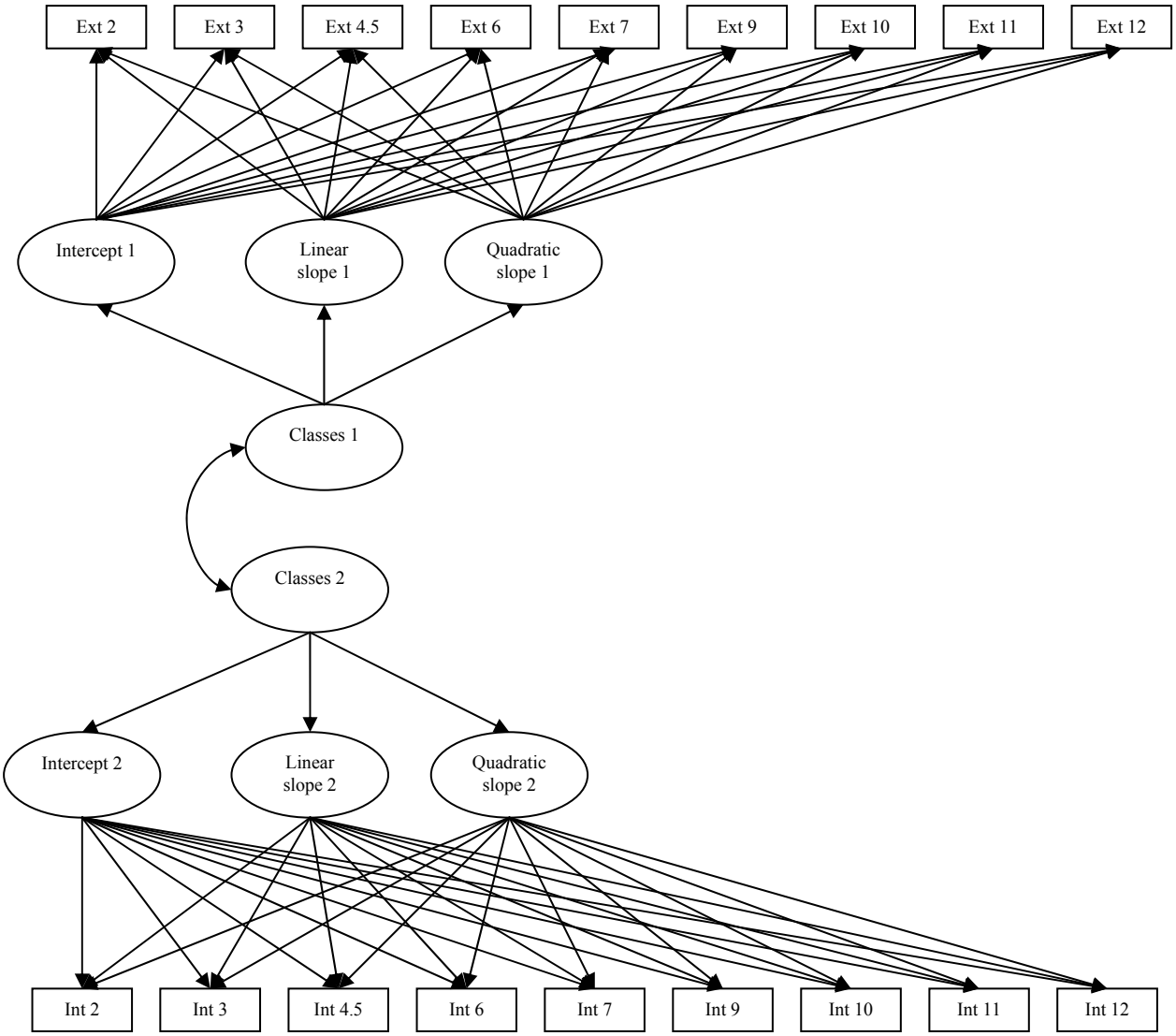

Figure 2. Joint occurrence analysis.

Identification of antecedents distinguishing group membership

Multinomial logistic regression analyses were used to identify antecedents that discriminate among individuals with divergent pure or co-occurring developmental trajectories. Multinomial Logistic Regression is appropriate when the dependent variables are unordered categorical, such as the differential trajectory groups derived from this study. The analysis included the three antecedents as independent variables - temperament, cognitive functioning, and familial environment - controlling for demographics, and SES and medical risk indexes.

Outcomes associated with different group membership

The different groups were compared in terms of sixth grade outcomes using Analysis of Covariance (ANCOVA) in SPSS. The independent variable reflected the different trajectory groups. The dependent variables (DVs) reflecting risky behaviors were the study's child delinquency reported by mothers, the study's child delinquency reported by the child and the child's friend, and delinquency committed by friends as reported by the study's child and the child's friend. The DVs also included behaviors with peers: whether the child is asocial with peers or excluded by peers. The ANCOVA analyses tested whether there were statistically reliable mean differences among the trajectory groups after adjusting the DVs for differences on covariates. Demographic contrasts, such as gender, were also included in all sets of analyses.

Results

As mentioned in the previous section, the first part of the analysis used the LCGA method to assign children to different trajectory classes for internalizing and externalizing problems separately. After these analyses, the LCGA method was used to join the different trajectory classes representing distinct externalizing and internalizing latent classes to investigate co-occurrence. These analyses resulted in the normative and high risk pure or co-occurring latent

classes. After the identification of the final groups the analyses that followed used (1) multinomial logistic regression to compare the final higher risk groups to the normative group in terms of antecedents, (2) multinomial logistic regression to perform specific comparisons among the higher risk groups, (3) ANCOVAs to compare the higher risk groups to the normative group in terms of third grade outcomes, and (4) ANCOVAs to identify the group at higher risk for maladaptation during early adolescence. Because many comparisons were conducted a stringent alpha level of $p < .01$ was selected to reduce the chance of Type I error.

Descriptive statistics

Table 1 reports the means and standard deviations for externalizing problems from age 2 to age 12. An inspection of the means suggests that there is a decrease in the average number of externalizing problems with age. In average, children exhibited high externalizing problems early in development and exhibited lower levels of externalizing problems as they approached early adolescence. Table 1 also shows the means and standard deviations for internalizing problems from age 2 to age 12. However, in contrast to the means for externalizing problems, the means for internalizing problems did no vary as much and seemed to remain relatively stable across development. Table 1 also reports the Cronbach's alphas for externalizing and internalizing problems across the different measurement periods. The Cronbach's alphas for externalizing problems ranged from .73 to .79, and for internalizing problems from .58 to .70. Therefore, internalizing problems were less internally consistent compared to externalizing problems.

Table 1. *Means, Standard Deviations (SD), Ranges, and Internal Reliabilities for Externalizing and Internalizing Problems.*

	N	α	Mean	SD	Min.	Max.
Externalizing - 24 months	1171	.75	4.17	2.72	0	18
Externalizing - 36 months	1167	.75	4.08	2.68	0	18
Externalizing - 54 months	1070	.78	3.10	2.61	0	16
Externalizing - kindergarten	1058	.77	2.62	2.49	0	15
Externalizing – grade 1	1028	.79	2.28	2.45	0	15
Externalizing – grade 3	1022	.74	1.97	2.12	0	13
Externalizing – grade 4	1022	.74	1.75	2.04	0	12
Externalizing – grade 5	1017	.75	1.61	2.08	0	13
Externalizing – grade 6	1022	.73	1.51	1.96	0	13
Internalizing - 24 months	1171	.58	1.16	1.26	0	8
Internalizing - 36 months	1167	.60	1.41	1.42	0	11
Internalizing - 54 months	1070	.62	1.60	1.51	0	8
Internalizing - kindergarten	1058	.64	1.44	1.52	0	8
Internalizing – grade 1	1028	.62	1.61	1.54	0	10
Internalizing – grade 3	1022	.68	1.64	1.70	0	12
Internalizing – grade 4	1022	.65	1.54	1.62	0	11
Internalizing – grade 5	1017	.67	1.68	1.71	0	10
Internalizing – grade 6	1022	.70	1.55	1.75	0	11

Externalizing problem trajectories

To further investigate the average trajectories of externalizing problems, a general quadratic growth curve model was estimated (fig. 3). As shown in figure 3, there was a decrease in externalizing problems across time. The unstandardized intercept (i = 4.306, SE = .076, p < .001), linear slope (s = -.488, SE = .024, p < .001), and the quadratic acceleration term (q = .021, SE = .002, p < .001) were all significant. In addition, the unstandardized residual intercept (i = 5.231, SE = .286, p < .001), linear slope (s = .351, SE = .029, p < .001), and quadratic acceleration term (q = .002, SE = .001, p < .001) were also significant. These findings indicate that there was significant variability at the initial levels of externalizing problems and in terms of change over time. Therefore, it was concluded that not all children in the sample followed the same patterns of externalizing problems.

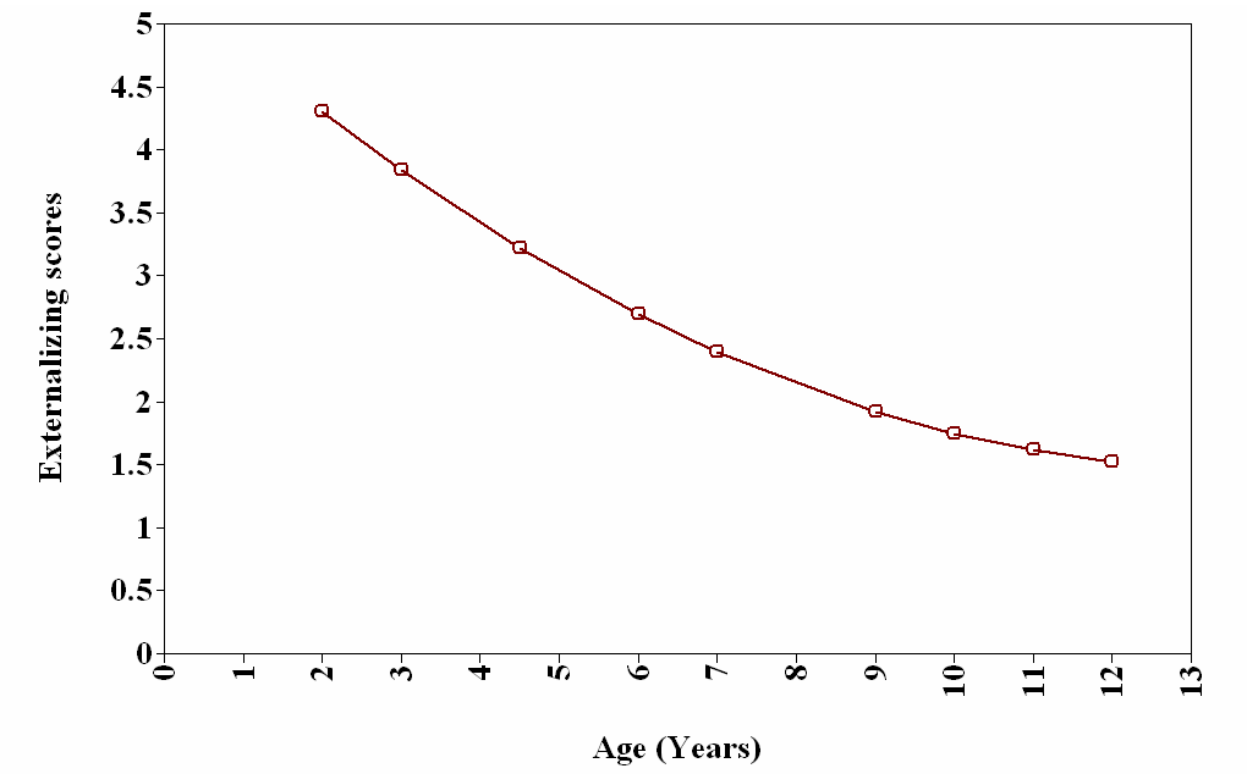

Figure 3. Quadratic growth model for externalizing problems.

To identify the optimal number of trajectories for externalizing problems, models with one to six groups were estimated with the use of LCGA. As mentioned in the analysis section, the best fitting model was selected based on the lowest BIC, the LMR statistic, and by inspection of the different classes. As shown in table 2, the BIC scores kept decreasing up to the 5 class model. However, the six-group model had a higher BIC suggesting that the 5 class model fit the data better. Moreover, the LMR statistic fell out of significance for the 6-class model indicating that the better fitting model was the 5-class model. Additionally, inspection of the graphs suggested that the 6 class model split the lower class into two smaller groups, which was of limited theoretical importance. In contrast, the five class model indicated the existence of 5 distinct classes each representing a different developmental pattern (fig. 4). Based on the convergence of these criteria, the decision was taken that the 5 class model represented the sample best. Furthermore, the mean probability score for the five externalizing groups ranged from .77 to .94 and the entropy value was .76, suggesting that the classes were well separated.

Table 2. *Model Fit Statistics for Externalizing Problems*

	Externalizing problems		
Classes	BIC	Entropy	LMR
1	40296.17	N/A	N/A
2	35855.40	.87	$p < .001$
3	34527.37	.85	$p < .001$
4	34127.92	.79	$p < .001$
5	**33920.43**	**.76**	**$p = .03$**
6	33929.27	.72	$p = .62$

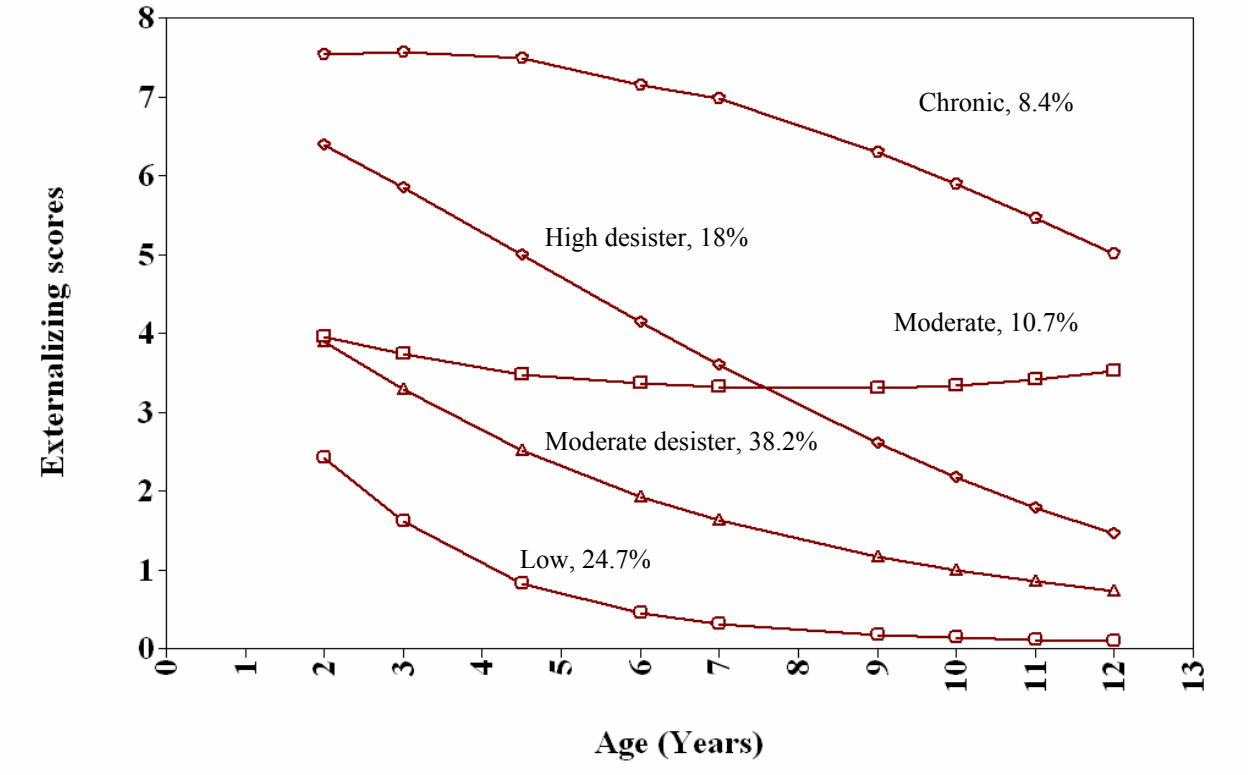

Figure 4. Final LCGA model for externalizing problems.

The trajectory groups identified with LCGA are shown in figure 4 and the unstandardized intercepts, linear and quadratic terms in Table 3. Children in the low externalizing problems group (n = 302) exhibited some externalizing problems early on, which declined to almost zero across time. A quarter of the sample was in this low externalizing problems trajectory group, suggesting that a large number of children only engaged in some externalizing behaviors early in development, but refrained from such behaviors after late childhood. Children in the moderate desister externalizing problems group accounted for 38.2% of the sample (n = 467). This class represented the largest class of children in the sample. Furthermore, this group is a good depiction of the overall quadratic growth curve shown in figure 3, suggesting that this group is a good representation of average levels of externalizing problems. Children in the moderate

externalizing problems group (*n* = 131), represented one tenth of the sample and started at the same levels as the moderate desister externalizing problems group, but remained at moderate levels for externalizing problems across the 10 year developmental period. Children in the high desister externalizing problems group represented 18% of the sample (*n* = 220). The high desister externalizing problems group started at high levels of externalizing problems but desisted to low levels across time. Therefore, even though children in the high desister group started at higher levels of externalizing problems early in development than the moderate group, they were at lower risk than the moderate group for exhibiting externalizing problems. Children in the chronic externalizing problems group (*n* = 103) started higher on externalizing problems in comparison to any of the other groups and remained high on externalizing problems, with a quadratic deceleration across the 10 year period. This chronic group represented the smaller class and accounted for 8.4% of the sample, and this group is considered to be the higher risk group.

Table 3. *Unstandardized Growth Factor Parameter Estimates and Standard Errors (SE) for Externalizing Problems*

Groups	Intercept	Linear Slope	Quadratic Slope
Low	2.44(.085)**	-.304(.056)**	.007(.008)
Moderate desister	3.96(.052)**	-.183(.021)**	.002(.002)
Moderate	3.97(.180)**	-.057(.021)	.005(.003)
High desister	6.42(.074)**	-.082(.022)**	-.007(.003)*
Chronic	7.54(.057)**	.010(.019)	-.005(.002)*

Note: *$p \leq .01$; **$p \leq .001$

Table 4 shows the gender and ethnicity differences for the different groups. According to this table, the different groups were not differentiated in terms of ethnicity, but some gender differences emerged. More specifically, the low group had more females compared to males and the chronic group was overrepresented by males.

Internalizing problem trajectories

As with externalizing problems, a quadratic growth curve was estimated for internalizing problems. As shown in figure 5, there was an increase in internalizing problems early in development which stabilized over time with only a small quadratic deceleration. The intercept (i = 1.224, SE = .035, p < .001), linear slope (s = .118, SE = .015, p < .001), and the quadratic deceleration term (q = -.009, SE = .001, p < .001) were all significant. The residual intercept (i = .959, SE = .066, p < .001), linear slope (s = .110, SE = .011, p < .001), and the quadratic term (q = .001, SE = .001, p < .001) were significant as well, indicating significant variability in the intercept, and the linear and quadratic terms.

Table 4. *Group break down by Gender and Ethnicity for Externalizing Problems*

Groups	Male	Female	$x^2(1)$	White	Minority	$x^2(1)$
	n = 631	n = 592		n = 948	n = 275	
Low	131	171	8.17**	242	60	1.18
Moderate desister	242	225	.01	372	95	1.23
Moderate	72	59	.60	99	32	.28
High desister	116	104	.11	163	57	1.47
Chronic	70	33	11.05**	72	31	3.42

Note: $*p \leq .01$; $**p \leq .001$

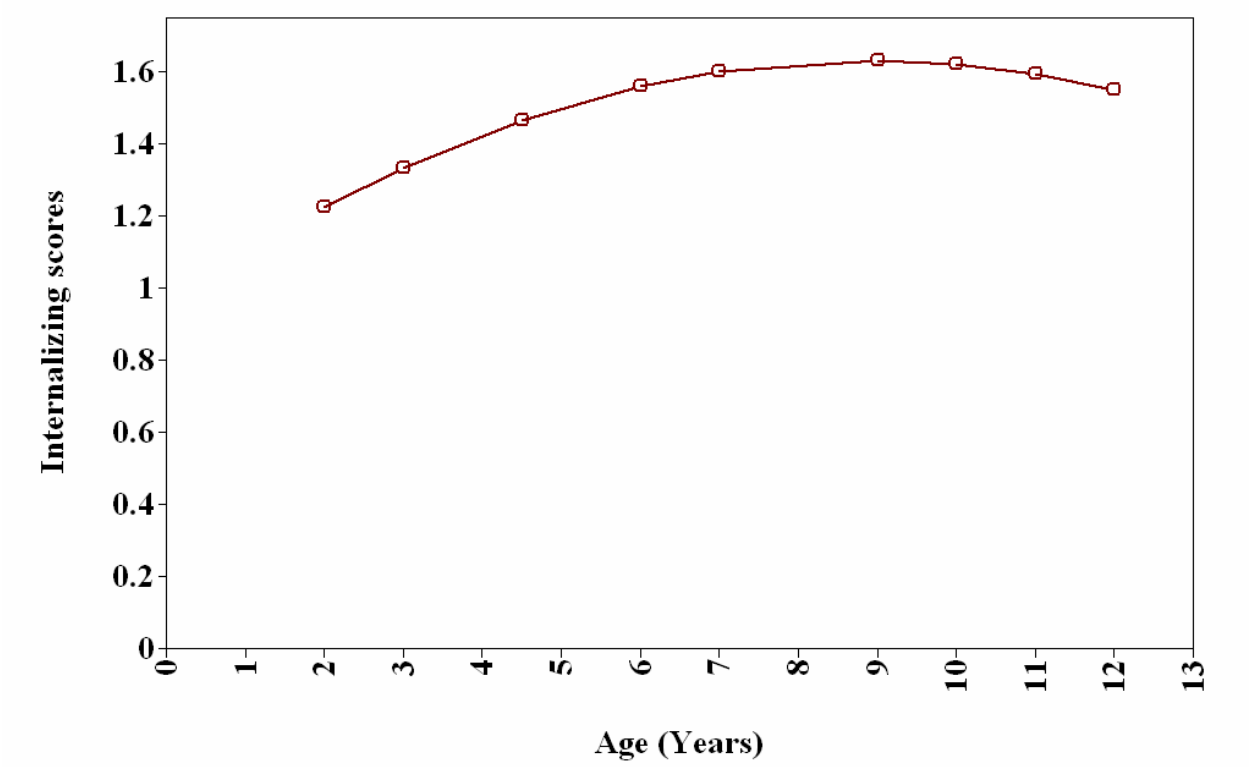

Figure 5. Quadratic growth model for internalizing problems.

Models with one to five groups were estimated with LCGA to identify the optimal number of trajectories for internalizing problems. The BIC statistic changed dramatically from class 2 to class 3, but the change was much smaller from class 3 to class 4, which suggests that the biggest improvement in fit occurred from the 2-class model to the 3-class model (Table 5). In addition, the LMR statistic fell out of significance for the 4-class model suggesting that the 3 class model better fit the data. Moreover, the four and five class models indicated the existence of two and three, respectively, very similar low classes of small theoretical importance. Accordingly, the more parsimonious 3-class model was selected. In addition, the mean probability score for the three internalizing groups ranged from .87 to .90 and the entropy was .76, suggesting that the classes in the three group model were well separated.

Table 5. *Model Fit Statistics for Internalizing Problems*

	Internalizing problems		
Classes	BIC	Entropy	LMR
1	31868.72	N/A	N/A
2	29162.75	.81	p < .001
3	**28519.71**	**.76**	**p < .001**
4	28418.53	.69	p = .347
5	28338.42	.69	p = .133

Figure 6 shows the groups identified in the three class model, and Table 6 shows the unstandardized intercept, linear and quadratic slopes for the different classes. Children in the low internalizing problems group represented 34.3% of the sample (*n* = 421). The low internalizing problems group started low on internalizing problems and remained low across the 10 year period suggesting that one third of the sample exhibited very low internalizing problems from infancy to early adolescence. In addition, the low internalizing problems group had no significant linear or quadratic terms indicating that this group remained constant over time. Children in the moderate internalizing problems group represented approximately half the sample (47.4%, *n* =579), suggesting that moderate levels of internalizing problems might be normative. Children in group 3, the high internalizing problems group, represented 18.3% of the sample (*n* = 223). This group started at higher levels of internalizing problems as compared to the other two groups and showed an increase over time. Therefore, around one fifth of the sample was at risk for exhibiting high internalizing problems from infancy to early adolescence.

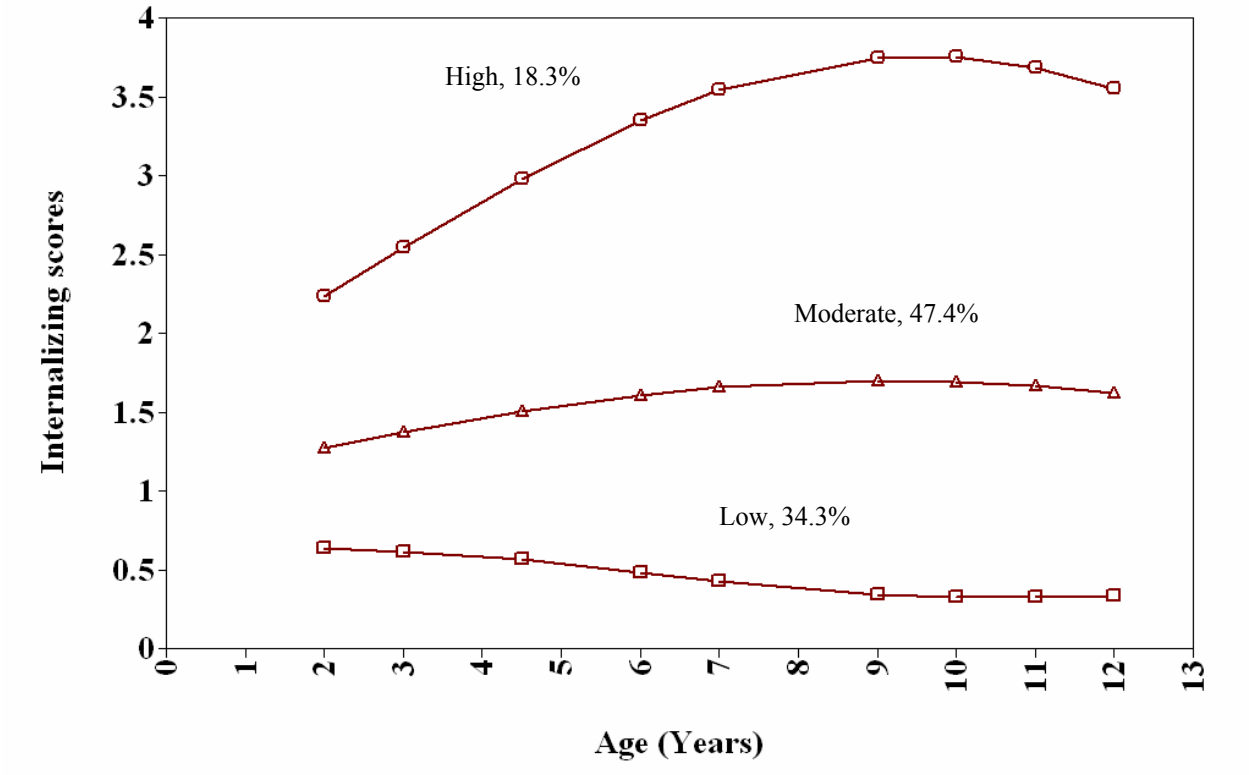

Figure 6. Final LCGA model for internalizing problems.

Table 6. *Unstandardized Growth Factor Parameter Estimates and Standard Errors (SE) for Internalizing Problems*

Groups	Intercept	Linear Slope	Quadratic Slope
Low	.64(.087)**	-.019(.052)	-.002(.007)
Moderate	1.28(.057)**	.079(.020)**	-.005(.002)**
High	2.31(.076)**	.126(.018)**	-.008(.002)**

Note: $*p \leq .01$; $**p \leq .001$

Table 7. *Group Break Down by Gender and Ethnicity for Internalizing Problems*

Groups	Male	Female	$x^2(1)$	White	Minority	$x^2(1)$
	n = 631	n = 592		n = 948	n = 275	
Low	238	183	.95	326	95	.01
Moderate	287	292	1.47	443	136	.33
High	106	117	4.11*	179	44	.97

Note: $*p \leq .01$; $**p \leq .001$

Table 7 shows the gender and ethnicity differences for the different groups. According to this table the different classes were not differentiated in terms of ethnicity, and more girls than boys were identified in the high internalizing group.

Joint occurrence

Initially a 15-class model representing all possible classes between the 3-class model for internalizing and the 5-class model for externalizing problems (3 x 5) was included in the joint occurrence analysis. Table 8 shows the probabilities indicating joint occurrence among the different externalizing and internalizing groups based on this analysis. Also note that Table 8 assigns numbers from 1 to 15 to the different groups resulting from the analyses.

The entropy for the 15 group model identified in Table 8 was .72, which is considered to be good. However, some identified groups had very low probabilities. Specifically, groups 4, 9, 12, and 13 had probabilities, between .50 to .59, suggesting that around half of the children in each of these classes did not fit the category they were assigned. Moreover, a large percentage of these children could also fit in either group 8 or group 14. Groups 2, 3, 6, 7, 8, 10, 11, and 14 had good posterior probabilities between .71 to .80, which indicated that these classes were well separated from the rest of the sample, and groups 1, 5, and 15 had probabilities between .86 and

.90, indicating that these classes were very well separated by the rest of the classes (NICHD Early Child Care Research Network, 2004). To ensure that the different groups were distinct from one another groups 4, 9, 12, and 13 were excluded from the analyses. Therefore, the intercept, linear and quadratic terms representing these classes were not included in the joint analyses, and the children in these low probability classes were forced to identify with a different class. Table 9 shows the resulting groups from this analysis. According to this table, the number of children in groups 7 and 10 increased substantially, suggesting that most of the children from the dropped groups identified with these classes. Moreover, the chronic co-occurring group did not change at all, and the rest of the groups only changed by a very small percentage. The entropy for the 11 group model was .77 suggesting that the classes in the 11- group model were more distinct than the 15-group model. Furthermore, the BIC for the 11-class model (BIC = 62569.22) was lower in comparison to the BIC for the 15-class model (BIC = 62845.02) indicating that the 11-class model better represented the data.

Low-normative risk groups:

Groups 1, 2, 5, and 6 (Table 9) are considered to be of low or normative risk because they exhibit low or moderate desisting externalizing problems, and low or moderate internalizing problems. Therefore, these children exhibit low or normative levels of emotional and behavioral problems. Children in group 1 represented 17.1% of the sample (n = 209), and scored low in both internalizing and externalizing problems. Children in group 2 represented 13.1% of the sample (n = 160), and exhibited no signs of internalizing problems and moderate desisting externalizing problems. Children in group 5 represented 8.1% of the sample (n = 99), and exhibited no signs of externalizing problems and moderate internalizing problems. Children in group 6 represented

Table 8. *Initial group Probabilities of Pure and Co-occurring Problems (N = 1223)*

	Internalizing problems		
	Low	Moderate	High
Externalizing problems:			
Low	.170[1]	.087[6]	.013[11]
Moderate desister	.132[2]	.132[7]	.030[12]
Moderate	.056[3]	.092[8]	.046[13]
High desister	.019[4]	.070[9]	.047[14]
Chronic	.016[5]	.045[10]	.045[15]

Note: The numbers 1-15 assign initial group membership

Table 9. *Final Probabilities of Pure and Co-occurring Problems (N = 1223)*

	Internalizing problems		
	Low	Moderate	High
Externalizing problems:			
Low	.171[1]	.081[5]	.023[9]
Moderate desister	.131[2]	.136[6]	0
Moderate	.074[3]	.151[7]	0
High desister	0	0	.118[10]
Chronic	.019[4]	.052[8]	.045[11]

Note: The numbers 1-11 assign final group membership

13.6% of the sample (*n* = 166), and exhibited moderate signs of internalizing problems and moderate desisting externalizing problems.

Pure externalizing problems:

Children in groups 3 and 4 exhibited different levels of externalizing problems, but no signs of internalizing problems. Children in group 3 (7.4%, *n* = 91), the moderate pure externalizing problems group, scored moderately on externalizing problems and continued exhibiting moderate externalizing problems across time. Children in group 4 (1.9%, *n* = 23), the chronic pure externalizing problems group, exhibited high externalizing problems across time. Children in the chronic pure externalizing problems group were at higher risk for externalizing problems in comparison to the pure moderate externalizing problem groups.

Pure internalizing problems:

Children in group 9 exhibited pure internalizing problems. These children (2.3%, *n* = 28) scored high on internalizing problems early on and exhibited some increase over time.

Combined internalizing and externalizing problems:

Children in groups 7, 8, 10 and 11 exhibited different levels of combined internalizing and externalizing problems. Children in group 7 (15.1%, *n* = 185) scored moderately on both internalizing and externalizing problems. Children in group 8 (5.2%, *n* = 63) scored moderately on internalizing problems and high on externalizing problems across development. Children in group 10 (11.8%, *n* = 144) scored high on internalizing problems and exhibited high desisting externalizing problems. Children in group 11 (4.5%, *n* = 55) scored high on both internalizing and externalizing problems, and these children were at high risk for exhibiting chronic internalizing and externalizing problems.

For the following analyses, in line with the study's hypothesis, the low/normative risk groups (groups 1, 2, 5, and 6) were collapsed to indicate a composite group exhibiting low/normative levels of internalizing and externalizing problems. This group was used as a normative comparison or reference group. Therefore, the antecedent and outcome analyses proceeded to compare 8 groups. The first group was the collapsed low/normative group, representing 51.8% (n = 634) of the sample. The rest of the groups remained as they were in Table 8: the pure moderate externalizing group, the pure chronic externalizing problems group, the moderate co-occurring group, the moderate internalizing-chronic externalizing group, the pure internalizing problems group, the high internalizing-high desisting externalizing group, and the chronic co-occurring group.

Table 10 reports the gender and ethnicity differences for the final groups. According to this table, the different groups did not differ significantly in terms of ethnicity, and therefore ethnicity was not included in further analyses. The groups exhibiting pure forms of externalizing problems (both moderate and chronic) were overrepresented by males, and the same was true for the group exhibiting moderate internalizing-chronic externalizing problems.

Antecedents

Table 11 shows the means and Standard Deviations (SD) for the antecedents for the whole sample, and Table 12 the means and Confidence Intervals (CI) for the antecedents differently for the 8 final groups. The analyses proceeded to compare the low/normative group to the rest of the groups with the use of multinomial logistic regression.

Table 10. *Group Break Down by Gender and Ethnicity for the Final Groups*

Groups	Male *n* = 631	Female *n* = 592	$x^2(1)$	White *n* = 948	Minority *n* = 275	$x^2(1)$
Low/normative	306	328	2.81	502	132	1.01
Pure moderate externalizing	57	34	4.44*	64	27	2.69
Pure chronic externalizing	18	5	6.55**	19	4	.34
Moderate co-occurring	96	89	.01	139	46	.60
Moderate internalizing-chronic externalizing	41	22	4.59*	43	20	3.10
Pure internalizing	15	13	.04	24	4	1.08
High internalizing-high desisting externalizing	65	79	2.40	118	26	1.62
Chronic co-occurring	33	22	1.56	39	16	1.37

Note: $*p \leq .01$; $**p \leq .001$

Table 11. *Means and Standard Deviations (SD) of the Study's Variables*

Measured variable	Mean	SD
Antecedents:		
SES risk	.74	1.17
Medical risk	2.06	1.30
Home	36.96	4.06
Temperament	3.25	0.44
Bayley Mental Scale	100.06	12.80
Outcomes:		
Asocial with peers	0.74	0.62
Excluded by peers	0.58	0.67
Study's child Risky behaviors (mother reports)	7.25	4.32
Child's Risky behaviors (friend and child reports)	2.30	1.81
Friend's Risky behaviors (friend and child reports)	3.76	2.66

Table 12. *Means and 95% Confidence Intervals (CI) for Antecedents Based on the Final Groups (N=1223).*

Internal./External.	SES risk	Med. risk	Home	Bayley	Temperament
low/normative	.56(±.07)	1.89(±.07)	37.62(±.27)	101.59(±.94)	3.19(±.02)
pure moderate externalizing	.81(±.19)	2.43(±.23)	35.93(±.92)	99.44(±2.52)	3.26(±.05)
pure chronic externalizing	1.04(±.44)	2.44(±.44)	34.91(±1.54)	91.58(±4.76)	3.39(±.12)
moderate co-occurring	.93(±.17)	2.16(±.20)	36.33(±.62)	97.71(±1.96)	3.26(±.05)
moderate intern.-chronic extern.	1.44(±.35)	2.30(±.35)	34.32(±1.21)	96.85(±3.07)	3.37(±.09)
pure internalizing	.25(±.27)	1.71(±.47)	38.59(±1.31)	106.39(±4.74)	3.22(±.11)
high intern.-high desisting extern.	.73(±.17)	2.28(±.21)	37.27(±.58)	99.62(±2.13)	3.34(±.05)
chronic co-occurring	1.38(±.37)	2.33(±.21)	35.59(±1.19)	96.30(±3.66)	3.42(±.09)

Deviations from the normative group in terms of antecedents:

The multinomial regression comparing the low risk group to the other seven groups was significant, $x^2(42, N = 1223) = 165.72$, $p < .001$. Table 13 incorporates odd ratios to compare each higher risk group to the low-normative reference group. In general, odds ratios reflect the odds likelihood of being in one group over the other, based on the level of the independent variable.

Table 13. *Multinomial Logistic Regression Analyses Comparing the Higher Risk Groups to the Low-normative Group in terms of Antecedents (N=1223)*

	Group comparisons based on Odds ratios						
	8 vs 1	7 vs 1	6 vs 1	5 vs 1	4 vs 1	3 vs 1	2 vs 1
Gender	1.53	.83	1.36	2.03	1.08	3.08	1.78
SES risk	1.45**	1.08	.75	1.31	1.13	.96	.97
Medical risk	1.17	1.23**	.92	1.15	1.12	1.25	1.33**
Home environment	.97	1.01	1.03	.89**	.96	.90*	.90**
Difficult temperament	2.55**	2.06	1.30	2.03	1.29	2.23	1.28
Bayley	.98	.99	1.03	1.00	.98	.96	1.00

Note: comparisons are based on *odds ratios;* $*p \leq .01$; $**p \leq .001$. *Group 1 is the low/normative group; Group 2 is the pure moderate externalizing group; Group 3 is the pure chronic externalizing group; Group 4 is the moderate co-occurring group; Group 5 is the moderate internalizing chronic externalizing group; Group 6 is the pure internalizing group; Group 7 is the high internalizing-high desisting externalizing group; Group 8 is the chronic co-occurring group.*

Risk indexes. A one unit increase in SES risk was associated with a higher likelihood of being in the chronic co-occurring group compared to the normative group. One unit increase in medical risk was associated to a higher likelihood of being in the high internalizing-high desisting externalizing group and to the pure moderate externalizing group compared to the normative group.

Antecedents. Children who experienced a more negative home environment were more likely to be in the moderate internalizing chronic externalizing group, the pure chronic externalizing group, and the pure moderate externalizing group, compared to the normative group. Children with more difficult temperament were more likely to be in the chronic co-occurring group, compared to the normative group. The Bayley scale did not have an effect on the likelihood of group membership.

Specific comparisons:

After comparing each group to the normative group, the analyses proceeded to compare the higher risk groups based on the study's hypotheses. With the use of multinomial regression the analysis proceeded to compare: (1) the three groups representing the chronic externalizing problems group: the chronic co-occurring, the pure chronic externalizing group, and the moderate internalizing chronic externalizing group, (2) the three groups representing the high internalizing problems group: the pure internalizing group, the chronic co-occurring group, and the high internalizing-high desisting externalizing group, and (3) the pure internalizing to the pure chronic externalizing problem groups.

No significant differences were found between the *chronic co-occurring group, the pure chronic externalizing problems group, and the moderate internalizing-chronic externalizing problems group* according to the multinomial regression, $x^2(12, N = 141) = 12.43, p = .41$.

Therefore, antecedents did not differentiate between the three groups at high risk for externalizing problems.

Significant differences were found when comparing the *chronic co-occurring group* to the *pure internalizing problems group and the high desister externalizing chronic internalizing group*, $x^2(12, N = 83) = 32.56$, $p < .001$, although none of the comparisons was significant at the .01 level. However, there was some indication that higher SES risk was associated to a greater likelihood of being in the chronic co-occurring group compared to the pure internalizing problems group (odds ratio = 2.24, $p = .03$), and the high internalizing-high desisting externalizing group (odds ratio = 1.36, $p = .05$). Furthermore, children with more difficult temperament were more likely to be in the chronic co-occurring group compared to the pure internalizing problems group (odds ratio = 4.44, $p = .05$). These findings are only presented as additional information and will not be further interpreted because the alpha level for the current study was set at .01.

Significant differences were also found when comparing the *pure internalizing* and the *pure chronic externalizing groups*, $x^2(6, N = 51) = 29.80$, $p < .001$. The only significant difference at the .01 level was that children with more cognitive deficiencies were more likely to be in the pure chronic externalizing group than the pure internalizing group (odds ratio = .88, $p = .01$). Furthermore, there was some indication that males were more likely to belong to the pure chronic externalizing group in comparison to the pure internalizing problems group (odds ratio = 10.39, $p = .02$), and that children who experienced a more negative home environment were more likely to be in the pure chronic externalizing group compared to the pure internalizing group (odds ratio = .75, $p = .03$). As mentioned only the findings significant at the .01 alpha level are going to be interpreted.

Outcomes

Table 11 shows the means and Standard Deviations (SD) for the outcomes for the whole sample, and Table 14 shows the means and confidence intervals for the outcome variables differently for the final 8 groups. Analysis included different ANCOVAs for the child and friend risky behaviors, and for the different behaviors with peers, controlling for gender, SES risk, and medical risk. Table 15 uses the standardized mean difference statistic (Cohen's d), as an effect size to compare the higher risk groups to the normative group (Cohen, 1988). The effect size was computed as the difference between the means of the two groups under comparison (after these means were adjusted for the covariate effects) divided by the root mean squared error for the particular model. Cohen's d is a scale-free measure of the separation between two group means. After comparing the higher risk groups to the normative group, the analyses proceeded to identify the group at higher risk for exhibiting risky behaviors, having friends who exhibited risky behaviors, and for exhibiting negative peer behaviors.

Risky behaviors:

According to Table 15, the three chronic externalizing problem groups and the pure moderate externalizing problems group engaged in more risky behaviors, based on both mother and child/friend reports, and had more friends who committed risky behaviors. None of the other groups were significantly different from the low/normative group. To identify the group at higher risk for committing risky behaviors and for having friends who committed risky behaviors, a new set of ANCOVA analyses were performed to compare the four groups who differed significantly from the low-normative group, the pure moderate externalizing problems group, the pure chronic externalizing problems group, the chronic externalizing-moderate internalizing group, and the chronic co-occurring group. As with previous analyses, the analysis comparing

Table 14. *Means (CI) for Outcomes Based on the Final Groups (N=1223).*

Internalizing/Externalizing	Friend risk	Child risk Friend/child	Child risk mother	Asocial	Excluded
low/normative	3.39(±.17)	2.06(±.11)	6.02(±.25)	.62(±.03)	.42(±.03)
pure moderate externalizing	4.96(±.66)	3.05(±.49)	9.46(±.86)	.71(±.09)	.77(±.15)
pure chronic externalizing	5.40(±1.64)	3.44(±1.09)	9.29(±2.09)	1.07(±.29)	.94(±.37)
moderate co-occurring	3.67(±.35)	2.29(±.23)	7.62(±.58)	.77(±.07)	.72(±.09)
moderate internalizing-chronic externalizing	4.79(±.06)	3.01(±.52)	11.68(±1.52)	.78(±.15)	.76(±.19)
pure internalizing	2.73(±.68)	1.56(±.41)	4.99(±1.31)	.99(±.23)	.48(±.17)
high internalizing-high desister externalizing	3.75(±.39)	2.22(±.27)	7.41(±.58)	.94(±.09)	.72(±.11)
chronic co-occurring	4.87(±.94)	3.08(±.52)	11.23(±1.41)	1.25(±.21)	1.07(±.21)

Table 15. *ANCOVA Analyses Comparing the Higher Risk Groups to the Low-normative Group (N=1223)*

			Group comparisons based on effect sizes (Cohen's d)						
	F	$p\eta^2$	8 vs 1	7 vs 1	6 vs 1	5 vs 1	4 vs 1	3 vs 1	2 vs 1
Friend risky behaviors	6.10**	.04	.18**	.04	-.09	.15*	.02	.26**	.21**
Child risky behaviors (child/friend report)	4.97**	.03	.19**	.02	-.11	.15*	.03	.27**	.20**
Child risky behaviors (mother report)	27.80**	.14	.24**	.06	-.05	.25**	.07	.13**	.15**
Asocial with peers	11.35**	.06	.29**	.15**	.19**	.05	.05	.19**	.02
Excluded by peers	11.53**	.06	.27**	.13**	.03	.12**	.12**	.21**	.14**

Note: *the group comparisons are based on Cohen's d; *p ≤ .01; **p ≤ .001. Group 1 is the low/normative group; Group 2 is the pure moderate externalizing group; Group 3 is the pure chronic externalizing group; Group 4 is the moderate co-occurring group; Group 5 is the moderate internalizing chronic externalizing group; Group 6 is the pure internalizing group; Group 7 is the high internalizing-high desisting externalizing group; Group 8 is the chronic co-occurring group.*

the four groups included different ANCOVAs for the child and friend risky behaviors, controlling for gender, SES risk, and medical risk. No significant differences were found for friend risky behaviors ($F(3, 232) = .38$, $p\eta^2 = .005$, $p = .76$), or for risky behaviors engaged by the study's child as reported by the child and friends ($F(3, 232) = .31$, $p\eta^2 = .004$, $p = .82$), or for risky behaviors engaged by the study's child as reported by the mothers ($F(3, 232) = 2.93$, $p\eta^2 = .04$, $p = .04$).

Behaviors with friends:

Peer exclusion. To identify the groups more at risk to be excluded by peers the analysis proceeded to compare the groups of children who scored higher than the normative group (Table 15): the pure moderate externalizing group, the pure chronic externalizing group, the moderate co-occurring group, the moderate internalizing chronic externalizing group, the high internalizing-high desisting externalizing group, and the chronic co-occurring group. The ANCOVA comparing these groups in terms of peer exclusion was significant ($F(5, 551) = 4.20$, $p\eta^2 = .04$, $p < .001$). Significant differences were only found when comparing the chronic co-occurring group to the rest of the groups. The findings suggested that the chronic co-occurring group scored higher on peer exclusion in comparison to the high internalizing-high desisting externalizing group ($d = .31$, $p < .001$), the moderate internalizing chronic externalizing group ($d = .31$, $p < .001$), the moderate co-occurring group ($d = .32$, $p < .001$), the pure moderate externalizing group ($d = .28$, $p < .001$), and the pure chronic externalizing group ($d = .14$, $p = .01$)

Asocial behaviors with peers. To identify the groups more at risk to be asocial with peers the analysis proceeded to compare the groups of children who scored higher than the normative group (Table 15): the pure chronic externalizing group, the pure internalizing group, the high

internalizing-high desisting externalizing group, and the chronic co-occurring group. The ANCOVA comparing these groups in terms of peer exclusion was not significant ($F(3, 242) = 1.76$, $p\eta^2 = .02$, $p = .16$), suggesting that there were no between group differences in terms of asocial behavior with peers.

Chapter 5 - Discussion

The present study makes unique contributions by investigating the development of combined and distinct internalizing and externalizing problems within a Latent Class Growth framework. In addition to providing information for the development of internalizing and externalizing problems separately, the findings make four distinct contributions to the investigation of pure and co-occurring problem behaviors and emotions, they: (1) provide information on the developmental pathways of pure and co-occurring internalizing and externalizing problems, (2) identify antecedents related to co-occurrence or their pure counterparts, (3) identify outcomes related to pure and co-occurring problems, and (4) provide empirical evidence for the taxonomy of combined and distinct internalizing and externalizing problems (Angold and Costello, 1993; Rutter & Sroufe, 2000). Each of these contributions will be discussed after a discussion of the development of externalizing and internalizing problems. Finally, the strengths, limitation, future directions, and implications of the investigation will be addressed.

Development of externalizing problems

On average children exhibited moderate levels of externalizing behaviors initially and these behaviors declined over time. This average trajectory for externalizing problems is congruent with previous findings that suggest children tend to exhibit higher levels of

externalizing problems early in development and that externalizing problems decrease to low levels by school entry (e.g. Tremblay, 2000; Gilliom & Shaw, 2004).

The latent class growth analysis identified five latent classes for externalizing problems, with children exhibiting low, moderate desisting, moderate, high desisting, and chronic externalizing problems. Children in the moderate desisting and the low externalizing problem groups resembled the normative growth of externalizing problems as previously described, starting higher in externalizing problems early in development and then desisting over time (e.g. Tremblay, 2000). Furthermore, the high desister group was also a low risk group by early adolescence, even though children in this group exhibited higher externalizing problems early in development compared to most of the study's children. Children in the moderate and chronic group were at higher continuous risk than the other three groups, with the chronic group being the higher risk group. In general, the latent classes identified with the use of the LCGA method are incongruent with previous research that found externalizing problems to remain stable across time for all children, and indicates the existence of different groups of individuals following distinct trajectories of externalizing problems across time (Loeber et al., 1993; Patterson, 1994). However, the findings do suggest that children in the chronic and moderate groups exhibited continuing and stable externalizing problems across time. Furthermore, the different classes identified indicate that initial levels of externalizing problems might not be a good indicator for identifying children who remain at risk for exhibiting externalizing problems. These findings indicate that using single summary statistics, such as correlations, to investigate longitudinal change is problematic and provides further evidence for using person oriented methods that take longitudinal change into account, such as LCGA (Nagin & Trembley, 2001; Muthén, 2000,

2001). Indeed, this study was able to capture increased diversity through LCGA and found greater heterogeneity than prior studies.

Similar to the current study, two previous studies used LCGA to investigate the development of physical aggression and conduct problems beginning in infancy, and both of these studies identified groups exhibiting normative levels of problem behaviors, groups exhibiting high and decreasing problem behaviors, and a group exhibiting chronic problem behaviors (NICHD Early Child Care Research Network, 2004; Shaw et al., 2003). In addition to these groups, a moderate group exhibiting moderate levels of externalizing problems across development emerged in the current investigation. The identification of the moderate and the chronic groups propose the existence of two groups at high risk for exhibiting continuous externalizing problems, although they differ in the severity of externalizing problems they exhibit across time. Furthermore, the chronic externalizing problems group was identified by studies investigating the development of mother and teacher reported externalizing problems from infancy to childhood and childhood to adolescence using the LCGA method (Broidy et al., 2003; Loeber & Hay, 1997; Nagin, Farrington, & Moffitt, 1995; Nagin & Tremblay, 1999; NICHD Early Child Care Research Network, 2004; Shaw et al., 2003; Tremblay et al., 1999). Therefore, the existence of the chronic group has been replicated for different developmental periods and across different informants. Identifying this chronic externalizing problems group is important because this group of children resembles a group of individuals described as the life course persistent group (Moffitt, 1993; Patterson, 1982). These individuals are considered to be at the higher risk for developing psychopathology, for following a path of deviant and delinquent behaviors, and for committing the majority of crimes in society (Moffitt, 1993). The chronic

group represents a small percentage of the whole population exhibiting pathological levels of externalizing problems across development (Moffitt, 1993).

Development of internalizing problems

On average, internalizing problems showed some increase over time. This finding follows previous research that internalizing problems gradually increase after the age of two (Kaslow, Brown, & Mee, 1994; Vasey, Crnic, & Carter, 1994). In terms of latent classes, the majority of the sample exhibited either low or moderate levels of internalizing problems from infancy to early adolescence. A minority of the sample, the high internalizing problems group, started higher than the low and moderate groups and exhibited increased levels of internalizing problems across the 10 year period. This finding provides evidence for the existence of a high internalizing problems group as suggested by previous research (Duggal, Carlson, Sroufe, & Egeland, 2001). Children in the low and moderate internalizing problem groups were at lower risk in comparison to children in the high internalizing problems group and because they represented the majority of the sample were considered to exhibit normative levels of internalizing problems (Achenbach, Conners, Quay, Verhulst, & Howell, 1989). The current study is the first to use the LCGA method to investigate the development of internalizing problems, and additional studies are needed to establish more support for how different classes of children exhibit internalizing problems across time.

Therefore, the investigation suggests that internalizing problems may start at high levels beginning in the second year of life and that children who exhibit high levels of internalizing problems early in life are more at risk for exhibiting continuous and increasing internalizing problems. One previous study investigated the developmental pathway of internalizing problems beginning in infancy using latent growth analysis and also suggested that internalizing problems

might appear as early as the second year of life (Gilliom & Shaw, 2004). This information is important because very little is known about the development of internalizing problems early in life (Gilliom & Shaw, 2004; Keiley et al., 2000). The implication of this finding is that interventions for internalizing problems need to start as early as the second year of life to prevent the continuation of these symptoms later in life. Furthermore, previous research provided evidence of the importance of taking into account the different changes in the trajectories of psychopathology (Lahey et al., 1995), and the trajectory for the high internalizing problems group suggests that internalizing problems increase until the age of 7 and then these problems tend to stabilize. This finding might indicate that implementing interventions after this point in development might be too late because of the possibility that internalizing problems might have already reached their peak around the age of seven. In addition, the trajectory changes identified in the current study are in contrast to previous research that found internalizing problems to increase during early adolescence (Bongers et al., 2003; Twenge & Nolen-Hoeksema, 2002).

Developmental pathways of pure and co-occurring problems

On average externalizing problems decreased and internalizing problems increased over time. This inverse growth relationship is consistent with previous research investigating the average development of internalizing and externalizing problems (Achenbach, Howell, Quay, Conners, 1991; Gilliom & Shaw, 2004; Tremblay et al., 1996). The current study is the first to investigate the co-occurrence of internalizing and externalizing problems within a latent class growth analysis framework, LCGA. In this way, there are no previous findings to compare the different distinct or combined internalizing and externalizing classes identified.

However, the current study does support the idea that internalizing and externalizing problems can co-occur throughout development (Achenbach, 1993; Angold, Costello, & Erkanli,

1999; Caron & Rutter, 1991; Gilliom & Shaw, 2004; Keiley et al., 2000; Lilienfeld, 2003; Youngstrom, Findling, & Calabrese, 2003), and complements previous studies that identified groups of children exhibiting pure internalizing and externalizing problems and co-occurring internalizing and externalizing problems (Epkins, 2000; Evans & Frank, 2004; Keiley et al., 2003; Reitz, Dekovic, & Meijer, 2005; Youngstrom, Findling, & Calabrese, 2003). In addition, the present study lends additional support for the existence of a chronic co-occurring group as suggested by studies investigating the average trajectories of internalizing or externalizing problems (Gilliom & Shaw, 2004; Keiley et al., 2000). Moreover, as previous research suggested, the current study finds that co-occurrence might have an early age of onset (Loeber & Keenan, 1994; Newman et al., 1998). Therefore, children embark on pathways to pure or co-occurring internalizing and externalizing problems as early as the second year of life, and therefore interventions on pure or combined externalizing and internalizing problems need to be initiated early in life.

Furthermore, the present study's findings are unique because LCGA enabled the identification of heterogeneous developmental patterns of pure or combined internalizing and externalizing problems within a dynamic framework by taking trajectories of change into account. The majority of previous studies have investigated point by point change or average trajectories of internalizing and externalizing problems over time (Nagin & Tremblay, 2001), although the LCGA method offers a more comprehensive view of co-occurrence. In terms of latent classes, the present study identified different groups exhibiting low/normative externalizing and internalizing problems, pure moderate externalizing problems, pure chronic externalizing problems, moderate co-occurring externalizing and internalizing problems, moderate internalizing and chronic externalizing problems, pure internalizing problems, high

internalizing and high desisting externalizing problems, and chronic co-occurring internalizing and externalizing problems. The existence of these groups provide support for the idea that the co-occurrence between internalizing and externalizing problems is complex, and previous studies that failed to identify latent classes for pure and combined internalizing problems may be misleading (Keiley et al., 2003).

Demographic differences

No ethnicity differences were found for the current study, following previous research which examined the growth of internalizing and externalizing problems from infancy to childhood (Gilliom & Shaw, 2004). Furthermore, as previous research suggested, boys were at higher risk for developing chronic externalizing problems, and girls were at higher risk for developing high internalizing problems (Achenbach et al., 1991; Broidy et al., 2003; NICHD Early Child Care Research Network, 2004).

In terms of joint occurrence, previous research provided evidence that males are at higher risk for exhibiting co-occurring internalizing and externalizing problems (Graham & Rutter, 1973; Keiley et al., 2003; Somersalo, Solantau, & Almqvist, 1996). However, the present study did not replicate this finding, suggesting that girls and boys are at similar risk for exhibiting chronic co-occurring internalizing and externalizing problems. Furthermore, according to the study's findings, more males compared to females exhibited pure chronic externalizing problems and moderate internalizing-chronic externalizing problems, suggesting that males are at higher risk for exhibiting chronic externalizing problems and low or moderate levels of internalizing problems. Therefore, studies finding more males compared to females tend to exhibit chronic externalizing problems (e.g. Broidy et al., 2003; NICHD, 2004) provide incomplete evidence because of not taking the existence of co-occurrence into account.

Antecedents related to co-occurrence or their pure counterparts

The current study suggested a number of antecedent differences when comparing the low normative group to the higher risk groups. Of particular importance from a prevention viewpoint was the finding that early indices of familial socio-economic status and the child's difficult temperament differentiate children who are at risk for developing chronic co-occurring internalizing and externalizing problems from normative groups. Therefore, the identification of children at high risk for continuous behavioral and emotional problems may be possible during the first years of life based on the child's environment and temperamental characteristics. Furthermore, these findings suggest that both environmental and child antecedents should be taken under account to understand the development of general psychopathology characterized by the combination of continuous internalizing and externalizing problems.

Previous research indicated that children who come from low SES families are more likely to be at higher risk for both internalizing and externalizing problems (Lipsey & Derzon, 1998; Keenan et al., 1997; Keiley et al., 2000), and SES has been considered as a general stressor for psychopathology (Dodge et al., 1994; Duncan, Brooks-Gunn, & Klebanov, 1994; McLoyd, 1990). Therefore, exposure to SES risk early in life and exposure to the higher stressful life events associated with low SES might result in higher general psychopathology for exhibiting co-occurring internalizing and externalizing problems (Conger et al., 1992; Deater-Deckard et al., 1998). This finding provides evidence for Angold and Costello's (1992) suggestion that one possible explanation for the co-relation between internalizing and externalizing problems in children is that it represents undifferentiated responding to stress. In addition, a large number of studies have found an association between difficult temperament measured during the first two years of life and later internalizing and externalizing problems (Bates, Bayles, Bennett, Ridge, &

Brown, 1991; Earls & Jung, 1987; Gilliom & Shaw, 2004; Keenan, Shaw, Delliquardi, Giovanelli, & Walsh, 1998; Sanson, Oberklaid, Pedlow, & Prior, 1991). However, according to the current study's findings, difficult temperament may be a general risk for psychopathology and might be a good indicator for identifying children at high risk for exhibiting co-occurring internalizing and externalizing problems. Therefore, the additive effects of high difficult temperament and low SES early in life might contribute to the dysregulation of both internalizing and externalizing symptoms setting the stage for children to develop co-occurring chronic internalizing and externalizing psychopathology, but not necessarily single form psychopathology, such as pure externalizing and pure internalizing problems.

Another important finding based on the antecedent analysis was that the pure chronic externalizing group exhibited more cognitive deficiencies compare to the pure internalizing group. Finding differences between the pure externalizing and the pure internalizing groups is essential for understanding the unique characteristics of each type of disorder and for improving prevention and treatment efforts (Oland & Shaw, 2005). For example, it has been proposed that different treatments need to be administered to children exhibiting pure externalizing problems and children exhibiting pure internalizing problems (Pliszka, 1989), and the current findings might provide support for a need to pay attention to the cognitive deficiencies for children who exhibit pure chronic externalizing problems compared to children who exhibit pure internalizing problems. Furthermore, it is important to identify children at differential risk for exhibiting pure externalizing problems versus pure internalizing problems early in life from an intervention stand point, and the current findings suggest that an additional factor that needs to be taken under consideration is the children's cognitive abilities during the first two years of life.

Moreover, children who were at higher risk for exhibiting externalizing problems, but low or normative levels of internalizing problems were the children who were exposed to a more negative early familial environment compared to the normative group. This finding might suggest that a negative home environment predisposes children at risk for externalizing problems, but not internalizing problems. As suggested by previous research, children who exhibit high externalizing problems early in life may influence their parents negatively, resulting to parents being less involved and providing a less positive environment to these children (Shaw et al., 2003). Eventually, a negative home environment may result in the continuation of externalizing problems across development. Therefore, the current investigation provides evidence for another factor that might be more strongly related to externalizing problems compared to internalizing problems, and also contradicts previous research that found the home environment to be related to high externalizing, high internalizing, and co-occurring internalizing and externalizing problems (Duggal, Carlson, Sroufe, & Egeland, 2001; Ge et al., 1996; Keiley et al., 2003; Moffitt, 1993; Shaw, Owens, Vondra, Keenan, & Winslow, 1996).

Outcomes related to pure and co-occurring problems

The current study also investigated how the different classes were related to early adolescent outcomes. Such an investigation is important because previous studies' failure to measure co-occurrence may have lead to the erroneous belief that a single disorder instead of a combination of these disorders leads to a specific outcome (Angold and Costello, 1993). For example, the current study showed that the children at higher risk for exclusion by peers were those who exhibited chronic co-occurring problems. This finding indicates that the combination of internalizing and externalizing problems might act as a general risk for being rejected by peers (Rudolph et al., 1994). For example, it may be that children who are anxious and withdrawn as

well as aggressive might be regarded as more annoying by peers, compared to children who are just aggressive (Keiley et al., 2003).

On the other hand, children in most of the risk groups were more asocial with peers, compared to the normative group. Therefore, being asocial with peers might be a common maladaptive behavior for pure and combined internalizing and externalizing problems. Both children with internalizing and externalizing problems may have poor social skills with peers, and therefore both groups of children tend to exhibit more asocial behavior with peers (Kennedy, Spence, & Hensley, 1989; Oland & Shaw, 2004). Children exhibiting externalizing symptoms tend to exhibit impulsive and undercontrolled behaviors toward peers, which are considered as asocial behaviors from peers (Calkins, Gill, & Wilford, 1999; Pope et al., 1991), whereas children exhibiting internalizing problems tend to be withdrawn and avoidant and because of that they do not engage in friendly relations with peers and also their peers perceive them as asocial (Oland & Shaw, 2004; Rudolph et al., 1994). Furthermore, asocial behavior with peers was the only outcome that differentiated the pure internalizing group from the normative group, suggesting that this type of behavior maybe a core part of children exhibiting internalizing problems.

In addition to the peer behaviors, risky behaviors during early adolescence were also included as possible maladaptive outcomes. The current study suggested that children exhibiting pure moderate externalizing problems and children exhibiting chronic externalizing problems, no matter their trajectories of internalizing problems, were at higher risk for exhibiting risky behaviors and for having friends who also engaged in risky behaviors. These findings follow previous evidence that individuals exhibiting high externalizing problems during childhood and adolescence are at higher risk to be associated with delinquent peers and to engage in risky

behaviors (Broidy et al., 2003; Curran, Stice, & Chassin, 1997; Moffit, 1993; Patterson et al., 1992). Furthermore, the current results indicate that following a path of stable and continuous externalizing problems might set the stage for interacting with other deviant peers and also engaging in deviant behaviors. Therefore, the continuation of externalizing problems across time, and not necessarily the levels or severity of externalizing problems, may be used to explain deviant associations and deviant behaviors later in life. Also, these differences were identified at age 12, which suggests that engagement in risky behaviors and the association with deviant peers might be initiated by early adolescence. Moreover, research has provided evidence that anxiety and depression in the absence of externalizing problems may serve as a protective factor against later externalizing problems, for being affiliated with delinquent peers, and for engaging in risky behaviors (Fite, Colder, & O' Connor, 2006; Ialongo et al., 1996). These findings might explain why children exhibiting high internalizing problems, but who did not exhibit continuous externalizing problems were not differentiated from the low risk groups in terms of risky behaviors.

Informing taxonomy

That high levels of co-occurrence between different disorders were detected may indicate that revisions of the taxonomy of constructs are needed (Angold and Costello, 1993; Rutter & Sroufe, 2000). The definitions of individual externalizing and internalizing problems might be inappropriate, and definitions might need to also reflect different classes of distinct or combined internalizing and externalizing problems (Achenbach & Quay, 1989; Angold and Costello, 1993; Rutter & Sroufe, 2000). Although the study's findings are not intended to provide a definitive taxonomy for behavioral and emotional problems, the findings provide new information in terms of the taxonomy of these syndromes. In addition, the findings of the current study suggest that

more empirical studies investigating joint occurrence are needed because investigating the phenomenon of co-occurrence is essential for the developmental psychopathology approach and has implications for the validity of current and future classification systems.

The existence of heterogeneous classes fits well with previous theories which proposed that co-occurrence should be regarded as a distinct syndrome (Angold & Costello, 1992; Lilienfeld, 2003; O'Connor et al., 1998). The current study served to identify one group of children with distinct development patterns who are most at risk for exhibiting high continuous internalizing and externalizing problems. It has been suggested that children exhibiting combined internalizing and externalizing problems experience the highest level of risk factors and have worse developmental outcomes compared to cases with pure internalizing or externalizing problems (Kovacs, 1997; Nottleman & Jensen, 1995; Oland & Shaw, 2004). The current study's findings provide partial support for this idea. The chronic co-occurring group was the only group differentiated from the normative group in terms of difficult temperament and SES risk. Therefore, both child and environmental risk factors might place a child at risk for general psychopathology as reflected by the occurrence of both internalizing and externalizing problems. Furthermore, the chronic co-occurring group was differentiated from the rest of the groups because it was at higher risk for being excluded by peers, which might suggest that these children did not attain the necessary socio-developmental milestones to associate with peers. However, these children were at similar risk to be asocial with peers, engage in risky behaviors and have friends who engage in risky behaviors as children in other groups. Therefore, the current study provides partial evidence that co-occurrence is related to higher maladjustment compared to pure internalizing or externalizing problems. In conclusion, the findings provide support for a unique group of children who are born in socio-economic adversity and start life by

exhibiting difficult temperament in the form of negative emotionality, high intensity, and low adaptability. Their exposure to adverse environmental conditions and their early difficult temperament sets the stage for the development of chronic externalizing and internalizing problems, which then leads to the engagement of deviant behaviors, the association with deviant peers, being rejected by peers, and being asocial with peers.

Also, the investigation identified two groups of children exhibiting high pure externalizing and pure internalizing problems. These groups of children only represent a small percentage of the study's sample and suggests that exhibiting pure problem behaviors or emotions might only represent a minority of children compared to children exhibiting some form of combined internalizing and externalizing problems. The pure externalizing problem group exhibited lower cognitive abilities in comparison to the pure internalizing problem group, and lower cognitive abilities have been associated to a host of negative outcomes, including following a course of delinquent behavior (Moffitt, 1993). Actually, the pure externalizing problem group was at high risk to engage in deviant behaviors during early adolescence, was at high risk to be affiliated with deviant peers, and was also rejected by peers. Therefore, these findings suggest that the pure chronic externalizing problem group might be at higher risk for maladaptation compared to the pure internalizing group. Furthermore, the pure internalizing problems group seemed to be at low risk for most of the early adolescent outcomes considered in this study. According to Oland and Shaw's (2005) socio-developmental milestone model children exhibiting high internalizing problems but low externalizing problems are more likely to exhibit isolative behavior, and to be withdrawn and avoidant because of the internalizing problems they exhibit, such as depression, anxiety, behavioral inhibition, and negative affect. Furthermore, because of these characteristics children exhibiting pure internalizing problems are

less likely to be involved with delinquent peers and less likely to exhibit continuous externalizing symptoms. The study's findings fit with this description because children in the pure internalizing group tended to be asocial with peers, but did not exhibit delinquent acts in comparison to the reference group and they were less likely to have friends who exhibited risky behaviors.

Additionally, the study's findings can inform previous research concerned with the life course persistent externalizing problems group (Moffitt, 1993). The life course persistent externalizing problems group, which is a group of individuals exhibiting severe chronic externalizing problems, can be differentiated based on the levels of internalizing problems they exhibit. Much research has focused on finding possible ways to identify these children who might be responsible for the majority of crimes committed in society (e.g. Frick & Ellis, 1999), and the present study offers an additional perspective. That the chronic externalizing group can be differentiated based on their levels of internalizing problems demonstrates that not all the children in the chronic externalizing group share the same characteristics, at least in term of the emotions and anxiety they display. A child who is at higher risk for displaying continuous withdrawal, anxiety, fearfulness, depression, hyperactivity, aggression, defiance, and destructive behavior is probably very different from a child who only displays pure externalizing problems.

Furthermore, the study suggests that high internalizing problems can also be differentiated based on the levels of externalizing problems children exhibit. These are important findings because little information is available for the development of internalizing problems early in life (Duggal, Carlson, Sroufe, & Egeland, 2001; Keiley, Bates, Dodge, & Pettit, 2000). The analyses further indicated that most of the children exhibiting high internalizing problems belong in the group exhibiting high internalizing problems but high desisting externalizing

problems. This group of children was more likely to have experienced medical problems early in life in comparison to the normative group, which might suggest that these children responded to their medical problems with high externalizing behaviors early on, but continuing internalizing problems across time. Children in this group were also of low risk to engage in risky behaviors or associate with delinquent peers. However, these children were at higher risk than the normative group to be asocial and excluded by peers.

Strengths, limitations, and future directions

Strengths of this investigation included a large sample of children followed from birth to early adolescence. The data from birth to age 2 enabled the investigation of early antecedents and the nine data points available for externalizing and internalizing problems enhanced the reliability and flexibility of the longitudinal analyses (Singer & Willett, 2003). Furthermore, the antecedent and outcome data were based on multiple informants and multiple methods (Allen, McElhaney, Kuperminc, & Jodl, 2004).

The investigation also offers a number of methodological advances. Researchers have been using statistical methods, such as correlations, clinical cutoff scores, cluster analysis, and factor analysis, to identify syndromes that tend to co-occur in the individual (Achenbach, Conners, Quay, Verhulst, & Howell, 1989); however these approaches are not built to take longitudinal change into account and at most these methods only test the association of two assessment periods (Nagin & Tremblay, 2001). LCGA has a number of advantages when compared to these methods because it investigates co-occurrence within a dynamic framework by taking trajectories of change into account, by investigating non-linear change, and by including all the available longitudinal data (even incomplete data) in the analysis. Furthermore, the latent variables used in LCGA have the potential to reduce measurement errors.

More recently the advent of latent growth models in Hierarchical Linear Modeling (HLM) and Structural Equation Modeling (SEM) enabled the estimation of the average trajectories of different behaviors, and the investigation of the codevelopment of different domains by relating their trajectories (Bryk & Raudenbush, 1992; Willett & Sayer, 1996). However, these models assume that individual curves within each behavior are relatively homogeneous and that growth trajectories in the model arise from a single multivariate normal distribution, which masks the presence of distinct subgroups. On the other hand, LCGA enables researchers to identify different latent classes by modeling a mixture of distinct multivariate distributions or latent classes (Muthén, 2000; Nagin & Tremblay, 2001). Furthermore, based on the heterogeneous trajectories of each latent class and by taking longitudinal change into account, LCGA also estimates the joint occurrence between distinct latent classes of different behaviors. The current study with the use of LCGA was able to: (1) look at more narrowly defined patterns of co-occurrence, (2) investigate latent classes of pure and co-occurring problems, and (3) take into account the course and development of pure and co-occurring problems (Keiley et al., 2003; McConaughy & Skiba, 1993; Verhulst & van Der Ende, 1993).

An alternative method to LCGA was developed by Muthén and Shedden (1999). This method, called General Growth Mixture Modeling (GGMM) is an extension of LCGA because it adds random effects to the parameters which define the different groups' mean trajectories. Thus, GGMM allows the trajectories of individuals within groups to vary around the group's mean trajectory. However, according to Nagin and Trembaly (2005) the addition of the variability parameters makes the model more complicated and more technically demanding. Furthermore, these authors suggest that the addition of variability parameters raises issues about what constitutes a group. For LCGA a group is a collection of individuals who follow approximately

the same developmental trajectory, but for GGMM a latent class is a population of heterogeneous individuals who can also be described by a single probability distribution. Because the current study was interested in identifying unique trajectories representing groups of individuals the LCGA method was more suitable for the investigation. However, GGMM has a number of advantages. One advantage of GGMM is that fewer groups are generally required to specify a satisfactory model. Furthermore, the major advantage of GGMM is that by allowing the investigation of variability within classes, researchers can test whether antecedents operate differently for different classes, but also antecedents can be used to investigate within class variation (Muthén & Muthén, 2006). Future studies with the use of GGMM can investigate for example not only how difficult temperament might be related to the development of distinct classes, but also whether difficult temperament can explain the variability of children within a latent class. Such an investigation has the potential to enhance the investigation of individual differences.

One limitation of the current study was the relatively low internal consistency of the internalizing scale. The lower internal consistency of the internalizing scale in comparison to the externalizing scale might provide an argument for why externalizing problems were found to be more important in the antecedent and outcome analyses. However, some factors which were included in the analyses, like delinquency, might be more related to externalizing problems compared to internalizing problems. Another possible limitation might be that the externalizing and internalizing problem trajectory analyses only relied on mother reports. However, parents are considered to be a critical source of their offspring behavior (Achenbach, Conners, Quay, Verhulst, & Howell, 1989; Shaw et al., 2003). In addition, mothers might be more observant of

their children's internalizing symptoms compared to teachers or other informants (Keiley et al., 2000).

Furthermore, the current study included an overall measure of difficult temperament. However, according to previous research examining distinct traits of temperament may be important to differentiate between internalizing and externalizing problems. For example, the temperamental trait of resistance to control is more strongly related to the development of externalizing problems, and the temperamental trait of fearfulness is more strongly related to internalizing problems (Bates et al., 1991; Keiley et al., 2002). Therefore, future researchers should consider using different temperamental components when investigating the development of pure or co-occurring internalizing and externalizing problems. In addition, temperament has been found to interact with home environment, and future research might consider using an interactive model approach to investigate the interactions between temperament and home environment and their effect on pure or co-occurring internalizing and externalizing problems (Gilliom & Shaw, 2004).

Moreover, the current study used a community sample to investigate co-occurrence, and, although studies of general population samples are recommended (Caron & Rutter, 1991), investigating co-occurrence in high risk and clinical samples is also important as a higher rate of co-occurring disorders may be identified (Angold, Costello, & Erkanli, 1999). In addition, the study investigated longitudinal change from age 2 to age 12, and as a result the study's findings may not apply to adolescents or adults. Therefore, future studies which provide more of a life span perspective are needed. For example, Moffitt (1993) identified a group of children exhibiting externalizing problems only during adolescence; however the current study was not able to investigate whether this group exists due to the sampling period.

Additionally, the inclusion of more vulnerability or protective factors than those included in the current study might be important for future research. For example, genetic components may be related to the vulnerability of being in a co-occurring or pure internalizing and externalizing problem group (O'Connor et al., 1998). Moreover, considering factors external to the child, such as physical abuse or exposure to community violence, can provide further information for risk factors related to internalizing and externalizing problems (Lansford et al., 2006; Luthar & Cicchetti, 2000). Also, the antecedents used in the current study did not differentiate between the three groups at high risk for externalizing problems, and the inclusion of other antecedents, like callous unemotional traits, parental psychopathology and genetic differences might suggest differences between these three groups (Dodge & Pettit, 2003). For example, the presence of callous-unemotional traits, which includes such characteristics as a lack of remorse for misdeeds, absence of empathy, narcissism, a callous use of others for one's own gain, and a lack of emotionality, has been related to higher externalizing problems, although these traits suppress the development of internalizing problems (Frick & Ellis, 1999; Frick et al., 1999). Therefore, the inclusion of multiple factors, including biological, individual, and sociocultural factors, is important for understanding psychopathology (Dodge & Pettit, 2003).

Furthermore, taking into account specific types of aggression may be important for future research. For example, individuals exhibiting proactive compared to individuals exhibiting reactive aggression may differ in the levels of internalizing problems they exhibit (Ialongo et al., 1996). Reactive aggression is described as a reactive or emotionally charged aggressive response characterized by a loss of behavioral control (Barratt, 1991), and the individual overreacts to minor provocation and is viewed as short tempered and volatile (Dodge, 1991). In addition, reactive aggression is characterized in part by feelings of remorse and by thought confusion

following the aggressive acts (Barratt, et.al., 1999). However, proactive aggression is considered as a purposeful, controlled aggressive display that is usually instrumental in nature (Stanford, et al., 2003). The proactive aggressor is often a bully to peers and a criminal threat to society (Dodge, 1991). Proactive aggressors use aggression for social gain and dominance and think of aggression as a positive behavior, and because of that they have no negative emotions when acting aggressively (Barratt, et.al., 1999). Because reactive aggressors have feelings of remorse and negative thoughts after engaging in an aggressive act they may experience more internalizing problems compared to proactive aggressors. Furthermore, proactive and reactive aggression may be used to differentiate between children who exhibit chronic externalizing problems.

Finally, future research might consider investigating co-occurrence separately for boys and girls. A lot of research has suggested that males are at higher risk for developing externalizing problems, and females are at higher risk for developing internalizing problems (Achenbach et al., 1991; Broidy et al., 2003; NICHD Early Child Care Research Network, 2004). Therefore, different models of co-occurrence suggesting differential taxonomy may be identified if the two genders are investigated separately.

Implications

Externalizing and internalizing symptoms have negative effects on children, their families, and the communities they live in (Kazdin, 1993; Loeber & Keenan, 1994). Furthermore, the public costs associated with chronic externalizing and internalizing symptoms are tremendous, with co-occurring disorders having a higher cost to society compared to pure disorders (Cohen, 1998; Foster, Dodge, & Jones, 2003; Newman et al., 1998). Individuals exhibiting co-occurring disorders exceed individuals exhibiting pure disorders in terms of

chronic history of mental illness, higher use of treatments, more physical health problems, greater functional interference in daily life, more encounters with the justice system, unemployment, welfare dependence, and generally more impaired adaptation across domains such as work, education, health, and social-support networks (Armbruster & Kazdin, 1995; Kovacs, & Devline, 1998; Newman et al., 1998). Because of these reasons, an understanding of co-occurrence is essential. However, even though research has indicated the existence of pure and co-occurring forms of externalizing and internalizing problems, the evidence in the literature remain limited in many respects (Oland & Shaw, 2005), and inefficient evidence on the issue of co-occurrence may lead to ineffective treatments because of the complex and diverse nature of co-occurring disorders (Keilley et al., 2003; Newman et al., 1998).

The current study provided findings on the developmental trajectories of different latent classes of children exhibiting normative, and pure or combined internalizing and externalizing problems, and how these differential latent classes are affected by different antecedents and are expressed during early adolescence. These findings may have the ability to inform the construction of intervention, prevention, and treatment programs for individuals exhibiting co-occurring internalizing and externalizing problems. First of all, the investigation suggests that interventions may need to be individually tailored to specific subgroups of children, since children with co-occurring problems respond differently to treatment compared to children with pure behavioral or emotional problems (Pliszka, 1989). Therefore, the findings of this study have implications for treatment, since children exhibiting co-occurring internalizing and externalizing problems may benefit from more comprehensive treatments or from broad-band approaches to treatment, addressing both problem behaviors and emotions, compared to children with pure symptoms (Angold & Costello, 1993; Russo & Beidel, 1994). Even though multimodal

treatments are expensive, the cost to the individual and to society for not taking both externalizing and internalizing symptoms into account may be far more expensive (Newman et al., 1998). Furthermore, single-disorder interventions might not produce successful recovery to individuals with co-occurring disorders, although these interventions might be really important for children exhibiting pure externalizing or pure internalizing problems.

In addition, as the antecedent analyses suggested children who live in low SES environment and also exhibit difficult temperament may be at higher risk for exhibiting co-occurring problems. These findings can inform early interventions for identifying children at high risk for co-occurring problem behaviors and emotions. Also, the outcome analysis suggested that children who exhibit co-occurring problems might be more at risk for being rejected by peers. Based on this finding, social skill training early in life might help children with chronic co-occurring problems to deal with peers better and not be excluded by peers (Anderson et al., 2003; Brestan & Eyeberg, 1998), which might then suppress their development of co-occurring symptoms. Numerous studies have linked peer rejection to both internalizing and externalizing problems across different developmental periods from kindergarten to adolescence (Coie et al., 1992; Dodge, Coie, & Brakke, 1982; Keiley, Bates, Dodge, & Pettit, 2000; Keiley et al., 2003; Wright, Zakriski, & Drinkwater, 1999). Therefore, the current study's findings, in combination with previous research, might suggest that peer rejection can be regarded as both a risk for co-occurrence and a consequence of co-occurrence between internalizing and externalizing problems (Keiley et al., 2003; Wright, Zakriski, & Drinkwater, 1999). Based on this idea, taking into consideration the transactional relationship between peer relationships and co-occurring internalizing and externalizing problems across time might provide important

information of the development of co-occurrence, and ways to prevent the development of co-occurrence.

Moreover, a better understanding of what characterizes the life course persistent group would benefit the society as a whole because these individuals are responsible for the majority of crimes committed in society (Moffitt, 1993; Patterson, 1982). This small minority of persons (5-8%) display chronic antisocial behavior and are responsible for over 50% of violent behaviors (Elliot, 1994; Moffitt, 1993). The current study's suggestion that the life course persistent group can be differentiated in terms of the levels of internalizing problems they exhibit is important for designing individual interventions in trying to prevent lifelong severe antisocial behavior. For example, there might be a group of children who engage in chronic externalizing problems, but their engagement in these chronic aggressive behaviors, their inability to control their actions, and the social consequences coming from such behavior, makes them more vulnerable to experience anxiety and depression, which they then express in co-occurring internalizing and externalizing problems. In this way, internalizing and externalizing problems may mutually reinforce each other, and children exhibiting co-occurring internalizing and externalizing symptoms may be benefited more if both of these symptoms were treated. On the other hand, children displaying pure chronic externalizing problems might not feel negatively or guilty about their behavior because these children have failed to attain the socio-developmental milestones of self reflection and self evaluation, and tend to be more narcissistic and have a higher sense of self-esteem which prevents them from developing internalizing problems (Oland & Shaw, 2004). Therefore, children exhibiting pure externalizing problems may be benefited more if treatment is focused on characteristics associated with externalizing behavior, such as high self-esteem.

Finally, investigating the trajectories of behavioral and emotional problems over time is important because these findings may inform the timing of interventions (Dodge, 1993; Loeber & Farrington, 1994). The current study suggested that high pure and co-occurring internalizing and externalizing problems may start as early as the second year of life, and interventions early in life are important because psychopathology and many lifetime psychiatric disorders might have their roots in these problems early in life (Briggs-Gowan et al., 2003; Cohen et al., 1993; Costello, Egger, & Angold, 2005). Based on this idea, Dodge and Pettit (2003) suggested that it is important to carry interventions early in life before antisocial outcomes or other types of psychopathology become inevitable. Furthermore, early and continuous interventions have higher probability of success, which strengthens the idea that the earlier interventions take place the better chances the children at high risk for psychopathology might have (Dishion & Patterson, 1992).

Implications for Developmental Psychopathology

One of the major goals of the developmental psychopathology perspective is the identification of suitable methods to investigate the development and co-development of different psychopathological conditions. The present study offers further evidence that mixture modeling, and specifically LCGA, are important tools to be used for the identification of different latent classes of individuals exhibiting pure or combined symptoms. Furthermore, with the use of the LCGA method, the current study was able to provide information on the validity of classification systems, etiological theories, and treatment, which are of major importance for the developmental psychopathology approach (Angold & Costello, 1993; Keiley et al., 2003; Rutter & Sroufe, 2000). Also, the investigation provides some additional answers to the idea of co-

occurrence which is considered as a major research challenge for developmental psychopathology (Rutter & Sroufe, 2000).

References

Achenbach, T. M. (1990). “Comorbidity” in child and adolescent psychiatry: Categorical and quantitative perspectives. *Journal of Child and Adolescent Psychopharmacology, 1*, 271-278.

Achenbach, T. M. (1991a). *Manual for the Child Behavior Checklist/4-18 and 1991 Profile.* Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. (1991b). *Manual for the Teacher’s Report Form and 1991 Profile.* Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. (1992). *Manual for the Child Behavior Checklist/2-3 and 1992 Profile.* Burlington, VT: University of Vermont Department of Psychiatry.

Achenbach, T. M. (1993). Taxonomy and comorbidity of conduct problems: Evidence from empirically based approaches. *Development and Psychopathology, 5,* 51-64.

Achenbach, T. M., Conners, C. K., Quay, H. C., Verhulst, F. C. & Howell, C. T. (1989). Replication of empirically derived syndromes as a basis for taxonomy of child/adolescent psychopathology. *Journal of Abnormal Child Psychology, 17*(3), 299-323.

Achenbach, T. M., & Edelbrock, C. S. (1978). The classification of child psychopathology: A review and analysis of empirical efforts. *Psychological Bulletin, 85*, 1275-1301.

Achenbach, T. M., Howell, C. T., Quay, H. C., & Conners, C. K. (1991). National survey of problems and competencies among 4 to 16-year-olds: Parents’ reports for normative and clinical samples. *Monographs of the Society for Research in Child Development, 56.*

Ackerman, B. P., Brown, E. D., & Izard, C. E. (2004). The relations between contextual risk, earned income, and the school adjustment of children from economically disadvantaged families. *Developmental Psychology, 40*, 204-216.

Ackerman, B. P., D'Eramo, K. S, Umylny, L., Schultz, D., & Izard, C. E. (2001). Family structure and externalizing behavior of children from economically disadvantaged families. *Journal of Family Psychology, 15*(2), 288-300.

Aguilar, B., Sroufe, L. A., Egeland, B., & Carlson, E. (2000). Distinguishing the early-onset/persistent and adolescence-onset antisocial behavior types: From birth to 16 years. *Development and Psychopathology, 12*, 109-132.

Armbruster, P., & Kazdin, A. E. (1995). Attrition in child psychotherapy. In T. H. Ollendick & R. J. Prinz (Eds.), *Advances in clinical child psychology* (pp. 50-83). New York: Plenum.

Anderson LM, Shinn C, Fullilove MT, Scrimshaw SG, Fielding JE, Normand J, Carande-Kulis VG (2003). The effectiveness of early childhood development programs: a systematic review. *American Journal Prev Medicine, 24*, 32-48.

Anderson, J., Williams, S., McGee, R., & Silva, P. (1987). DSM-III disorders in preadolescent children: Prevalence in a large sample from the general population. *Archives of General Psychiatry, 44*, 69-76.

Anderson, J., Williams, S., McGee, R., & Silva, P. (1989). Cognitive and social correlates of *DSM-III* disorders in preadolescent children. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*, 842-846.

Angold, A., & Costello, E. J. (1992). Comorbidity in children and adolescents with depression. *Child and Adolescent Psychiatric Clinics of North America, 1,* 31-51.

Angold, A., & Costello, E. J. (1993). Depressive comorbidity in children and adolescents: Empirical, theoretical, and methodological issues. *American Journal of Psychiatry, 150*, 1779-1791.

Angold, A., Costello, E., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, *40*(1)*,* 57-87.

Angold, A., Erkanli, A., Silberg, J., Eaves, L., & Costello, E. J. (2002). Depression scale scores in 8-17-year-olds: Effects of age and gender. *Journal of Child Psychology and Psychiatry, 43*(8), 1052-1063.

Angold, A., & Rutter, M. (1992). Effects of age and pubertal status on depression in a large clinical sample. *Development and Psychopathology*, *4*(1), 5-28.

Bakeman, R., & Brownlee, J. B. (1982). Social rules governing object conflicts in toddlers and preschoolers. In K. H. Bubin & H. S. Ross (Eds.), *Peer relations and social skills in childhood* (pp. 99-111). New York: Springer-Verlag.

Barratt, E.S. (1991). Measuring and predicting aggression within the context of a personality theory. *Journal of Neuropsychiatry, 3*(2), 35-39.

Barratt, E.S., Stanford, M.S., Dowdy, L., Liebman, M.J. & Kent, T.A. (1999). Impulsive and premeditated aggression: a factor analysis of self reported acts. *Psychiatry Research, 86*, 163-173.

Barron, A. R., & Cover, T. M. (1991). Minimum complexity density estimation. *IEEE Theory 37,* 1034–1054.

Bates, J. E., Bayles, K., Bennett, D. S., Ridge, B., & Brown, M. M. (1991). Origins of externalizing behavior problems at eight years of age. In D. J. Pepler & K. H. Rubin (Eds.), *The development and treatment of childhood aggression* (pp. 93-120). Hillsdale, NJ: Erlbaum.

Bates, J. E., Pettit, G. S., Dodge, K. A., & Ridge, B. (1998). Interaction of temperamental resistance to control and restrictive parenting in the development of externalizing behavior. *Developmental Psychology, 34*, 982-995.

Bayley, N. (1993). *Bayley Scales of Infant Development-II.* San Antonio, TX: Psychological Corporation.

Bauer, D. J., & Curran, P. J. (2003). Distributional assumptions of growth mixture models: Implications for over-extraction of latent trajectory classes. *Psychological Methods, 8*, 338-363.

Belsky, J., Hsieh, K. H., & Crnic, K. (1998). Mothering, fathering, and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology, 10*, 301-319.

Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. *Development and Psychopathology, 9*, 291-319.

Bongers, I. L., Koot, H. M., van der Ende, J., & Verhulst, F. C. (2003). The normative development of child and adolescent problem behavior. *Journal of Abnormal Psychology, 112*, 179-192.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371-399.

Bradley, R. H., Mundfrom, D. J., Whiteside, L., Casey, P. H., & Barrett, K. (1994). A factor-analytic study of the infant-toddler and early-childhood versions of the home inventory administered to White, Black, and Hispanic American parents of children born preterm. *Child Development, 65*, 880-888.

Brennan, P. A., Hall, J., Bor, W., Najman, J. M., & Williams, G. (2003). Integrating biological and social processes in relation to early-onset persistent aggression in boys and girls. *Developmental Psychology, 39*(2)*,* 309-323.

Brestan EV, Eyberg SM (1998). Effective psychosocial treatments of conduct-disordered children and adolescents: 29 years, 82 studies, and 5272 kids. *Journal of Clinical Child Psychiatry, 27*, 180-189.

Broidy, L. M., Nagin, D. S., Tremblay, R. E., Bates, J. E., Brame, B., Dodge, K. A., et al. (2003). Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: A six-site cross-national study. *Developmental Psychology, 39*(2), 222-245.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods.* Thousand Oaks, CA: Sage.

Brunnekreef, J. A., De Soneville, L. M. J., Althaus, M., Minderaa, R. B., Oldenhinkel, A. J., et al. (2007). Information processing profiles of internalizing and externalizing behavior problems: evidence from a population-based sample of preadolescents. *Journal of Child Psychology and Psychiatry, 48*(2), 185-193.

Cairns, R., Cairns, B., Neckerman, H., Gest, S., Gariepy, J. (1988). Social networks and aggressive behavior: Peer support or peer rejection? *Developmental Psychology, 24*, 815-823.

Caldwell, B. M. & Bradley, R. H. (1984). *Home observation of the measurement of the environment.* Little Rock: University of Arkansas at Little Rock.

Calkins, S. D., Gill, K., & Williford, A. (1999). Externalizing problems in two-year-olds: Implications for patterns of social behavior and peers' responses to aggression. *Early Education and Development, 10*, 267-288.

Campbell, S. B. (1995). Behavior problems in preschool children: A review of recent research. *Journal of Child Psychology and Allied Disciplines*, *36,* 113-149.

Campbell, S. B., Pierce, E. W., March, C. L., Ewing, L. J., & Szumowski, E. K. (1994). Hard-to-manage preschool boys: Symptomatic behavior across contexts and time. *Child Development, 65*, 836-851.

Cantwell, D. P., & Baker, L. (1989). Stability and natural history of DSM-III childhood diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*, 691-700.

Caplan, M., Vespo, J. E., Pedersen, J., & Hay, D. F. (1991). Conflict and its resolution in small groups of one- and two-year-olds. *Child Development, 62*, 1513-1524.

Care, W. B., & McDevitt, S. C. (1978). Revision of the infant temperament questionnaire. *Pediatrics, 61*, 735-739.

Caron, C., & Rutter, M. (1991). Comorbidity in child psychopathology: Concepts, issues and research strategies. *Journal of Child Psychology and Psychiatry, 32*, 1063-1080.

Caspi, A., Moffitt, T. E., Newman, D. L., & Silva, P. A. (1998). Behavioral observations at age 3 years predict adult psychiatric disorders: Longitudinal evidence from a birth cohort. In M. E. Hertzig & E. A. Farber (Eds), *Annual progress in child psychiatry and child development: 1997* (pp. 319-331). Philadelphia, PA: Brunner/Mazel.

Cicchetti, D. (1984). The emergence of developmental psychopathology. *Child Development, 55*, 1-7.

Cicchetti, D., & Rogosch, F. (1996). Equifinality and multifinality in developmental psychopathology. *Development and Psychology, 8*, 597-600.

Cicchetti, D., & Toth, S. L. (1998). The development of depression in children and adolescents. *American Psychologists, 53*, 221-241.

Cohen, J. (1988). *Statistical power for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, M. A. (1998). The monetary value of saving a high-risk youth. *Journal of Quantitative Criminology, 14*, 5-33.

Cohen, P., Cohen, J., Kasen, S., Velez, C. N., Hartmark, C., Johnson, J., et al. (1993). An epidemiological study of disorders in late childhood and adolescence: Age- and gender-specific prevalence. *Journal of Child Psychology and Psychiatry, 34*, 851-867.

Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (pp. 779–862). New York: Wiley.

Coie, J. D., Lochman, J. E., Terry, R., & Hyman, C. (1992). Predicting early adolescent disorder from childhood aggression and peer rejection. *Journal of Consulting and Clinical Psychology, 60*, 783-792.

Conger, R. D. & Elder, G .H. (1994). *Families in troubled times: Adapting to change in rural America.* New York: Aldine de Gruyter.

Costello, E. J., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *Journal of the American Medical Association, 290*, 2023-2029.

Costello, E. J., Egger, H., & Angold, A. (2005). 10-year research update review: The epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*, 972-986.

Cote, S., Tremblay, R. E., Nagin, D., Zoccolillo, M., & Vitaro, F. (2002). The development of impulsivity, fearfulness, and helpfulness during childhood: Patterns of consistency and change in the trajectories of boys and girls. *Journal of Child Psychology and Psychiatry, 43*, 609-618.

Craig, W. M. (1998). The relationship among bullying, victimization, depression, anxiety, & aggression in elementary school children. *Personality & Individual Differences, 24*, 123-130.

Crick, N. R., Bigbee, M. A., & Howes, C. (1996). Gender differences in children's normative beliefs about aggression: How do I hurt thee? Let me count the ways. *Child Development, 67*, 1003-1014.

Curran, P. J., Stice, E., & Chassin, L. (1997). The relation between adolescent alcohol use and peer alcohol use: A longitudinal random coefficients model. *Journal of Consulting and Clinical Psychology, 65*, 130-140.

Day, N. L., Richardson, G. A., Goldschmidt, L., & Cornelius, M. D. (2000). Effects of prenatal tobacco exposure on preschoolers' behavior. *Journal of Development and Behavioral Pediatrics, 21*, 180-188.

Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology, 10*, 469-493.

Dishion, T. J., Andrews, D. W., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence: Relationship characteristics, quality, and interaction process. *Child Development, 66*, 139-151.

Dishion, T., & Patterson, G. R. (1992). Age effects in parent training outcome. *Behavior Therapist, 23*, 719-729.

Dodge, K. A. (1993). The future of research on the treatment of conduct disorder. *Development and Psychopathology, 5*, 311-319.

Dodge, K. A., Coie, J. D., & Brakke, N. P. (1982). Behavior patterns of socially rejected and neglected preadolescents: The roles of social approach and aggression. *Journal of Abnormal Child Psychology, 10*, 389-410.

Dodge, K., & Pettit, G. S. (2003). A biopsychosocial model of the development of chronic conduct problems in adolescence. *Developmental Psychology, 39*(2), 349-371.

Dodge, K. A., Pettit, G. S., & Bates, J. E. (1994). Socialization mediators of the relation between socioeconomic status and child conduct problems. *Child Development, 65*, 649-665.

Duggal, S., Carlson, E. A., Sroufe, A., & Egeland, B. (2001). Depressive symptomatology in childhood and adolescence. *Development and Psychopathology, 13,* 143-164.

Duncan, G. J., Brooks-Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early childhood development. *Child Development, 65*, 296-318.

D'Unger, A., Land, K., McCall, P., and Nagin, D. (1998). How many latent classes of delinquent/criminal careers? Results from mixed Poisson regression analyses of the London, Philadelphia, and Racine cohort studies. *American Journal of Sociology, 103*, 1593-1630.

Earls, F., & Jung, K. G. (1987). Temperament and home environment characteristics as causal factors in the early development of childhood psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 26,* 491-498.

Elliott, D. S. (1994). Serious violent offenders: Onset, developmental course, and termination-The American Society of Criminology 1993 presidential address. *Criminology, 32*, 1-21.

Epkins, C. (2000). Cognitive specificity in internalizing and externalizing problems in community and clinic-referred children. *Journal of Clinical Child Psychology, 29*(2), 199-208.

Evans, A. S., & Frank, S. J. (2004). Adolescent depression and externalizing problems: Testing two models of comorbidity in an inpatient sample. *Adolescence, 39*(153), 1-18.

Fergusson, D., Lynksey, M., & Horwood, L. (1996). Factors associated with continuity and change in disruptive behavior patterns between childhood and adolescence. *Journal of Abnormal Child Psychology, 24*, 533-553.

Foster, E. M., Dodge, K. A., & Jones, D. (2003). Issues in the economic evaluation of prevention programs. *Applied Developmental Science, 7*, 76-86.

Frick, P. J., & Ellis, M. (1999). Callous-unemotional traits and subtypes of conduct disorder. *Clinical Child and Family Psychology Review, 2,* 149-168.

Frick, P. J., Lilienfeld, S. O., Ellis, M., Loney, B., & Silverthorn, P. (1999). The association between anxiety and psychopathy dimensions in children. *Journal of Abnormal Child Psychology*, *27,* 383-392.

Garrison, C. Z., Jackson, K. L., Marsteller, F., McKeown, R., & Addy, C. (1990). A longitudinal analysis of depressive symptomatology in young adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*, 581-585.

Ge, X., Best, K. M., Conger, R. D., & Simons, R. L. (1996). Parenting behaviors and the occurrence and co-occurrence of adolescent depressive symptoms and conduct problems. *Developmental Psychology, 32*(4), 717-731.

Gilliom, M., & Shaw, D. S. (2004). Codevelopment of externalizing and internalizing problems in early childhood. *Development and Psychopathology, 16*, 313-333.

Graham, P., & Rutter, M. (1973). Psychiatric disorder in the young adolescent: A follow-up study. *Proceedings of the Royal Society of Medicine, 66*, 58-61.

Hall, D. B. (2000). Zero-Inflated Poisson and Binomial Regression with Random Effects: A Case Study. *Biometrics, 56*, 1030-1039.

Harrington, R. C. (1994). Affective disorders. In M. Rutter, E. Taylor, & L. Hersov (Eds.), *Child and Adolescent Psychiatry: Modern Approaches* (pp. 330-350). Cambridge, MA, Blackwell.

Henrich, C. C., Schwab-Stone, M., Fanti, K., Jones, S. M., & Ruchkin, V. (2004). The association of community violence exposure with middle school achievement: A prospective study. *Journal of Applied Developmental Psychology, 25*, 327-348.

Hededer, D., & Gibbons, R. D. (1994). A random-effects ordinal regression model for multilevel analysis. *Biometrics*, 50: 933-944.

Hill, J. (2002). Biological, psychological, and social processes in the conduct disorders. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 43*, 133-164.

Hinshaw, S. P. (2002). Process, mechanism, and explanation related to externalizing behavior in developmental psychopathology. *Journal of Abnormal Child Psychology, 30*, 431-446.

Hogue, A., & Steinberg, L. (1995). Homophily of internalizing distress in adolescent peer groups. *Developmental Psychology, 31*(6), 897-906.

Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., & Crockett, L. (1996). The course of aggression in first-grade children with and without comorbid anxious symptoms. *Journal of Abnormal Child Psychology, 24*(4), 445-456.

Jedidi, K., Jagpal, H. S., & DeSarbo, W. S. (1997). Finite-mixture structural equation models for response-based segmentation and unobserved heterogeneity. *Marketing Science, 16*, 39-59.

Juvonen, J. (2001). School violence: Prevalence, fears, and prevention. Rand Corporation. Retrieved May 29, 2007, from http://www.rand.org/publications/IP/IP219/index.html

Kaslow, N. J., Brown, R. T., & Mee, L. (1994). Cognitive and behavioral correlates of childhood depression: A developmental perspective. In W. M. Reynolds & H. F. Johnson (Eds.), *Handbook of depression in children and adolescents* (pp. 97-121). New York: Plenum Press.

Kass, R. E. & Raftery, A. E. (1993). Bayes factors. *Journal of the American Statistical Association, 90*, 773-795.

Kazdin, A. E. (1993). Treatment of conduct disorder: Progress and directions in psychotherapy research. *Development and Psychopathology, 5*, 277-310.

Keenan, K., & Shaw, D. (1997). Developmental and social influences on young girls' early problem behavior. *Psychological Bulletin*, *121*(1), 95-113.

Keenan, K., Shaw, D. S., Delliquadri, E., Giovannelli, J., & Walsh, B. (1998). Evidence for the continuity of early problem behaviors: Application of a developmental model. *Journal of Abnormal Child Psychology, 26,* 441-454.

Keenan, K., Shaw, D. S., Walsh, B., Delliquadri, E., & Giovannelli, J. (1997). *DSM-III-R* disorders in preschool children from low-income families. *Journal of the American Academy of Child and Adolescent Psychiatry, 36,* 620-627.

Keiley, M. K., Bates, J. E., Dodge, K. A. & Pettit, G. S. (2000). A cross-domain growth analysis: Externalizing and internalizing behaviors during 8 years of childhood. *Journal of Abnormal Child Psychology*, *28*, 161-179.

Keiley, M. K., Bates, J. E., Dodge, K. A., & Pettit, G. S. (2002). Effects of temperament on the development of externalizing and internalizing behaviors over 9 years. In F. Columbus (Ed.), *Advances in psychology research* (Vol. 6, pp. 256-288). Huntington, NY: Nova Science Publishers.

Keiley, M. K., Lofthouse, N., Bates, J. E., Dodge, K. A., & Pettit, G. S. (2003). Differential risks of covarying and pure components in mother and teacher reports of externalizing and internalizing behavior across ages 5 to 14. *Journal of Abnormal Child Psychology*, *31*(3), 267-283.

Kennedy, E., Spence, S., Hensley, R. (1989). An examination of the relationship between childhood depression and social competence among primary school children. *Journal of Child Psychology and Psychiatry, 30*, 561-573.

Klein, D., & Riso, L. (1993). Psychiatric disorders: Problems of boundaries and comorbidity. In C. Costello (Ed.), *Basic issues in psychopathology* (Vol. IX, pp. 19-66), New York: Guilford.

Kochenderfer, B. J. and Ladd, G. W. (1996). Peer victimization: Cause or consequence of school maladjustment? *Child Development, 67*, 1305-1317.

Kovacs, M., & Devline, B. (1998). Internalizing disorders in childhood. *Journal of Child Psychology and Psychiatry, 1*, 47-63.

Kovacs, M., Paulauskas, S., Gatsonis, C., & Richards, C. (1988). Depressive disorders in childhood: III. A longitudinal study of comorbidity with and risk for conduct disorders. *Journal of Affective Disorders, 15*, 205-217.

Krol, N. P. C. M., De Bruyn, E. E. J., & Van Den Bercken, J. H. L. (1995). Intuitive and empirical prototypes in childhood psychopathology. *Psychological Assessment, 7*(4), 533-537.

Kreuter, F. & Muthén, B. (2006). Analyzing criminal trajectory profiles: Bridging multilevel and group-based approaches using growth mixture modeling. Submitted for publication.

Kuperminc, G. P., Blatt, S. J., Shahar, G., Henrich, C., & Leadbeater, B. J. (2004). Cultural equivalence and cultural variance in longitudinal associations of young adolescent self-definition and interpersonal relatedness to psychological and school adjustment. *Journal of Youth and Adolescence, 33*(1), 13-30.

Kuperminc, G. P., & Brookmeyer, K. A. (2006). Developmental Psychopathology. In R. T. Ammerman (Ed), *Comprehensive Handbook of Personality and Psychopathology Volume III: Child Psychopathology, Part I* (pp. 100-113). Hoboken, NJ: John Wiley & Sons.

Ladd, G. W. and Profilet, S. M. (1996). The Child Behavior Scale: A teacher-report measure of young children's aggressive, withdrawn, and prosocial behaviors. *Developmental Psychology, 32*(6), 1008-1024.

Lahey, B. B., Loeber, R., Hart, E. L., Frick, P. J., Applegate, B., Zhang, Q., Green, S. M., & Russo, M. F. (1995). Four-year longitudinal study of conduct disorder in boys: Patterns and predictors of persistence. *Journal of Abnormal Psychology, 104*, 83-93.

Lahey, B. B., Waldman, I. D., & McBurnett, K. (1999). The development of antisocial behavior: An integrative causal model. *Journal of Child Psychology and Psychiatry, 40*, 669-682.

Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71(1)*, 107-118.

Lilienfeld, S. (2003). Comorbidity between and within childhood externalizing and internalizing disorders: Reflections and directions. *Journal of Abnormal Child Psychology, 31*(3), 285-291.

Lambert, D. (1992). Zero-inflated poisson regression with application to defects in manufacturing. *Technometrics, 34*, 1-14.

Lansford, J. E., Malone, P. S, Stevens, K. I., Dodge, K. A., Bates J. E., & Pettit, G. S. (2006). Developmental trajectories of externalizing and internalizing behaviors: Factors underlying resilience in physically abused children. *Development and Psychopathology, 18*, 35-55.

Lipsey, M. W., & Derzon, J. H. (1998). Predictors of violent or serious delinquency in adolescence and early adulthood. In R. Loeber & D. P. Farrington (Eds.), *Serious and violent juvenile offenders: Risk factors and successful interventions* (pp. 86-105). Thousand Oaks, CA: Sage.

Lo, Y., Mendell, N., & Rubin, D. B. (2001). Testing the number of components in a normal mixture, *Biometrika, 88*, 767-778.

Loeber, R., & Farrington, D. P. (1994). Problems and solutions in longitudinal and experimental treatment of child psychopathology and delinquency. *Journal of Consulting and Clinical Psychology, 62*, 887-900.

Loeber, R., & Hay, D. (1997). Key issues in the development of aggression and violence from adulthood to early adulthood. *Annual Review Psychology,* 371-410.

Loeber, R., & Keenan, K. (1994). Interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review, 14*, 497-523.

Loeber, R., Tremblay, R. E., Gargon, C., & Charlebois, P. (1989). Continuity and desistance in disruptive boys' early fighting in school. *Development and Psychopathology, 1*, 39-50.

Loeber, R., Wung, P., Keenan, K., Giroux, B., Stouthamer-Loeber, M., VanKammen, W. B., & Maughan, R. (1993). Developmental pathways in disruptive child behavior. *Development and Psychopathology, 5*, 103-133.

Lynam, D., Moffitt, T., & Stouthamer-Loeber, M. (1993). Explaining the relation between IQ and delinquency: Class, race, test motivation, school failure, or self-control? *Journal of Abnormal Psychology, 102*, 187-196.

Luthar, S. S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology, 14*, 945-967.

Maccoby, E. E., & Jacklin, C. N. (1980). Sex differences in aggression: A rejoinder and reprise. *Child Development, 51*, 964-980.

McArdle, J. J., & Bell, R. Q. (2000). An introduction to latent growth models for developmental data analysis. In T. D. Little & K. U. Schnabel (Eds.), *Modeling longitudinal and multilevel data: Practical issues, applied approaches, and specific examples* (pp. 69-107). Mahwah, NJ: Erlbaum.

McCauley, E., Mitchell, J., Burke, P., & Moss, S. (1988). Cognitive attributes of depression in children and adolescents. *Journal of Consulting and Clinical Psychology, 56*, 903-908.

McConaughy, S. H. & Skiba, R. J. (1993). Comorbidity of Externalizing and Internalizing Problems. S*chool Psychology Review, 22*, 421-436.

McLeod, J. D., & Shanahan, M. J. (1996). Trajectories of poverty and children's mental health. *Journal of Health and Social Behavior, 37*, 207-220.

McLoyd, V. C. (1990). Minority children: Introduction to the special issue. *Child Development, 61*, 311-346.

Medoff-Cooper, B., Carey, W. B., & McDevitt, S. C. (1993). Early infancy temperament questionnaire. *Journal of Developmental and Behavioral Pediatrics, 14*, 230-235.

Milan, S., Pinderhughes, E. E., & The Conduct Problems Prevention Research Group (2006). Family instability and child maladjustment trajectories during elementary school. *Journal of Abnormal Child Psychology, 34*(1), 43-56.

Miller-Johnson, S., Lochman, J. E., Coie, J. D., Terry, R., & Hyman, C. (1998). Comorbidity of conduct and depressive problems at sixth grade: Substance use outcomes across adolescents. *Journal of Abnormal Child Psychology, 26*(3), 221-232.

Moffitt, T. E. (1990). The neuropsychology of delinquency: A critical review of theory and research. In N. Morris & M. Tonry (Eds.), *Crime and justice* (Vol. 12, pp. 99-169). Chicago: University of Chicago Press.

Moffitt, T. E. (1993). Adolescence-limited and life-course persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674-701.

Moffitt, T. E., Caspi, A., Dickson, N., Silva, P., & Stanton, W. (1996). Childhood-onset versus adolescent-onset antisocial conduct problems in males: Natural history from ages 3 to 18 years. *Development and Psychopathology, 8*, 399-424.

Muthén, B. (2000). Latent Variable Mixrure Modeling. In G.A. Marcoulides & R. E. Schumacker (Eds.), Advanced Structural Equation Modeling: New Developments and Techniques (pp. 1-33). Lawrence Erlbaum Associates.

Muthén, B. (2001). Second-generation structural equation modeling with a combination of categorical and continuous latent variables: New opportunities for latent class-latent growth modeling. In L. M. Collins & A. G. Sayers (Eds.)*, New methods for the analysis of change* (pp. 291-322). Washington, DC: American Psychological Association.

Muthén, B. (2003). Statistical and substantive checking in growth mixture modeling. *Psychological Methods, 8*, 369-377.

Muthén, L. K. & Muthén, B. (2006). Mplus User's Guide. Los Angeles, CA: Muthén & Muthén.

Muthén, B., & Shedden, K. (1999). Finite mixture modeling with mixture outcomes using the EM algorithm. *Biometrics, 55*, 463-469.

Nagin, D. S. (1999). Analyzing developmental trajectories: A semiparametric, group-based approach. *Psychological Methods, 4*, 139-157.

Nagin, D. S., & Land, K. C. (1993). Age, Criminal Careers, and Population Heterogeneity: Specification and Estimation of a Nonparametric, Mixed Poisson Model. *Criminology, 31*, 327-362.

Nagin, D. S., Farrington, D. P., & Moffitt, T. E. (1995). Life-course trajectories of different types of offenders. *Criminology, 33*, 11-139.

Nagin, D. S., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and nonviolent juvenile delinquency. *Child Development, 70*, 1181-1196.

Nagin, D. S. & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group based method. *Psychological Methods, 6*, 18-34.

Nagin, D. S., & Tremblay, R. E. (2005). Developmental trajectory groups: Fact or a useful statistical fiction? *Criminology, 43*, 873-903.

Newman, D., Moffitt, T., Caspi, A., & Silva, P. (1998). Comorbid mental disorders: Implications for treatment and sample selection. *Journal of Abnormal Psychology, 107*(2), 305-311.

NICHD Early Child Care Research Network (2004). Trajectories of physical aggression from toddlerhood to middle childhood. *Monographs of the Society for Research in Child Development, 69*(4), 1-128.

Nottelman, E. D., & Jensen, P. S. (1995). Comorbidity of disorders in children and adolescents: Developmental perspectives. In T. H. Ollendick & R. J. Prinz (Eds.), *Advances in clinical child psychology* (Vol. 17, pp. 109-155). New York: Plenum.

O'Connor, T. G., McGuire, S., Reiss, D., Hetherington, E. M., & Plomin, R. (1998). Co-occurrence of depressive symptoms and antisocial behavior in adolescence: A common genetic liability. *Journal of Abnormal Psychology, 107,* 27–37.

Offord, D. R., Boyle, M. H., & Racine, Y. A. (1991). The epidemiology of antisocial behavior in childhood and adolescence. In D. J. Pepler & K. H. Rubin (Eds.), *The development and treatment of childhood aggression* (pp. 31-54). Hillsdale, NJ: Erlbaum.

Oland, A. A, & Shaw, D. S. (2005). Pure versus co-occurring externalizing and internalizing symptoms in children: The potential role of socio-developmental milestones. *Clinical Child and Family Psychology Review, 8*(4), 247-270.

Overpeck, M. D., & Moss, A. J. (1991). Children's exposure to environmental cigarette smoke before and after birth: Health of our Nation's children, United States, 1988. *Advance*

Data: From Vital and Health Statistics of the National Center for Health Statistics, 202, 1-12.

Park, R. D., & Slaby, R. G. (1983). The development of aggression. In P. Mussen & E. M. Hetherington (Eds), *Handbook of child psychology: Vol 4. Socialization, personality, and social development* (pp. 547-641). New York: Wiley.

Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin, 102*, 357-389.

Patterson, G. R. (1982). *Coercive family process.* Eugene, OR: Catsalia.

Patterson, G. R. (1995). Coercion as a basis for early age of onset for arrest. In J. McCord (Ed.), *Coercion and punishment in long-term perspectives* (pp. 81-105). Cambridge: Cambridge University Press.

Patterson, G. R. (1994). Some alternatives to seven myths about treating families of antisocial children. In C. Henricson (Ed.), *Crime and the family: Conference report: Proceedings of an international conference* (pp. 26-49). London: Family Policy Studies Center.

Patterson, G. R., Capaldi, D. M., & Bank, L. (1991). An early starter model for predicting delinquency. In D. J. Pepler & K. H. Rubin (Eds.), *The development and treatment of childhood aggression* (pp. 139-168). Hillsdaly, NJ: Erlbaum.

Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *A social learning approach: IV. Antisocial boys*. Eugene, OR: Castalia.

Patterson, G., & Stoolmiller, M. (1991). Replications of a dual failure model for boys' depressed mood. *Journal of Consulting and Clinical Psychology, 59*(4), 491-498.

Pihlakoski L, Aromaa M, Sourander A, Rautava P, Helenius H, Sillanpää M(2004). Use of and need for professional help for emotional and behavioral problems among preadolescents. *Journal of American Academy Child Adolescence Psychiatry, 43*, 974-983.

Pliszka, R. (1989). Effect of anxiety on cognition, behavior, and stimulant responses in ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry, 28*, 882-887.

Prior, M., Smart, D., Sanson, A., & Oberklaid, F. (1993). Sex differences in psychological adjustment from infancy to 8 years. *Journal of the American Academy of Child & Adolescent Psychiatry, 32*(2), 291-304.

Ramaswamy, V., Desarbo, W., Reibstein, D., & Robinson, W. (1993). An empirical pooling approach for estimating marketing mix elasticities with PIMS data. *Marketing Science, 12*, 103-124.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods.* Second edition. Sage Publications, Newbury Park, CA.

Roeder, K., Lynch, K., and Nagin, D. (1999). Modeling uncertainty in latent class membership: A case study in criminology. *Journal of the American Statistical Association, 94*, 766-776.

Reitz, E., Dekovic, M., & Meijer, A. M. (2005). The structure and stability of externalizing and internalizing problems behavior during early adolescence. *Journal of Youth and Adolescence, 34*(6), 577-588.

Renouf, A., Kovacs, M., & Mukerji, P. (1997). Relationship of depressive, conduct, and comorbid disorders and social functioning in childhood. *Journal of the American Academy of Child and Adolescent Psychology, 36*(7), 998-1004.

Richman, N., Stevenson, J., & Graham, P. J. (1982). *Preschool to school: A behavioral study.* London: Academic Press.

Richters, J. E. (1997). The Hubble hypothesis and the developmentalist's dilemma. *Development and Psychopathology, 9*, 193-229.

Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of Child Psychology: Vol 3. Social, emotional, and personality development (5th ed., pp. 105-178).* New York: Wiley.

Rubin, K. H., & Mills, R. S. (1991). Conceptualizing developmental pathways to internalizing disorders in childhood. *Canadian Journal of Behavioural Science, 23*, 300-317.

Rudolph, K. D., Hammen, C., & Burge, D. (1994). Interpersonal functioning and depressive symptoms in childhood: Addressing the issues of specificity and comorbidity. *Journal of Abnormal Child Psychology, 22*(3), 355-371.

Russo, M., & Beidel, D. (1994). Comorbidity of childhood anxiety and externalizing disorders: Prevalence, associated characteristics, and validation issues. *Clinical Psychology Review, 14*, 199-221.

Rutter, M. (1986). The developmental psychopathology of depression: Issues and perpectives. In M. Rutter, C. Izard, & P. Read (Eds.), *Depression in young people: Developmental and Clinical Perspectives* (pp. 3-30). New York: Guilford.

Rutter, M. (1997). Comorbidity: Concepts, claims and choices. *Criminal Behavior and Mental Health, 7*, 265-285.

Rutter, M. & Sroufe, L. A. (2000). Developmental psychopathology: Concepts and challenges. *Development and Psychopathology, 12*, 265-296.

Sanson, A., Oberklaid, F., Pedlow, R., & Prior, M. (1991). Risk indicators: Assessment of infancy predictors of pre-school behavioural maladjustment. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 32*, 609-626.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford, NY: Oxford University Press.

Schwartz (1978). Estimating the dimension of a model. *The Annals of Statistics, 6*, 461-464.

Shaw, D. S., Gilliom, M., Ingoldsby, E. M., & Nagin, D. S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology, 39*(2), 187-200.

Shaw, D. S., Owens, E. B., Vondra, J. I., Keenan, K., & Winslow, E. B. (1996). Early risk factors and pathways in the development of early disruptive behavior problems. *Development and Psychopathology, 8*, 679-699.

Smith, P. K., & Green, M. (1974). Aggressive behavior in English nurseries and playgrounds: Sex differences and response of adults. *Child Development, 45*, 211-214.

Somersalo, H., Solantaus, T., & Almqvist, F. (1996). Four-year course of teacher-reported internalizing, externalising, and comorbid syndromes in preadolescent children. *European Child and Adolescent Psychiatry, 8*, 89-97.

Spieker, S. J., Larson, N. C., Lewis, S. M., Keller, T. E., & Gilchrist, L. (1999). Developmental trajectories of disruptive behavior problems in preschool children of adolescent mothers. *Child Development, 70*, 443-458.

Sroufe, L. A. (1997). Psychopathology as an outcome of development. *Development and Psychopathology, 9*, 251-268.

Sroufe, L. A., & Rutter, M. (1984). The domain of developmental psychopathology. *Child Development, 55*, 17-29.

Stanford, M.S, Houston, R.J., Vileemarette-Pittman, N.R., & Greve, K.W. (2003). Premediated aggression: clinical assessment and cognitive psychophysiology. *Personality and Individual Differences, 34*, 773-781.

Talbott, E., & Flemming, J. (2003). The role of social contexts and special education in the mental health problems of urban adolescents. *The Journal of Special Education, 73*(2), 11-123.

Tremblay, R. E. (2000). The development of aggressive behavior during childhood: What have we learned in the past century? *International Journal of Behavioral Development, 24*, 129-141.

Tremblay, R. E., Boulerice, B., Harden, P. W., McDuff, P., Perusse, D., Pihl, R. O., & Zoccolillo, M. (1996). Do children in Canda vecome more aggressive as they approach adolescence? In Human Resources Development Canada and Statistics Canada (Eds.), *Growing up in Canada: National longitudinal survey of children and youth* (pp. 127-137). Ottawa: Statistics Canada.

Tremblay, R. E., Japel, C., Perusse, D., Boivin M., Zocolillo, M., Montplaisir, J., & McDuff, P. (1999). The search for the age of "onset" of physical aggression: Rousseau and Bandura revisited. *Criminal Behavior and Mental Health, 9*(1), 8-23.

Turner, J., & Cole, D. (1994). Developmental differences in cognitive diatheses for child depression. *Journal of Abnormal Child Psychology, 22*(1), 15-33.

Twenge, J. M., & Nolen-Hoeksema, S. (2002). Age, gender, race, socioeconomic status, and birth cohort difference on the children's depression inventory: A meta-analysis. *Journal of Abnormal Psychology, 111*, 578-588.

Vasey, M. W., Crnic, K. A., & Carter, W. G. (1994). Worry in childhood: A developmental perspective. *Cognitive therapy and research, 18*, 529-549.

Verhulst, F. C., & van der Ende, J. (1993). "Comorbidity" in an epidemiological sample: A longitudinal perspective. *Journal of Child Psychology and Psychiatry, 28*, 707-713.

Verhulst, F. C. (1995). A review of community studies. In F. C. Verhulst, & H. M. Koot (Eds.), *The epidemiology of child and adolescent psychopathology* (pp. 146-177). London: Oxford University Press.

Youngstrom, E., Findling, R., & Calabrese, J. (2003). Who are the comorbid adolescents? Agreement between psychiatric diagnosis, youth, parent, and teacher report. *Journal of Abnormal Child Psychology, 31*(3), 231-245.

Wiesner, M. & Windle, M. (2004). Assessing Covariates of Adolescent Delinquency Trajectories: A Latent Growth Mixture Modeling Approach. *Journal of Youth and Adolescence, 22*, 5, 431-442.

Willett, J. B., & Sayer, A. G. (1996). Cross-domain analyses of change over time: Combining growth modeling and covariance structure analysis. In R. Schumacker & G. A. Marcoulides (Eds.), *Advanced structural equation modeling techniques* (pp. 125-157). Hillsdale, NJ: Erlbaum.

Wright, J. C., Zakriski, A. L., & Drinkwater, M. (1999). Developmental psychopathology and the reciprocal patterning of behavior and environment: Distinctive situational and behavioral signatures of internalizing, externalizing and mixed-syndrome children. *Journal of Consulting and Clinical Psychology, 67*, 95-107.