Male and Female Pathways to Psychopathology: Findings from a Preventive Intervention Study

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Male and Female Pathways to Psychopathology: Findings from a Preventive Intervention Study

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1 | **Introduction**

Chapter 1

Introduction

In this thesis, the results of the follow-up assessments in late childhood and early adolescence of the Good Behavior Game (GBG; Barrish, Saunders, & Wolfe, 1989; Dolan, Jaylan, Werthamer, & Kellam, 1989) intervention study are presented. The GBG is a universal, classroom-based preventive intervention aimed at the reduction of problem behavior in elementary schoolchildren. The GBG study is a randomized controlled intervention study that started in 1998 when 666 first grade students from 13 elementary schools in the metropolitan areas of Rotterdam and Amsterdam were enrolled in the study (van Lier, 2002). In prior reports on this project, the direct impact of the GBG on children's behavior development was examined. The results showed that children's Attention Deficit/Hyperactivity problems (ADHD), oppositional defiant problems, conduct problems from age 7 to 9 years (van Lier, Muthén, van der Sar, & Crijnen, 2004), and antisocial behavior from age 7 to 10 years (van Lier, Vuijk, & Crijnen, 2005) were effectively targeted by the GBG preventive intervention program.

The importance of randomized controlled trials in studying developmental psychopathology

As shown by the previous reports from this study, an obvious contribution of prevention science is to study the effectiveness of interventions in preventing negative outcomes. However, another less well addressed capability of prevention science is to test developmental models leading to psychopathology (Kellam & Rebok, 1992). Developmental models generally postulate hypothesized causal associations between risk factors and outcomes. This implies that interventions that target these hypothesized causal risk factors have the potential to test the postulated pathways to psychopathology. Randomized controlled trials (RCTs) provide this unique opportunity because it can be tested whether the reduction in the manifestation of the risk variable, due to a controlled influence – the intervention – mediates the distal impact of the program on the manifestation of the outcome variable (Kellam, Koretz, & Mościcki, 1999; Kellam & Rebok, 1992). Such findings on mediation provide evidence, although not conclusive, that a particular risk factor plays a causal role in the development of problem behavior (Howe, Reiss, & Yuh, 2002; Rutter, Pickles, Murray, & Eaves, 2001). In addition to testing developmental models, RCTs can be used to test the hypothesized long-term influence of particular risk factors. For instance, prenatal exposure to maternal smoking is hypothesized

to have an entrenched influence on children's development (e.g., Maughan, Taylor, Caspi, & Moffitt, 2004; Thapar et al., 2003). The premises of such hypotheses can be tested through intervention by studying whether the children who are exposed to the risk variable remain at high risk for adverse outcomes despite beneficial changes in the child's environment, such as receiving the GBG intervention program.

In the present study, the GBG intervention program is used to explore male and female pathways to psychopathology from childhood into early adolescence. By nesting the GBG intervention program in a longitudinal study on the pathways to psychopathology, the long-term influence of hypothetical risk factors on these pathways can be tested.

Sex differences in problem behavior

When investigating models on the development of problem behavior, potential sex differences are of special interest. Previous research has shown that sex differences in the prevalence rates of problem behavior vary across developmental stages (Keenan & Shaw, 1997).

In early childhood (i.e., prior to approximately age 3), girls and boys are equally likely to exhibit externalizing problem behavior (Mesman, Bongers, & Koot, 2001; Tremblay et al., 2004). During middle and late childhood, boys have been overwhelmingly identified as exhibiting more externalizing problem behavior than girls (Archer & Côte, 2005; NICHD ECCRN, 2004). However, the majority of the studies on childhood externalizing behavior problems, and more specifically those studies on aggression, have been limited in two important ways: (1) aggressive boys have received most of the research attention, whereas aggressive girls have often been either under included or completely excluded from studies, and (2) forms of aggression that are salient to boys have been emphasized, whereas forms of aggression that may be more salient to girls have often been neglected (Crick & Zahn-Waxler, 2003). In an attempt to address these limitations, research has turned attention to the identification of aggressive behaviors that are more salient to girls, which has resulted in the study of relational aggression (Crick & Grotpeter, 1995).

With regard to internalizing problems (anxiety, depression), no sex differences in childhood have been reported (Bongers, Koot, van der Ende, & Verhulst, 2003). However, in early adolescence and adulthood, female rates of internalizing problems exceed those of males (Bongers et al., 2003; Roza, Hofstra, van der Ende, & Verhulst, 2003), while rates of externalizing disorders are still higher for males than for females (Hofstra, van der Ende, & Verhulst, 2001).

This thesis will investigate three sex-specific pathways to psychopathology from childhood into early adolescence. Specifically, the pathways towards ADHD symptoms, which are more prominent among males, and relational aggression and symptoms of anxiety and depression, which are most prominent among females, will be addressed.

Pathways to ADHD symptoms: the role of prenatal exposure to maternal smoking

Recent studies suggest that both genetic and environmental factors play an important role in the development of ADHD. Recently, there is growing evidence of the importance of the influence of the prenatal environment on the development of AHDH (Linnet et al., 2003). A special interest of recent research is the influence of prenatal exposure to maternal smoking on the development of children (Rodriguez & Bohlin, 2005). In fact, prenatal exposure to maternal smoking is assumed to influence fetal programming, which occurs during critical fetal periods (Barker, 1998), in a negative way. According to the concept of fetal programming, particular experiences have a lasting influence on the structural and functional development of the organism. Such negative influences are thus expected to persist even when beneficial changes in the environment during a later developmental phase occur (Rutter, 2002).

Although there is accumulating evidence that prenatal exposure to maternal smoking contributes to the etiology ADHD problems (Button, Thapar, & McGuffin, 2005; Rodriguez & Bohlin, 2005; Romano, Tremblay, Farhat, & Côté, 2006), to date, however, no study has tested the second part of the fetal programming hypothesis by examining whether the pathway from prenatal exposure to maternal smoking to offspring ADHD problems persists despite beneficial changes in the environment of the child through intervention. In view of this paucity of data, we investigated the entrenched and harmful role of prenatal smoking in the etiology of ADHD symptoms by testing (1) whether children who were prenatally exposed to maternal smoking had elevated ADHD symptoms at age 7 years, and (2) whether the effects of prenatal smoking on the development of ADHD symptoms from age 7 to 9 years among these children persisted despite the beneficial changes the GBG intervention program delivered to the child's environment.

Pathways to relational aggression: the role of behavior, emotional, and social problems

Although great strides have been made in research on relational aggression (for a review, see Crick et al., 1999), the knowledge about early risk markers for later relational aggression is still very limited (Geiger, Zimmer-Gembeck, & Crick, 2004). For instance, although behavioral, emotional, and social problems have been previously associated with relational

aggression (Crick, 1997; Crick & Grotpeter, 1995; Marsee, Silverthorn, & Frick, 2005; Werner & Crick, 2004; Zahn-Waxler, Park, Essex, Slattery, & Cole, 2005; Zalecki & Hinshaw, 2004), an important limitation is that many of these studies are lacking prospective designs (Crick, Ostrov, & Werner, 2006). Consequently, we currently know relatively little about the directional nature of the associations between early behavioral, emotional, and social problems and the development of relational aggression. In the present thesis we aimed to extend our knowledge on the pathways to relational aggression by examining the associations between behavioral, emotional, and social problems in middle childhood and relational aggression from late childhood into early adolescence.

In the study on the causes of relational aggression, it is also important to notice that most of the studies that demonstrate a link between early childhood problem behavior and relational aggression development are either cross-sectional or longitudinal observational studies. However, no claim for causality within the relationships that were found in these studies can be made due to the correlational nature of the findings (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001; Moffitt, 2005). In order to extend conclusions on associations between risk variables and outcome variables beyond the risk factor stage, Rutter et al. (2001) proposed a number of research designs, including RCTs. With this thesis we aimed to test the hypothesized role of behavioral, emotional, and social problems in middle childhood as risk markers for the development of relational aggression in early adolescence in two ways. We first explored the longitudinal relationship between these variables in the control group. After identifying the variables that were related to relational aggression in late childhood and early adolescence, we tested these associations through the GBG intervention program. More specifically, we examined whether intervention-induced reductions in the behavioral problems as found after the intervention, mediated the reductions in relational aggression from late childhood into early adolescence, in addition to testing whether this mediation depended upon the sex of the child.

Pathways to symptoms of anxiety and depression: the role of peer victimization
A growing body of research documents the detrimental effects of peer victimization on the development of symptoms of anxiety and depression (for a review, see Hawker & Boulton, 2000). The majority of studies in this area focused on physical victimization (being the victim of physically aggressive acts or physical threat). An important extension to this research field is the study of relational victimization, which encompasses behaviors that are specifically designed to inflict harm by damaging or manipulating the victim's relationships with others

(Crick et al., 2001). Results on sex differences in peer victimization indicated that boys are more likely to experience physical victimization, whereas girls tend to experience more relational forms of victimization (Cullerton-Sen & Crick, 2005; Schäfer, Werner, & Crick, 2002), although research on relational aggression has yielded mixed results.

The sparse studies that did incorporate both physical and relational victimization measures provided preliminary evidence that both types of victimization experiences may lead to the development of anxiety and depression (Craig, 1998; Crick & Bigbee, 1998; Storch, Zelman, Sweeney, Danner, & Dove, 2002). However, these previous reports on the association between physical and relational victimization and indices of anxiety and depression are correlational of nature, because they have used mainly cross-sectional or at best longitudinal designs. As a consequence these studies are incapable of claiming that peer victimization plays a causal role in pathways towards anxiety and depression. And as stated before, although RCTs do not provide conclusive evidence on causality, they can provide unique information on the possible causal role of peer victimization in anxiety and depression development. The present study therefore aims at testing sex differences in the hypothesized role of physical and relational victimization as risk markers for the development of symptoms of anxiety and depression through the GBG intervention program. Because of the reductions in the rates of both physical and relational aggression as found in the GBG study, it was likely to assume that victimization of these behaviors was also reduced in the GBG study sample. We therefore tested whether reductions in physical and relational victimization during late childhood, due to GBG intervention, mediated the reductions in symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia during early adolescence.

Parenting and problem behavior
In addition to the main aim of this study, to identify and test pathways to male and female behavioral and emotional problems, we also focused on the empirical identification of distinct parenting styles. The role of parenting styles in children's behavioral and emotional problems has been a vital component of child developmental theories. However, a parenting style is comprised of combinations of various forms of parenting behaviors. For clinical and intervention purposes it is important to have a thorough understanding of the parenting styles that are most associated with the child's behavioral and emotional problems. This implies that only parenting styles that adequately represent distinct sets of parenting behaviors within a population and are associated with child behavioral and emotional problems should be the focus of prevention effort.

However, many previous studies on the association between distinct parenting styles and child outcomes did not empirically identify their distinct parenting styles (Galambos, Barker, & Almeida, 2003). Rather, they categorized parents into distinct clusters based on arbitrary pre-determined cutoff scores on dimensions of parenting behaviors. Typically, parents who did not fit the predetermined classifications, for instance because they would not fit into the predetermined clusters, were often excluded from the analysis in order to contrast extreme parenting styles (e.g., Chao, 2001). As a consequence, the existing studies that have applied parenting styles to explain variations in children's problem behavior often explored the association between hypothesized distinct parenting styles and childhood psychopathology, and did not necessarily explore the association between parenting styles that represent the variations in the population, and child outcomes. With this study, we aimed to overcome this limitation through the empirical identification of distinct parenting styles through Latent Profile Analysis, a technique that allows naturally occurring patterns of interaction among the incorporated variables. We then aimed to validate these empirically identified parenting styles by studying the association between our identified parenting styles and indices of environmental and maternal risk and childhood problem behavior.

Aims of this study

In summary, in this study we used a randomized controlled preventive intervention study to extent our knowledge on the pathways to male and female psychopathology from childhood into early adolescence. Specifically our aims were:

(1)   To test the hypothesized entrenched influence of prenatal exposure to maternal smoking on symptoms of ADHD. In particular, it was tested whether the hypothesized developmental chain of prenatal exposure to maternal smoking, which results in the development of childhood symptoms of ADHD and associated elevated risk for early-onset experimentation with smoking, would persist after systematically changing the child's environment by the GBG intervention program.

(2)   To examine the longitudinal association between behavioral, emotional, and social problems at elementary school entry and relational aggression from late childhood into early adolescence.

(3)   To test the hypothesized role of childhood disruptive behavior problems (e.g., ADHD symptoms, overt aggression, oppositional defiant problems) in the pathway to relational

aggression through the GBG intervention program, and to explore whether these pathways differed by sex.

(4)   To test sex differences in the hypothesized roles of both physical and relational victimization in the pathway to symptoms of anxiety and depression through the GBG intervention program.

(5)   To empirically identify distinct parenting styles and to study the associations between these parenting styles and indices of environmental and maternal risk and childhood psychopathology.

Method

Sample and study design

The present study reports on the results of the GBG intervention study in a sample of children that were followed from 1999 to 2005. In Figure 1.1 the study design is presented.
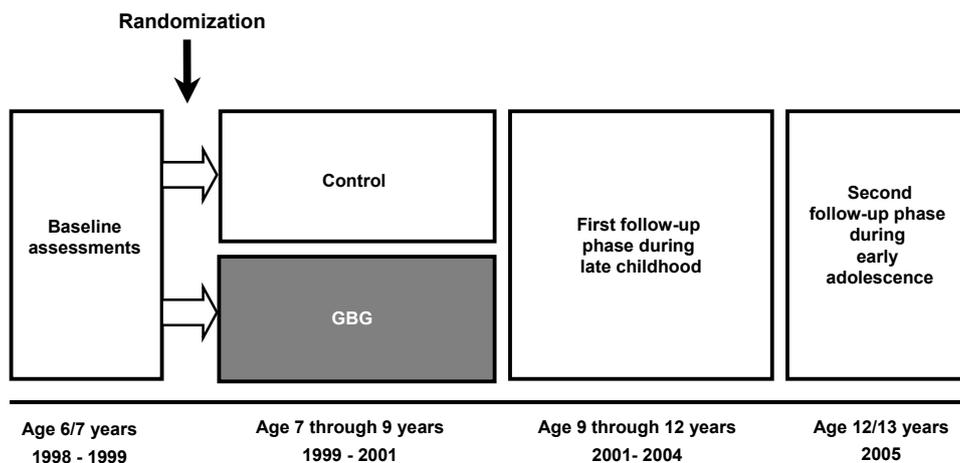
Figure 1.1 Good Behavior Game study design

In 1999, mainstream elementary schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited. The first 13 schools that responded positively to the invitation to participate were included. The original target sample consisted of 794 first grade children. In 1999, parents were informed about the project and were invited to

participate in the study. A reminder was sent when parents did not respond to this invitation. Research-assistants contacted the parents by telephone when the parents did not respond to the reminder. If the research-assistants were unable to reach the parents, teachers reminded the parents about the project. Parents of minority children were informed through brochures in their native language. Research-assistants who spoke the parents' native language went to their homes to give additional information and asked these parents to participate in the study.

Only children who moved from first to second grade – 722 children – in addition to 22 children who repeated second grade in 1999 and moved into the study cohort, were eligible for inclusion, resulting in a target sample of 744 children. Of these 744 children, 666 parents or parent substitutes (89.5%) signed written informed consent forms granting the child permission to participate in the study. The mean age of the children was 6.9 years ($SD = 0.6$) at baseline. Fifty-one of the children were male. Sixty-nine percent of the children were Caucasian, 9% were Moroccan, 10% were Turkish, 5% were Surinam-Dutch Antilles, and 7% were from other ethnic background. Thirty-four percent of the households were of low socio-economic status, which was consistent with the Dutch population (Statistics Netherlands, 1999).

At the start of the project, each of the participating schools had at least two first grade classes. During the summer break between grade 1 and grade 2, when second grade class compositions were known, classes within one school were randomly assigned to either the GBG intervention or control condition. Of the 31 grade 2 classes in the 13 schools, 16 became intervention classes, resulting in 363 children receiving the GBG intervention program and 303 control group children.

The GBG intervention started in fall in the second grade. Over the two-year intervention period (grades 2 and 3, ages 8 and 9 years), the composition of the class remained the same for 90.4% of the children. Nineteen children moved from a control-group into an intervention group. These children were treated as intervention children. During this two-year intervention period, ninety-two children were lost to follow-up because they moved away from a study school.

Starting with the follow-up assessments in grade 4, one school refused to further participate ($n = 55$). Eighty-five parents who did not grant their child to participate when collecting baseline measures at age 7 years did grant their child's participation at age 10 years. Because intervention status of these children was affirmed, these children were included in the study, resulting in a sample of 604 children at age 10 years. However, due to missing data during the intervention period assessments of these children, they were not included in all the analyses and results presented in this study.

During follow-up measures in grade 5, 6, and 7 (from ages 11 to 13 years), 156 children dropped out of the study cohort. Of these 156 children, parents of 114 children refused their child to participate in these follow-up measures, while 42 children could not be traced, making a total final sample of 448 children (255 intervention children, 193 controls), yielding a response rate of 67% over a period of 7 years. Fifty-three percent of these children were male. Thirty percent were of low socio-economic status. Eighty-two percent of the children were Caucasian, 7% were Moroccan, 7% were Turkish, and 4% were from other ethnic background.

The Good Behavior Game intervention program
The GBG intervention program is a classroom-based behavior management strategy that promotes prosocial behavior and reduces disruptive behavior. In the GBG, teachers and students choose positively formulated class rules, which are accompanied by pictograms. At the beginning of the GBG cycle, teachers assign children to one of three or four teams, each containing equal numbers of disruptive and non-disruptive children. Children are encouraged to manage their own and their team-mates' behavior. Each team receives a number of cards, one of which will be taken by the teacher when a team-member violates a rule. Teams are rewarded when, at the end of the game, at least one card remains, while all students are always rewarded with compliments throughout the game. Initially, winning teams also receive tangible rewards directly after each game. Later on, winning teams receive delayed rewards.

The GBG was implemented in second and third grade. Both years, teachers received eight hours of training on its implementation. In class, they were also coached by the school advisory services in ten 60-minute classroom observations. The GBG was implemented in three different stages. In the *introduction* stage, which started in the second grade in fall, it was played for three times a week during 10 minutes. In addition to the compliments, winning teams also received tangible rewards (stickers) directly after each game. In the *expansion* stage, it was extended with regard to time and settings, and also to the behaviors targeted. Rewards were delayed until the end of the week and month. This phase lasted until the early spring of the school year. In the third stage – the *generalization* stage – the emphasis lay on explaining to children that the GBG rules also apply in various other settings.

External school advisors assessed the implementation fidelity for each class that participated in the program. Implementation fidelity was based on the frequency and the total number of hours the GBG was played. Based on this, 9 of the 13 schools implemented all three stages of the GBG program during the two intervention years. However, in 3 schools the

frequency and total hours of GBG played corresponded with only implementing the introduction and expansion stage. In one school, the total number of GBG hours played corresponded with only implementing the introduction phase. Despite these differences in GBG implementation fidelity, an intent to treat approach was used in the analyses and presentation of the results in this study.

Before the GBG trial started, the program was adapted and tested for use in the Netherlands by the educational services (van der Sar, 2002; van der Sar & Goudswaard, 2001). In contrast to the GBG in the United States, Dutch teams do not compete for weekly winners, and teachers do not mention the children who violate GBG rules. In addition, children are encouraged to actively support each other in behaving appropriately.

Instruments

Table 1.1 presents an overview of the variables measured and instruments used at each of the assessments. Detailed information on the variables and instruments used in this study can be found in *Chapters 2 to 6*.

Procedure

Phase 1: *GBG intervention period*

During the Phase 1-assessments between 1999 and 2001 (from age 7 to 9 years), parents were annually visited at home for a structured interview. Interviewers were trained to obtain informed consent, to provide information to the parents about the project, and to conduct a structured interview. During this interview, all questions were read aloud and parents responded. A well-trained native language-speaking interviewer approached parents of other than Dutch ethnic groups and the interview was conducted in the native language of the parents.

Teacher assessments from age 7 through 9 years were collected by sending teachers forms for 5 children each week. Teachers completed the questionnaires for each child in their class in approximately 5 weeks.

Peer nominations during Phase 1 were conducted annually by two trained research-assistants. Children were supplied with rosters of their classmates and nomination forms. Children used these rosters to nominate classmates for each item, after the children identified each child on the roster first. Children completed the peer nomination forms in groups of six in a separate place in the school, under direct supervision of two trained research-assistants. The children were separated to ensure that they would not influence peers while filling out the

forms. The children were asked whether they understood the description and, if necessary, an example was given. Children were instructed to keep their answers confidential.

Phase 2: *Follow-up during late childhood*

During the Phase 2 follow-up measures at age 10, 11, and 12 years, teacher assessments were conducted by trained research-assistants. Interviews were completed for all children attending these teachers' classes.

Children completed the self-report questionnaires in their classroom, supervised by two trained research-assistants. The children were asked whether they understood the description and, if necessary, an example was given. Children were instructed to keep their answers confidential and were told that they did not have to answer any question they did not want to complete. The teachers were asked to leave the classroom during the assessment to ensure that children felt comfortable filling out the questionnaires. The same procedure was followed for the peer nominations during Phase 2.

When the children were 10 years old, trained interviewers contacted their mothers by telephone for information on the number and frequency of cigarettes they had smoked during pregnancy, and the use of other substances during pregnancy.

Phase 3: *Follow-up during early adolescence*

During the Phase 3 follow-up measures at age 13, assessments were collected by mail. Only children's self-reported information was obtained in this phase.

Table 1.1 Variables and Measures used at each Time of Assessment

Variables	Self-report	Parent-report	Teacher-report	Peer-report
		Phase 1 GBG Intervention period (1999-2001)		
Age 7				
Socioeconomic status, ethnicity	-	Interview	-	-
Behavioral and emotional problems	-	CBCL/4-18	TRF/6-18	-
Physical aggressive behavior	-	-	-	Peer nominations
Peer status	-	-	-	Sociometric status
Parental psychopathology	-	GHQ-28	-	-
Parenting stress	-	PSI	-	-
Parenting behavior	-	APQ	-	-
Life-events	-	LEQ	-	-
Age 8				
Behavior and emotional problems	-	CBCL/4-18	TRF/6-18	-
Physical aggressive behavior	-	-	-	Peer nominations
Peer status	-	-	-	Sociometric status
Parental psychopathology	-	GHQ-28	-	-
Parenting stress	-	PSI	-	-
Parenting behavior	-	APQ	-	-
Life-events	-	LEQ	-	-
Age 9				
Behavior and emotional problems	-	CBCL/4-18	TRF/6-18	-
Disruptive classroom behavior	-	-	PBSI	-
Physical aggressive behavior	-	-	-	Peer nominations
Peer status	-	-	-	Sociometric status
Parental psychopathology	-	GHQ-28	-	-
Parenting stress	-	PSI	-	-
Parenting behavior	-	APQ	-	-

Table 1.1 (continued)

Variables	Self-report	Parent-report	Teacher-report	Peer-report
Phase 2 follow-up during late childhood (2001-2004)				
Age 10				
Socioeconomic status, ethnicity, religion	-	Interview	-	-
Low birth weight	-	SUPI	-	-
Disruptive classroom behavior	-	-	PBSI/ TOCA	-
Physical and relational aggression	-	-	RCSE-T	CSBS-P
Physical and relational victimization	SEQ-S	-	-	-
Peer status	-	-	-	Sociometric status
Early-onset experimentation with Substances	SUQ	-	-	-
Behavior and emotional problems	-	CBCL/4-18	-	-
Anxiety and depression symptoms	-	RCADS	-	-
Parental psychopathology	-	GHQ-28/ YASR	-	-
Parenting stress	-	PSI	-	-
Parenting behavior	-	DCRQ-PR	-	-
Parental monitoring	-	Monitoring	-	-
Parental nicotine dependence	-	FTQ	-	-
Parental alcoholism	-	CAGE	-	-
Family history of substance use	-	Interview	-	-
Maternal substance use during Pregnancy	-	SUPI	-	-

Table 1.1 (continued)

	Variables	Self-report	Parent-report	Teacher-report	Peer-report
Age 11	Disruptive classroom behavior	-	-	PBSI	-
	Physical and relational aggression	-	-	RCSE-T	-
	Physical and relational victimization	SEQ-S	-	-	-
	Early-onset experimentation with substances	SUQ	-	-	-
	Knowledge, attitudes, and expectations on substances	HSDQ	-	-	-
	Behavioral and emotional problems	YSR	-	-	-
	Parenting behavior	DCRQ-CR	-	-	-
	Parental monitoring	Monitoring	-	-	-
Age 12	Disruptive classroom behavior	-	-	PBSI/ TOCA	-
	Physical and relational aggression	-	-	RCSE-T	CSBS-P
	Physical and relational victimization	SEQ-S	-	-	-
	Peer status	-	-	-	Sociometric status
	Early-onset experimentation with substances	SUQ	-	-	-
	Knowledge, attitudes, and expectations on substances	HSDQ	-	-	-
	Behavioral and emotional problems	YSR	-	-	-
	Anxiety and depression symptoms	RCADS	-	-	-
	Anxiety	MASQ	-	-	-

Table 1.1 (continued)

	Variables	Self-report	Parent-report	Teacher-report	Peer-report
		Phase 3 follow-up during early adolescence (2005)			
Age 13	Physical and relational aggression	CPRS	-	-	-
	Physical and relational victimization	SEQ-S	-	-	-
	Early-onset experimentation with substances	SUQ	-	-	-
	Behavioral and emotional problems	YSR	-	-	-
	Anxiety and depression symptoms	RCADS	-	-	-

Note. CBCL/4-18 = Child Behavior Checklist; TRF/6-18 = Teacher's Report Form; GHQ-28 = General Health Questionnaire 28 item version; PSI = Parenting Stress Index; APQ = Alabama Parenting Questionnaire; LEQ = Life Events Questionnaire; PBSI = Problem Behavior at School Interview; SUPI = Substance Use during Pregnancy Interview; TOCA = Teacher Observation of Classroom Adaptation; RCSE-T = Ratings of Children's Social Experience – Teacher Report; CSBS-P = Children's Social Behavior Scale - Peer Report; SEQ-S = Social Experience Questionnaire – Self Report; SUQ = Substance Use Questionnaire; RCADS = Revised Child Anxiety and Depression Scale; YASR = Young Adult Self-Report; DCRQ-PR = Dutch Child Rearing Questionnaire – Parent Report; FTQ = Fagerström Tolerance Questionnaire; CAGE = Cutting Down, Annoyance by criticism, Guilty feeling, Eye-openers; HSDQ = Healthy School and Drugs Questionnaire; DCRQ-CR = Dutch Child Rearing Questionnaire – Child Report; YSR = Youth Self-Report; MASQ = Multidimensional Anxiety Scale for Children; CPRS = Children's Peer Relations Scale.

Structure of this thesis

In **Chapter 2**, we tested whether prenatal exposure to maternal smoking moderated the impact of the GBG intervention on the development of ADHD symptoms, and the associated risk for early-onset experimentation with smoking in children from ages 7 to 11 years. In **Chapter 3**, we examined the longitudinal association between behavioral, emotional, and social problems during middle childhood and relational aggression from late childhood into early adolescence, and whether these associations were sex-specific. In **Chapter 4**, the hypothesized role of overt aggression, ADHD symptoms, and oppositional defiant problems as risk markers for the development of relational aggression in late childhood and early adolescence was tested through the GBG intervention program. It was also explored whether these pathways differed by sex. In **Chapter 5**, the hypothesized role of both physical and relational victimization in the pathway to symptoms of anxiety and depression was tested through intervention. Again, it was explored whether these pathways differed by sex. In **Chapter 6**, the empirical identification of different parenting styles through Latent Profile Analysis is described. We validated these empirically identified parenting styles by examining the associations between our identified parenting styles and indices of environmental and maternal risk and childhood problem behavior. Finally, in **Chapter 7**, the main findings and conclusions of this study are discussed. Moreover, clinical implications and recommendations for future research are given.

2 | Prenatal smoking predicts non-responsiveness to an intervention targeting Attention-Deficit/Hyperactivity symptoms in elementary schoolchildren

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Chapter 2

Prenatal smoking predicts non-responsiveness to an intervention targeting Attention-Deficit/Hyperactivity symptoms in elementary schoolchildren

Abstract

Some evidence suggests that prenatal exposure to maternal smoking contributes to the etiology of Attention-Deficit/Hyperactivity Disorder (ADHD). The present study tested an intervention targeting disruptive behavior to establish whether exposure to maternal smoking during pregnancy predicts intervention failure in elementary schoolchildren. Five hundred and eight elementary schoolchildren were followed from ages 7 to 11. At ages 8 and 9, they were randomly assigned to a control condition, or to a two-year universal classroom-based intervention targeting disruptive behavior. Measures included maternal reports of smoking during pregnancy, teacher-rated symptoms of ADHD from ages 7 to 9 years, and children's self-report of experimentation with smoking at ages 10 and 11 years. At age 7, prenatally exposed children had higher ADHD symptom scores. The intervention did not affect the course of their ADHD symptoms and the probability of early-onset experimentation with smoking. Among non-exposed children, the intervention positively affected the course of ADHD symptoms, and reduced the probability of early-onset experimentation with smoking. Prenatally exposed children are most prone to follow a path of high levels of ADHD symptoms and associated elevated risk for early-onset experimentation with smoking, which are unreceptive to a universal preventive intervention. In these children, the developmental course of ADHD symptoms seems to have been influenced by their prenatal exposure to maternal smoking. Future research should further explore whether prenatal smoking is a proxy measure that indexes another risk factor, or a causal factor for adverse developmental outcomes.

Introduction

According to the concept of developmental programming, 1) particular experiences have a lasting influence on the structural and functional development of the organism, an influence that 2) will persist despite any beneficial changes that occur in the environment during a later developmental phase (Rutter, 2002). Similarly, stimuli or insults during fetal life that have lasting or lifelong effects can be regarded as fetal programming (Barker, 1998). Prenatal exposure to maternal smoking, which is thought to affect the development of children, has thus been the focus of recent studies.

Several studies that accord with the fetal programming hypothesis have found associations between prenatal exposure to maternal smoking and various problems in offspring: attention-deficit/hyperactivity problems (Button et al., 2005; Linnet et al., 2003; Rodriguez & Bohlin, 2005; Thapar et al., 2003), conduct disorder (for a review, see Wakschlag, Pickett, Cook, Benowitz, & Leventhal, 2002), delinquency (Brennan, Grekin, Mortensen, & Mednick, 2002), and early-onset experimentation with smoking (Cornelius, Leech, Goldschmidt, & Day, 2000; Milberger, Biederman, Faraone, Chen, & Jones, 1997). To date, however, no study has tested whether the reported association between smoking during pregnancy and behavioral problems in offspring persists despite beneficial changes in the environment. The present study therefore aimed to test whether the hypothesized developmental chain of prenatal exposure to maternal smoking, which results in the development of childhood symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD) and associated elevated risk for early-onset experimentation with smoking, would persist after systematically changing the child's environment by a universal, classroom-based preventive intervention.

Fetal exposure to maternal smoking is thought to be linked to childhood behavioral problems through influences on early brain development (Ernst, Moolchan, & Robinson, 2001). Support for a causal link between prenatal exposure to maternal smoking and a deleterious effect on brain development has been shown in animal models where nicotine, one of the many compounds of cigarettes, has been found to be a "neuroteratogen" (Slotkin et al., 2005). These animal studies also demonstrated that prenatal nicotine exposure causes long-lasting ADHD-like symptoms in offspring (Pauly, Sparks, Hauser, & Pauly, 2004).

Several studies have sought to test the plausibility of this hypothesized pathway in humans by testing whether this association was confounded by environmental and heritable risks. Using genetically informative samples, two recent studies examined whether prenatal exposure to smoking, in addition to genetic liability to problem behavior and correlated environmental risk factors (low birth weight, low socio-economic status, antisocial traits and psychopathology in parents, harsh parenting practices, and women's use of alcohol and drugs during pregnancy), predicted offspring problem behavior. Both studies found that, although genetic liability and the correlated environmental risk accounted for much of the association, prenatal smoking still uniquely predicted offspring ADHD symptoms (Thapar, Holmes, Poulton, & Harrington, 1999), as well as conduct problems (Maughan et al., 2004). These results support the first part of the fetal programming hypothesis that prenatal smoking has a lasting influence on a child's structural and functional development.

The aim of the present study was to test the second part of the fetal programming hypothesis by examining whether the effect of prenatal exposure to maternal smoking persisted despite the beneficial changes intervention brings to a child's environment. To test the association between prenatal exposure to maternal smoking, the development of childhood ADHD symptoms (from age 7 to age 9), and the associated risk for early-onset experimentation with smoking (at age 10 and 11), we used an ongoing preventive intervention trial. Specifically, in a population-based sample of 508 Dutch elementary schoolchildren, we tested whether prenatal exposure to maternal smoking moderated the effectiveness of the Good Behavior Game (GBG; Dolan et al., 1989), a classroom-based, preventive intervention targeting disruptive behavior, which has been adapted for use in the Netherlands by the educational services (van der Sar & Goudswaard, 2001).

The GBG has already been shown to be effective in reducing Attention-Deficit/Hyperactivity problems (van Lier et al., 2004), aggressive behavior (i.e., Ialongo, Poduska, Werthamer, & Kellam, 2001), antisocial behavior (van Lier et al., 2005), and early-onset smoking (Storr, Ialongo, Kellam, & Anthony, 2002). Given the hypothesized influence of maternal smoking on early brain development, and associated elevated risks for ADHD symptoms and early-onset smoking, we reasoned that prenatally exposed children 1) would show higher levels of ADHD symptoms after controlling for environmental confounders, 2) would be unreceptive to a positive impact of the GBG on the development of ADHD symptoms, 3) would subsequently have a higher risk for early-onset experimentation with smoking, and 4) would be unreceptive to the – indirect – impact of the GBG on early-onset experimentation with smoking.

Method

Participants

Participants were part of a longitudinal intervention study targeting disruptive behavior. Mainstream elementary schools in the metropolitan area of Rotterdam and Amsterdam were eligible for inclusion. The first 13 schools that responded positively to the invitation to participate were included. In these schools, 794 children attending first grade (age 6) were assessed in the spring of 1999. Of those who moved on to second grade (age 7), 722 were eligible for inclusion. Twenty-two children who repeated second grade in 1999 and moved into the study cohort were included in the sample for intervention purposes, making a total sample of 744 children. Of these children, 666 parents or parent substitutes (89.5%) signed written informed consent forms granting the child permission to participate in the study. Thirty-one

percent of the sample was of low socio-economic status, which was consistent with the Dutch population (Statistics Netherlands, 1999).

Initially approached and found eligible	N = 744	Drop-outs:
		N = 78, due to no permission to participate
Included in the study	N = 666	
		N = 92, due to school leave or grade retention
		N = 55, due school drop-out
		N = 11, due to language problems of the mother
	N = 508	

N = 235 Non-exposed GBG-group	N = 181 Non-exposed Control-group	N = 44 Exposed GBG-group	N = 48 Exposed Control-group
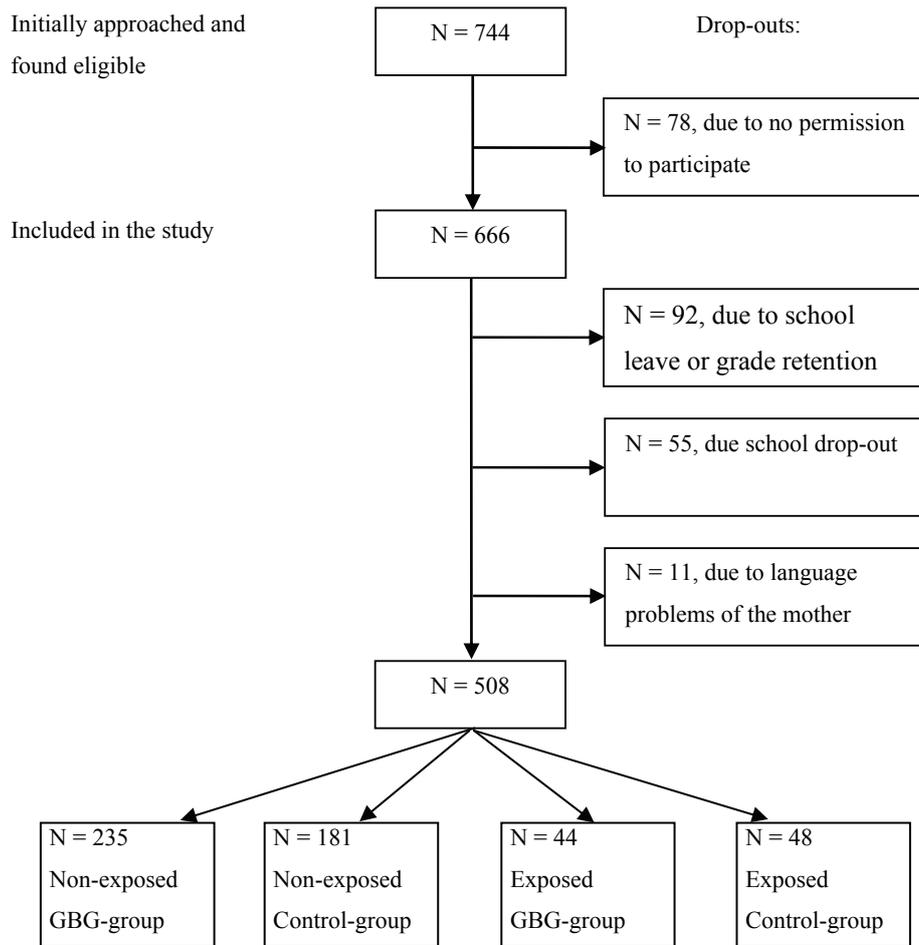
Figure 2.1 Number of included participants

Figure 2.1 shows a flowchart in which the dropouts are presented for each step. During the 2-year intervention period in grades 2 and 3 (age 7 and 8), 92 children were lost to follow-up because they moved away from a study school before participating in the follow-up measures. During the follow-up measures in grades 4 and 5 (age 9 and 10), one school ($n = 55$)

dropped out of the study. In the case of 11 more children, language problems of the mother meant that data about mother's smoking during pregnancy and current parental smoking was unavailable. Dropout in these 66 children was not significantly related to the child's gender (χ^2(1, $N = 574$) = .51, $p > .05$), teacher ratings of ADHD symptoms at age 7 (F(1, 540) = .72, $p > .05$), and maternal psychopathology F(1, 532) = .24, $p > .05$). However, children who dropped out of the study cohort were predominantly of non-Caucasian ethnicity (χ^2(1, $N = 574$) = 40.40, $p < .01$), and of low socio-economic status (χ^2(1, $N = 533$) = 33.48, $p < .01$). Characteristics of the sample included in this study are presented in Table 2.1.

Table 2.1 Characteristics of Non-Exposed and Exposed GBG and Control Group Children

	Non-exposed		Exposed	
	$n = 416$		$n = 92$	
	Control	GBG	Control	GBG
Male gender (%)	51	55	60	50
Caucasian (%)	81	80	82	91
Low SES (%)	34	28	46	30

Note. No differences between exposed and non-exposed or GBG and Controls were found. SES = socio-economic status.

Preventive Intervention

The GBG is a classroom-based behavior management strategy that promotes prosocial behavior and reduces disruptive behavior. Teachers and students choose positively formulated class rules, which are accompanied by pictograms. At the beginning of the GBG cycle, teachers assign children to one of three or four teams, each containing equal numbers of disruptive and non-disruptive children. Children are encouraged to manage their own and their team-mates' behavior. Each team receives a number of cards, one of which will be taken by the teacher when a team-member violates a rule. Teams are rewarded when, at the end of the game, at least one card has remained, while all students are always rewarded with compliments throughout the game. Initially, winning teams also receive tangible rewards directly after each game. Later on, winning teams receive delayed rewards.

The GBG was implemented in three different stages. In the *introduction* stage, which started in the second grade in fall, it was played three times a week for 10 minutes. In the *expansion* stage, it was extended with regard to time and settings, and also to the behaviors targeted. Rewards were delayed until the end of the week and month. This phase lasted until the early spring of the school year. In the third stage – the *generalization* stage – the emphasis lay on explaining to children that the GBG rules also apply in various other settings.

The GBG was implemented in second and third grade. Both years, teachers received eight hours of training on its implementation. In class, they were also coached by the school advisory services in ten 60-minute classroom observations. External school advisors assessed the fidelity of implementation; per class, this was based on the frequency with which the GBG was performed, as well as the total number of hours it was performed. This led to an implementation fidelity score at three levels: "*good*", "*average*", or "*bad*". Differences in implementation fidelity were not related to the mother's smoking status during pregnancy ($\chi^2(2, N = 276) = 3.71, p > .05$).

Design

In 1999, each of the schools had at least two first grade classes, which is where the baseline assessments were completed. During the summer break, when second grade class compositions were known, classes within one school were randomly assigned to either the intervention or control condition. The GBG intervention started in fall in the second grade. Over the two-year intervention period, the composition of the class remained the same for 90.4% of the children.

Measures

Women's use of cigarettes during pregnancy was assessed by means of a standard interview, the Substance Use during Pregnancy Interview (SUPI; Erasmus MC, 2002). When the children were 10 years old, trained interviewers contacted the mothers by telephone for information on the number and frequency of cigarettes they had smoked during pregnancy.

Teacher-reported child behavior problems over the last 2 months were assessed using the Teacher's Report Form/6-18 (TRF/6-18; Achenbach, 1991a), which has been translated and validated for use in the Netherlands (Verhulst, van der Ende, & Koot, 1997), and which contains a list of 120 items whereby a child's behavior is rated on a three-point scale. The TRF/6-18 was completed at baseline, and at 12-month and 24-month assessments. Items from the Attention Problem scale were used. Items included "*This child can't sit still, is restless, or*

hyperactive", and "*This child has difficulty following directions*". Cronbach's α ranged from .90 to .91 over the assessments. Teachers received a gift certificate for their participation.

Teacher-reported problem behavior at school was assessed using the Problem Behavior at School Interview (PBSI; Erasmus MC, 2000a), a 32-item interview assessing disruptive behavior and shy/withdrawn behavior in children. Teachers rated each child's behavior on a 5-point Likert scale. Research-assistants interviewed the teachers at the 18-month and 24-month assessment. In this study, only the ADHD symptoms scale was used, which consists of eight items, including "*This child has difficulty with concentration*" and "*This child is impulsive*". Cronbach's α were .93 and .94.

Information on *children's early-onset experimentation with smoking* was obtained using the Substance Use Questionnaire (SUQ; Erasmus MC, 2000b), which contains self-report items regarding children's experimentation with smoking at ages 10 and 11. The SUQ was filled out in the classroom. The children were told that their answers would be confidential and that they did not have to answer any of the questions if they did not want to.

Confounding variables
Variables were assessed through a parent interview that was conducted before the start of the intervention (at age 7).

Low socio-economic status (SES) was based on the highest parental occupation and highest level of education completed within a family. Low SES was defined as unemployment, the performance of work requiring minimal education and/or having completed only elementary school or less (Statistics Netherlands, 1999).

Maternal psychopathology was assessed using the Dutch translation of the General Health Questionnaire-28 item version (GHQ-28; Goldberg, 1972; Koeter & Ormel, 1991), which has demonstrated adequate psychometric properties for use in the Netherlands (Koeter & Ormel, 1991), and which consists of four 7-item scales measuring Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction, and Severe Depression. Mothers rate their mental health over the last two weeks on a 4-point Likert scale. Following the procedure of Goldberg and Williams (1988), the scoring was transformed into a yes/no format by recoding the original codes. Thus, 0 ("better than usual") and 1 ("same as usual") became 0 (*"no"*); and 2 ("worse

than usual") or 3 ("much worse than usual") became 1 ("*yes*"). All items were then summed to a total score. High maternal psychopathology was defined as having a total score of 5 or higher. According to this definition, 21% of the sample had a high score for maternal psychopathology.

Harsh parenting practices were assessed using the Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996), a 42-item questionnaire in which parents use a 5-point Likert scale to rate how often they display the described parenting behavior. In our analyses, only the Corporal Punishment (Cronbach's α = .54) and Inconsistent Discipline (Cronbach's α = .53) scales were used.

Women's use of alcohol during pregnancy was assessed through the SUPI (Erasmus MC, 2002). Mothers were asked whether they had used alcohol during the pregnancy. Only 4.2% of the mothers indicated that they had done so.

Current parental smoking and *birth weight* were assessed during the telephone interview when children were 10 years old. At the time of the assessment, parents were asked if they still currently smoked, current smoking being defined as a dichotomized variable: 0 ("no") if they did not currently smoke and 1 ("yes") if they did. Low birth weight was defined as a birth weight of 2500 grams or less.

Statistical approach

The model used to analyze ADHD symptoms is shown in Figure 2.2. Items from the TRF/6-18 and PBSI reflecting similar content were selected, resulting in the selection of eight ADHD symptoms from both the TRF and PBSI. These items were summed to a total ADHD symptoms score (TRF at baseline, 12 and 24 months; PBSI at 18 and 24 months).

To account for the missing-by-design data, the following procedure was used. First, a latent variable was considered for each of the four time-points (baseline, 12-, 18-, and 24-month follow-up), which served as the indicators for the growth factors (intercept and slope). Indicators for these latent variables were the total ADHD symptom scores derived from the TRF and PBSI at the given time-points. Second, measurement invariance of ADHD symptoms across the four time points was approached as follows: a) To put the four latent ADHD problem variables in the same metric at each of the four time-points, the factor loading of the TRF on the latent variables at each time-point was set by default at 1; the factor loading for

PBSI was held equal across time. b) The measurement intercepts were held to be equal across time for both the TRF and PBSI scores.
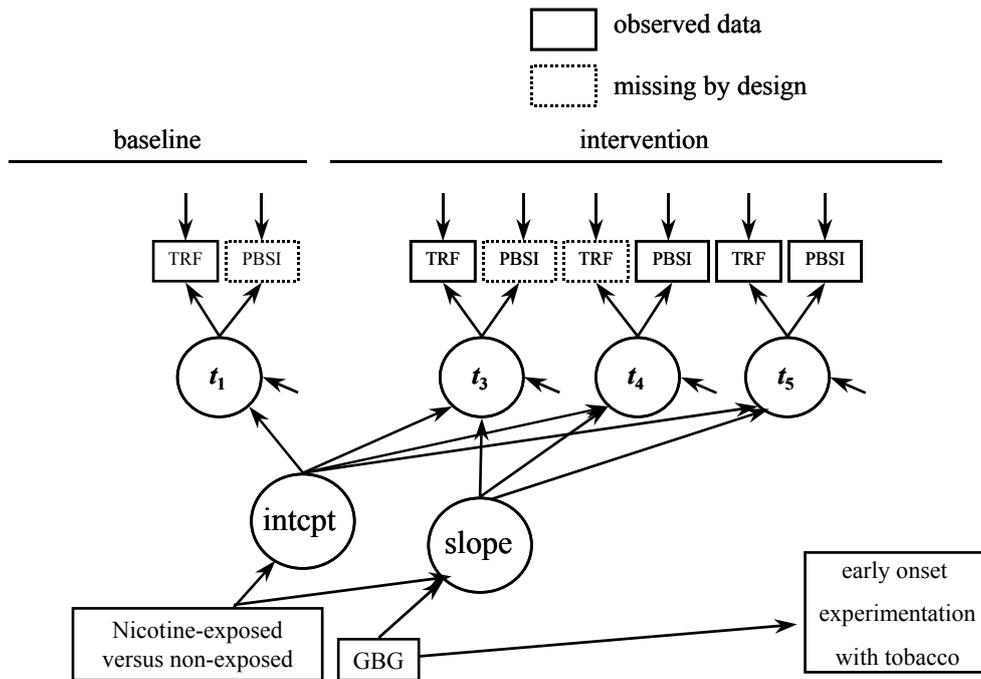
Figure 2.2 Observed and latent variables to analyze the impact of the GBG intervention on the development of ADHD symptoms and early-onset experimentation with smoking

To test the hypothesis that levels of ADHD symptoms at elementary school entry were higher for prenatally exposed children, we first estimated the direct effect of smoking during pregnancy on the intercept of ADHD symptoms, also controlling for the hypothesized confounding factors (current parental smoking, low SES, maternal psychopathology, harsh parenting practices, women's use of alcohol during pregnancy, and low birth weight).

Then, to explore whether the developmental course of exposed and non-exposed children was receptive to change, we used Growth Mixture Modeling (GMM; Muthén, 2001) to study the impact of the GBG on the development of ADHD symptoms and on the probability of early-onset experimentation with smoking. Two classes were defined, one for prenatally exposed children, and one for non-exposed children. For each class of children,

GMM estimates mean growth curves, i.e., initial status (intercept) and change (slope), and captures individual variation around these growth curves by estimating factor variances for each class. The slopes of the developmental trajectories of the two classes were regressed on intervention status (Muthén, 2002). Probability of smoking at age 10 and 11 years was included as a distal outcome in the model and regressed on intervention status. Male gender and current parental smoking were included in the model to control for possible gender influences on the growth parameters and impact of the GBG intervention. All analyses were performed with Mplus 3.0 (Muthén & Muthén, 1998-2004).

Results

Descriptive statistics

During their pregnancy with the target children, 18% of the mothers had smoked ($n = 92$), a figure approximately similar to that of the general Dutch population (Crone, Hirasing, & Burgmeijer, 2000). Of these mothers, 62% had smoked 1 to 9 cigarettes per day, 25% had smoked 10 to 19 cigarettes per day, and 13% had smoked over 20 cigarettes per day. The percentage of children exposed was similar between GBG and control-group children ($\chi^2(1, N = 508) = .15, p > .05$). Thirteen percent of the children reported early-onset experimentation with smoking at ages 10 and 11 ($n = 67$), which is about the same as in the general Dutch population (Monshouwer, van Dorsselaer, Gorter, Verdurmen, & Vollebergh, 2004). The percentage of early-onset smokers was similar among prenatally exposed and non-exposed children ($\chi^2(1, N = 502) = .16, p > .05$).

Smoking during pregnancy and ADHD symptoms at age 7

Smoking during pregnancy had a significant impact on the intercept of the development of ADHD (see Table 2.2), indicating a higher level of ADHD symptoms in prenatally exposed children. To account for possible confounding factors, we included male gender, alcohol use during pregnancy, maternal psychopathology, low birth weight, harsh parenting practices, and low SES in the model. The potential confounding factors were first tested individually. Parameter estimates are presented in Table 2.2. Only male gender, harsh parenting, inconsistent discipline, and low SES were significantly associated with the intercept of ADHD symptoms. These risk factors, including smoking during pregnancy, were then submitted to a multiple regression model, in which all the significant predictors from the simple regression models remained significant (see Table 2.2).

Table 2.2 Parameter Estimates of Simple and Multiple Regression Coefficients of Risk Variables on the Level of ADHD Symptoms at Age Seven

| | Parameter estimates | | | |
| | Simple | | Multiple | |
Risk variables	Est.	SE	Est.	SE
Pregnancy				
Low birth weight	-1.0	.7	-	-
Smoking	1.1	.4*	.9	.4*
Alcohol use	-1.2	.8	-	-
Male gender	1.5	.3**	1.5	.3**
Family/parenting				
Maternal psychopathology	.2	.4	-	-
Inconsistent discipline	1.0	.4*		
Harsh parenting	1.3	.4**	.8	.4*
Contextual				
Low SES	1.3	.3**	1.2	.3**

Note. Est = Estimate; SE = Standard Error; SES = socioeconomic status; * $p < .05$; ** $p < .01$.

ADHD symptoms development, early-onset experimentation with smoking, and GBG impact

We then tested whether the course and malleability of ADHD symptoms and the probability of early-onset experimentation with smoking was different for exposed and non-exposed children. The developmental courses of exposed and non-exposed children were analyzed simultaneously. The slope of ADHD symptoms and early-onset experimentation with smoking at ages 10 and 11 were regressed on intervention status for both exposed and non-exposed children. To control for possible confounding of male gender and current parental smoking, both the main effects and the interaction with GBG impact were included in the model. Neither of the two interaction terms, nor the main effect of current parental smoking was significant. They were thus excluded from the model. The course of ADHD symptoms for both groups of children is displayed in Figure 2.3. The impact of the GBG intervention on the parameter estimates and the effect of male gender on the parameter estimates are presented in Table 2.3.
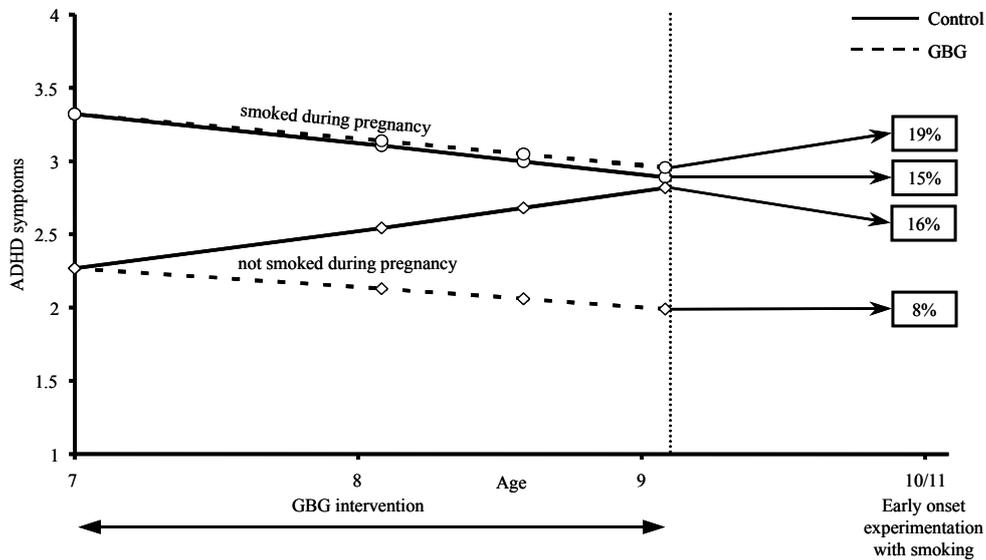
Figure 2.3 The development of ADHD symptoms and impact of GBG intervention from age 7 to 9, and the probability of early-onset experimentation with smoking and GBG impact at age 10 and 11 for prenatally exposed and non-exposed children

From ages 7 to age 9, exposed children had stable high levels of ADHD symptoms (slope estimate: b = .081, β = .99, SE = .76, p > .05), levels of ADHD symptoms being higher in boys than in girls (see Table 2.3). The estimate of intervention status on the slope of ADHD symptoms was not significant, indicating no impact of the GBG on the development of ADHD symptoms in these exposed children. By ages 10 and 11, 15% of the exposed control-group children and 19% of the exposed GBG children had experimented with smoking. The difference in this percentage was not statistically significant (see Table 2.3).

In non-exposed children in the control-group, ADHD symptoms increased significantly between age 7 and age 9, reaching levels similar to those in exposed children. The estimate of GBG on the slope of ADHD symptoms was negative and significant, indicating that the GBG intervention had a positive impact (see Table 2.3).

Table 2.3 Impact of Male Gender and GBG Intervention on Parameter Estimates of the Development of ADHD Symptoms, Probability of Early-onset Experimentation with Smoking at Age 10/11 for Prenatally Exposed and Non-Exposed Children

Status	ADHD symptoms						Probability of early-onset experimentation with smoking[a]			
	Male gender				GBG		Male gender		GBG	
	Intercept		Slope		Slope					
	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Non-exposed ($n = 416$)	1.7	.3*	.1	.2	-.4	.1**	1.1	.3**	-.4	.1*
Exposed ($n = 92$)	.4	.8	.4	.4	.0	.3	1.0	.6	.4	.6

Note. [a] Estimates are on a logit scale. * $p < .05$; ** $p < .01$. Abbreviations: ADHD = Attention-Deficit/Hyperactivity Disorder; GBG = Good Behavior Game; Est = estimate; SE = Standard Error. Interactions between gender and GBG and current paternal smoking and GBG were not significant at $p < .05$ and excluded from the model.

The effect size (Cohen's d; Cohen, 1988) of the mean difference in ADHD symptom score between GBG and control group non-exposed children was .27. As Figure 2.3 shows, the GBG prevented the increase in ADHD symptoms found in the control-group of non-exposed children. Non-exposed boys had higher levels of ADHD symptoms than non-exposed girls (see Table 2.3). Overall, 16% of the non-exposed control-group children had experimented with smoking by age 10 and 11 years. This percentage was reduced by half to 8% in non-exposed GBG children – a difference that was significant (see Table 2.3). Non-exposed boys, however, had a higher probability of early-onset experimentation with smoking than non-exposed girls (boys: 11% GBG, 22% controls; girls: 4% GBG, 9% controls).

Discussion

Previous studies have documented the hazardous influence of prenatal exposure to maternal smoking on child development. The aim of this study was to test whether prenatal smoking also moderated the impact of a universal preventive intervention on the development of ADHD symptoms, and the associated risk for early-onset experimentation with smoking in elementary schoolchildren.

These are the main conclusions. First, at entry to elementary school, prenatally exposed children had higher levels of teacher-rated ADHD symptoms. After controlling for a number of familial and socio-environmental risk factors that are known to be related to elevated disruptive behavior scores in children, this higher level of ADHD symptoms remained significant. This finding is in accordance with previous findings on ADHD (Linnet et al., 2003; Thapar et al., 2003).

Second, stable high levels of ADHD symptoms were found both in prenatally exposed control-group children and in intervention-group children. This indicates that prenatally exposed children were not susceptible to a positive impact of the intervention. Non-exposed control-group children started off with lower mean levels of ADHD symptoms than prenatally exposed children. From ages 7 to 9 years, these children showed a significant increase in ADHD symptoms to levels that were similar to those in their prenatally exposed peers. This increase in ADHD symptoms from age 7 to 9 years may reflect a normative growth in ADHD symptoms over these ages, as previously reported in a general Dutch population sample (Bongers et al., 2003). Unlike prenatally exposed children, non-exposed children who received the intervention were receptive to its impact. In these children, the GBG prevented the – possibly normative – increase in ADHD symptoms found in non-exposed control-group children.

The growth in ADHD symptoms among non-exposed children who did not receive the GBG intervention warrants some further attention. Although, as stated above, it may reflect a 'normative' growth in these symptoms in the studied period, it was somewhat surprising to see that this normative growth was not observed among exposed children. One possible explanation for this finding might be that exposed children had relatively extreme ADHD symptom scores at age 7 years. Subsequently, these children were unlikely to have increased scores with repeated assessments, which is referred to as regression to the mean (Cohen & Cohen, 1983). Other explanations should, however, be considered also. To start with, ADHD symptom scores were only studied from age 7 to 9 years. It may well be that non-exposed children temporarily meet exposed children with respect to ADHD symptoms at this age, but that exposed children remain highly problematic after this age whereas low-risk children show declining levels of ADHD symptoms after age 9. In the study of Bongers et al. (2003), attention problems started to decline in late childhood and continued to decline in adolescence. In addition, only maternal smoking status during pregnancy was considered as the discriminator between the two trajectory groups. However, also given the correlation between prenatal smoking and other risk variables (e.g., parenting, SES), heterogeneity within this exposed group is likely. The stable levels of ADHD symptoms may therefore not be observed among each of the exposed children.

Our third finding was that children with high levels of ADHD symptoms at age 9 had the highest probability of early-onset experimentation with smoking at 10 and 11 years. Exposed children were always among this group with the highest probability at ages 10 and 11. In exposed-intervention children, the GBG had no influence on the probability of smoking. In non-exposed control-group children, whose levels of ADHD symptoms at age 9 were as high as those of prenatally exposed children, the probability of early-onset experimentation with smoking was as high as that in exposed children aged 10 and 11. In contrast, in non-exposed intervention children who had lower levels of ADHD symptoms than their control group counterparts at age 9, the probability that they would experiment with smoking was 50% lower than in the non-exposed control-group children.

On the basis of these results, it can be concluded that the GBG can positively influence the developmental course of ADHD symptoms, and, as a possible consequence, the onset of experimentation with smoking. However, this effect was observed only among children who had not been prenatally exposed to maternal smoking.

With respect to gender, the fact that the developmental course of ADHD symptoms and early-onset experimentation of exposed children was similar for boys and girls corresponds

only partly with previous studies on the effects of prenatal smoking on childhood behavior problems. For instance, several authors have reported that the effects on childhood conduct problems were as marked for girls as for boys (Maughan, Taylor, Taylor, Butler, & Bynner, 2001). Others, however, found that, during middle childhood, exposed boys were significantly more likely to develop conduct problems than girls (Rodriguez & Bohlin, 2005; Wakschlag & Hans, 2002); non-exposed boys had higher levels of ADHD symptoms and a higher probability of early-onset experimentation with smoking than non-exposed girls.

While the findings of this study should be regarded in the context of several limitations, we should first state that we had two reasons for choosing to focus on ADHD symptoms as the outcome of interest, rather than on oppositional defiant problems or conduct problems. First, of all the behavioral problems associated with prenatal exposure to maternal smoking, ADHD symptoms are among those most frequently studied (Linnet et al., 2003). Second, ADHD is the most commonly diagnosed childhood psychiatric disorder (American Psychiatric Association, 1994). However, the co-occurrence of ADHD symptoms with oppositional defiant problems and conduct problems in our studied period is substantial (Loeber, Green, Lahey, Frick, & McBurnett, 2000). This implies that prenatal smoking may also be a moderator of intervention success with respect to symptoms of oppositional defiant problems or conduct problems. Additionally, ADHD has been characterized as a disorder of notable heterogeneity in its composition, with symptom dimensions of hyperactivity, impulsivity, and inattention (Burke, Loeber, & Lahey, 2001). Given this heterogeneity, prenatal exposure to maternal smoking may not be a moderator of intervention effectiveness in each of these symptom dimensions. Testing each of these hypotheses was however beyond the scope of this manuscript, but clearly warrants further investigation.

This study had a number of limitations. A concern is the fact that no data were available on the IQs or cognitive abilities of the children. It was therefore not possible to examine whether learning difficulties or lower cognitive abilities made some children less receptive to the GBG.

Another limitation concerned the use of retrospective maternal reports of smoking during pregnancy. Although these may have involved a higher likelihood of recall bias, Maughan et al. (2004) found similar percentages of smoking during pregnancy rated only one year after birth. Moreover, our percentage was approximately similar to that of mothers who reported having smoked during pregnancy in the Netherlands (Crone et al., 2000). Related to this is the problem of rater bias: the risk that, due to the stigma associated with substance-use during pregnancy, self-reported smoking data may in this case not reflect actual smoking

behavior. We tried to overcome this problem by using different time-points in our assessment of child behavior problems and women's use of cigarettes during pregnancy. It has also been suggested that, when pregnancy has passed and there is no apparent major adverse effect on the child, a mother may be more forthright in her reporting (Williams et al., 1998).

Also, teachers who implemented the GBG intervention were also the source of the children's outcome ratings. In other words, the fact that they were not blind to intervention may have led them to underreport the ADHD symptoms. In our view, because a class generally had a new teacher at the start of each grade, the severity of this limitation should not be overestimated, especially as the average assessment of the level of ADHD symptoms and of the impact of the GBG intervention on these ADHD symptoms is the product of a consensus of three different teachers per class.

Finally, in line with the fetal programming hypothesis, we expected prenatal smoking effects also to be present at age 9. However, our results showed that exposed children started off with higher mean levels of ADHD symptoms than non-exposed children at age 7, but ended up with levels similar to those in non-exposed control-group children at age 9. Taking the points with regard to growth in ADHD symptoms among non-exposed controls, as discussed earlier, in mind, this age-specific finding provides some support for the hypothesis of Maughan et al. (2004) – who argued that the effects of prenatal smoking should be most evident in early childhood, and that older samples would highlight different patterns of effects – more research is needed to test the tenability of the fetal programming hypothesis in different age samples.

Given these caveats, the core conclusion of our analyses is that the consequence of prenatal exposure to maternal smoking is in accordance with the hypothesis that fetal programming may underlie the higher levels of ADHD symptoms at entry to elementary school. The intervention had no impact on the course of ADHD symptoms, nor on the probability that exposed children would engage in early-onset experimentation with smoking. In contrast, non-exposed children entered elementary school with lower levels of ADHD symptoms and were receptive to the environmental intervention. It may be argued that the intervention merely prevented a normative growth in ADHD symptoms, and that the size of the effect was modest. However, there are three reasons why these results should not be underestimated. First, the non-exposed group consisted of 82% of the total sample. It is therefore reasonable to assume that the reason that not all these children improved on their ADHD symptoms is because their levels of such problems were already low. Instead, these results were probably due to a sub-sample within this non-exposed group whose improvement

was likely to have been much larger than the improvement found overall. Second, ADHD symptoms are highly predictive of a number of serious negative outcomes, including antisocial behavior, delinquency, Conduct Disorder and Antisocial Personality Disorder (American Psychiatric Association, 1994). Third, early experimentation with smoking is predictive of prolonged smoking, possibly through the impact on the still-developing brain (Di Franza et al., 2000). The GBG intervention reduced the rate of smoking in childhood among non-exposed children by 50%.

Although, like previous studies, this study associates prenatal exposure to maternal smoking with elevated symptoms of ADHD in children, a key obstacle to interpreting this association is that there has been no unequivocal demonstration of a direct causal link (Thapar et al., 2003). By demonstrating that a randomized controlled promotive factor for behavioral adjustment was successful only among children who had not been prenatally exposed to maternal smoking, this study has gone beyond previous correlational studies on the hazardous influence of prenatal smoking. We could not, however, control for genetic influences, such as a familial history of ADHD, nor did we directly target the risk variable (prenatal smoking). Therefore, we cannot rule out the possibility that the genes that are associated with smoking during pregnancy are also transferred to the child, in whom they then cause ADHD symptoms. Neither can we prove that reductions in prenatal smoking due to intervention are associated with reductions in ADHD symptoms. With regard to genetic influences in this association, two previous studies (Maughan et al., 2004; Thapar et al., 2003) used genetically sensitive designs to control for them. Each found that there was a significant association between prenatal exposure to maternal smoking and offspring behavioral outcomes in addition to genetic and other environmental risk variables.

In sum, this study supported the entrenched and harmful role prenatal smoking plays in the etiology of ADHD symptoms by showing that individual changes in ADHD symptoms due to a randomized delivered promotive factor took place only among children who had not been prenatally exposed to smoking. However, future research should explore whether prenatal smoking is a proxy measure that indexes another risk factor, or a causal factor for adverse developmental outcomes. In addition to the previous studies using genetic informative samples, intervention studies aimed at reducing prenatal smoking should be undertaken.

3

Childhood predictors of relational aggression from late childhood to early adolescence

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Chapter 3

Childhood predictors of relational aggression from late childhood to early adolescence

Abstract

The longitudinal association between teacher- and peer-rated overt aggression, teacher-rated attention problems, social problems, anxiety/depression, and peer-rated sociometric status at age 7, with teacher- and peer-rated relational aggression from age 10 to 12 years was studied in 234 Dutch elementary schoolchildren. Female gender and teacher- and peer-rated overt aggression predicted teacher- and peer-rated relational aggression from age 10 to 12. In addition, controversial status predicted teacher-rated relational aggression. These results suggest that the underlying mechanism that accounts for higher levels of relational aggression, especially observed among girls, is similar to the mechanism that has been associated with male forms of antisocial behavior. Implications for understanding female paths towards anti-social behavior are discussed.

Introduction

For decades, research on the development of aggressive behavior in childhood was dominated by a primary focus on forms of aggression that were more characteristic of boys than of girls, which resulted in the stereotype view of girls as being non-aggressive (Conway, 2005; Crick & Rose, 2000; Crick & Zahn-Waxler, 2003). Recently, a new perspective on the study of girls' aggressive behavior began to expand, one that posits that girls *do* behave aggressively, but that this behavior has been overlooked due to a failure to define and assess forms of aggression that are most salient to girls (Crick & Zahn-Waxler, 2003). In defining the gender-linked hypothesis of aggression, Crick and Grotpeter (1995) proposed a construct called *relational aggression*. Relational aggression is defined as damaging interpersonal relationships or feelings of inclusion and involves acts such as deliberately ignoring others or excluding others from a peer-group, spreading rumors about others, and threatening to end a friendship.

Relationally aggressive acts have been described as behaviors that are hostile, hurtful, emotionally distressing, and often enacted in anger (Crick, 1995; French, Jansen, & Pidada, 2002). Childhood consequences that have been associated with relational aggression include decreased levels of peer acceptance or even rejection by peers, impulsive or defiant behavior, somatic complaints, sadness, anxiety, and depression in childhood (Crick, 1996; Crick, 1997; Crick & Grotpeter, 1995; Crick et al., 2006; Werner & Crick, 2004). Adolescent and young adulthood problems associated with relational aggression include alcohol and drugs problems

(Storch, Bagner, Geffken, & Baumeister, 2004), and externalizing problems, borderline personality features, and bulimia (Werner & Crick, 1999).

Relational aggression has been reported to be present as early as in kindergarten (Crick, Casas, & Mosher, 1997; Ostrov, 2006). However, because of the growing social-cognitive skills with age - which can be used for relational aggressive acts – it is hypothesized that relational aggression may become more manifest in middle childhood (Underwood, Galen, & Paquette, 2001). Given the previously reported outcomes associated with relational aggression, knowledge about the pathways in childhood leading toward such aggressive acts in late childhood is of importance.

Before discussing pathways leading to relational aggression, it is important to notice that different labels have been used to describe these forms of aggression. Specifically *indirect aggression* (e.g., Björkqvist, Lagerspetz, & Kaukiainen, 1992) and *social aggression* (e.g., Galen & Underwood, 1997) have been described in addition to relational aggression. Indirect aggression describes a set of behaviors that are social manipulative and circuitous in nature (e.g., spreading rumors about another person), while social aggression is used to describe behavior that is directed toward attacking another's self-esteem, social status, or both. Although these three types of aggression overlap considerably in that they involve hurtful behaviors that are socially scheming, it has been argued that these types of aggression are in fact conceptually different from another (Crick et al., 1999; Underwood et al., 2001). For instance, relational aggression is different from social aggression in that it especially involves damaging a person's peer relationships, whereas social aggression is aimed at attacking another's self-esteem or social status. Relational aggression is similar to indirect aggression in that it involves the manipulation of peers and damage to relationships with peers, but differs because it encompasses behaviors that are both overt and covert, while indirect aggression is mainly covert in nature.

Compared with the multitude of studies that have explored the pathways towards male forms of aggression and antisocial behavior, our knowledge about early risk markers for later relational aggression is still in its infancy (Geiger et al., 2004; Park et al., 2005; Underwood et al., 2001). With regard to the behavioral antecedents of relational aggression, one longitudinal study found that high levels of physical aggression at age 7 years predicted self-reported relational aggression at age 13 years (Zahn-Waxler et al., 2005). Interestingly, this was found only for girls. The pathway from physical aggression leading towards relational forms of aggression has also been suggested by Björkqvist and colleagues (e.g., Björkqvist et al., 1992; Björkqvist, Osterman, & Kaukiainen, 1992). Although indirect aggression was used as their

outcome, these authors hypothesized that the pathway leading toward the onset of indirect forms of aggression starts with physical aggression (e.g., kicking, hitting, slapping) in early childhood and gradually shifts to verbal aggression (e.g., shouting, swearing, arguing) when their language skills develop, and, in turn, to indirect or relational aggression as their social-cognitive skills advance. Empirical evidence for this model has been provided by a study on social aggression by Brendgen et al. (2005), who demonstrated that high levels of physical aggression led to high levels of social aggression in 6-year-old twins. However, the only study that directly tested the longitudinal associations between physical and social aggression did not find any cross-lagged links (Vaillancourt, Brendgen, Boivin, & Tremblay, 2003).

Relational aggression has also been associated with other types of childhood problem behaviors, such as hyperactivity problems. Empirical evidence for an association between hyperactivity problems and relational aggression was provided by Crick (1997), who demonstrated that relational aggressive children age 9 to 12 years old exhibited more impulsivity than non-relationally aggressive children. This association has also been described by Zalecki and Hinshaw (2004), who studied the level of relational aggression in a study of girls aged 6 to 12 years. This study indicated that girls with ADHD manifested higher levels of relational aggression than controls. Moreover, Marsee et al. (2005) investigated the association between hyperactivity and relational aggression in youth in the fifth through ninth grades. In this study, hyperactivity was associated with self-reported relational aggression in girls but not boys.

In addition to disruptive behavior problems, associations between emotional problems and relational aggression have been found. Crick and Grotpeter (1995) reported associations between anxiety and depression and relational aggression in a cross-sectional study of third through sixth grade children. Thus, both behavioral and emotional problems have been associated with relational aggression. However, many studies were cross-sectional, and therefore could not examine the directional nature of the associations. Moreover, none of the previously described studies incorporated indices of both behavioral and emotional problems simultaneously within the same study. Therefore, these studies cannot provide an answer to the question whether behavioral or emotional difficulties, or both, are predictive of future relational aggression. The first aim of this study was therefore to explore the age 7 years behavioral antecedents of relational aggression at age 10 to 12 years in 234 Dutch elementary schoolchildren. More specifically, we tested whether the predictive association between overt aggression and relational aggression would survive when taking into account attention problems and internalizing problems.

Apart from behavioral and emotional problems, relational aggression in elementary school has been associated with difficulty in peer relations. In several studies, rejected children (i.e., those who are highly disliked by peers) were found to be more relationally aggressive than popular, average, and neglected children (Crick & Grotpeter, 1995; Tomada & Schneider, 1997). More recently, Werner and Crick (2004) demonstrated that for girls, a rejected status was predictive of an increase in relational aggression over a one-year period. However, it is important to notice that there is some controversy about whether relational aggressive children are socially unaccepted/rejected children with behavior problems such as physical aggression and/or hyperactivity problems, or whether they are confident and 'cool' planners of their tormenting of others, because several studies have also reported associations between relational aggression and indices of popularity. In this regard, children with a controversial sociometric status (i.e., children who are liked by some peers but disliked by others) have also been found to exhibit high levels of relational aggression (Crick & Grotpeter, 1995; Nelson, Robinson, & Hart, 2005; Tomada & Schneider, 1997). Moreover, Rose, Swenson, and Waller (2004) found that relational aggression was positively related to peer-perceived popularity (an index of social reputation and impact) among seventh- and ninth-graders, and that these relations were bi-directional. Cillessen and Mayeux (2004) demonstrated that perceived popularity preceded relational aggression for both genders in children from ages 10 to 14. Therefore, in addition to studying behavioral antecedents to relational aggression, we aimed to explore which sociometric classification of children would be predictive of teacher- and peer-rated relational aggression from age 10 to 12 years.

Finally, one particular topic with regard to the predictors of relational aggression concerns sex differences. Studies have found mixed results for the occurrence and size of the sex difference as a function of age, type of measurement, and sample (for a review, see Archer & Coyne, 2005). For instance, whereas the majority of studies have shown girls to manifest higher levels of relational aggression in preschool samples (Bonica, Arnold, Fisher, Zeljo, & Yershova, 2003; Crick et al., 1997; Ostrov & Keating, 2004; Ostrov, Woods, Jansen, Casas, & Crick, 2004), during elementary school period (Crick, 1997; Crick & Grotpeter, 1995), and in early adolescence (French et al., 2002; Zahn-Waxler et al., 2005), some other studies showed boys to manifest higher levels of relational aggression than girls during the elementary school period (Henington, Hughes, Cavell, & Thompson, 1998; Rys & Bear, 1997; Tomada & Schneider, 1997). Moreover, as we discussed previously, the behavioral antecedents of children's relational aggression may be different between boys and girls (e.g., physical aggression, Zahn-Waxler et al., 2005; hyperactivity, Marsee et al., 2005; peer rejection,

Werner and Crick, 2004). The final aim of the present study was therefore to further expand the knowledge on sex differences in relational aggression by examining whether the sex of the child predicted teacher- and peer-rated relational aggression above and beyond behavioral antecedents and sociometric classifications and whether the predictive associations depended upon the sex of the child.

In summary, we aimed at examining whether teacher- and peer-rated overt aggression, in addition to other behavioral and emotional problems, and sociometric characteristics at age 7 years, were predictive of teacher- and peer-rated relational aggression from age 10 to 12 years old. It was hypothesized that relational aggression from age 10 to 12 would be preceded by early childhood overt aggressive behavior and that this association would survive when taking into account attention problems and indices of internalizing problems. We also expected that rejected and controversial children at age 7 would manifest higher levels of relational aggression at age 10 to12 years. Finally, we aimed at studying the influence of sex on both the level of relational aggression as well as on the predictive association between the behavioral and sociometric antecedents and relational aggression. Regarding sex differences in relational aggression, we hypothesized that girls would be consistently higher on teacher- and peer-rated relational aggression from age 10 to 12 years than boys. Regarding sex differences in the predictive associations, it was hypothesized that the predictive associations would not depend upon the sex of the child.

Method

Sample

Analyses were performed on the control group of children from a school-based, preventive intervention study targeting disruptive behavior in young children in the Netherlands (van Lier, Verhulst et al., 2003). Large mainstream elementary schools in the metropolitan areas of Rotterdam and Amsterdam were eligible for inclusion. The first 13 schools that responded positively to the invitation to cooperate with the project were included.

At the start of the project, all 744 children from these 13 schools, who moved on to second grade over the summer (age 6 and 7) were eligible for inclusion. Parents of 666 children (89.5%) signed written informed consent granting the child permission to participate in the study. Of these children, 304 became control group children. During the 2-year intervention period in grade 2 and 3 (age 8 and 9), 18 children moved from a control-class to an intervention-class. These children were excluded from this study, leaving 286 children in the sample. Fourteen children were lost to follow-up because they left school or due to grade

retention. Thirty-eight children were lost to follow-up because one school terminated participation with the research project after the end of the intervention (grade 3). Consequently, data was available for 234 children (85.7% of the included children). Loss to follow-up of these 38 children was not related to the gender (χ^2 (1, N = 272) = 1.12, p > .05), low socio-economic status (χ^2 (1, N = 260) = .15, p > .05), ethnicity of the child (χ^2 (3, N = 272) = 5.93, p > .05), teacher-ratings of overt aggression (F (1, 271) = .025, p > .05) and peer-nominated overt aggression (F (1, 265) = .18, p > .05) at age 7.

Forty-nine percent of the children were girls. Seventy-eight percent of the children were Caucasian, 11% were Moroccan, 7% were Turkish, and 4% were from other ethnic background. Thirty-four percent of the households were of low socio-economic status, which was defined as unemployment, the performance of work requiring minimal education and/or having completed only elementary school or less (Statistics Netherlands, 1999). This percentage is in accordance with the general Dutch population (Statistics Netherlands, 1999).

Measures

Outcome Variables

Teacher-rated relational aggression was assessed with the Ratings of Children's Social Experience-Teacher Report (RCSE-T; Crick & Grotpeter, 1995) from fourth through sixth grades (ages 10 to 12 years). The items were translated into Dutch and back translated into English to ensure accuracy. The RCSE-T Relational Aggression scale was used, which consists of five items (This child spreads rumors or gossips about some peers; When this child is mad at a peer, (s)he gets even by excluding the peer from his or her clique or play group; When mad at a peer, this child ignores the peer or stops talking to the peer; This child threatens to stop being a peer's friend in order to hurt the peer or to get what (s)he wants from the peer; When angry at a peer, this child tries to get other children to stop playing with the peer or to get what s(he) wants from the peer). Each question was rated on a 5-point scale (0 = *never true*, 1 = *seldom true*, 2 = *sometimes true*, 3 = *very often true*, 4 = *almost often true*). Cronbach's alpha ranged from .85 to .87 over the three assessments.

Peer-nominations of relational aggression were obtained at age 10 and 12 years through five behavioral descriptions (Crick, 1997). Items include 'This child says mean things about other children when they're not around', 'This child tries to keep other kids outside the group of friends when s(he) is angry', 'When (s)he is mad at a person, this child ignores the person or

stops talking to him/her', 'This child tries to exclude or keep certain people from being in their group when doing things together', 'This child lets his/her friends know that (s)he will stop liking them unless the friends do what (s)he wants them to do'. Children were asked to nominate all classmates of either sex that fit each of these descriptions (Coie & Dodge, 1988). The scores were divided by the number of children in the classroom minus one (children were not allowed to nominate themselves) and then summed to the Relational Aggression scale. Cronbach's alpha for relational aggression at age 10 and 12 were .92 and .88 respectively.

Predictor Variables

Teacher ratings of children's behavioral and emotional problems over the last two months were assessed with the Teacher's Report Form (TRF/6-18; Achenbach, 1991a) in first grade (age 7 years). Teachers rated the child's behavior on a 3-point scale (0 = *not true*, 1 = *somewhat true*, 2 = *very true or often true*). In the present study, the syndrome scales Anxious/Depressed (range = 0 - 15), Social Problems (range = 0 - 10), Attention Problems (range = 0 - 31), and Aggressive Behavior (range = 0 - 39) were used. The Anxious/Depressed scale consists of 18 items, including 'This child complains of loneliness' and 'This child cries a lot'. Cronbach's alpha was .79. The Social Problems scale consists of 13 items, which include 'This child doesn't get along with other pupils' and 'This child gets teased a lot'. Cronbach's alpha was .75. The Attention Problems scale consists of 20 items and include 'This child can't sit still, is restless, or hyperactive' and 'This child has difficulty following directions'. Cronbach's alpha was .90. The Aggressive Behavior scale consists of 25 items. Items included 'This child is defiant, talks back to staff' and 'This child destroys property belonging to others'. Cronbach's alpha was .95. The TRF has been translated and validated for use in the Netherlands (Verhulst et al., 1997).

Peer-nominations of overt aggression were obtained through four behavioral descriptions when children were in first grade (age 7). The Overt Aggression scale consisted of four items. Items included 'This child starts fights', 'This child gets angry easily' (Coie & Dodge, 1988). Children were asked to nominate all classmates of either sex that fit each of these descriptions. The scores were divided by the number of children in the classroom minus one (children were not allowed to nominate themselves) and then summed to the Overt Aggression scale (range = 0 - 3.44). Cronbach's alpha was .92.

Rejected, neglected, controversial, and popular status at age 7 years were based on a combination of liked-most and liked-least nominations obtained in first grade (Coie, Dodge, & Coppotelli, 1982), and were computed in the traditional way (Coie & Kupersmidt, 1983). Dummy coded variables indexing *rejected, neglected, controversial*, and *popular peer status* (0 = *no*, 1 = *yes*) were included as predictor variables.

A dummy coded variable indexing *Female gender* (0 = *male*, 1 = *female*) was included as a predictor variable.

Procedure

Teacher assessments of children's behavioral and emotional problems were conducted in the spring of first grade (age 7). Five TRF forms with preprinted names were sent to the teacher each week and they were asked to fill out the forms during that week. Teachers completed the TRF for each child in their class in approximately 5 weeks. Teachers received a gift certificate of €45.

Peer nominations of aggressive behavior and sociometric status at age 7 years were conducted by two trained research-assistants. Children were supplied with rosters of their classmates and nomination forms. Children used these rosters to nominate classmates (male or female) for each item, after the children identified each child on the roster first. Each time, a group of six children was taken from the classroom to complete the peer nomination forms in a separate place in the school, supervised by two research-assistants. The children were separated to ensure that they would not influence peers while filling out the forms. Each child filled out the form, under direct supervision of one of the research-assistants. Children were asked whether they understood the description and, if necessary, an example was given. Children were instructed to keep their answers confidential.

Teacher assessments of relational aggression were conducted annually in three waves of data collection starting in fourth grade, when children were 10 years old, and at the two follow-up assessments. Assessments were conducted near the end of the school year. Teachers received a gift certificate of €25.

Children completed the peer nominations of relational aggression at age 10 and 12 years in the classroom, supervised by two trained research-assistants. Children were instructed to keep their answers confidential and were told that they did not have to answer any question they did not want to complete. The teachers were asked to leave the classroom during the assessment to ensure that children felt comfortable filling out the questionnaires.

Statistical approach

As outcome variables, teacher-rated relational aggression data were present at age 10, 11 and 12 years, in addition to peer-rated relational aggression data for ages 10 and 12 years. Therefore, a latent variable for teacher- and peer-rated relational aggression outcomes over the period of age 10 to 12 years was considered for each informant separately.

The predictor variables were entered to estimate the association with teacher- and peer-rated relational aggression from age 10 to 12 years. We first entered all predictor variables individually. Then all significant predictors were entered in a multiple model to estimate the unique predictive association. Parameter estimates were controlled for female sex. The analyses were conducted using Mplus 4.0 (Muthén & Muthén, 1998-2006).

Table 3.1 Means and Standard Deviations for Teacher- and Peer-Rated Relational Aggression for Girls and Boys from Age 10 to 12 Years

| | Teacher-Rated Relational Aggression | | | | Peer-Rated Relational Aggression | | | |
| | Girls | | Boys | | Girls | | Boys | |
Age	M	SD	M	SD	M	SD	M	SD
10	10.32	4.64	9.81	3.83	.41	.42	.48	.50
11	10.53	4.56	9.37	3.43	-	-	-	-
12	9.25	4.07	9.02	3.60	.47	.60	.47	.40

Note. M = Mean; SD = Standard Deviation.

Results

Descriptive statistics

Table 3.1 presents the means and standard deviations of teacher- and peer-rated relational aggression at ages 10 to 12 years. The correlations for teacher-rated relational aggression at ages 10 to 12 years for boys ranged from .21 to .41, and for girls from .33 to .57. Differences between the correlations for boys and girls were only significant at $p < .01$ for teacher-rated relational aggression at age 11 years (grade 5). The correlations for peer-rated relational aggression at age 10 and 12 years were .78 for boys, and .61 for girls. Difference between the correlations for boys and girls were significant at $p < .05$.

Table 3.2 presents the correlations between the predictor variables. Although this table indicates strong bivariate correlations between the predictors, these correlations were not too high for multiple regression models (Stevens, 1999).

Table 3.2 Bivariate Correlations between Predictor Variables

Variable	2	3	4	5
Teacher-Reported				
1. Anxious/Depressed	.59**	.36**	.47**	-.05
2. Social Problems	-	.58**	.53**	.18**
3. Attention Problems		-	.62**	.40**
4. Overt Aggression			-	.50**
Peer-Reported				
5. Overt Aggression				-

Note. ** $p < .01$.

Childhood behavioral and emotional problems and sociometric status and teacher-rated relational aggression from age 10 to 12 years

All predictor variables were first entered individually to study whether they were significantly associated with teacher-rated relational aggression.

Behavioral problems. The simple regression coefficients for predictors of teacher-rated relational aggression are presented in Table 3.3 (left columns). Teacher-reported overt aggressive behavior, attention problems, and social problems, and peer-nominated aggressive behavior had a significant positive bivariate association with teacher-rated relational aggression.

Emotional problems. Teacher-rated anxious/depressed was not significantly associated with relational aggression.

Sociometric status. Thirteen percent of the children were classified as rejected, 7% had a controversial status, 10% had a neglected status, and 14% were rated as popular. Rejected and controversial status had a positive bivariate association with relational aggression, while

popular status was negatively associated with relational aggression. Neglected sociometric status was not significantly associated with relational aggression (see Table 3.3, left columns).

Multiple regression analyses

To study the unique contribution of the childhood behavioral variables and sociometric status on teacher-rated relational aggression from age 10 to 12 years, a multiple regression model was used. Only predictor variables that were significantly associated with the outcome in the bivariate models, in addition to female gender, were entered. Non-significant predictors were dropped from the model. The final model had a good fit to the data (χ^2 (8, $N = 234$) = 11.89, $p > .05$), and explained 44% of the variance in teacher-rated relational aggression. Results are presented in Table 3.3, right columns.

Female gender, teacher-, and peer-rated overt aggression and a controversial status were significant independent predictors of teacher-rated relational aggression. To study whether any of the associations between aggressive behavior and controversial sociometric status were gender specific, the interaction between sex and the predictor variable was entered. These interaction terms were not significant (teacher-rated overt aggression; $\beta = -.01$, $p > .05$; peer-rated overt aggression, $\beta = .62$, $p > .05$), showing that these associations were not gender specific.

Teacher-rated relational aggression was not assessed at age 7. Consequently, it was impossible to examine whether female gender, teacher- and peer-rated overt aggression, and controversial status predicted higher levels of relational aggression from 10 to12 years above and beyond relational aggression at age 7 years. To study the possible effect of this, we ran a multiple regression model predicting teacher-rated relational aggression at age 12. Female gender, teacher- and peer-rated overt aggression, and controversial status at age 7 were entered as predictors, while controlling for teacher-rated relational aggression at age 10. The results were similar to our previous findings (female gender: $\beta = .14$, $p < .01$; teacher-rated overt aggression: $\beta = .09$, $p < .05$; peer-rated overt aggression: $\beta = 1.70$, $p < .01$; controversial status: $\beta = 3.1$, $p < .01$).

Table 3.3 Regression Coefficients from Simple and Multiple Regression for Predictors of Teacher-Rated Relational Aggression from Age 10 to 12 Years ($N = 234$)

Predictor variables	Simple		Multiple	
	Est.	*SE*	Est.	*SE*
Female Gender	-	-	.66**	.40
Teacher-Reported				
Anxious/Depressed	.04	.06	-	-
Social Problems	.10*	.09	-.07	.10
Attention Problems	.07**	.04	.01	.04
Overt Aggression	.07**	.03	.04**	.02
Peer-Reported				
Overt Aggression	.98**	.40	.64**	.35
Sociometric Status				
Popular	-.53*	.51	-.09	.44
Rejected	1.02**	.62	.35	.59
Neglected	-.10	.60	-	-
Controversial	1.39**	.78	1.01**	.65

Note. Cell contents are standardized parameter estimates. * $p < .05$; ** $p < .01$.

Childhood behavioral and emotional problems and sociometric status and peer-rated relational aggression from age 10 to 12 years

All predictor variables were first entered individually to study whether they were significantly associated with peer-rated relational aggression.

    Behavioral problems. The simple regression coefficients for the predictors of peer-rated relational aggression are presented in Table 3.4 (left columns). Teacher- and peer-rated overt aggressive behavior, attention problems, and social problems all had a significant positive bivariate association with peer-rated relational aggression, in addition to female gender.

    Emotional problems. Anxious/depressive problems, as rated by teachers at age 7 were significantly associated with relational aggression.

Sociometric status. Rejected and controversial status had a positive bivariate association with relational aggression (see Table 3.4, left columns).

Multiple regression analyses

Again, to study the unique contribution of the behavioral variables and sociometric status on peer-rated relational aggression from age 10 to 12 years, a multiple regression model was used. Non-significant predictors were dropped from the model. This final model had a good fit to the data (χ^2 (2, $N = 234$) = 1.51, $p > .05$) and explained 52% of the variance in peer-rated relational aggression from age 10 to 12 years. Results are in Table 3.4, right columns. Only teacher- and peer-rated overt aggression were significantly associated with peer-rated relational aggression, in addition to female gender. Again, we tested whether these associations were gender specific by adding the interaction term between teacher- and peer- rated overt aggression and female gender. These interaction terms were not significant (teacher-rated overt aggression; $\beta = -.01$, $p > .05$; peer-rated overt aggression, $\beta = .10$, $p > .05$), demonstrating that the predictive associations were not gender specific.

Discussion

The aim of the present study was to explore whether teacher- and peer-rated relational aggression from age 10 to 12 years were impacted by early behavioral and emotional problems, sociometric classifications, and female gender. With regard to the behavioral antecedents of relational aggression, only behavioral problems in early elementary school were associated with the outcome in late childhood. Especially overt aggressive behavior at age 7, as rated by both teacher and peers, was predictive of teacher- and peer-rated relational aggression from age 10 to 12. These findings corroborate with previous research on relational aggression (Zahn-Waxler et al., 2005) and social aggression (Brendgen et al., 2005).

Unlike behavioral problems, however, anxiety/depression and social problems were not associated with later relational aggression. This finding opposed previous – cross-sectional – findings on such associations (Crick & Grotpeter, 1995). Therefore, emotional problems may be associated with relational aggression at the same time of assessment, but we found no evidence for a longitudinal pathway from emotional problems in early elementary school to relational aggression 3 to 5 years later.

Controversial peer status predicted teacher-rated relational aggression from age 10 to 12 years. This finding is consistent with previous results (Crick & Grotpeter, 1995; Tomada & Schneider, 1997). Controversial children display a profile that combines features of popular as

well as rejected status children (Coie et al., 1982; Newcomb, Bukowski, & Pattee, 1993). Controversial children are similar to rejected children in being disruptive, but in contrast to rejected children, are perceived as being leaders in the peer group and showing greater sociability (Coie et al., 1982).

Table 3.4 Regression Coefficients from Simple and Multiple Regression for Predictors of Peer-Rated Relational Aggression from Age 10 to 12 Years ($N = 234$)

Predictor variables	Simple		Multiple	
	Est.	SE	Est.	SE
Female Gender	-	-	.29*	.06
Teacher-Reported				
Anxious/Depressed	.07*	.01	-.01	.01
Social Problems	.16**	.02	-.04	.02
Attention Problems	.08**	.01	.02	.00
Overt Aggression	.08**	.01	.05**	.00
Peer-Reported				
Overt Aggression	1.12**	.05	.81**	.06
Sociometric Status				
Popular	-.10	.09	-	-
Rejected	1.02**	.11	.03	.10
Neglected	-.10	.15	-	-
Controversial	.13**	.15	.28	.13

Note. Cell contents are standardized parameter estimates. * $p < .05$; ** $p < .01$.

Although our study is the first to detect a controversial status to be predictive of relational aggression 3-5 years later, this finding coincides with recent studies of Cillessen and Mayeux (2004), and Rose et al. (2004). These authors demonstrated that perceived popular children (popularity as a measure of social visibility in the peer group) was consistently and positively associated with relational aggression, especially among girls. Cillessen and Mayeux

(2004) argued that relationally aggressive children use these types of aggressive acts strategically to manipulate social relationships in ways to ensure their tenuous and unstable social status in the peer group. Although in our study controversial status was only predictive of relational aggression when teacher-ratings were used, our results tend to support this hypothesis.

With regard to sex differences in relational aggression, in both multiple regression models, a main effect of female gender was found indexing that girls were consistently higher on teacher- and peer-rated relational aggression from age 10 to 12 years than boys. This is in accordance with previous findings by Crick and others (e.g., Crick, 1997; Crick et al., 1999). It is important to notice that studies on relational aggression among adolescents reported males and females being equally high on relational aggression (Linder, Crick, & Collins, 2002), or males to be higher on relational aggression than females (Storch et al., 2004). Our results demonstrate that until late childhood, females are more inclined to relational aggression than males. Hence, if boys do catch-up with girls with respect to relational aggression, our results indicate that this does not occur before early adolescence. It is also important to notice that only a main effect of (female) gender was found; none of the interaction terms between female gender and behavioral characteristics or sociometric classification achieved significance. This indicates that, unlike previous reports on gender specific associations, our results suggest that especially early elementary school aggressive behavior predicts higher levels of relational aggression in late childhood, and that in addition to the behavioral antecedents as explored in this study, girls exhibit higher levels of relational aggression than boys.

Some limitations of this study should be taken into account. First, no data was available regarding relational aggression at age 7. This made it impossible to study whether teacher- and peer-rated aggressive behavior predicted the outcome above and beyond relational aggression at age 7. However, the predictive association between the childhood behavioral and peer relational indices and teacher-rated relational aggression at age 12 years survived while controlling for the level of relational aggression at age 10 years. This suggests an independent path from childhood overt aggression to early adolescent relational aggression above and beyond prior levels of relational aggression. However, it cannot be argued that the same results would be obtained if relational aggression at age 7 was controlled for.

Moreover, the present study focuses only on children's emotional and behavioral characteristics in addition to sociometric status. Other variables that were not included have been associated with relational aggression in previous research, such as high involvement with

parents, combined with a lack of warmth (Hart, Nelson, Robinson, Olsen, & McNeilly-Choque, 1998), and language development (Bonica et al., 2003).

Taking these limitations into account, this study found indications that especially childhood overt aggressiveness is related to later relational aggression. In previous studies, childhood aggression has been especially observed among boys, and has demonstrated to escalate in antisocial behavior, delinquency, and conduct disorder (e.g., Broidy et al., 2003), which is also most prevalent among males. However, as confirmed in this study, relational aggression has been associated most with girls, especially during childhood. This may suggest that the underlying mechanisms of children's deviant behavior are shared across gender, and that boys and girls simply differ in the way these mechanisms are manifested through their behavior in late childhood. The suggestion that the underlying mechanisms of male forms of antisocial behavior may be similar to the mechanism towards forms of antisocial behavior that are more common among females is in accordance with the recent finding by Brendgen et al. (2005), who reported that overlapping genes account for both physical (most prevalent among males) and social aggression (most prevalent among females) in six-year-old twins, and that specific environmental influences accounted for their manifestation.

Because our findings on the importance of aggression on relational aggression corroborate with previous research, a tempting implication may be to use these results for the development of prevention programs. However, since most of the evidence on the association between aggression and relational aggression is based on correlational designs, we cannot conclude on causality. The risk of getting causality wrong is that, for instance, preventive interventions may not be able to alter the behavior, or even result in iatrogenic results. Therefore, the emerging consistency in the findings that early overt aggression is associated with later relational aggression does not yet warrant the conclusion that preventive interventions that target childhood aggression could be used to also alter relational aggression, because of the lacking proof of causality in the association. In order to make a case for causation in the association, Rutter et al. (2001) proposed three research designs: (1) models of individual change, in which changes in the risk variables (overt aggression) predict changes in outcome (relational aggression) above and beyond other risk variables within the same subject, (2) genetic sensitive designs to control for possible genetic influences in the association (see Brendgen et al., 2005, in this regard), and (3) experimental designs, in which changes in the manifestation of the risk variable, due to intervention, mediate the impact of the intervention on the outcome variable. None of these research designs alone can make decisive proof of

causation, but consistency in these findings can make a strong case for causality in the association between overt aggression and relational aggression.

On the basis of the current understanding of processes leading to relational aggression, it can be concluded that the causes of relational aggression are not yet well enough understood to guide prevention efforts (see also Geiger, Zimmer-Gembeck, & Crick, 2004). However, because of the reported negative consequences of relational aggression, future research, using the above described designs and including a wide range of possible risk and protective factors within multiple contexts and developmental periods, is needed to achieve a better understanding of the causes of relational aggression and the putative processes through which these predictive links operate in order to effectively target its course.

4

Testing the pathway from early disruptive behavior problems to relational aggression in early adolescence through intervention

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Chapter 4

Testing the pathway from early disruptive behavior problems to relational aggression in early adolescence through intervention

Abstract

The aim of this study was to test the hypothesized role of early disruptive behavior problems as a risk marker for the development of relational aggression in early adolescence through a randomized prevention trial. A sample of 551 first grade boys and girls were randomly assigned to the Good Behavior Game intervention, a two-year (grades 2 and 3) universal classroom-based intervention aimed at reducing disruptive behavior problems, or a control condition. Measures on the direct impact of the intervention on overt aggression, ADHD symptoms, and oppositional defiant problems (age 9 years), in addition to teacher- and peer-rated relational aggression 1 to 3 years post intervention (age 10 to 12 years) were available. Mediation analyses supported the role of especially early overt aggression as a risk marker for relational aggression from age 10 to 12 years among boys, and the role of ADHD symptoms as a risk marker for relational aggression among girls. Implications for research on the pathways to relational aggression and prevention programs are discussed.

Introduction

The study of gender linked peer-directed aggression has demonstrated that, unlike previous notions that aggressive behavior in childhood is primarily a problem for boys, girls do behave aggressively, and that they typically use relational aggression as a way to inflict harm on others (Crick et al., 1999; Crick & Zahn-Waxler, 2003). Indeed, relational aggression has been found to be especially high among girls in childhood (e.g., for a review, see Crick et al., 1999). Research on relational aggression provides evidence for the harmful, damaging nature of this type of aggressive acts. From preschool to young adulthood, individuals describe relationally aggressive acts as behaviors that are hostile, hurtful, emotionally distressing, and often enacted in anger (Crick, 1995; French et al., 2002). Specifically, children who engage in high levels of relational aggression have been found to be at risk of experiencing decreased levels of peer acceptance and rejection by peers, impulsivity or defiant behavior, somatic complaints, sadness, anxiety, loneliness, and depression in childhood (Crick & Grotpeter, 1995; Crick, 1996; Crick, 1997; Crick et al., 2006; Werner & Crick, 2004), alcohol and drugs problems in adolescence (Storch et al., 2004), and externalizing problems, borderline personality features, and bulimia in young adulthood (Werner & Crick, 1999).

Given these reported negative outcomes, knowledge about the pathways leading towards relational aggression seems crucial. In our understanding of developmental pathways leading to maladjustment, randomized controlled trials can be very effective, because they provide the unique opportunity to test for reciprocity between hypothesized risk variables and problem behavior development (Kellam & Rebok, 1992). The aim of the present study was to examine one suggested pathway leading to relational aggression, namely the pathway from childhood disruptive behavior to relational aggression in early adolescence (Underwood et al., 2001). Specifically, this study tested whether reductions in overt aggression, ADHD symptoms, and oppositional defiant problems, due to intervention, mediated the reductions in teacher- and peer-rated relational aggression from age 10 to 12 years.

Before discussing pathways leading to relational aggression, it is important to notice that the definition of relational aggression – as damaging interpersonal relationships or feelings of inclusion (Crick & Grotpeter, 1995) – overlaps with the terms indirect aggression (e.g., Björkqvist et al., 1992) and social aggression (e.g., Galen & Underwood, 1997). All these terms refer to the social manipulation of peer relations in order to harm another individual, but indirect aggression is mainly covert in nature, whereas relational aggression can be both covert (e.g., negative facial expressions), and overt (e.g., threatening to withdraw friendship). Social aggression encompasses both overt and covert behaviors that attack another's self-esteem or social status, and are not necessarily aimed at damaging relationships. In addition, social aggression includes non-verbal aggressive behavior (e.g., ignoring someone). Despite this conceptual overlap between relational aggression and indirect and social aggression, relational aggression has been empirically validated as a distinct type of aggression (Crick et al., 1999).

One suggested pathway leading to relational aggression is through early childhood physical/overt aggression (Underwood et al., 2001). Several recent longitudinal studies have provided evidence for a predictive association between childhood physical aggression and relational aggression. Zahn-Waxler et al. (2005) demonstrated that high levels of physical aggression at age 7 years predicted self-reported relational aggression at age 13 years, but only for girls. Vuijk, van Lier, Huizink, and Crijnen (submitted) examined the longitudinal link between overt aggression at age 7 years, and relational aggression from age 10 to 12 years, and found that relational aggression was preceded by early overt aggression, in addition to female gender. Although Björkqvist and colleagues (1992) studied indirect aggression and not specifically relational aggression, their work is noteworthy. These authors proposed a theoretical model of aggression, which proclaims that the nature of aggression changes from physical to indirect aggression when children's social-cognitive skills advance. Empirical

evidence for this model has been provided by several studies on indirect aggression (e.g., Vaillancourt et al., 2003) and social aggression (e.g., Brendgen et al., 2005). For instance, regarding social aggression, Brendgen et al. (2005) found a directional link from high levels of physical aggression to high levels of social aggression in 6-year-old twins. Moreover, these authors found that the genetic factors that were associated with physical aggression were also associated with social aggression, but that unique environmental influences accounted for the manifestation of the twins' aggressive acts.

In addition to overt forms of aggression, relational aggression has also been associated with other behavioral problems. For instance, Crick (1997) reported that 9- to 12-year-old relational aggressive children age exhibited more defiant behaviors and impulsivity than children who were low on relational aggression. Zalecki and Hinshaw (2004) studied the association between ADHD and level of relational aggression among 7- to 12-year-old girls. The authors reported that girls with ADHD displayed higher levels of relational aggression than controls. Moreover, Marsee et al. (2005) investigated the association between hyperactivity and relational aggression in youth in the fifth through ninth grades. In this study, hyperactivity was associated with self-reported relational aggression in girls but not boys. Therefore, in addition to studying overt aggression as a possible risk factor for increased levels of relational aggression, we aimed to test the pathway from childhood ADHD symptoms and oppositional defiant problems leading to relational aggression in early adolescence. Specifically, we explored whether the pathway from overt aggression to relational aggression remained statistically significant when taking ADHD symptoms and oppositional defiant problems into account.

The gender of the child may be an important factor when studying the pathway from early disruptive behavior problems to relational aggression. There is inconclusive evidence whether these associations apply to both sexes, or are limited to females only. For instance, as we have shown above, the link between overt aggression and relational aggression was limited to girls, (Zahn-Waxler et al., 2005), and similar findings were reported with respect to hyperactivity (Marsee et al., 2005). The second aim of the present study was therefore to examine whether the predictive association between overt aggression, ADHD symptoms, and oppositional defiant problems and relational aggression depends upon the gender of the child.

In our study on the causes of relational aggression, it is important to notice that the above-described studies that demonstrated a link between early childhood behavioral problems and relational aggression development are either cross-sectional or longitudinal observational studies. However, no claim for causality within the relationships found in these studies can be

made due to the correlational nature of the findings (Kraemer et al., 2001; Moffitt, 2005; Rutter et al., 2001). To extend conclusions on associations between risk variables and outcomes beyond the risk factor stage, Rutter et al. (2001) proposed a number of research designs, including randomized controlled treatment studies. Randomized controlled trials are examples of such studies because they provide the opportunity to test whether the reduction in the manifestation of the risk variable, due to a controlled influence – the intervention – mediates the distal impact of the program on reductions in the outcome variable (see also Coie et al., 1993; Kellam & Rebok, 1992), while the randomization controls for possible sources of confounding. Given the above described findings on a link between childhood disruptive behavior problems and relational aggression, we aimed to study whether reductions in overt aggression, ADHD symptoms, and oppositional defiant problems at age 9 due to the Good Behavior Game intervention (GBG, Barrish et al., 1969; Dolan et al., 1989) mediate the reductions in teacher- and peer-rated relational aggression from age 10 to 12 years old. The GBG is a universal classroom-based preventive intervention targeting disruptive behavior problems. In prior studies, the GBG was proved to be effective in the reduction of teacher- and peer-reported aggressive behavior (Dolan et al., 1993; Ialongo et al., 1999, 2001; Kellam, Rebok, Ialongo, & Mayer, 1994; Reid, Eddy, Fetrow, & Stoolmiller, 1999), teacher-rated attention deficit/hyperactivity problems, oppositional defiant problems, conduct problems (van Lier et al., 2004), and peer-rated antisocial behavior (van Lier et al., 2005).

A number of recent studies used experimental designs to test for reciprocity in the association between risk variables and outcomes (e.g., Bierman et al., 2002; Leve & Chamberlain, 2005; Lochman & Wells, 2002; van Lier et al., 2005, Vitaro, Brendgen, & Tremblay, 2001). For instance, Bierman et al. (2002) tested the role of problem behavior in social preference scores, in addition to several other developmental models leading to antisocial development outcomes through the Fast Track randomized prevention trial (Conduct Problems Prevention Research Group, 1992, 2002). The authors reported that in accordance with developmental theory, improvements in social preference scores, as distal outcomes of intervention, were mediated by the direct effect of intervention in reducing teacher-rated aggression and improving prosocial behavior of these children. Similarly, Lochman and Wells (2002) tested the link between children's social cognitions and parenting behaviors (risk factors) and delinquency, substance use, and school behavior (outcomes) through intervention. Again, the results confirmed the hypothesized developmental relationship between the risk variables and outcomes. Specifically, the reductions in delinquency, substance use, and improvements in school behavior, due to intervention, were at least partially mediated through

intervention-produced changes in boys' social-cognitive processes and schema and measures of parenting processes that were the targets of the intervention. These studies thus successfully tested developmental models leading to problem behavior and related outcomes. However, as with studies on aggression in general, these studies explored forms of problem behaviors that are most characteristic of boys (Geiger et al., 2004; Underwood et al., 2001). The present study focuses on testing a hypothesized developmental pathway to relational aggression, a form of aggression in which high levels, especially in childhood, have been mostly associated with girls.

To summarize, we aimed to test the pathway from childhood overt aggression, ADHD symptoms, and oppositional problems, leading to teacher- and peer-rated relational aggression from age 10 to 12 years. It was hypothesized that the reductions in teacher- and peer-rated relational aggression would be mediated by reductions in overt aggression, ADHD symptoms, and oppositional defiant problems due to intervention. Second, when studying the unique contribution of overt aggression, ADHD symptoms, and oppositional defiant problems leading to relational aggression, it was hypothesized that the pathway from overt aggression to relational aggression would remain statistically significant when ADHD symptoms and oppositional defiant problems are taken into account. Finally, this study aimed at testing sex differences in the hypothesized reciprocal relationship between early disruptive behavior problems and later relational aggression. It was hypothesized that especially early elementary school aggressive behavior would be a risk marker for relational aggression in late childhood for boys. It is, however, uncertain whether this would apply also to girls. Their manifestation of relational aggression may be more influenced by prior symptoms of ADHD.

Method

Participants

As part of a school-based preventive intervention study targeting disruptive behavior in a sample of young elementary schoolchildren, 13 large mainstream elementary schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999 (for details, see van Lier, Verhulst et al., 2003). The first 13 schools that responded positively to the invitation to participate were included. In these schools, 794 children attending first grade (age 6) were assessed in the spring of 1999. Of those who moved on to second grade (age 7), 722 children were eligible for inclusion. Twenty-two children who repeated second grade in 1999 and moved into the study cohort were included in the sample for intervention purposes, making a total sample of 744 children. Of these children, 666

parents or parent substitutes (89.5%) signed written informed consent forms granting the child permission to participate in the study. At baseline, the mean age of these children was 6.9 years ($SD = 0.6$).

Over the two-year intervention period (second and third grade), 19 children moved from a control-group into an intervention group. These children were treated as intervention children. Hundred fifteen children dropped out of the study cohort because they moved away from a study school before participating in the follow-up measures, and because one school refused to participate after third grade ($n = 55$), making a total sample of 551 children. Loss to follow-up of these 115 children was not related to the child's sex or teacher- and peer-ratings of overt aggressive behavior at age 7 years. Children who dropped out of the study were however more likely to be of low socio-economic status (χ^2 (1, $N = 623$) = 38.40, $p < .05$), and of non-Caucasian ethnicity (χ^2 (1, $N = 666$) = 105.84, $p < .05$). Forty-seven percent of the children were girls. Eighty-four percent of the children were Caucasian, 7% were Moroccan, 5% were Turkish, and 4% were from other ethnic background. Twenty-nine percent of the households were of low SES, which is in accordance with the general Dutch population (Statistics Netherlands, 1999).

Preventive Intervention

The GBG is a classroom-based behavior management strategy that promotes prosocial behavior and reduces aggressive and disruptive behavior. Teachers and students choose positively formulated class rules, which are accompanied by pictograms. After observing children on well-defined behaviors in the classroom, teachers assign children to one of the three or four teams, each containing equal numbers of disruptive and non-disruptive children. Children are encouraged to manage their own and their team-mates' behavior through a process of group reinforcement and through mutual self-interest. Each team receives a number of cards, one of which will be taken by the teacher when a team-member violates a rule. Teams are rewarded when, at the end of the game, at least one card has remained, while all students are always rewarded with compliments throughout the game. Initially, winning teams also receive tangible rewards directly after each game. Later on, winning teams receive delayed rewards.

The GBG was implemented in three different stages. In the *introduction* stage, which started in the second grade in fall, it was played for three times a week during 10 minutes. In addition to the compliments, winning teams also received tangible rewards (stickers) directly

after each game. In the *expansion* stage, it was extended with regard to time and settings, and also to the behaviors targeted. Rewards were delayed until the end of the week and month. This phase lasted until the early spring of the school year. In the third stage – the *generalization* stage – the emphasis lay on explaining to children that the GBG rules also apply in various other settings.

The GBG was implemented in second and third grade. Both years, teachers received eight hours of training on its implementation. In class, they were also coached by the school advisory services in ten 60-minute classroom observations. External school advisors assessed the fidelity of implementation; per class, this was based on the frequency with which the GBG was performed, as well as the total number of hours it was performed. Of the 13 schools, 9 implemented the GBG program completely. Three schools implemented the introduction and expansion stage. Despite differences in implementation fidelity of the GBG, an intention to treat approach was used throughout the analyses. The GBG was adapted for use in the Netherlands by the educational services (van der Sar, 2002; van der Sar & Goudswaard, 2001).

Measures

Time 1 Pre-intervention Measures (Age 7)

Children's behavioral and emotional problems over the last two months were assessed with the TRF/6-18 (Achenbach, 1991a) at age 7 years. Teachers rated the child's behavior on a 3-point scale (0 = *not true*, 1 = *somewhat true*, 2 = *very true or often true*). In the present study, only those items of the syndrome scales Attention Problems and Aggressive Behavior were used that reflected similar content as the Time 2 intervention change measures of the Problem Behavior at School Interview. The TRF has been translated and validated for use in the Netherlands (Verhulst et al., 1997).

Peer-nominations of overt aggression were obtained through four behavioral descriptions at age 7 years. The Overt Aggression scale consisted of four items. Items included 'This child starts fights', 'This child gets angry easily' (Coie & Dodge, 1988). Children were asked to nominate all classmates of either sex that fit each of these descriptions. The scores were divided by the number of children in the classroom minus one (children were not allowed to nominate themselves) and then summed to the Overt Aggressive scale (range = 0 - 3.44). Cronbach's alpha was .92.

Two dummy coded variables, one for *Intervention status* (0 = *control*, 1 = *GBG*) and one for *Female sex* (0 = *male*, 1 = *female*) were included as a predictor variables.

Time 2 Intervention Change Measures: *Teacher Ratings (Age 9)*
Teacher-reported problem behavior at school was assessed at age 9 years using the Problem Behavior at School Interview (PBSI; Erasmus MC, 2000a). The PBSI is a 32-item interview that assesses disruptive behavior in children. Teachers rated the child's behavior on a 5-point Likert scale ranging from 1 (*never applicable*) to 5 (*often applicable*). The ADH problems scale consists of eight items. Items include 'This child has difficulty with concentration', 'This child is impulsive', or 'This child finds it hard to sit still'. Cronbach's alpha was .94. The Overt Aggression scale consists of twelve items, which include 'This child fights', 'This child attacks other children physically', and 'This child is truant'. Cronbach's alpha was .93. The Oppositional Defiant Problems scale consists of eight items, which include 'This child argues frequently', and 'This child disobeys teachers' instructions'. Cronbach's alpha was .92.

Time 3 Outcome Measures (Age 10 to 12)
Teacher-rated relational aggression was annually assessed with the 5-item Relational Aggression scale of the Ratings of Children's Social Experience-Teacher Report (RCSE-T; Crick & Grotpeter, 1995) in three waves of data collection at ages 10 to 12 years. Items include 'This child spreads rumors or gossip about some peers', 'When this child is mad at a peer, (s)he gets even by excluding the peer from his or her clique or play group', 'When mad at a peer, this child ignores the peer or stops talking to the peer', 'This child threatens to stop being a peer's friend in order to hurt the peer or to get what (s)he wants from the peer', 'When angry at a peer, this child tries to get other children to stop playing with the peer or to get what s(he) wants from the peer'. Each question was rated on a 5-point scale (0 = *never true*, 1 = *seldom true*, 2 = *sometimes true*, 3 = *very often true*, 4 = *almost often true*). Cronbach's alphas ranged from .84 to .87 over the three assessments.

Peer-rated relational aggression was obtained at age 10 and 12 years through five behavioral descriptions (Crick, 1997); 'This child says mean things about other children when they're not around', 'This child tries to keep other kids outside the group of friends when s(he) is angry', 'When (s)he is mad at a person, this child ignores the person or stops talking to him/her', 'This child tries to exclude or keep certain people from being in their group when doing things together', 'This child lets his/her friends know that (s)he will stop liking them unless the

friends do what (s)he wants them to do'. Children were asked to nominate all classmates of either sex that fit each of these descriptions (Coie & Dodge, 1988). The scores were divided by the number of children in the classroom minus one (children were not allowed to nominate themselves) and then summed to the Relational Aggression scale. Cronbach's alphas for relational aggression at age 10 and 12 were .92 and .88 respectively.

Procedure

Baseline assessments of pre-intervention measures (Time 1) were conducted in the spring of grade 1. During the summer break, when second grade class compositions were known, classes within each school were randomly assigned to either the intervention or control condition. Of the 31 classes in the 13 schools, 16 were assigned to the intervention condition, resulting in 303 children receiving the GBG program and 248 control group children. The GBG intervention started in the fall of the second grade and continued throughout the following year. The intervention thus covered a 2-year period of time. Classroom composition of 90.4% of the children remained the same over the intervention period. Time 2 post-intervention assessments were collected in the summer of grade 3 following the intervention, and Time 3 outcome assessments were collected in the summer of grade 4, 5, and 6.

We collected teacher assessments at Time 1 by sending teachers each week five forms of the TRF/6-18. Teachers were asked to fill out the forms during that week. Teacher assessments at Time 2 and Time 3 were conducted by trained research-assistants. Interviews were completed for all children attending these teachers' classes. Teachers received a gift certificate of €45.

Peer nominations at Time 1 were conducted by two trained research-assistants. Children were supplied with rosters of their classmates and nomination forms. Children used these rosters to nominate classmates (male or female) for each item, after the children identified each child on the roster first. Children completed the peer nomination forms in groups of six in a separate place in the school, under direct supervision of two trained research-assistants. The children were separated to ensure that they would not influence peers while filling out the forms. The children were asked whether they understood the description and, if necessary, an example was given. Children were instructed to keep their answers confidential. Children completed the peer nominations at Time 3 in the classroom, supervised by two trained research-assistants. Children were instructed to keep their answers confidential and were told that they did not have to answer any question they did not want to complete. The

teachers were asked to leave the classroom during the assessment to ensure that children felt comfortable filling out the questionnaires.

Statistical approach

As outcome variables, teacher-rated relational aggression data were present at age 10, 11, and 12 years, in addition to peer-rated relational aggression data for ages 10 and 12 years. Therefore, a latent variable for teacher- and peer-rated relational aggression outcomes over the period of age 10 to 12 years was considered for each informant separately.

In order to test whether changes in overt aggression, ADHD symptoms, and oppositional defiant problems mediated the effectiveness of the GBG intervention on teacher- and peer-rated relational aggression from age 10 to 12 years, the following procedure was used (see Baron & Kenny, 1986). First, to test whether the independent variable (GBG intervention status) impacted the outcome variables and potential mediators, a model was fitted in which we tested for a direct effect of intervention status on Time 3 outcome measures of teacher- and peer-rated relational aggression from age 10 to 12 years, in addition to testing for a direct effect of intervention status on each of the three Time 2 intervention change measures individually (overt aggression, ADHD symptoms, and oppositional defiant problems). No path from the mediators to the outcome variables was specified in this stage of the analyses. After affirming for positive intervention effects on both the outcomes and potential mediators, the direct path of the mediator to the outcome was specified. Models were run for each potential mediating variable (overt aggression, ADHD symptoms, and oppositional defiant problems) individually. Finally, to test for the unique contribution of overt aggression, ADHD symptoms and oppositional defiant problems, a multiple model was specified containing all three potential mediating variables. These final models were first run using all children, followed by analyses for boys and girls separately to test whether the mediation paths were sex specific. The analyses were run separately for the teacher- and peer-rated outcome.

Evidence for full mediation would be found if the significant direct effect of intervention status on teacher- and peer-rated relational aggression from the first model would turn into a non-significant estimate once the mediating variable is taken into account. Support for partial mediation would be found if the indirect path was significant, and this indirect path resulted in a significant decrease in the direct effect of intervention status on teacher- and peer-rated relational aggression. The direct path would however remain significant (Baron & Kenny, 1986). All analyses were controlled for female gender. The structural models were tested in Mplus 4.0 (Muthén & Muthén, 1998-2006).

Results

Descriptive statistics

Table 4.1 presents the bivariate correlations between the three hypothesized mediating variables and the outcome variables. As expected, strong bivariate correlations were found between the three mediating variables (.75 - .82). Females had significant higher levels of teacher-rated relational aggression ($\beta = .29$, $p < .05$) and peer-rated relational aggression ($\beta = .37$, $p < .01$) from age 10 to 12 years than males.

Table 4.1 Correlation Matrix for Key Variables

Variable	2	3	4	5	6	7	8
Teacher-Report Age 9							
1. Overt Aggression	.75**	.82**	.19**	.31**	.30**	.53**	.43**
2. ADHD Symptoms	-	.80**	.17**	.29**	.32**	.46**	.34**
3. Oppositional Defiant Problems		-	.15**	.32**	.30**	.49**	.33**
Teacher-Report Age 10-12							
4. Relational Aggression Age 10			-	.33**	.33**	.44**	.37**
5. Relational Aggression Age 11				-	.48**	.44**	.39**
6. Relational Aggression Age 12					-	.37**	.44**
Peer-Report Age 10 and 12							
7. Relational Aggression Age 10						-	.52**
8. Relational Aggression Age 12							-

Note. ** $p < .01$.

Teacher-rated relational aggression from age 10 to 12 years

A first requirement for mediation as studied here is that the GBG intervention has a significant impact on teacher-rated relational aggression from age 10 to 12 years in the absence of the mediator variables. Indeed, a significant direct effect of intervention status on teacher-rated relational aggression from age 10 to 12 years, controlling for female gender and pre-intervention levels of disruptive behavior problems was found ($\beta = -.25$, $p < .05$).

A second requirement to test for mediation is that the GBG intervention has a significant direct impact on the targeted intervention change (mediating) variables. All three Time 2 targeted intervention change variables were tested individually. Analyses demonstrated a significant bivariate effect of intervention status on Time 2 teacher-rated overt aggression (β = -.16, p < .05), ADHD symptoms (β = -.27, p < .01), and oppositional defiant problems (β = -.22, p < .01), controlling for pre-intervention levels of teacher-rated disruptive behavior problems and female gender.

Mediation. To test for mediation, three mediation models were specified, one for each Time 2 (potentially) mediating variable separately. The results showed a significant indirect path from intervention status, via teacher-rated overt aggression, ADHD symptoms, and oppositional defiant problems change to teacher-rated relational aggression from age 10 to 12 years (see Table 2, last column). In addition to the significant indirect paths, the direct paths from intervention status to relational aggression were no longer significant (see Table 4.2, first column). The results thus showed that when tested individually, the reductions in teacher-rated overt aggression, ADHD symptoms, and oppositional defiant problems fully mediated the distal effect of intervention on teacher-rated relational aggression.

Multiple model. To test whether each of the Time 2 targeted intervention change variables uniquely accounted for the reductions in relational aggression, a model containing all three mediators was specified. The associations were controlled for pre-intervention levels of disruptive behavior problems and female gender. Parameter estimates are in Table 4.2, bottom part. Analyses of the relations between intervention-target mediators and the outcome revealed significant indirect paths from intervention status, via teacher-rated overt aggression and ADHD symptoms to teacher-rated relational aggression from age 10 to 12 years (see Table 4.2, bottom part, last column). When controlling for overt aggression and ADHD symptoms, the indirect path through oppositional defiant problems was no longer significant. Again, when including the mediators in the model, the direct effect of the intervention on the outcome was no longer significant, indicating full mediation. Therefore, the reductions in teacher-rated relational aggression from age 10 to 12 years were mediated by reductions in overt aggression and ADHD symptoms, but not by oppositional defiant problems.

Table 4.2 Estimates from Simple and Multiple Mediator Models for Teacher-Rated Relational Aggression from Age 10 to 12 Years for Boys and Girls (N = 551)

	Teacher-Rated Relational Aggression from Age 10 to 12 Years			
	Simple			
	Direct Effects			Indirect Effect
Variables	GBG > Outcome	GBG > Mediator	Mediator > Outcome	GBG > Outcome
Overt Aggression	-.14 (.19)	-.18* (.08)	.42** (.14)	-.07* (.07)
ADHD Symptoms	-.14 (.19)	-.28** (.08)	.39** (.13)	-.11** (.07)
Oppositional	-.18 (.20)	-.24** (.08)	.36** (.13)	-.08** (.06)
	Multiple			
Overt Aggression	-.12 (.19)	-.22** (.08)	.29** (.19)	-.12** (.06)
ADHD Symptoms	-.12 (.19)	-.29** (.08)	.24* (.18)	-.13** (.06)
Oppositional	-.12 (.19)	-.23** (.08)	.06 (.20)	.02 (.05)

Note. Cell contents are standardized parameter estimates with standard errors in parentheses. * $p < .05$; ** $p < .01$.

It is important to notice that the mediators in the above-described results were not controlled for the effect of concurrent relational aggression. Because studies have demonstrated relational aggression to be present at age 9 years (e.g., Werner & Crick, 1999) this may be an important omission. To test this, we used the teacher-rated relational aggression at age 11 and 12 only as the outcome, and used teacher-rated relational aggression at age 10 as a mediator to test whether overt aggression and ADHD symptoms remained significant mediators above the mediating effect of relational aggression at age 10. In the non-mediation model, the direct effect of intervention status on teacher-rated relational aggression at age 11 and 12 was significant ($\beta = -.22$, $p < .05$). We then specified the mediation model. As expected, relational aggression at age 10 mediated relational aggression at age 11 and 12 ($\beta = .09$, $p < .01$). More importantly, the path from intervention status via overt aggression at age 9 to relational aggression at age 11 and 12 ($\beta = .34$, $p < .01$), as well as the path from intervention status via ADHD symptoms at age 9 to relational aggression at age 11 and 12 ($\beta = .34$, $p < .01$) remained significant. Thus, these results suggest that for boys and girls together, reductions in overt aggression and ADHD symptoms uniquely mediated the reductions in relational aggression, even when controlling relational aggression.

Finally, we tested whether the mediating effect was sex specific. First, to ensure that the direct effect of intervention status on teacher-rated relational aggression and on the teacher-rated mediators was not limited to either of the sexes, the interaction terms between intervention status and female gender were added to these paths. None of these interactions were significant (intervention * female sex to outcome: $\beta = .04$, $p > .05$; overt aggression: $\beta = .08$, $p > .05$, ADHD symptoms: $\beta = -.08$, $p > .05$, oppositional defiant problems: $\beta = -.10$, $p > .05$). Second, to test whether the mediating effects of overt aggression, ADHD symptoms, and oppositional defiant problems were sex specific the model was run for boys and girls separately. Results are displayed in Figure 4.1. For girls, significant mediation by the three intervention targeted variables was found. This effect was accounted for by the reductions in ADHD symptoms.

However, among girls, it could not be tested whether overt aggression mediated the reductions in teacher-rated relational aggression, because the direct effect of intervention status on overt aggression was not significant (see Figure 4.1, top).

With regard to boys, significant overall mediation by the three intervention targeted variables was found. However, unlike girls, this overall effect was especially driven by reductions in overt aggression. The paths from ADHD symptoms and oppositional defiant problems were not significant for boys (see Figure 4.1, bottom).
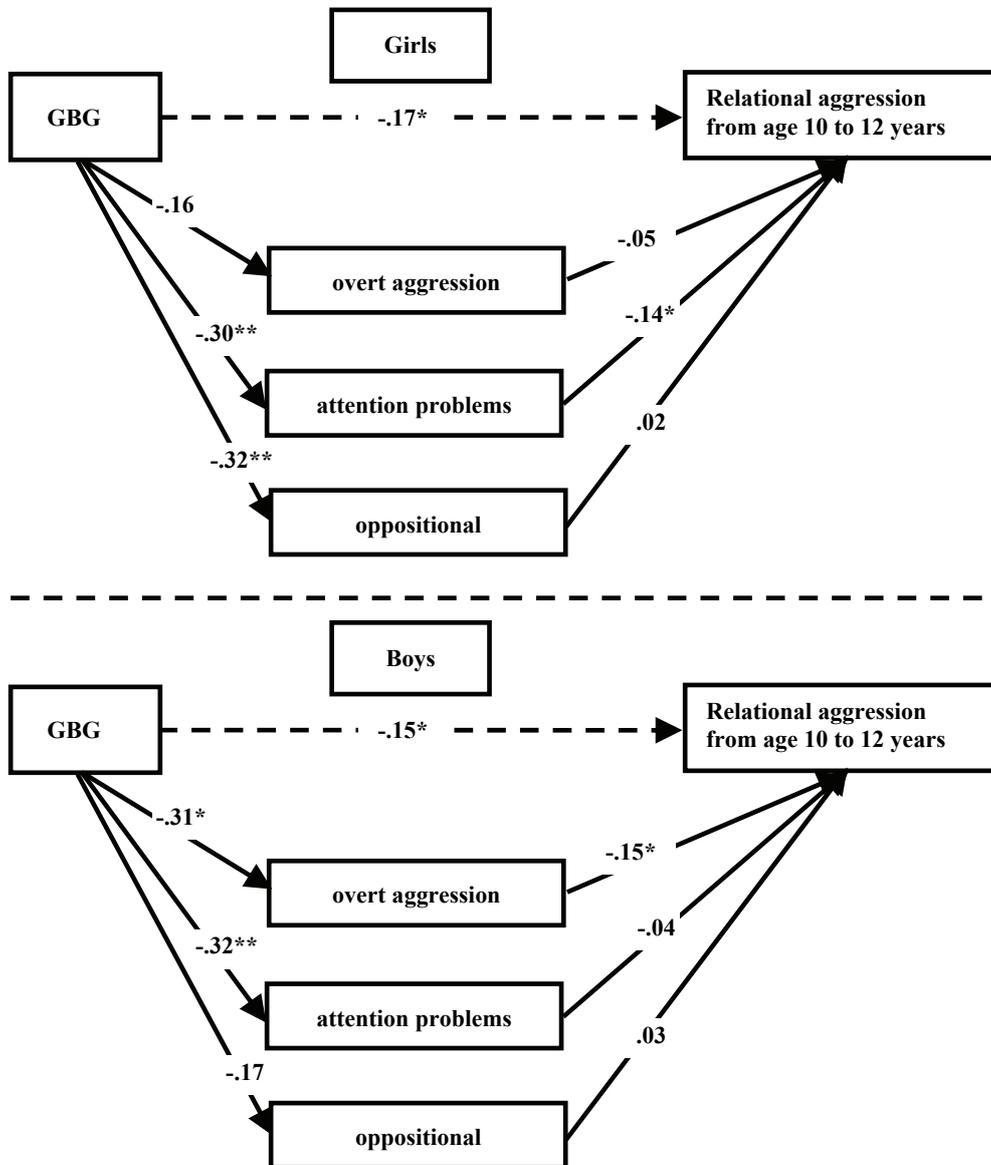
Figure 4.1 Estimates from the multiple mediator model for teacher-rated relational aggression from age 10 to 12 years for boys and girls separately. * *p* < .05; ** *p* < .01

Peer-nominated relational aggression from age 10 to 12 years

A significant effect of intervention status was found on peer-rated relational aggression at ages 10 to 12 years, controlling for pre-intervention levels of teacher- and peer-rated disruptive behavior problems and female gender (β = -.33, p < .01).

Analyses also demonstrated a significant bivariate effect of intervention status on Time 2 teacher-rated overt aggression (β = -.18, p < .05), ADHD symptoms (β = -.25, p < .01), and oppositional defiant problems (β = -.21, p < .01), controlling for pre-intervention levels of teacher- and peer-rated disruptive behavior problems and female gender.

Mediation. Again, separate mediation models for Time 2 teacher-rated overt aggression, ADHD symptoms, and oppositional defiant problems were specified first. Significant indirect paths from intervention status via teacher-rated overt aggression, ADHD symptoms, and oppositional defiant problems change to peer-rated relational aggression at age 10 to 12 years were found (see Table 4.3, fourth column). However, despite these significant indirect paths, the direct paths of intervention to relational aggression remained significant (see Table 4.3, first column). This indicates that, when tested individually, the reductions in teacher-rated overt aggression, ADHD symptoms, and oppositional defiant problems partially mediated the found reductions in peer-rated relational aggression (Baron & Kenny, 1986).

Multiple model. We then tested the unique contribution of each of the three Time 2 mediating variables. Results are presented in Table 4.3, bottom part. Analyses of the association between the hypothesized mediators and the outcome revealed only a significant indirect path from intervention status, via overt aggression to peer-rated relational aggression.

The association between teacher-rated ADHD symptoms and oppositional defiant problems and the outcome did not remain significant after controlling for overt aggression. However, again the direct path from intervention status to peer-rated relational aggression from age 10 to 12 remained significant (β = -.22, p < .01) indicating partial mediation. This indicates that, when using the peer-rated outcome in boys and girls together, only the reductions in overt aggression at age 9 years, due to intervention, mediated the reductions in relational aggression at age 10 to 12 years.

Table 4.3 Estimates from Simple and Multiple Mediator Models for Peer-Rated Relational Aggression from Age 10 to 12 Years for Boys and Girls (N = 551)

	Peer-Rated Relational Aggression from Age 10 to 12 Years			
	Direct Effects			Indirect Effect
	Simple			
Variables	GBG > Outcome	GBG > Mediator	Mediator > Outcome	GBG > Outcome
Overt Aggression	-.20* (.03)	-.19** (.07)	.41** (.02)	-.17* (.01)
ADHD Symptoms	-.27** (.03)	-.26** (.07)	.23** (.02)	-.14** (.00)
Oppositional	-.24** (.03)	-.21** (.07)	.29** (.02)	-.14* (.01)
	Multiple			
Overt Aggression	-.22** (.03)	-.21** (.07)	.37** (.03)	-.04* (.01)
ADHD Symptoms	-.22** (.03)	-.28** (.07)	.01 (.03)	-.00 (.01)
Oppositional	-.22** (.03)	-.22 (.07)	.23** (.03)	-.00 (.01)

Note. Cell contents are standardized parameter estimates with standard errors in parentheses. $* p < .05$; $** p < .01$.

Finally, we tested whether the mediating effect was sex specific. Again, the interaction terms between intervention and female gender for both the outcomes and the three mediators were not significant (peer-rated relational aggression: $\beta = -.01$, $p > .05$, overt aggression: $\beta = .26$, $p > .05$, ADHD symptoms: $\beta = .18$, $p > .05$, oppositional defiant problems: $\beta = -.01$, $p > .05$), ensuring that the intervention effect on mediators and outcome was not limited to either of the sexes. To test for gender specific mediation, the mediation models were run separately for boys and girls. Results are displayed in Figure 4.2. For girls, the indirect path containing all three mediating variables was not significant (see Figure 4.2, top). For boys, significant mediation by the three mediating variables was found. However, this overall mediating effect was especially driven by reductions in overt aggression; the other indirect paths were not significant (see Figure 4.2, bottom).

Discussion

The aim of this study was to test the hypothesized role of early disruptive behavior problems (i.e., overt aggression, ADHD symptoms, oppositional defiant problems) as a risk marker for the development of relational aggression in early adolescence. To our knowledge, the present study is the first to test this hypothesized pathway through a randomized intervention trial. Assessments of the direct effect of intervention on disruptive behavior problems at age 9 years in addition to measures of teacher- and peer-rated relational aggression from age 10 to 12 years were present.

Our finding that girls were higher on teacher- and peer-rated relational aggression from age 10 to 12 years than boys was in accordance with previous research on relational aggression in late childhood (e.g., Crick, 1997; Crick et al., 1999).

We first examined the role of overt aggression in the development of relational aggression. Our results supported our hypothesis of a reciprocal relationship between early overt aggression and relational aggression in early adolescence.

The strength of the direct effects of the GBG intervention on both teacher- and peer-rated outcome variables was clearly reduced when change in overt aggression was added to the model. Moreover, the indirect path from intervention through overt aggression to relational aggression remained significant when taking into account ADHD symptoms and oppositional defiant problems, thereby supporting our second hypothesis that the reciprocal relationship between overt aggression and relational aggression would remain statistically significant when taking into account ADHD symptoms and oppositional defiant problems.
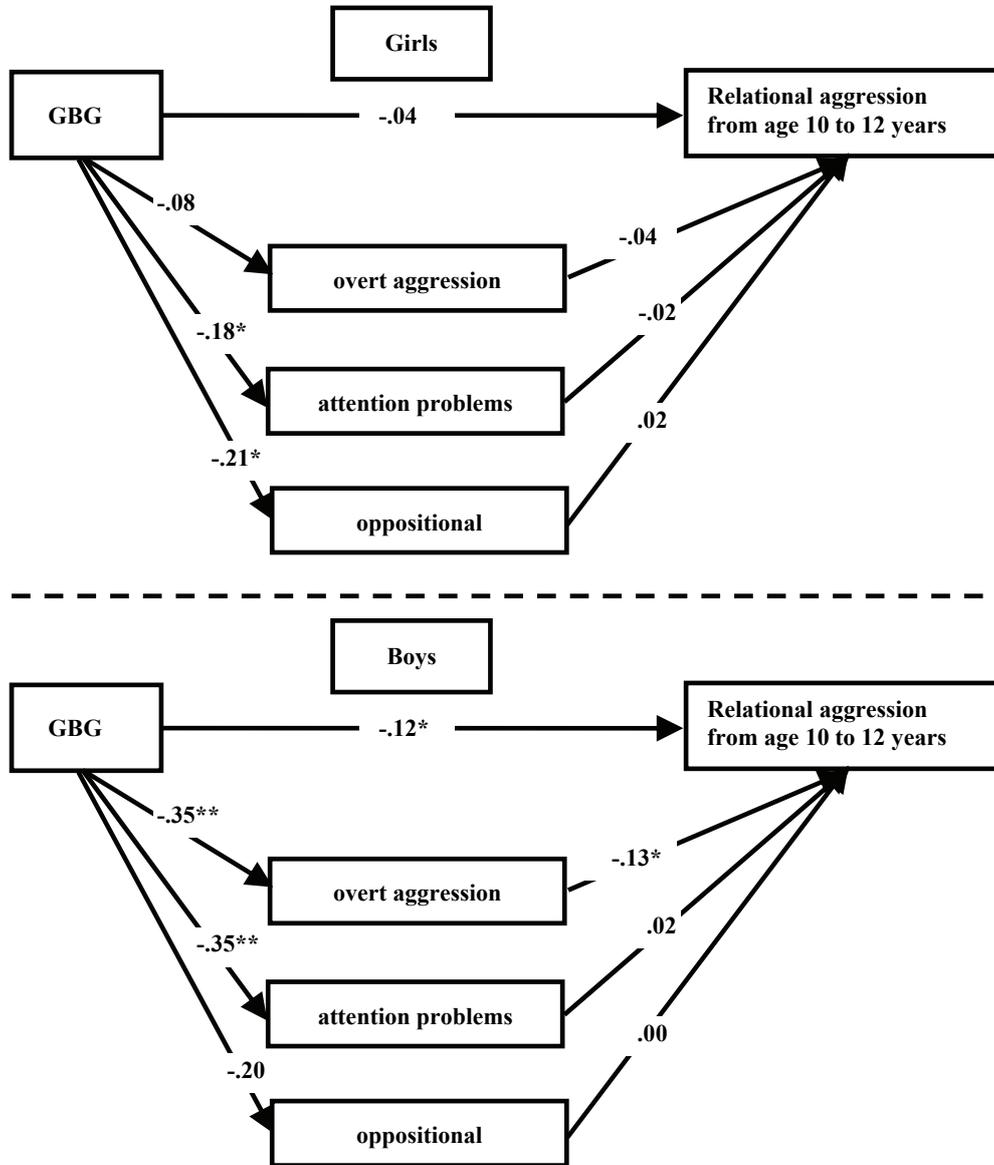
Figure 4.2 Estimates from the multiple mediator model for peer-rated relational aggression from age 10 to 12 years for boys and girls separately. * *p* < .05; ** *p* < .01

However, when taking into account sex differences in the reciprocal relationship between early overt aggression and later relational aggression, it was found that the mediation of overt aggression on both teacher- and peer-rated relational aggression from age 10 to 12 years was limited to boys. In fact, reductions in overt aggression fully mediated the direct effect of the intervention on teacher-rated relational aggression. This indicates that a large portion of the variance attributable to the direct effect of intervention status on teacher-rated relational aggression was due to intervention-produced changes in overt aggression among boys. This finding adds to the role of overt aggression in males' pathways to deviancy. Specifically, in previous research overt aggression has been shown as a type of behavior that triggers the onset of several forms of antisocial behavior, such as theft, violence, vandalism, and substance use (e.g., Broidy et al., 2003). This study is the first to demonstrate a reciprocal relationship between overt and relational aggression in boys, suggesting that overt aggression is also linked to these forms of problem behavior in males.

Among girls, a different picture emerged. In girls, reductions in teacher-rated relational aggression from age 10 to 12 years were accounted for by reductions in ADHD symptoms, although these results were not substantiated when using the peer-rated outcome. This finding is in line with two previous cross-sectional studies on the association between ADHD symptoms and relational aggression in females (Marsee et al., 2005; Zalecki & Hinshaw, 2004). However, the cross-sectional nature of both previous studies made it impossible to draw conclusions on a direct link between ADHD symptoms and relational aggression in girls. This study adds to previous studies by demonstrating a reciprocal link between ADHD symptoms and relational aggression in girls. Unfortunately, the hypothesized reciprocal relationship between early overt aggression and relational aggression among girls could not be tested due to a failure of the GBG intervention to show direct effects on girls' overt aggression. An explanation appears to be that the levels of overt aggression in 9-year-old girls in this study were already low, thereby limiting the GBG intervention in reducing their levels of overt aggression.

Findings on reciprocal relationships between risk variables and outcomes may be supportive of causal relationships (Rutter et al., 2001). However, some caution is needed when interpreting our findings. First, conclusions on causal pathways, based on evidence on reciprocal links between mediating variables and outcomes, always have the risk of having omitted important risk variables (Howe et al., 2002). Omitted mediators may share considerable variance with the study mediator (i.e., overt aggression, ADHD symptoms). Hence links between the mediator and outcome may well be spurious. In this regard, no data

on relational aggression at age 9 years was available. This made it impossible to control the mediating influence of overt aggression on the outcome for relational aggression at age 9 years. However, when using only the age 11 and 12 teacher-rated relational aggression score as the outcome, and controlling the path from overt aggression to outcome for relational aggression at age 10 years, the indirect path from intervention status via overt aggression to relational aggression remained significant. This indicates that reductions in overt aggression mediated the reductions in relational aggression at age 12 years above and beyond prior levels of relational aggression.

Second, some inconsistencies regarding the mediating effects of overt aggression and ADHD symptoms emerged in this study. For boys, reductions in overt aggression fully mediated the effect of the intervention on teacher-rated relational aggression. However, the reductions in peer-rated relational aggression, due to intervention, were only partially mediated by the positive effects of intervention status on overt aggression. This indicates that overt aggression is an important but not sufficient mediating variable in explaining variation within peer-rated relational aggression. Hence other, unexamined, processes, such as emotion regulation difficulties (e.g., Conway, 2005) and aversive parenting (Nelson, Hart, Yang, Olsen, & Jin, 2006), may contribute to relational aggression outcomes. For girls, a path between ADHD symptoms and relational aggression was found when using the teacher-rated outcome, but not substantiated by the peer-rated outcome, again leaving room for additional, non-measured risk variables.

Third, the time frame for the current study is restricted to the elementary school period, which limits generalization of the results for this age period. It is plausible that different mediation effects may emerge when the same children are followed into adolescence, because the nature and impact of socially manipulative behaviors may change as the nature and relevance of friendships, cliques, and same and opposite sex peer group changes (Geiger et al., 2004).

Taking these concerns into account, our empirical support for the reciprocal link between overt and relational aggression in boys, and ADHD symptoms and relational aggression in girls may suggest that prevention programs aimed at reducing relational aggression need to be sex-specific. Our finding that especially overt aggression is an important risk variable for the development of relational aggression in males implies that preventative programs that focus on (male forms of) aggression should also be effective in reducing relational aggression in boys, a strategy that is also recommended by several other researchers studying relational aggression (Park et al., 2005; van Schoiack-Edstrom, Frey, & Beland,

2002). Our results on the reciprocal link between ADHD symptoms and relational aggression in girls implies that reducing early symptoms of ADHD may be effective in reducing girls' relational aggression in early adolescence.

Given the high correlations between overt aggression and ADHD symptoms in children, and the fact that preventive interventions generally do not target specific behavior but more generally disruptive behavior, including both overt aggression and ADHD symptoms (as is done by the GBG), such prevention programs may thus be able to effectively target relational aggression development. However, because this is the first known study to test the developmental pathways from overt aggression and ADHD symptoms to relational aggression through intervention, and because this study was hampered in testing a reciprocal relationship between overt aggression and relational aggression among girls, it can be argued that the sex-specific causes of relational aggression are not yet well enough understood to guide prevention efforts. Consistency in our findings from other studies, in addition to ruling out other mediating variables will be necessary to make a strong case for specifically targeting both risk markers in our attempt to prevent the development of relational aggression. Elucidating the precise sex-specific role of overt aggression and ADHD symptoms in the causes of relational aggression development will increase our understanding of how interventions might be optimally timed, constructed, or delivered to prevent or treat relational aggression in both males and females.

5

Testing sex-specific pathways from peer victimization to anxiety and depression in early adolescents through a randomized intervention trial

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Chapter 5

Testing sex-specific pathways from peer victimization to anxiety and depression in early adolescents through a randomized intervention trial

Abstract

The aim of this study was to test for sex differences in the hypothesized roles of physical and relational victimization as risk markers for the development of symptoms of anxiety and depression through a randomized prevention trial. A sample of 448 first-grade boys and girls were randomly assigned to the Good Behavior Game (GBG) intervention program, a two-year (grades 2 and 3, ages 8 and 9) universal classroom based intervention aimed at reducing disruptive behavior problems and creating a safe and predictable classroom environment, or to a control condition. Measures of the distal impact of the GBG on self-reported physical and relational victimization at age 10 years, in addition to self-reported symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia 5 years post-intervention (age 13 years) were present. Mediation analyses supported especially the role of relational victimization as a risk marker for the development of symptoms of anxiety and depression among girls, and the role of physical victimization in anxiety and depression symptoms among boys. Implications for research on sex-specific pathways from peer victimization experiences to anxiety and depression are discussed.

Introduction

The past two decades have witnessed a great expansion in the study of anxiety and depressive disorders in childhood and early adolescence. Although anxiety and depressive problems do occur in childhood (Mesman et al., 2001), there is an increase in the incidence of these problems in early adolescence, especially among females (Hankin et al., 1998; Roza et al., 2003). Recent epidemiological studies indicate prevalence rates of clinically elevated levels of anxiety and depression in children and early adolescents ranging from 2% to 4% (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Ford, Goodman, & Meltzer, 2003). An anxiety or depressive disorder during early adolescence confers a strong risk for anxiety and depressive disorders during adulthood (Bittner et al., 2004; Pine, Cohen, Gurley, Brook, & Ma, 1998; Woodward & Fergusson, 2001). Moreover, anxious and depressive symptoms have been associated with suicide attempts, completed suicide (e.g., Apter & Wasserman, 2003), and illicit drug dependence (Woodward & Fergusson, 2001). In view of these findings, knowledge about the pathways leading towards anxiety and depressive disorders seems crucial.

A pathway that has been associated with the development of anxiety and depression is through victimization by peers (for a review, see Hawker & Boulton, 2000). The experience of victimization by peers is hypothesized to influence the social database that is used by children to evaluate themselves and others (e.g., Crick & Bigbee, 1998; Crick & Dodge, 1994). Negative peer experiences such as peer victimization provide feedback that one does not fit into the peer group, a circumstance that may result in negative evaluations of self and low self-efficacy in achieving social goals, which then might lead to feelings of anxiety and depression. Several studies offer empirical support for this by demonstrating that peer victimization experiences were positively associated with destructive self-evaluations, and in turn, with internalizing symptoms, including depression and anxiety (Graham & Juvonen, 1998; Prinstein, Cheah, & Guyer, 2005; Troop-Gordon & Ladd, 2005).

Despite the evidence from previous research on the role of victimization in the pathways to anxiety and depression, previous studies did insufficiently take into account different forms of victimization. In addition to physical victimization (i.e., being the victim of physically aggressive acts or physical threat), children can also be relationally victimized. Relationally victimized children are the target of peers' attempts to harm or control their relationship with others, for instance through hostile rumor spreading within the peer group, or being – overtly – excluded from activities with peers (Crick et al., 2001). The distinction between physical and relational victimization may be sex-linked because previous research has shown that boys are more likely to experience physical victimization, whereas some studies have reported girls to more frequently experience relational forms of victimization (e.g., Crick & Bigbee, 1998; Crick & Grotpeter, 1995; Cullerton-Sen & Crick, 2005; Schäfer et al., 2002). However, this sex difference in experiencing relational victimization has not been replicated by others. For instance, Storch, Crisp, Roberti, Bagner, and Masia-Warner (2005) demonstrated that boys and girls experience similar levels of relational victimization, while Nishina, Juvonen, and Witkow (2005) even showed that boys are more frequent targets of both overt and relational victimization compared with girls. Therefore, both forms of victimization, in addition to assessing sex-differences in experiencing them, should be taken into account when studying the role of victimization in anxiety and depression development.

In addition to sex differences in experiencing physical and relational victimization, it has also been suggested that sex differences exist in the ways that physical and relational victimization experiences are perceived. For instance, it has been suggested that relational victimization may be more significantly related to psychopathology in girls than in boys, possibly because girls value social relationships more than boys, and are thus more hurt when

these relationships are harmed or put into jeopardy (Crick, Casas, & Nelson, 2002; Crick & Zahn-Waxler, 2003; Sullivan, Farrell, & Kliewer, 2006). However, the results of sex-specific mediation with regard to relational victimization remain inconclusive. Some recent studies indeed demonstrated that relational victimization experiences are particularly distressing for girls compared with boys (e.g., Crick, Grotpeter, & Bigbee, 2002; Crick & Nelson, 2002; Storch, Phil, Nock, Masia-Warner, & Barlas, 2003). However, several other studies found that the associations between relational victimization and internalizing problems did not differ by sex (e.g., Craig, 1998; La Greca & Harrison, 2005; Prinstein, Boergers, & Vernberg, 2001), or even failed to demonstrate a link between relational victimization and social anxiety in both boys and girls (Storch, Masia-Warner, Crisp, & Klein; 2005).

In contrast to girls, boys have been hypothesized to be more likely to internalize physical victimization experiences, because exposure to physical aggressive acts taps into concerns about loss of status, or relative power in the peer group, which are important social goals for boys (Crick & Zahn-Waxler, 2003). Evidence for this has been found by Prinstein et al. (2001), who demonstrated that for boys, but not for girls, physical victimization was associated with depressive symptoms. However, again, this finding was not substantiated by other studies. For instance, Storch and colleagues (Storch et al., 2002, 2003) demonstrated that physical victimization was significantly correlated with symptoms of depression in both boys and girls. Therefore, although both physical and relational peer victimization seem to have an impact on the development of anxiety and depression in children and adolescents, there are inconsistencies in whether these links are sex-specific. The aim of the present study was therefore to clarify the role of the child's sex in the pathways from peer victimization experiences towards symptoms of anxiety and depression by examining sex differences in the hypothesized roles of physical and relational victimization as risk markers for the development of symptoms of anxiety.

A limitation of previous research on the sex-specific links between forms of victimization and anxiety and depression is the correlational of nature of the findings. Despite the importance of these previous studies, their findings cannot be extended beyond the conclusion that peer victimization is associated with anxiety and depressive disorders, without any possible claim for peer victimization as playing a *causal* role in the developmental of anxiety or depression (Kraemer et al., 2001). To extend conclusions on associations between risk variables and outcomes beyond the risk factor stage, Rutter et al. (2001) proposed a number or research designs, including randomized controlled trails (RCTs). RCTs provide the unique opportunity to test whether the reduction in the manifestation of the risk variable, due

to a controlled influence – the intervention – mediates the distal impact of the program on reductions in the outcome variable (see also Coie et al., 1993, Kellam & Rebok, 1992), while the randomization controls for possible sources of confounding. The aim of the present study was therefore to test the hypothesized role of physical and relational victimization as risk markers for the development of symptoms of anxiety and depression through a randomized controlled trial, and to test for sex differences in these predictive links. Specifically, we aimed at testing whether reductions in physical and relational victimization at age 10, due to the Good Behavior Game intervention program (GBG, Barrish et al., 1969; Dolan et al., 1989), mediated the reductions in self-reported symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia at age 13 years.

The GBG is a universal classroom-based preventive intervention, aimed at promoting prosocial behavior and reducing disruptive behavior by explicitly defining and systematically rewarding appropriate, prosocial behavior towards peers, and by facilitating the positive interaction between children through a team-based approach. In prior studies, the GBG was proved to be effective in the reduction of peer- and teacher-rated aggressive, oppositional, inattentive, and antisocial behavior (Dolan et al., 1993; Ialongo et al., 1999, 2001; Kellam et al., 1994; Reid et al., 1999; van Lier et al., 2004, van Lier, Vuijk et al. 2005). Given these reductions in disruptive behavior problems at school it is likely to find reduced levels of physical victimization as a distal result of the GBG intervention. Moreover, because the GBG facilitates positive interactions between children, and aims to create a safe and predictable classroom environment, we hypothesized to also find reductions in relational forms of victimization.

Taken together, the aim of the present study was to test the hypothesized role of both physical and relational victimization in the pathways towards symptoms of anxiety and depression through the GBG intervention program, and explore whether these pathways differ by sex. It was hypothesized that the reductions in symptoms of anxiety and depression would be mediated by intervention-induced reductions in both physical and relational victimization. It was also hypothesized that the predictive association between physical and relational victimization and indices of anxiety and depression symptoms differed by sex. More specifically, it was hypothesized that among girls, the mediating effects on the outcome variables would be especially driven by reductions in relational victimization, whereas among boys, the mediating effects on the outcome variables would be accounted for by reductions in physical victimization.

Method

Participants

As part of a school-based preventive intervention study targeting disruptive behavior in a sample of young elementary schoolchildren, 13 large mainstream elementary schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999 (for details, see van Lier, Verhulst et al., 2003). The first 13 schools that responded positively to the invitation to participate were included. In these schools, 794 children attending first grade (age 6 years) were assessed in the spring of 1999. Children who moved on to second grade (722 children), in addition to 22 children who repeated second grade in 1999 and moved into the study cohort, were eligible for inclusion making a total sample of 744 children. Of these children, 666 parents or parent substitutes (89.5%) signed a written informed consent form, granting the child permission to participate in the study. At baseline, the mean age of these children was 6.9 years (SD = 0.6). Fifty-two percent of the children were male. Thirty percent of the households were of low socio-economic status (SES). This percentage is in accordance with the general Dutch population (Statistics Netherlands, 1999).

Over the two-year intervention period (second and third grade, age 8 to 9 years), 19 children moved from a control-group into an intervention group. These children were treated as intervention children.

At the beginning of the follow-up phase, when the assessments on victimization and outcomes of this study were conducted (age 10 onwards), 11 parents who did not grant their child permission to participate when the pre-intervention measures were collected did allow their child to participate in the study. Because intervention status of these children was affirmed, these children were included in this study. However, at age 10 years, ninety-one children did no longer participate in the study because they moved away from a study school, or because one school refused to participate after third grade (n = 55). Children who dropped out of the study during this phase were more likely to be female (χ^2 (1, N = 677) = 6.53, p < .05), of non-Caucasian ethnicity (χ^2 (1, N = 677) = 70.66, p < .01), and of low SES (χ^2 (1, N = 624) = 31.57, p < .01).

During the follow-up assessment at age 13 years, self-reported ratings of anxiety and depression symptoms could be collected for 448 children. The missing data of the 127 children was either due to parents refusing their child to participate in this follow-up assessment (85 cases), or because children could not be traced (42 cases). Loss to follow-up was not related to the child's gender, nor to the intervention condition (GBG/control) they were assigned to.

However, children for whom the outcome data was not available were more likely to be of non-Caucasian ethnicity (χ^2 (1, N = 677) = 4.25, p < .05), and of low SES (χ^2 (1, N = 624) = 23.79, p < .01). Furthermore, loss to follow-up was related to parent-ratings of social problems at age 7 years, but not to teacher-ratings of anxious/depressed problems at age 7 years.

Preventive Intervention

The GBG is a classroom-based behavior management strategy that promotes prosocial behavior and reduces aggressive and disruptive behavior. Teachers and students choose positively formulated class rules, which are accompanied by pictograms. After observing children on well-defined behaviors in the classroom, teachers assign children to one of the three or four teams, each containing equal numbers of disruptive and non-disruptive children. Children are encouraged to manage their own and their team-mates behavior through a process of group reinforcement and through mutual self-interest. Each team receives a number of cards, one of which will be taken by the teacher when a team-member violates a rule. Teams are rewarded when, at the end of the game, at least one card has remained, while all students are always rewarded with compliments throughout the game. Initially, winning teams also receive tangible rewards directly after each game. Later on, winning teams receive delayed rewards.

The GBG was implemented in three different stages. In the *introduction* stage, which started in the second grade in fall, it was played for three times a week during 10 minutes. Winning teams received tangible rewards (stickers) directly after each game. In the *expansion* stage, the game was extended in the time and settings played, and more diverse behaviors were targeted. Rewards were delayed until the end of the week and month. This phase lasted until the early spring of the school year. In the third stage – the *generalization* stage – the emphasis lay on explaining to children that the GBG rules also apply in various other settings.

The GBG was implemented in the second and third grade. Both years, teachers received eight hours of training on its implementation. Teachers were also coached by the school advisory services in ten 60-minute classroom observations. External school advisors assessed the fidelity of implementation, which was based on the frequency and the total number of hours the GBG was played. Based on this, 9 of the 13 schools implemented all three stages of the GBG program during the two intervention years. However, in 3 schools the frequency and total hours of GBG played corresponded with only implementing the introduction and expansion stage. Despite differences in implementation fidelity of the GBG, an intention to treat approach was used throughout the analyses. The GBG was adapted for use

in the Netherlands by the educational services (van der Sar, 2002; van der Sar & Goudswaard, 2001).

Measures

Time 1 Pre-intervention Measures (age 7)

Teacher-reported anxious/depressed problems over the last 2 months were assessed with the Teacher's Report Form/6-18 (TRF/6-18; Achenbach, 1991a). Teachers rate the child's behavior on a three-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Items included '*This child is too fearful or anxious'* and '*This child cries a lot'*. Cronbach's alpha was .83. The TRF has been translated and validated for use in the Netherlands (Verhulst et al., 1997).

Parent-reported social problems over the last 6 months were assessed with the Child Behavior Checklist/4-18 (CBCL/4-18; Achenbach, 1991b). Parents rate their child's behavior on a three-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Items included '*This child doesn't get along with other pupils'* and '*This child is not liked by other pupils'*. Cronbach's alpha was .59. The CBCL has been translated and validated for use in the Netherlands (Verhulst et al., 1996).

Two dummy coded variables, one for *Intervention status* (0 = *control*, 1 = *GBG*) and one for *Female gender* (0 = *male*, 1 = *female*) were included as predictor variables.

Time 2 Distal Intervention Change Measures (age 10)

Children's self-reports of physical and relational victimization at age 10 years were obtained with the Social Experience Questionnaire-Self Report Form (SEQ-S; Crick & Grotpeter, 1995). The SEQ-S is a self-report measure that consists of 2 5-item victimization subscales: Relational Victimization (e.g., '*How often does another child say (s)he won't like you unless you do what (s)he wants you to do?'*) and Physical Victimization (e.g., '*How often are you hit by another child?'*). Items are rated on a 5-point Likert scale with 0 = *never true*, 1 = *seldom true*, 2 = *sometimes true*, 3 = *very often true*, 4 = *almost often true*. Cronbach's alpha was .72 for Physical Victimization and .60 for Relational Victimization.

Time 3 Outcome Variables (age 13)

Children's self-reported symptoms of anxiety and depression at age 13 years were obtained with the Revised Child Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000). The RCADS is a 47-item self-report instrument designed to measure symptoms of Social Anxiety (5 items), Separation Anxiety (6 items), Panic/Agoraphobia (7 items), Obsessive-Compulsions (6 items), Fear of Physical Injury (5 items), Generalized Anxiety (12 items), and Major Depressive Disorder (11 items). Children were asked to rate how often each item applied to them. Items were scored on a 4-point Likert scale with 0 = *never*, 1 = *sometimes*, 2 = *often*, 3 = *always*. In the present study, only the subscales Social Anxiety (alpha = .72), Generalized Anxiety (alpha = .86), Panic/Agoraphobia (alpha = .80), and Major Depressive Disorder (alpha = .83) were used.

Procedure

Time 1 pre-intervention measures were collected in the spring of grade 1 (at age 7 years). During the summer break, when second grade class compositions were known, classes within each school were randomly assigned to the intervention or control condition. The GBG intervention started in the fall of second grade.

At Time 1, teacher assessments were collected by sending teachers five forms with pre-printed names each week. Teachers completed the questionnaires for each child in their class in approximately 5 weeks. Teachers received a gift certificate of €45. Parent-reported information was collected through home interviews. Parents received a gift certificate of €5.

Time 2 post-intervention assessments were collected in the spring of 4th grade (at age 10 years). Children completed the questionnaires in their classroom, supervised by two trained research-assistants. Children were instructed to keep their answers confidential and were told that they did not have to answer any question they did not want to complete. The teachers were asked to leave the classroom during the assessment to ensure that children felt comfortable filling out the questionnaires.

Time 3 follow-up assessments were collected by mail in the spring of 7th grade (at age 13 years). Children received a gift certificate of €5 for their participation.

Statistical approach

The analyses proceeded in four stages. First, it was tested whether children who had received the GBG intervention had lower levels of anxiety and depression symptoms at age 13 years (outcomes) and experienced less physical and relational victimization at age 10 years

(mediators). A model was fitted in which intervention status influenced Time 3 outcome measures in addition to each of the two Time 2 intervention mediators (physical and relational victimization). No paths from the mediators to the outcome variables were specified in this stage of the analyses.

Second, after affirming for positive intervention effects of intervention on both the outcomes and potential mediators, the direct paths of both the mediators to the outcome were specified. In this phase, models were run for each outcome variable individually. However, subtypes of anxiety generally correlated with each other and with indices of depression (see Table 5.1). Therefore, to test for the unique influence of physical and relational victimization on symptoms of anxiety and depression, a multivariate model was specified containing both potential mediating variables and all outcome variables (phase 3).

Finally, in phase 4, we explored the influence of gender in the relation between peer victimization and anxiety and depression. Interaction terms between outcomes, mediators, and female sex were added to the model. Models in each of the four phases were controlled for the main effect of female sex and for pre-intervention levels of teacher-reported anxious/depressive problems and parent-reported social problems at age 7 years. The structural models were tested in Mplus 4.1 (Muthén & Muthén, 1998-2006).

Results

Descriptive statistics

Table 5.1 presents the bivariate correlations between the hypothesized mediating variables and the outcome variables. A moderate correlation (.54) was found between the hypothesized mediating variables physical and relational victimization.

Boys reported significantly higher levels of physical victimization at age 10 years (β = -.71, p < .05), whereas no sex differences were found in relational victimization experiences (β = -.38, p > .05). Finally, girls reported significantly more symptoms of major depression (β = 1.34, p < .01), generalized anxiety (β = 2.70, p < .01), social anxiety (β = .93, p < .01), and panic/agoraphobia (β = .40, p < .05), compared with boys at age 13 years.

Effect of the GBG on outcomes and potential mediators

A first requirement for mediation as studied here was that the GBG had a significant impact on self-reported symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia at age 13 years in the absence of the mediator variables. Indeed, analyses

showed a significant direct effect of intervention status on symptoms of major depressive disorder (β = -.10, p < .05), generalized anxiety (β = -.11, p < .05), and panic/agoraphobia (β = -.09, p < .05), controlling for female gender and pre-intervention levels of anxiety/depressive and social problems at age 7 years. However, the direct effect of the GBG intervention on social anxiety symptoms was not significant (β = -.07, p > .05). Social anxiety was therefore dropped from further analyses.

Table 5.1 Correlations between Hypothesized Mediators and Outcome Variables

Variable	2	3	4	5	6
Self-Report Age 10					
1. Physical Victimization	.54**	.21**	.18**	.15**	.17**
2. Relational Victimization	-	.23**	.17**	.19**	.20**
Self-Report Age 13					
3. Generalized Anxiety		-	.70**	.60**	.72**
4. Social Anxiety			-	.41**	.58**
5. Panic/Agoraphobia				-	.67**
6. Major Depressive Disorder					-

Note. ** p < .01.

A second requirement to test for mediation was that the GBG had a direct significant impact on the – potentially – mediating variables. Analyses demonstrated a significant effect of intervention on physical victimization (β = -.25, p < .01), and relational victimization (β = -.12, p < .05) at age 10 years, controlling for female gender and pre-intervention levels of anxiety/depressive and social problems.

Individual mediation models
To test for mediation, models were first specified for each outcome separately, but included both potential mediators in addition to the pre-intervention control variables and female sex.

Major Depressive Disorder. When specifying the mediation paths, it showed that physical victimization was not associated with major depressive disorder, while relational

victimization was significantly associated with major depressive disorder at age 13 years (see Table 5.2, last column). More importantly, the direct path from intervention status to symptoms of major depressive disorder was no longer significant (see Table 5.2, first column), indexing mediation by relational victimization.

Generalized Anxiety. When specifying the mediation paths, the results showed that both physical and relational victimization were significantly associated with symptoms of generalized anxiety at age 13 years, while the direct paths from intervention status to symptoms of generalized anxiety was no longer significant, indexing mediation by both mediating variables.

Panic/Agoraphobia. The results showed that relational victimization was significantly associated with symptoms of panic/agoraphobia at age 13 years, while the direct path from intervention status to symptoms of panic/agoraphobia was no longer significant, again indexing mediation by relational victimization.
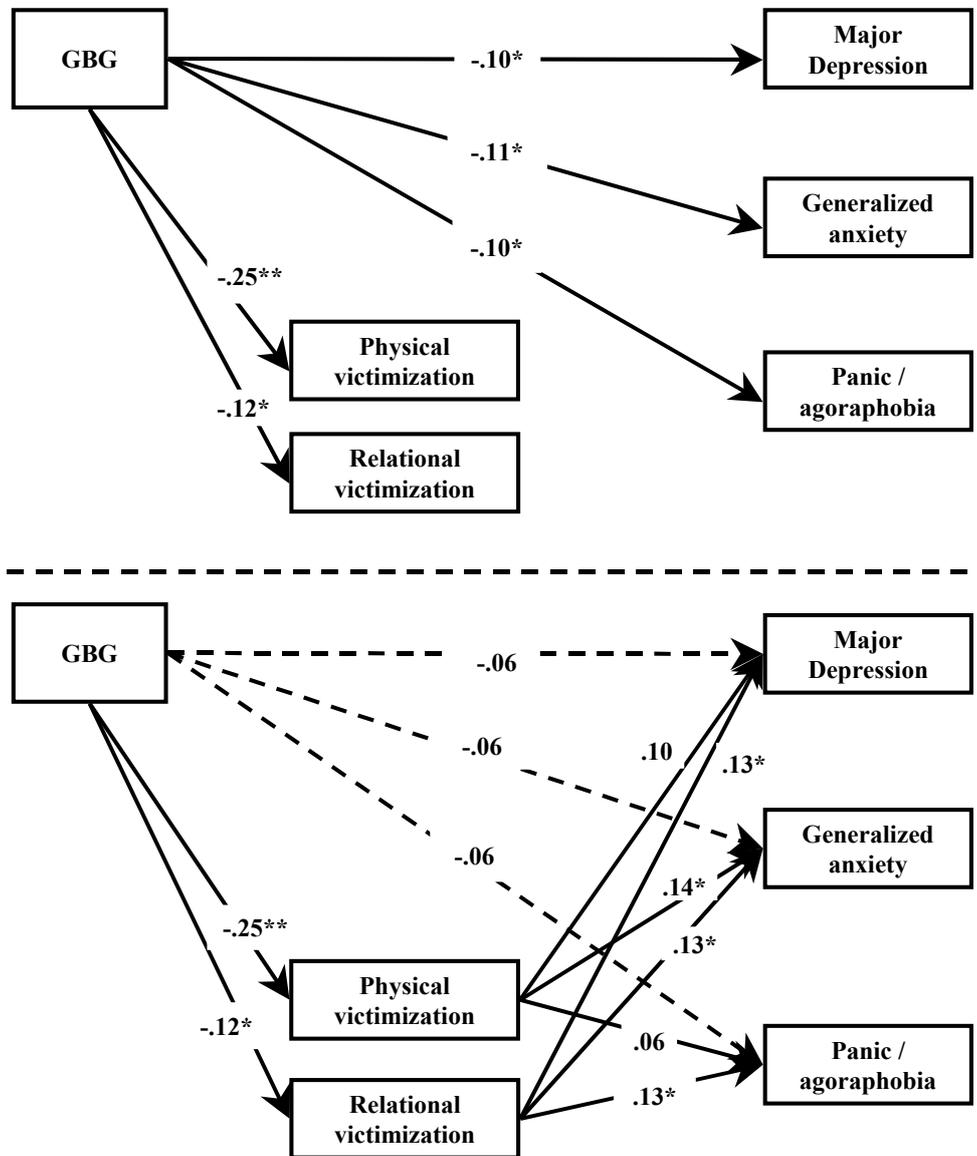
Multivariate model

Given the correlations between symptoms of generalized anxiety, panic/agoraphobia, and major depressive disorder, we tested whether relational and physical victimization uniquely mediated the levels of each of these problems at age 13 years. A model containing all three outcomes and both mediators was specified, controlling for female sex and pre-intervention levels of anxiety/depression and social problems. Results are displayed in Figure 5.1. The non-mediation model (see Figure 5.1, top) was specified first to confirm the significant direct effects of intervention on each of the outcomes and mediators in the multivariate model. The full mediation model is depicted in Figure 5.1 (bottom). When all three outcomes were included simultaneously, the result remained essentially the same as found for the individual outcomes. That is, reductions in major depressive disorder and panic/agoraphobia were especially driven by relational victimization, while reductions in generalized anxiety were driven by both physical and relational victimization.

Table 5.2 Estimates from the Individual Mediator Models for Each of the Self-Reported Depression and Anxiety Symptoms (*N* = 448)

	Major Depressive Disorder								
	GBG > Outcome			GBG > Mediator			Mediator > Outcome		
Mediating Variables	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Physical Victimization	-0.47	0.38	-0.06	-1.57	0.29	-0.25**	0.13	0.07	0.10
Relational Victimization	-0.47	0.38	-0.06	-0.78	0.31	-0.12**	0.16	0.07	0.13*
	Generalized Anxiety								
Physical Victimization	-0.63	0.50	-0.06	-1.55	0.29	-0.25**	0.24	0.10	0.14*
Relational Victimization	-0.63	0.50	-0.06	-0.77	0.31	-0.12**	0.22	0.09	0.13*
	Panic/Agoraphobia								
Physical Victimization	-0.23	0.18	-0.06	-1.56	0.29	-0.25**	0.04	0.04	0.06
Relational Victimization	-0.23	0.18	-0.06	-0.77	0.31	-0.12**	0.08	0.03	0.14**

Note. * $p < .05$; ** $p < .01$.

Figure 5.1 Estimates from the multivariate mediator model for self-reported symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia at age 13 years for boys and girls.
* *p* < .05; ** *p* < .01

Sex differences

Finally, we tested whether the mediating effects were sex-specific. First, to ensure that the direct effect of intervention status on symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia was not limited to either of the sexes, the interaction terms between intervention status and female sex were added to these paths. None of the interaction terms were significant (intervention * female sex to major depressive disorder: $\beta = -.09$, $p > .05$; generalized anxiety: $\beta = -.08$, $p > .05$; panic/agoraphobia: $\beta = -.11$, $p > .05$). Second, interactions between intervention status and female sex on both mediating variables were not significant, showing that the direct effect of the GBG on physical and relational victimization was not limited to either of the sexes (physical victimization: $\beta = -.02$, $p > .05$; relational victimization: $\beta = .82$, $p > .05$).

Finally, to test whether the mediating effects of physical and relational victimization were sex-specific we added the interaction terms between both mediating variables and female sex to the multiple model. Results are displayed in Table 5.3. It shows that the associations between major depressive disorder, generalized anxiety, and panic/agoraphobia and relational victimization were especially observed among girls. This suggests that the reductions in each of these outcomes were related to reduced rates of relational victimization among girls only. In contrast, symptoms of generalized anxiety and panic/agoraphobia were associated with self-reported physical victimization among boys, showing that the reductions in these outcomes were related to self-reported reductions in physical victimization among boys only. Finally, no sex-difference in the association between physical victimization and symptoms of major depressive disorder was found, probably because no main effect between this form of victimization and major depressive problems was found.

Discussion

The aim of this study was to test the hypothesized role of physical and relational victimization as risk markers for the development of symptoms of anxiety and depression, and to explore whether these predictive associations depended upon the child's sex. To our knowledge, the present study is the first to test this hypothesized pathway through a randomized controlled intervention trial. Assessments of the direct effect of intervention status on physical and relational victimization at age 10 years, in addition to measures of self-reported symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia at age 13 years were present.

Table 5.3 Estimates from the Sex-Specific Multiple Mediator Models for Self-Reported Symptoms of Anxiety and Depression at Age 13 Years ($N = 448$)

Variables	Major Depressive Disorder			Generalized Anxiety			Panic/Agoraphobia		
	Mediator > Outcome			Mediator > Outcome			Mediator > Outcome		
	B	SE B	β	B	SE B	β	B	SE B	β
Step 1									
Female	1.34	0.38	.17**	2.69	0.48	.25**	0.40	0.18	.11**
Physical Victimization	0.13	0.07	.10	0.04	0.10	.14*	0.04	0.04	.06
Relational Victimization	0.16	0.07	.13*	0.22	0.09	.13*	0.08	0.03	.13*
Step 2									
Female	0.90	1.34	.11	3.87	1.79	.36**	0.19	0.18	.05
Physical Victimization	-0.01	0.11	-.01	-0.10	0.15	-.06	-0.04	0.05	-.06
Relational Victimization	0.30	0.10	.24**	0.44	0.13	.26**	0.15	0.05	.26**
Physical Victimization * female gender	-0.26	0.15	-.35	-0.62	0.19	-.62**	-0.14	0.07	-.39*
Relational Victimization * female gender	0.29	0.14	.39*	0.47	0.19	.46**	0.15	0.07	.43**

Note. Only estimates of the mediator to outcome path in addition to female sex are printed. Parameter estimates for step 1 correspond to estimates presented in Figure 5.1.
* $p < .05$; ** $p < .01$.

As expected, self-reported symptoms of major depressive disorder, generalized anxiety, social anxiety, and panic/agoraphobia at age 13 years were more frequent in females than in males. This finding corroborates with the results of previous studies (e.g., Roza et al., 2003). Moreover, boys reported significantly more physical victimization than girls, while no gender differences were found with regard to relational victimization. These results are consistent with the gender patterns of victimization reported in several previous studies in middle and late childhood (e.g., Storch, Crisp et al., 2005).

We first documented the direct effect of intervention on the outcomes and assessed whether the strengths of these direct effects were clearly reduced when both mediating variables were added to the model, indicating that a portion of the variance attributable to the intervention effect was due to intervention-induced changes in both mediating variables. Assignment to the GBG intervention program was found to have a significant impact on self-reported symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia at age 13 years, but not on social anxiety. Our results also showed that the significant direct effects of the GBG intervention on symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia became non-significant when changes in physical and relational victimization were accounted for, thereby demonstrating the significance of both relational and physical victimization as risk markers in the pathways towards symptoms of anxiety and depression.

Our results underscored the importance of distinguishing between relational and physical victimization for two reasons. First, we demonstrated that physical and relational victimization were differentially related to indices of anxiety and depression. It was found that reductions in symptoms of major depressive disorder were mediated by reductions in especially relational victimization, but not in physical victimization. This finding is in contrast with two previous cross-sectional studies by Storch et al. (2002) and Craig (1998), who demonstrated that relational victimization was not significantly correlated with symptoms of depression in early adolescents while controlling for physical victimization. With regard to symptoms of panic/agoraphobia, again only the path from relational victimization was significant. Finally, our results showed that both reductions in physical and relational victimization mediated the reductions in symptoms of generalized anxiety.

We also found that associations between specific forms of victimization and internalizing problems were sex-specific. It was found that among girls, the overall mediating effects on symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia were especially driven by reductions in relational victimization. In contrast, among boys the

intervention-induced reductions in symptoms of generalized anxiety and panic/agoraphobia were accounted for by reductions in physical victimization. This sex-specific finding in the predictive association between relational victimization and indices of anxiety and depression provide evidence that key differences exist in the ways relational victimization is perceived. Remember that no sex differences in the level of relational victimization were found in this sample. Relationally aggressive acts deprive youth of opportunities to satisfy their social needs for closeness, acceptance, support, and friendship in peer relationships (Crick, Casas et al., 2002), and is particular threatening because this behavior betrays the trust placed in peer relationships. The hypothesis that girls might internalize these relational assaults to a greater degree than boys is supported by our findings.

Among boys, a different picture emerged. It was demonstrated that the intervention-induced reductions in symptoms of generalized anxiety and panic/agoraphobia were accounted for by reductions in especially physical victimization. It was hypothesized that boys may be more likely to internalize negative evaluations of other peers based on physical victimization experiences than girls, resulting in increased levels of psychosocial problems (Crick & Bigbee, 1998). The fact that the intervention-induced reductions in physical victimization resulted in reductions in symptoms of generalized anxiety and panic/agoraphobia tend to support this hypothesis. However, the same pattern of results was not found for major depressive disorder.

Although the presence of the mediation effects are supportive of the causal role of physical and relational victimization in the development of symptoms of anxiety and depression (Howe et al., 2002), several limitations need to be taken into account when interpreting our findings. First, it is important to notice that claims on causal relationships cannot be solely made based on intervention studies. Other, non-included variables can account for the relationship. For instance, genes have been reported to account for a significant proportion of the variance in anxiety and depressive disorders (Legrand, McGue, & Ianoco, 1999; Rutter, Silberg, O'Connor, & Simonoff, 1999). The study of the link between victimization and anxiety and depression is thus incomplete without taking genetic liability and possible gene-environment interplay into account (see Moffitt, 2005).

Second, in light of the above-mentioned limitation, it is important to notice that the GBG intervention program did not directly target peer victimization. It were the reductions in disruptive behavior, as targeted by the GBG, that are hypothesized to have resulted in the reductions in victimization, which in turn resulted in reduced symptoms of anxiety and depression. Although this reasoning seems logical, we cannot exclude the possibility that other, non-included variables accounted for, or moderated the found relationships (see Howe et al.,

2002). For instance, Grills and Ollendick (2002) demonstrated that victimized boys with higher global self-worth reported fewer anxiety symptoms than boys with lower global self-worth, while Storch et al. (2003) indicated that levels of prosocial peer support moderated the association between relational victimization and loneliness. To provide a more direct test of the mediating role of peer victimization and anxiety/depression, an intervention directed at preventing victimization would have been preferred.

It is also important to note that no positive impact of intervention on social anxiety was found in our study. This prohibited us to study the relationship between both forms of victimization and social anxiety, while most previous studies on the relationship between peer victimization and anxiety were directed at social anxiety as the main outcome.

Finally, the findings of this study were obtained from a population-based sample of early adolescents. The extent to which our findings generalize to clinical levels of anxiety and depression clearly warrants further investigation. Therefore, despite our evidence on mediation by peer victimization in the development of anxiety and depression, we would like to see our findings replicated in different samples and we would like to see that such studies account for possible non-included mediators to test the robustness of our findings.

Taking these concerns into account, to our knowledge, this study is the first that used a randomized controlled intervention trial to test for sex differences in the link between physical and relational victimization and indices of anxiety and depression in early adolescence. Our findings underscore the importance and possible causal link of victimization by peers in the pathways toward anxiety and depression. Moreover, this study thus provides evidence that in the etiology of the pathways to anxiety and depression, girls are especially vulnerable to the influences of relational victimization, whereas boys are especially vulnerable to the influences of physical victimization.

Specifically, although it has been shown that boys and girls are equally likely to experience relational victimization, relational victimization experiences were related to anxiety and depression development only for girls. This suggests that future research should be directed at studying the consequences of experiencing relational victimization, specific to girls, to understand the true link between this form of victimization and the development of anxiety and depression among them. Our results also demonstrated the importance of physical victimization in the pathways to anxiety and depression among boys. Not only were boys at higher risk of experiencing physical victimization, their reductions in anxiety and depression were only accounted for by this form of victimization. Our findings thus suggest that to

understand anxiety and depression development among boys, our attention should be directed at the consequences of experiencing physical victimization.

Our findings also underscore the importance of reducing the probability that children are exposed to peer victimization. Although we underscore the importance of prevention programs that are directly aimed at reducing the probability of peer victimization, also for research purposes, it is of interest that the GBG achieved such results. Apparently, an intervention aimed at forms of childhood problem behavior that are most prevalent among boys also results in the prevention of negative outcomes most prevalent among girls. This suggests that intervening in the social context of children, as the GBG does, results in multiple positive outcomes, among both males and females. This questions the specificity of prevention effort that is needed to prevent psychopathology development in children. That is, from a public mental health perspective, not from a research perspective (see our points above in this regard).

6 | Associations between empirically identified parenting styles and childhood behavioral and emotional problems

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Chapter 6

Associations between empirically identified parenting styles and childhood behavioral and emotional problems

Abstract

For clinical and intervention purposes it is important to have a thorough understanding of parenting styles inducing an optimal development of the child as well as of parenting styles associated with child behavioral and emotional problems. Therefore, it is of importance that only parenting styles will be identified that adequately represent the parenting behaviors within a population. The aim of this study was the empirical identification of distinctive parenting styles through Latent Profile Analysis, a technique that allows naturally occurring patterns of interaction among the variables belonging to the demandingness and responsiveness dimensions of parenting. In order to validate our empirically identified parenting styles, we examined associations between the four identified parenting styles, maternal internalizing and externalizing problems, and child behavior and emotional problems as reported by mothers of 604 children in the Netherlands. We identified a warm, average, cold/coercive, and ambivalent parenting style. Child behavioral and emotional problems and maternal psychopathology were most prevalent among children whose parents employed the cold/coercive parenting style.

Introduction

Throughout the history of child psychiatry, the role of *parenting styles* in children's behavioral and emotional behavior problems has been a vital component of child developmental theories. Parenting style, defined as a global set of parental attitudes, goals, and patterns of parenting practices, is hypothesized to create an emotional climate for the parent-child relationship, which in turn may affect children's behavioral and emotional problems (Darling & Steinberg, 1993). The aim of the present study was the empirical identification of different parenting styles and to examine the associations between our empirically identified parenting styles and indices of environmental and maternal risk and childhood behavioral and emotional problems.

Parenting styles consist of the combination of two or more parenting dimensions. Maccoby and Martin (1983), for example, studied the four-style typology of high support and high restrictiveness, high support and low restrictiveness, low support and high restrictiveness, and low support and low restrictiveness. Baumrind (Baumrind, 1967, 1982, 1991) used two

slightly different dimensions, demandingness and responsiveness, to derive a four-fold typology of parenting behavior that describes how parents reconcile the needs of children for nurturance and limit-setting (Baumrind, 1967, 1982, 1991), and distinguished patterns of authoritative, authoritarian, permissive, and rejecting-neglecting parenting. Both parenting style typologies are based on the substantial within-parents similarities across the two parenting dimensions (O'Connor, 2002), and the assumption that it is the combination of parenting characteristics in particular that is influential in child development (Baumrind, 1991; Darling & Steinberg, 1993).

Numerous studies have applied these parenting typologies to explain variations in children's level of adjustment (e.g., Chao, 2001; Glasgow, Dornbusch, Troyer, Steinberg, & Ritter, 1997; Steinberg, Lamborn, Darling, Mounts, & Dornbusch, 1994). Recently, however, researchers have begun to raise a serious question about the usefulness and validity of studies based on parenting styles (Galambos et al., 2003). This concern regards the methods used to form the distinct groups of parenting styles. Typically, parents who do not fit the predetermined classifications – for instance because they do have scores at or above the predetermined cutoff-scores - were often excluded from the analysis in order to contrast extreme parenting types, thereby weakening the external validity of these studies (Chao, 2001; Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Steinberg et al., 1994). As a consequence, the existing studies that have applied the parenting typologies to explain variations in children's level of adjustment have explored the association between *hypothesized* distinct parenting styles and childhood psychopathology, and did not necessarily explore the association between parenting styles as existing in the population and childhood psychopathology.

For clinical and intervention purposes, it is important to have a thorough understanding of parenting styles inducing an optimal development of the child as well as of parenting styles associated with child behavioral and emotional problems. This implies that only parenting styles should be identified that adequately represent distinct sets of parenting behaviors within a population. An important limitation of many previous studies is that the parenting styles as operationalized in these studies were not empirically identified, which reduces the interpretability of the described associations between these parenting styles and child behavioral outcomes. The first aim of this study was therefore to overcome the described limitations of previous studies through empirical identification of distinct parenting styles in a sample 604 Dutch mothers. In line with previous research and theories on parenting dimensions, we incorporated measures of both the responsiveness and demandingness

dimension. We operationalized high levels of responsiveness by an attached parent-child relationship and high levels of affection expression. Low levels of demandingness were considered as a composite of parental behaviors including harsh, arbitrary, and coercive methods of discipline (e.g., rejecting-neglecting and coercive punishment). In order to empirically identify distinct parenting styles, we applied Latent Profile Analysis (LPA; Muthén & Muthén, 2001). LPA is an analytic technique that allows for naturally occurring patterns of interaction among the variables. The purpose of LPA is to find the smallest number of parenting profiles that meet the criteria for the best fitting model, thus overcoming the limitation of forcing mothers into a predetermined number of parenting styles. In addition to the number of classes, the model also provides the characteristics of the identified parenting styles, thus overcoming the use of arbitrary cut-off points. As a consequence, distinct parenting styles that are in accordance with the differences in parenting behaviors as reported within the sample, and not hypothesized parenting styles are identified. This approach thus overcomes the limitation of having to exclude mothers who do not fit the predetermined profiles.

The second aim of this study was to validate our empirically identified parenting styles by studying the association between our empirically identified parenting styles and indices of environmental and maternal risk and childhood psychopathology (e.g., a low socioeconomic status, maternal withdrawn behavior, anxiety/depression, and aggressive behavior, and mother-reported child behavioral and emotional problems). With regard to maternal psychopathology, withdrawn and depressive symptoms (Baydar et al., 2003), and aggressive behavior (Patterson, Reid, & Dishion, 1992) have been associated with harsh, non-supportive, and non-responsive parenting styles. This psychopathology occurs at higher rates among families who are socio-economically disadvantaged (Webster-Stratton & Hammond, 1998) and negatively influences children's outcomes (Baydar et al., 2003).

With regard to parenting styles and child behavioral and emotional problems, studies that are based on parenting style typologies have produced a large body of findings linking one or more parenting styles with children's maladjustment. In general, children from authoritative homes score better on a variety of measures including competence, achievement, social development, and mental health than children whose parents employ non-authoritative techniques (Maccoby & Martin, 1983). Rejecting-neglecting parenting has been shown to be the most detrimental parenting style; children from rejecting-neglecting parents scored poorest of all children on these indices of adjustment (Baumrind, 1991; Lamborn et al., 1991; Steinberg et al., 1994). Children who are raised by authoritarian and permissive parents showed mixed outcomes (Steinberg et al., 1994).

In sum, the present study sought to answer the following research questions. First, how many and which parenting styles can be identified within a general population sample of 604 Dutch children, and what are the parenting characteristics of these distinct parenting styles? Second, what are the characteristics of the mothers who display these parenting styles? The third question addressed was which empirically identified parenting styles are associated with the highest levels of childhood behavioral and emotional problems.

Method

Participants

Participants in this study were part of an ongoing longitudinal study that started in 1999 (for details, see van Lier, Verhulst et al., 2003). Thirteen schools in Rotterdam and Amsterdam, the Netherlands, were recruited. The original target sample consisted of 794 first grade children. Because the project had a longitudinal design, only the 722 children who moved on to second grade and the 22 children who repeated second grade in 1999 were eligible for inclusion, making the total sample 744 children. All 744 parents were approached to obtain written informed consent, and 622 (83.6%) parents agreed for their child to participate in the study.

Prior to the assessment in grade 6, one school ($n = 55$) dropped out of the study. Furthermore, between 1999 and 2003, 78 families (13%) declined to participate in this study. This sample attrition was related to the child's ethnicity (χ^2 (3, $N = 622$) = 13.70, $p < .01$) and low socio-economic status (χ^2 (1, $N = 622$) = 10.69, $p < .01$), but not to the child's gender (χ^2 (1, $N = 622$) = .35, $p > .05$). Children who dropped out of the study had more often the Turkish or Moroccan ethnicity and were more frequently of low socio-economic status. 115 Children and their parents moved into the study cohort between 1999 and 2003 and were included in the study. The sample included in the present study consisted of 604 mothers and children. Mean age of the children was 10.6 years ($SD = 0.6$). Eighty-two percent of the mothers/children were Caucasian, 6% Turkish, 6% Moroccan, and 6% were from other ethnic backgrounds. Fifty-one percent of the children were male. Thirty-four percent of the households were of low socio-economic status (SES). This percentage is in accordance with the general Dutch population (Statistics Netherlands, 1999).

Measures

Maternal parenting. Scores on the parent version of the Dutch Child Rearing Questionnaire (DCRQ, Gerris et al., 1998, 1993) were used to assess mothers' perception of their parenting

behavior. The DCRQ is a 51-item questionnaire in which mothers rate on a 7-point Likert scale ranging from 1 (*totally not true*) to 7 (*totally true*) how often they employed the described parenting behavior. This instrument is extensively tested and shows good psychometric qualities (Dubas, Gerris, Janssens, & Vermulst, 2002; Lanz, Scabini, Vermulst, & Gerris, 2001; Gerris et al., 1998, 1993). In order to reach maximum coverage adequacy for the responsiveness dimension, we used the subscales Affection Expression and Attached Relationship. The Attached Relationship scale (9 items) assesses the extent to which the mother perceives the relationship with her child as warm, personal, intimate and understanding (e.g., 'It's difficult for me to trust my child completely', 'My child and I have a close relationship'). Cronbach's alpha was .80. The Affection Expression scale (9 items) assesses whether the mother uses perceptible expressions of positive affection and warmth to the child (e.g., 'I often cuddle, kiss and hug my child', 'I often show my child that I love him/her'). Cronbach's alpha was .80. In order to measure the demandingness dimension, we used the Coercive Punishment and Rejecting/Neglecting subscales. The Coercive Punishment scale (5 items) assesses whether the mother generally uses a harsh, arbitrary, and coercive method of discipline, such as physical punishment, and the deprivation of privileges and material resources (e.g., 'I often hit my child when s(he) does something which is not allowed', 'I often punish my child by forbidding something nice'). Cronbach's alpha was .70. The Rejecting/Neglecting scale (5 items) assesses whether the mother generally rejects or neglects the child when (s)he violates a rule (e.g., 'When my child does something which is not allowed, I often look mad and ignore my child' and 'When my child does something which is not allowed, I don't speak to my child until (s)he shows some regret'). Cronbach's alpha was .83.

Correlates of Parenting

Maternal psychopathology. To control whether the level of maternal behavioral and emotional problems varied over the identified parenting styles, mother's problem behavior over the last 6 months was assessed with the Young Adult Self-Report (YASR; Achenbach, 1997), designed to evaluate emotional and behavioral problems for ages 18 years and older. To comply with previous studies on maternal behavioral and emotional problems and parenting styles, only the Withdrawn, Anxious/Depressed and Aggressive Behavior subscales were used in this study. Good reliability and validity for the Dutch YASR have been reported by Wiznitzer, Verhulst, van den Brink, Koeter, and van der Ende (1992).

Children's behavioral and emotional problems. Children's problem behavior over the last 6 months was assessed with the Child Behavior Checklist/4-18 (CBCL/4-18; Achenbach, 1991b), which contains a list of 120 problem items. Mothers rate their child's behavior on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). The following syndrome scales were analyzed: Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior. The CBCL has been translated and validated for use in the Netherlands (Verhulst, van der Ende, & Koot, 1996).

Low SES. SES was scored on the basis of highest current parental occupation and highest level of education completed within a family. Low SES was defined as currently being unemployed and/or having elementary or lower occupations (Statistics Netherlands, 1999).

Procedure

When the children were 10 years old, mothers were visited at home by trained research-assistants in order to provide information to the mothers, to obtain informed consent and to conduct a structured interview. During the interview, all questions regarding mothers' parenting behavior, their internalizing and externalizing problems, and their child's emotional and behavioral problems and SES were read aloud and mothers responded. Native language-speaking interviewers approached mothers of other than Dutch ethnic groups, and these interviews were conducted in the native language of these mothers. Each participant received a gift certificate of €25 after participating.

Statistical approach

To empirically identify mothers who share similar parenting styles we applied Latent Profile Analysis (LPA). LPA is a probabilistic version of traditional non-hierarchical cluster analysis like K-means clustering and is useful when observed variables are continuous (parenting variables) and the latent variable (= profile membership) is categorical. Purpose of LPA is to find the smallest number of parenting profiles. In the analysis, profiles are added stepwise until the model fits the data well. To identify the most adequate number of parenting styles three criteria were used (Muthén & Muthén, 1998-2004). The first is Bayesian Information Criterion (BIC; Kass & Raftery, 1993; Schwartz, 1978) in which a lower BIC value indicates improvement of model fit relative to a model with number of classes minus 1. The second criterion is the classification quality of the model. High average posterior probabilities indicate

that the model is well able to assign each child to one particular class. The third criterion is the subjective usefulness of the classes, which can be determined by comparing the classes, the number of children in each class and differences in outcomes between classes.

To verify the stability of the LPA-solution and for interpreting purposes, we used bootstrap sampling. Bootstrapping is a computer-based method for assigning measures of accuracy to statistical estimates (Efron & Tibshirani, 1993). Bootstrap samples are generated by sampling with replacement from the original dataset. For each bootstrap sample an LPA is conducted and at the end all samples are combined to construct confidence intervals for the parameter estimates.

To test differences between parenting styles with regard to child problem behavior we used Multiple Analysis of Covariance (MANCOVA) with gender of the child and parenting styles as independent variables, maternal psychopathology (Withdrawn, Anxious/Depressed, and Aggressive Behavior) as covariates, and the 8 behavioral and emotional problem types of the child as dependent variables. If the overall test showed significant differences (reported with Pillai's trace), the second step would be performing univariate analyses of covariance (ANCOVA) for each of the 8 variables, followed by post hoc tests using Bonferroni's correction procedure to detect which parenting styles differed from each other. To explore the clinical relevance of reported differences in child behavioral and emotional problems, effect sizes, expressed as Partial Eta Squared (PES) were studied. Effect sizes of .01 are small, .06 are medium, and .15 are large (Cohen, 1988). ANCOVAs require that the scale scores within each profile are stemming from normal distributions with equal variances. The CBCL scales were skewed (range: 1.41-4.47) with high levels of kurtosis (range: 2.68-28.92). The YASR scales were also skewed (range: 1.49-2.15) with high levels of kurtosis (range: 2.79-8.98). We therefore decided to transform the data by taking the square root of the original data. The skewness of the transformed CBCL variables varied from -.08 to 1.93 and the kurtosis from -.61 to 3.20. The skewness of the transformed YASR variables varied from 1.49 to 2.15 and the kurtosis from 2.80 to 8.98.

Approximately half of the children received a school-based universal preventive program targeting disruptive behavior (for details about this intervention, see van Lier et al., 2004). Classrooms were randomly assigned to either the intervention or control condition. Parenting styles from mothers of intervention versus control children were compared. No significant differences were found between intervention and control children regarding their mother's parenting profile (results available from the authors on request). Therefore, LPA was performed on the entire sample. Analyses examining associations between the empirically

identified parenting styles and child behavior and emotional problems as reported by mothers were only performed on the control-group of children (n = 321), because previous research showed significant improvements in disruptive behavior in intervention children (van Lier et al., 2004, 2005).

Results

Latent Profile Analysis (LPA)

The correlations between the 4 parenting scales ranged from -.38 to .41 (p < .05). The standardized values of the four parenting scales of the DCRQ were used as input for LPA-analysis. Two (BIC = 6477), three (BIC = 6363), four (BIC = 6273), five (BIC = 6289) and six (BIC = 6299) parenting styles were fitted. Based on the BIC, this indicated that the 4-class solution was optimal. Class sensitivity, the average class-membership probability after classifying the children, was high for the 4-class solution (.79-.89), which showed that children were well classified to their particular class. Regarding the subjective usefulness of the classes, the 4-style solution was better interpretable than the 3-style solution because the additional style showed considerably different profile characteristics than those already present in the 3-style solution.

Finally, a 5-style solution was less interpretable, because one style consisted of a small number of parents (n = 18). The 4-style solution was therefore chosen as best fitting the data and proved to be the most optimal one. To verify the stability of this 4-style solution and to interpret the solution, 2000 bootstrap samples of size 604 were drawn from the original sample. 95% Bootstrap confidence intervals were computed of the mean standardized values for each of the four parenting measures within each style.

Parenting styles

Results of the LPA are presented in Table 6.1. The 4-style solution has proven to be stable: positive mean estimates have mostly positive confidence intervals, negative mean estimates have mostly negative intervals. Low mean standardized values have confidence intervals with negative and positive values. The interpretation of the 95% bootstrap confidence intervals and the mean values into a profile is as follows. A parenting scale with a bootstrap interval including positive as well as negative values is interpreted as having an average level within a profile and is denoted by 0. Intervals containing only positive values with mean estimates below .50 are considered as above average and denoted by +. Intervals with positive values and a mean estimate between .50 and 1.00 are considered as rather high and denoted by ++. A

mean estimate above 1.00 is seen as high and denoted by +++. The same applies for negative intervals.

The 4 parenting styles can be characterized as follows. The first style, found in 25% of the sample, is characterized by rather high mean scores on Attached Relationship, above average scores on Affection Expression and rather low mean scores on Coercive Punishment and Rejecting/Neglecting. This style is best labeled as *warm parenting* (style 1). This warm parenting style sharply contrasts with the fourth style. Mothers who have this parenting style have rather low mean scores on Attached Relationship and Affection Expression, high mean scores on Rejecting/Neglecting and rather high mean scores on Coercive Punishment. This style is best characterized as *cold/coercive parenting* (style 4) occurring in about 16% of all mothers. Forty-one percent of all mothers reported the parenting style with below average scores on all subscales. This style was denoted as *average parenting* (style 2) because this was the most often reported style. The last style, best labeled as *ambivalent parenting* (style 3), occurring in 18% of all mothers, is characterized by rather high mean scores on Attached Relationship and Affection Expression and above average mean scores on Rejecting/Neglecting and Coercive Punishment.

Parenting styles, family demographic variables, and maternal psychopathology
SES was significant (χ^2 (3, N = 594) = 23.96, p <.01): low SES was over- represented in the cold/coercive parenting style. Ethnicity was also significant (χ^2 (9, N = 604) = 19.74, p < .05): Caucasian people were over represented in the average style (see Table 6.2).

The MANCOVA with gender and parenting style as independent variables, maternal Withdrawn, Anxious/Depressed, and Aggressive Behavior as covariates, and children's emotional and behavioral problems as dependent variables showed no significant overall effects of gender (F(8, 274) = 1.11, p > .05), and no significant interaction between gender and parenting style (F(24, 828) = .97, p > .05). For this reason we rerun MANCOVA with parenting style as independent variable and the three maternal psychopathology variables as covariates.

Significant overall effects were found for parenting style (F(24, 840) = 1.96, p < .01, PES = .053), and each of the maternal psychopathology variables. For Withdrawn we found F(8, 278) = 2.93, p < .01, PES = .078, for Anxious/Depressed F(8, 278) = 3.88, p < .001, PES = .100, and for Aggressive Behavior F(8, 278) = 3.20, p < .01, PES = .084.

Table 6.1 Mean Standardized Values, 95% Bootstrap Confidence Intervals (CI) and Typology (T) of Four Parenting Profiles ($N = 604$)

Profiles		1. Warm			2. Average			3. Ambivalent			4. Cold/coercive		
% mothers		25%			41%			18%			16%		
Measures		M	95% CI	T	M	95% CI	T	M	95% CI	T	M	95% CI	T
Responsiveness	1. Attached Relationship	.89	(.87 .91)	++	-.26	(-.33 -.19)	-	.58	(.51 .64)	++	-1.32	(-1.58 -1.06)	---
	2. Affection Expression	.44	(.32 .56)	+	-.43	(-.55 -.32)	-	.92	(.83 1.00)	++	-.55	(-.75 -.35)	--
Demandingness	3. Rejecting/ Neglecting	-.90	(-.96 -.84)	--	-.19	(-.26 -.12)	-	.49	(.30 .68)	+	1.37	(1.20 1.54)	+++
	4. Coercive Punishment	-.52	(-.67 -.37)	--	-.16	(-.26 -.06)	-	.41	(.22 .60)	+	.80	(.60 .98)	++

Note: +++ = high, ++ = rather high, + = above average, 0 = average, --- = low, -- = rather low, - = below average.

To examine how maternal psychopathology is related to the 4 identified parenting styles, we conducted a MANOVA, with parenting style as independent variable and the three maternal psychopathology variables as dependent variables. Pillai's trace showed a significant overall effect ($F(9, 1641) = 4.33$, $p <.001$, PES = .023), indicating that maternal problem scores were different in mothers who reported different parenting styles. The ANOVA's for each of the syndrome scales were significant, see Table 6.2.

To assess the origin of these differences, post hoc tests with Bonferroni's correction were performed on the 3 syndrome scales of the YASR. Results are presented in Table 6.2. Mothers whose parenting behavior best resembled a cold/coercive parenting style reported significantly more anxiety/depression than mothers with a warm parenting style ($p < .001$), an average parenting style ($p < .001$), and an ambivalent parenting style ($p < .01$). Furthermore, mothers who employed a cold/coercive parenting style reported significantly more withdrawn behavior ($p < .05$) than mothers with a warm parenting style, and reported significantly more aggressive behavior than mothers with a warm ($p < .001$) and ambivalent parenting style ($p < .05$). Finally, mothers who employed an average parenting style reported significantly more aggressive behavior ($p < .05$) than mothers with a warm parenting style. Effect sizes, expressed as Partial Eta Squared (PES) were small (Withdrawn), small to medium (Aggressive Behavior), and almost medium (Anxious/Depressed), see Table 6.2.

Parenting styles and children's behavioral and emotional problems

Children's gender was equally distributed over the 4 identified parenting profiles (χ^2 (3, $N = 604$) = .58, $p > .05$). The ANCOVA for each of the problem scales showed significant differences between the four parenting styles. To assess the origin of these differences, post hoc tests using Bonferroni's correction were performed after controlling for maternal psychopathology. Results are presented in Table 6.3. The analyses showed higher levels of child emotional and behavior problems among families in which the mother reported a cold/coercive parenting style. For instance, mothers with this parenting style reported significantly higher Aggressive and Delinquent Behavior in their children than mothers who employed any of the other parenting styles. In addition, these mothers reported significantly higher levels of Anxious/Depressed and Social Problems in their children than mothers with an average or warm parenting style. Mothers with a cold/coercive parenting style also reported their children to have significantly higher scores on the Attention Problem scale than warm and ambivalent mothers.

Table 6.2 Maternal Psychopathology for Four Parenting Styles

	Parenting style									
	Warm		Average		Ambivalent		Cold/coercive		F(3,547)	PES
	M	SD	M	SD	M	SD	M	SD		
	Family background variables									
Low SES (%)	31		29		33		57			
Caucasian (%)	78		86		81		78			
	Maternal Psychopathology									
	M	SD	M	SD	M	SD	M	SD	F(3,547)	PES
Withdrawn	.90 [a]	.81	1.11 [a]	.81	.98 [ab]	.78	1.23 [b]	.83	3.67	.020
Anxious/Depressed	1.66 [a]	1.05	1.87 [a]	1.16	1.84 [a]	1.05	2.45 [b]	1.04	10.28	.053
Aggressive Behavior	.83 [a]	.81	1.11 [ab]	.90	.96 [ab]	.87	1.33 [b]	.82	6.80	.036

Note. Statistics are based on square root transformations of the original YASR scores. Means in the same row that do not share subscripts differ at $p < .05$ in the Bonferroni multiple comparisons. SES = Socio-economic status; M = Mean; SD = Standard Deviation; PES = Partial Eta Squared.

Effects sizes in terms of Partial Eta Squared (PES) showed small effects for Withdrawn, Somatic Complaints, Thought Problems, small to medium effects for Anxious/Depressed and Attention Problems and medium effects for Social Problems, Delinquent Behavior, and Aggressive Behavior, see Table 6.3.

Discussion

The first aim of this study was to empirically identify different parenting styles through Latent Profile Analysis, a technique that allows naturally occurring patterns of interaction among the responsiveness and demandingness dimensions of parenting. This procedure overcomes methodological and conceptual limitations of previous studies that were based on existing parenting typologies, specifically the use of arbitrary cut-off points to classify parents into a predetermined number of parenting styles. The second aim of this study was to validate our empirically identified parenting styles by examining the associations between our identified parenting styles and indices of environmental and maternal risk and childhood psychopathology. A number of findings stand out.

First, four distinctive parenting styles were empirically identified. We identified a warm parenting style (displayed in 25% of the mothers), characterized by a warm, personal, intimate, and understanding parent-child relationship, and the minimal use of harsh, arbitrary, and coercive parenting behaviors. We also identified a cold/coercive parenting style (displayed in 16% of the mothers), characterized by the absence of a warm and attached parent-child relationship, and the presence of rejecting/neglecting and coercive punishment strategies. Forty-one percent of the mothers employed a parenting style labeled as average with below average scores on indices of both the responsiveness and demandingness dimensions of parenting. Finally, an ambivalent parenting style was identified, displayed in 18% of the mothers. This style was characterized by a rather warm, personal, intimate, and understanding parent-child relationship, but also by the presence of rejecting/neglecting and coercive punishment strategies.

Table 6.3 Emotional and Behavioral Problems for Four Parenting Styles in Control Group Children

	Parenting style									
	Warm		Average		Ambivalent		Cold/coercive		F(3,285)	PES
	M	SD	M	SD	M	SD	M	SD		
	Children's behavioral and emotional problems									
Withdrawn	.91	.79	1.00	.85	1.09	.80	1.18	1.01	1.19	.012
Somatic Complaints	.55	.82	.60	.75	.66	.79	.84	.75	2.08	.021
Anxious/Depressed	1.15[a]	.89	1.27[a]	.95	1.34[ab]	.83	1.64[b]	.92	3.55	.036
Social Problems	.71[a]	.77	.74[a]	.82	.90[ab]	.71	1.23[b]	.91	5.96	.059
Thought Problems	.15	.47	.21	.48	.29	.49	.38	.67	2.09	.021
Attention Problems	1.38[a]	.87	1.40[ab]	.91	1.25[a]	1.01	1.83[b]	1.08	4.03	.041
Delinquent Behavior	.57[a]	.65	.64[a]	.71	.54[a]	.67	1.09[b]	.78	7.95	.077
Aggressive Behavior	1.83[a]	1.15	1.93[a]	1.11	1.87[a]	1.09	2.64[b]	1.06	7.39	.072

Note. Statistics are based on square root transformations of the original CBCL scores. Means in the same row that do not share superscripts differ at $p < .05$ in the Bonferroni multiple comparisons. SES = Socio-economic status; M = Mean; SD = Standard Deviation; PES = Partial Eta Squared.

Second, regarding the identified parenting styles, demographic variables, and maternal psychopathology, a number of findings stand out. First, mothers who employed a cold/coercive parenting style were predominantly of lower SES, and reported higher levels of Anxiety/Depression than other mothers. Cold/coercive mothers reported also more Withdrawn and Aggressive Behavior than warm mothers. These results are in accordance with previous research (Baydar et al., 2003). Results of this study also indicated that –after controlling for maternal psychopathology- behavioral and emotional problems were most prevalent in children raised with a cold/coercive parenting style. Mothers who employed a cold/coercive parenting style reported more aggressive and delinquent behavior in their children than mothers from any of the other parenting styles. In addition, these mothers reported their children to be among the highest on Anxious/Depressed, and Social Problems when compared with children whose mothers reported an ambivalent, average, or warm parenting style.

The findings of this study should be regarded in the context of several limitations. First, all assessments used in this study were based on mother reports, which increased the risk of finding significance due to shared method variance. A related problem is the use of a single reporter regarding parenting styles. Our findings are limited in that they do not show the full picture of parenting dynamics by not including father-reports and examination of combined mother-father parenting behaviors. Second, information on parenting styles was obtained from mothers' self-report, which may reflect the mothers' beliefs or attitudes toward childrearing more than their actual behaviors. Additional observational measures may provide a more accurate picture of parenting than mothers' self-report (Zhou, Eisenberg, Wang, & Reiser, 2004). However, the fact that findings from observational studies and those that used self-report measures of parenting are relatively consistent (for a review, see Hart, Newell, & Olsen, 2003) suggests that different information sources may, at least in part, yield similar information about parenting behaviors. Third, the present study only focused on the association between parenting styles and childhood behavioral and emotional problems. However, other processes, such as genetic susceptibility, peer influences, family, neighborhood, and community variables, and personality characteristics may account for the development of behavioral and emotional problems. Fourth, because the data presented are cross-sectional, it is impossible to determine whether the parenting styles were causes or consequences of the child outcomes or were reciprocally influencing each other. This study does not allow following parents and children across childhood to determine how parenting influences developmental courses of children's behavior. It also does not allow studying how earlier child behavior, under influence of the previously reported factors, shaped parenting. For instance, a difficult

temperament in young children predicts later behavioral as well as emotional disorders (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000), but is also associated with ineffective rearing styles of the child's parents (Shaw, Owens, Giovannelli, & Winslow, 2001). However, the identification of possible causal processes leading toward ineffective parenting styles and behavioral and emotional problems was not the aim of this study. For that, longitudinal research with experimental designs is needed, in which children's initial characteristics can be observed to change over time in relation to controlled distinct parenting styles.

Our findings are important for several reasons. First, although a plethora of studies based on existing parenting style typologies have been conducted to examine the role of parenting styles in children's behavioral and emotional problems, little research has been conducted to test whether these parenting styles could actually be empirically identified within the studied population, and whether or not these identified styles resembled parenting styles as operationalized, for instance, by Baumrind. For example, when comparing our identified parenting styles with those as operationalized Baumrind, the results from this study showed mixed findings. Regarding Baumrind's operationalization, permissive parents tend to make fewer demands on their children than do other parents, allowing them to regulate their own activities a much as possible. Permissive parents are relatively noncontrolling and tend to use a minimum of punishment with their children. Authoritarian parents, on the other hand, tend to be highly directive with their children and value unquestioning obedience in their exercise of authority over their children. Being less warm and detached than other parents, authoritarian parents discourage communication and favor punitive measures to control their children's behavior. Authoritative parents, however, tend to fall somewhere between these extremes. They are characterized as providing clear and firm direction for their children, but disciplinary clarity is moderated by warmth, reason, flexibility, and verbal give-and-take (Buri, 1991). Rejecting-neglecting parents are neither demanding nor responsive. These parents are not supportive, but may be actively rejecting or else neglecting their parenting responsibilities (Baumrind, 1991). The identification of a warm and cold/coercive parenting style were in accordance with Baumrind's permissive and authoritarian parenting style respectively. In contrast, although the identified average parenting style showed some resemblance to Baumrind's rejecting-neglecting parenting style, these mothers reported less prominent rejecting-neglecting and coercive punishment strategies than are characteristic of the rejecting-neglecting parenting style. Moreover, the ambivalent parenting style showed some profile resemblance to Baumrind's authoritative parenting style. In accordance with the authoritative

parenting style was that mothers who employed an ambivalent parenting style reported rather high mean scores on the responsiveness dimension. However, not in accordance was the presence of above average mean scores on harsh, arbitrary, and coercive parenting behavior. Authoritative parents are characterized by providing clear and firm direction for their children, while their disciplinary clarity is moderated by warmth, reason, flexibility, and verbal give-and-take (Buri, 1991). However, the disciplinary strategies of ambivalent parents were characterized by cold and coercive disciplinary strategies.

Second, with regard to child behavioral and emotional problems, the results of this study also only partially confirmed the hypothesized consequences of Baumrind's typology. Baumrind's rejecting-neglecting style is regarded as most destructive (Baumrind, 1991), a parenting style that was only partially identified in our sample. Moreover, according to Baumrind's theory, the authoritative parenting style is the prototype for appropriate parenting, resulting in low levels of adjustment problems in children. However, in this study, children of warm parents did not show the lowest levels of adjustment problems, whereas no significant differences in children's behavior problems between the warm, ambivalent, and average parenting styles were present. Furthermore, of concern is that children raised by our most often reported style, average parenting, did not score better on measures of behavioral and emotional problems than children of warm and ambivalent parents.

Because it is very important for clinical and intervention purposes to have a thorough understanding of parenting styles inducing an optimal development of the child as well as of parenting styles that are associated with child behavioral and emotional problems, it is important that only parenting styles are identified that adequately represent the parenting behaviors within a population. By contrasting empirically identified parenting styles associated with poor childhood outcomes to parenting styles inducing a more positive development of children, more effective parenting prevention programs can be developed, tailored to the specific needs of parents with a less appropriate parenting style. Based on the results from this study, it can be concluded that the co-occurrence of our empirically identified parenting styles and children's behavioral and emotional problems do only partially substantiate the existing hypothesized typologies and consequences. We therefore recommend that, in order to use a parenting typology to explain variations in children's level of adjustment, (1) parenting should be measured by an instrument capable of assessing the demandingness and responsiveness dimensions of parenting simultaneously, (2) only parenting styles should be used that adequately represent the parenting behaviors within a population, and (3) our empirical approach should therefore be replicated in other studies.

7 | General Discussion

Chapter 7
General Discussion

The main aim of this thesis was to study male and female pathways to psychopathology from childhood into early adolescence. Unique of this study was that half of the sample was randomly assigned to a preventive intervention, the Good Behavior Game (GBG), over a two-year period (ages 8 and 9 years). The GBG is a universal, classroom-based preventive intervention program that targets the development of disruptive problem behavior in young elementary schoolchildren. The nesting of the GBG in this prospective, population-based study allowed us to test the influence of hypothesized risk factors, which were directly or indirectly targeted by the GBG intervention, on the sex-specific pathways to internalizing and externalizing psychopathology (Kellam & Rebok, 1992).

The studies described in this thesis were embedded in the GBG project, which is a randomized controlled intervention study that started in 1998 when 666 children from 13 elementary schools in the metropolitan areas of Amsterdam and Rotterdam were enrolled in the study at age 6 years (van Lier, 2002). In prior reports on this study, the manifestation and development of disruptive problem behaviors and the direct impact of the GBG intervention on the development of disruptive behaviors from age 6 to 10 years was examined (Crijnen, Rigter, & Verhulst, 2001; Crijnen, Van Lier, & Van der Sar, 2002; van Lier & Crijnen, 2005; van Lier, Muthén, van der Sar, & Crijnen, 2004; van Lier, Verhulst, & Crijnen, 2003; van Lier, Verhulst, van der Ende, & Crijnen, 2003; van Lier, Vitaro, Wanner, Vuijk, & Crijnen, 2005; van Lier, Vuijk, & Crijnen, 2005).

In the present thesis, results are presented spanning the (retrospectively reported) prenatal phase, via the early elementary school period in which the GBG was implemented, to late childhood and early adolescence. In each of the studies, the influence of the GBG intervention was used to test the influence of risk factors on the pathways to psychopathology.

More specifically, we investigated the influence of hypothesized prenatal risk factors on the pathways to ADHD symptoms in middle and late childhood, tested the role of early elementary school period behavioral, emotional, and social problems on the development of relational aggression in late childhood, and tested the influence of both physical and relational victimization experiences in the pathways to anxiety and depression in early adolescence. In addition, we studied the typologies of parenting behaviors and their association with childhood psychopathology. In the present chapter, the main findings with respect to each of these four

study domains and their implications for prevention and clinical practice are presented, followed by the overarching implications and conclusions of this project.

Pathways to ADHD symptoms: the role of prenatal exposure to maternal smoking

Although there is accumulating evidence that prenatal exposure to maternal smoking contributes to the etiology ADHD problems, no study has tested yet whether the pathway from prenatal exposure to maternal smoking to offspring ADHD problems will persist despite beneficial changes in the environment of the child through intervention. The aim of this study was therefore to test the hypothesized entrenched influence of prenatal exposure to maternal smoking on symptoms of ADHD through the GBG intervention. More specifically, in the study presented in Chapter 2 we tested 1) whether children who were prenatally exposed to maternal smoking had elevated teacher-rated ADHD symptoms at age 7 years, and 2) whether the effects of prenatal smoking on the development of ADHD symptoms from age 7 to 9 years and the associated risk for early-onset experimentation with smoking at age 10 and 11 years among these children persisted despite the beneficial changes the GBG intervention program brought to the children's environment.

At age 7 years, exposed children had higher levels of ADHD symptoms compared to non-exposed children. Moreover, the high levels of ADHD symptoms from age 7 to 9 years in these exposed children were not impacted by GBG intervention, as compared to the exposed control group children. The GBG could also not prevent that the probability of early-onset experimentation with smoking among exposed children was high. By contrast, non-exposed children were receptive to GBG impact from age 7 to 9 years, as compared to non-exposed control group children. In addition, the probability of early-onset experimentation with smoking was reduced by 50% among non-exposed children who had received the GBG.

In conclusion, these findings extended the knowledge on the harmful role of prenatal smoking in the etiology of ADHD symptoms by being the first to demonstrate that prenatally exposed children were unreceptive to the positive impact of a universal intervention. The ADHD symptoms among exposed children were not reduced, and these children were at the highest risk for early-onset experimentation with smoking. Our results thus emphasize that prenatal exposure to maternal smoking set the stage for later problematic development that could not be effectively targeted by a universal program. Therefore, more intense intervention programs may be warranted for exposed children. Our results also call for the prevention of smoking during pregnancy, or more broadly, the reduction of risk factors among pregnant

women. In this regard, the Prenatal and Infancy Home Visitation by Nurses Intervention (Olds, 1998) has been found a proven effective intervention.

Pathways to relational aggression: the role of behavior, emotional, and social problems

Previous research has demonstrated associations between relational aggression and behavioral (Crick, 1997; Park et al., 2005; Zalecki & Hinshaw, 2004), emotional (Crick & Grotpeter, 1995), and social problems (Nelson et al., 2005; Werner & Crick, 2004). However, an important limitation of these previous studies is that they were of cross-sectional or at best longitudinal nature. As a result, the knowledge about the bi-directional nature of the associations between behavioral, emotional, and social problems and the development of relational aggression is still scarce. Because the GBG study has a prospective design, we were able to explore the longitudinal association between behavioral, emotional, and social problems at elementary school entry and relational aggression from late childhood into early adolescence. The study of these longitudinal associations was performed in two stages.

First, in Chapter 3, we aimed at studying the predictive associations between the behavioral, emotional, and social antecedents at age 7 years and relational aggression from age 10 to 12 years. In addition, we aimed to study whether these pathways were similar for boys and girls. Because our aim in this stage was to explore the longitudinal associations, all analyses were performed on the control-group children only. Girls were consistently higher on relational aggression from age 10 to 12 years old than boys. With regard to the behavioral and social antecedents of relational aggression, only overt aggressive behavior and a controversial sociometric status at age 7 were predictive of relational aggression from age 10 to 12 years. No evidence for a longitudinal pathway from emotional problems to relational aggression was found, despite previous, mainly cross-sectional findings on such associations. All the predictive associations were similar for boys and girls.

Second, after identifying variables that were related to relational aggression in late childhood and early adolescence, we aimed to test these associations through the GBG intervention (Chapter 4). Intervention studies allow us to test whether changes in risk factors, as a direct effect of intervention, mediate the distal effect of intervention on psychopathology. The GBG intervention thus provided the opportunity to test whether the reductions in overt aggression, ADHD symptoms, and oppositional defiant problems during middle childhood mediated the reductions in relational aggression from late childhood into early adolescence. We also studied whether the role of these disruptive behavior problems in the development of relational aggression was different for boys and girls. Our results showed that the intervention-

induced reductions in overt aggression that mediated the reductions in relational aggression were limited to boys. In girls, reductions in relational aggression were accounted for by reductions in ADHD symptoms. These findings provide evidence for the etiologic role of childhood disruptive problem behavior in the pathway towards relational aggression in late childhood, but also suggest sex differences in the factors that contribute to the development of relational aggression.

The obtained findings regarding the predictive association of childhood ADHD symptoms to relational aggression in girls are especially of importance. Results of this study provide significant evidence to counter the prevailing theoretical perspective of girls as relatively lacking in serious psychopathology during middle and late childhood periods. The findings reported here clearly demonstrate that the pathways leading to psychopathology in girls during childhood are more likely than previously believed to be externalizing in nature. In addition to this implication for theoretical views of girls' adjustment problems, the present findings may also suggest that prevention programs aimed at reducing relational aggression need to be sex-specific. Our finding that especially overt aggression is an important risk variable for the development of relational aggression in boys implies that preventative programs that focus on male forms of aggression should also be effective in reducing relational aggression in boys. Our results on a link between ADHD symptoms and relational aggression in girls might imply that reducing early symptoms of ADHD will be effective in reducing girls' relational aggression in early adolescence. In this regard, it is important to mention that the GBG intervention program has been proven effective in targeting both overt aggression and ADHD symptoms. This suggests that the GBG may also be able to effectively target relational aggression as well.

Pathways to symptoms of anxiety and depression: the role of peer victimization
Victimization by peers is one of the factors that has been frequently associated with the development of anxiety and depression. However, research in this area is mainly correlational in nature, which does not allow for testing the role of particular peer victimization experiences (both relational and physical victimization) in the etiology of anxiety and depression. Because the GBG effectively reduced disruptive behavior problems including physical and relational aggression, and because the GBG aims at facilitating prosocial interaction between children, it was likely to assume that both relational and physical victimization were reduced among GBG children. In Chapter 5, we therefore investigated whether the reductions in physical and relational victimization at age 10 years, as a distal outcome of intervention, mediated the

reductions in symptoms of anxiety and depression at age 13 years. We also studied whether these mediating paths were sex-specific.

It was found that among girls, the reductions in symptoms of major depressive disorder, generalized anxiety, and panic/agoraphobia were especially driven by reductions in relational victimization. Among boys, reductions in symptoms of generalized anxiety and panic/agoraphobia were accounted for by reductions in especially physical victimization. This study thus provides evidence that in the etiology of the pathways to anxiety and depression, girls are especially vulnerable to the influences of relational victimization, whereas boys are especially vulnerable to the influences of physical victimization.

These results highlight the importance of including relational victimization in the study on the pathways towards anxiety and depression among girls, and including physical victimization in the study on the pathways towards anxiety and depression among boys. These findings also underscore the importance of addressing both physical and relational victimization in anxiety and depression prevention programs. In this regard, the reduction of both physical and relational victimization by the GBG intervention as shown by this study warrants further attention. Until now, studies on the effectiveness of the GBG intervention program targeting externalizing behavior problems have focused on reductions in targeted behaviors. The GBG study now showed that an intervention aimed at improving the classroom environment also results in positive effects on internalizing problems among boys and girls by reducing sex-specific peer victimization experiences.

Parenting and problem behavior

For clinical and intervention purposes it is important to have a thorough understanding of parenting styles inducing an optimal development of the child as well as of parenting styles associated with childhood psychopathology. However, although a plethora of studies have used theory-driven parenting styles to examine the role of parenting styles in children's behavioral and emotional problems, little research has been conducted to test whether these parenting styles actually reflect empirically identified parenting styles within a study population. The final aim of this study was therefore to empirically identify different parenting styles through Latent Profile Analysis (see Chapter 6). This procedure overcomes methodological and conceptual limitations of previous studies based on existing parenting typologies. More specifically, it overcomes the use of arbitrary cut-off points to classify parents into a predetermined number of – also predetermined – parenting styles. In order to validate our

empirically identified parenting styles, we examined the associations between our identified parenting styles and maternal psychopathology, and child behavioral and emotional problems.

Four distinctive parenting styles were empirically identified: a warm parenting style (displayed in 25% of the mothers), a cold/coercive parenting style (displayed in 16% of the mothers), an average parenting style (displayed in 41% of the mothers), and, finally, an ambivalent parenting style (displayed in 18% of the mothers). Mothers who employed a cold/coercive parenting style were predominantly of lower SES, and reported higher levels of anxiety/depression, withdrawn and aggressive behavior than warm mothers. Child behavioral and emotional problems and maternal psychopathology were most prevalent among children whose parents employed the cold/coercive parenting style.

Based on the results from this study, it can be concluded that the co-occurrence between our empirically identified parenting styles and children's behavioral and emotional problems do only partially substantiate findings on hypothesized typologies and consequences from previous research. However, because this is the first study that has empirically tested which parenting styles are present within a study population, we recommend that our empirical approach should be replicated in other studies.

Some considerations about this study

In this randomized controlled study, a large general population-based sample was followed from childhood to early adolescence. In this relative long-term follow-up phase, spanning the period from age 6 to 13 years, data of approximately 70% of the sample was available. We used repeatedly assessed parent-, teacher-, peer-, and self-reports to measure predictor, mediating, and outcome variables.

A unique feature of this study was the randomized prevention trial. This design enabled us not only to study the effectiveness of the GBG intervention in preventing disruptive problem behaviors, but also to test the role of hypothesized risk factors in the pathways to male and female externalizing and internalizing psychopathology. As we described in Chapter 1 of this thesis, evidence that the reductions in the manifestation of such hypothesized risk factors are linked to the reductions in the outcome variables are supportive of causal connections between these risk variables and outcomes (Kellam & Rebok, 1992; Rutter et al., 2001). Demonstrating that the GBG-induced changes in the manifestation of postulated causal risk factors were linked to the modification of later relational aggression and symptoms of anxiety and depression (see Chapters 4 and 5) can therefore be considered as an experimental test of causal theory in these areas of research. Also, by demonstrating that a randomized controlled

promotive factor for behavioral adjustment was successful only among children who had not been prenatally exposed to maternal smoking (see Chapter 2), this study has gone beyond previous correlational studies on the hazardous influence of prenatal smoking. Therefore, this study marked an important extension of the research on the pathways to ADHD symptoms, relational aggression, and symptoms of anxiety and depression from childhood into early adolescence.

However, the interpretation of the results of this study, and especially conclusions on causal connections between hypothesized risk factors and outcomes from this thesis, are premature without considering a number of issues, in addition to the limitations already discussed in the previous chapters. First, it is important to notice that RCTs cannot provide *decisive evidence* on causality, but merely can provide *support* for causal connections. However, even then, a number of limitations of RCTs need to be considered (Howe et al., 2002). For instance, a prevention program can trigger several mediators. This limits the power of such studies to test specific pathways of development, because mediators that are not accounted for may influence the results, and thus may influence the validity of the conclusion based on the results. Evidence of this possibility was provided in our study. Although the study was aimed at reducing classroom disruptive behavior problems, positive intervention effects on many other outcomes were found. Some of these outcomes were closely linked to the targeted behaviors (e.g., early-onset experimentation with smoking linked to ADHD symptoms), but others were not. For instance, internalizing problems were never targeted by the GBG intervention. And although is may seem logical to assume that the reductions in physical and relational aggression caused reductions in physical and relational victimization which then caused the reductions in internalizing problems, this remains uncertain. Other non-included, or even non-measured mediation processes may have accounted for the associations. Therefore, the success of the GBG prevention program, in terms of a public mental health perspective, is also a limitation for research on the development of psychopathology.

Another barrier to interpreting an association between an alleged risk factor and an outcome is the possibility that some unknown variable that was not controlled for may account for both the risk factor and the outcome. For instance, anxiety and depression have been found to be genetically influenced (Boomsma, van Beijsterveldt, & Hudziak, 2005), and genetically vulnerable children may evoke responses of victimization (gene-environment correlation). The random assignment of children to either control or intervention condition, however, should have controlled for this possible source of confounding. However, the genetic liability of a child to develop psychopathology may also moderate the association between the risk variable

and outcome (genotype-environment interactions). This suggests that individual differences, such as genetic liability, can account for – parts of – the found associations of, for instance, peer victimization and anxiety and depression development. Therefore, conclusions on causal connections between risk variables and outcomes are incomplete without taking the genetic liability of a child to develop psychopathology into account. In this sense, a stronger research design would incorporate randomized controlled intervention trials targeting risk and protective factors hypothesized to interact with genetic vulnerability or responsiveness (Howe et al., 2002).

Another limitation of this study is the time frame, which is limited to childhood and early adolescence. Despite this relative long follow-up period, information on the effectiveness of the GBG intervention on the outcomes in mid-adolescence, a period in which forms of extreme externalizing behavior, such as delinquency but also internalizing problems become increasingly pronounced, could thus not be studied. A related problem of this limited time frame is that different mediation paths (see Chapter 4 and 5) may emerge as these children will be followed into adolescence and adulthood. Therefore, replications will be needed to assess the extent to which the results of the GBG project can be generalized to other developmental periods.

A final limitation concerns the fact that teachers who implemented the GBG intervention program were also the source of the children's outcome ratings in our study on the role of prenatal smoking in the etiology of ADHD symptoms (see Chapter 2), as well as in the two studies on the pathways to relational aggression (see Chapter 3 and 4). It may be possible that the fact that teachers were not blind to intervention may have led them to underreport the actual level of the outcome variables. However, in the prenatal smoking study, we found that no intervention effects were present for exposed children. This would imply that prenatal smoking would moderate the under-reporting of teachers, an assumption that we find difficult to believe. More importantly, the positive teacher-reported outcomes of the GBG intervention coincided with peer and children's self-reported outcomes. And although children were of course aware that they received the GBG intervention, we find it difficult to imagine that this caused their lower reported psychopathology outcomes, especially in early adolescence. Therefore, the use of different informants for predictor variables, mediating variables, and outcomes provide confidence in the significant results obtained.

Conclusions

Initially, the Good Behavior Game project was aimed at studying the effectiveness of the GBG intervention on reducing disruptive behavior problems in young elementary schoolchildren. The present thesis aimed at studying the long-term effectiveness and to enhance our understanding of male and female pathways towards psychopathology. Overall, two conclusions stand out.

First, from a public mental health perspective, the Good Behavior Game project demonstrated that an intervention aimed at creating a consistent, safe, and predictable classroom environment among early elementary schoolchildren – the GBG intervention – is effective in reducing children's psychopathology, both of externalizing as well as internalizing nature, and to reduce behaviors that are closely associated with youth psychopathology problems, such as early- onset experimentation with smoking. Prior reports on this project showed that children's ADHD problems, oppositional defiant problems, conduct problems from age 7 to 9 years, and antisocial behavior from age 7 to 10 years were effectively targeted by the GBG intervention. In the present thesis, it was demonstrated that the GBG intervention prevented increases in ADHD symptoms from age 7 to 9 years, reduced physical and relational aggression in late childhood and reduced the probability of experimentation with smoking at age 10 and 11 years. In addition, physical and relational victimization by peers in late childhood and anxiety and depression in early adolescence were reduced among those children who had received the GBG intervention in early elementary school.

Second, from a research perspective, it can be concluded that there is a rich potential in the use of randomized controlled trials to test environmental risk mediation hypotheses in the pathways towards psychopathology. For instance, this study tested the previously reported role of childhood overt aggression as a risk marker for the development of relational aggression among boys, and the role of ADHD symptoms as a risk marker for the development of relational aggression among girls through intervention. Moreover, this study provided unique evidence that relational victimization is linked to the etiology of anxiety and depression among girls, while physical victimization is linked to the etiology of anxiety and depression among boys.

However, the success of the GBG intervention from a public mental health perspective may also be an important limitation from a research perspective. That is, because the GBG intervention resulted in many positive outcomes, it may become hard to draw firm conclusions on evidence for specific relations between risk variables and psychopathology development

because other, non-included variables that were affected by the intervention may have accounted for the associations. Moreover, the studies incorporated in this thesis are incomplete without taking genetic liability and possible gene-environment interplay into account. Therefore, future research aimed at studying the onset and course of psychopathology among children and adolescents should integrate prevention research, possibly aimed at specific risk variables only, and behavioral-genetic research to make a more decisive evidence for causal connections between risk factors and outcomes.

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Summary

Summary

The objective of the present study was to extent the knowledge on the pathways to male and female psychopathology from childhood into early adolescence. In *Chapter 1*, the background of the Good Behavior Game (GBG) study was presented. The GBG study is a randomized controlled intervention study that started in 1998 when 666 children from 13 elementary schools in the metropolitan area of Rotterdam and Amsterdam were enrolled in the study at age 6. The GBG intervention is a universal classroom-based intervention aimed at the reduction of problem behavior and the promotion of prosocial behavior in elementary schoolchildren. In *Chapter 1*, we explained how the nesting of this randomized controlled preventive intervention allowed us to test the influence of hypothesized risk factors on the sex-specific pathways to externalizing and internalizing psychopathology spanning the period from middle childhood to early adolescence (from age 6 to 13 years). Using this method, we investigated: (1) the influence of prenatal exposure to maternal smoking on the pathway to Attention Deficit/Hyperactivity symptoms in middle and late childhood, (2) the role of middle childhood behavioral, emotional, and social problems in the development of relational aggression from late childhood to early adolescence, (3) the influence of physical and relational victimization experiences during middle childhood in the pathways to anxiety and depression in early adolescence, and in addition, we examined (4) typologies of parenting behaviors and their association with childhood psychopathology.

In *Chapter 2*, we first tested whether children who were prenatally exposed to maternal smoking had elevated ADHD symptoms at age 7 years. Next, we examined whether the effects of prenatal smoking on the development of ADHD symptoms from age 7 to 9 years, and the associated risk for early-onset experimentation with smoking at age 10 and 11 years, among these children persisted despite the beneficial changes the GBG intervention program brought to the children's environment. At age 7, prenatally exposed children had higher ADHD symptom scores. The GBG intervention did not affect the course of their ADHD symptoms from age 7 to age 9 years, and the probability of early-onset experimentation with smoking. Among non-exposed children, the GBG intervention positively affected the course of ADHD symptoms, and reduced the probability of early-onset experimentation with smoking by 50%. Our study is the first to demonstrate that prenatally exposed children were not susceptible to a positive impact of a universal intervention in reducing their ADHD symptoms and the

associated risk for early-onset experimentation with smoking, and underscores the hazardous influence of prenatal exposure to maternal smoking on child development.

In *Chapter 3*, we examined whether relational aggression from age 10 to 12 years was impacted by middle childhood behavioral and emotional problems, sociometric classifications (e.g., rejected, neglected, controversial, and popular sociometric status), and female sex. Girls were consistently higher on relational aggression from age 10 to 12 years than boys. Only overt aggressive behavior and a controversial sociometric status at age 7, but not emotional problems, were predictive of relational aggression from age 10 to 12 years. These predictive associations were similar for boys and girls. Given the reported negative consequences of relational aggression, and the fact that little is known about the pathways towards relational aggression, it would be of particular relevance for future research to study a wide range of possible risk factors within multiple contexts and developmental periods in order to achieve a better understanding of the causes of relational aggression.

In *Chapter 4*, we tested the hypothesized role of middle childhood disruptive behavior problems (e.g., overt aggression, ADHD problems, oppositional defiant problems) as risk markers for the development of relational aggression from late childhood to early adolescence through the GBG intervention, and tested whether the roles of these disruptive behavior problems in the development of relational aggression were sex-specific. The GBG study design allowed us to test whether changes in these disruptive behavior problems, as a direct effect of the GBG intervention, mediated the distal effect of the intervention on relational aggression. More specifically, the GBG study provided the opportunity to test whether the reductions in overt aggression, ADHD symptoms, and oppositional defiant problems during middle childhood mediated the reductions in relational aggression from late childhood into early adolescence. Such findings on mediation provide evidence that these hypothesized risk factors play a causal role in the development of relational aggression. Our results showed that especially overt aggression was a risk factor for the development of relational aggression from age 10 to 12 years among boys, whereas among girls, ADHD symptoms were predictive of the development of relational aggression. These findings provide evidence for the etiologic role of childhood disruptive problem behavior in the pathway towards relational aggression, but also suggest that prevention programs aimed at reducing relational aggression need to be sex-specific. However, because this is the first known study that tested the developmental pathway from disruptive behavior problems to relational aggression through intervention, it should be stressed that more research is needed to guide prevention efforts.

In *Chapter 5*, we tested sex differences in the hypothesized roles of physical and relational victimization as risk markers for the development of symptoms of anxiety and depression in early adolescence through the GBG intervention. Our results showed that relational victimization was a risk marker for the development of symptoms of anxiety and depression among girls, whereas physical victimization was a risk factor for the development of anxiety and depression symptoms among boys. These findings underscore the importance of distinguishing between physical and relational victimization in the pathways towards anxiety and depression. Moreover, this study provides evidence that in the etiology of the pathways to anxiety and depression, girls are especially vulnerable to the influences of relational victimization, whereas boys are especially vulnerable to the influences of physical victimization. These findings suggest that to understand anxiety and depression development among girls, out attention should be directed at the consequences of experiencing relational victimization, whereas among boys, attention should be directed at the consequences of experiencing physical victimization. However, because the present study is the first to test these hypothesized pathways through intervention, findings from this study should be replicated in other samples.

In *Chapter 6*, we empirically identified distinct parenting styles through Latent Profile Analysis, and validated these empirically identified parenting styles by studying the association between the identified parenting styles and indices of environmental and maternal risk and childhood psychopathology. Four distinctive parenting styles were empirically identified: a warm parenting style (displayed in 25% of the mothers), a cold/coercive parenting style (displayed in 16% of the mothers), an average parenting style (displayed in 41% of the mothers), and, finally, an ambivalent parenting style (displayed in 18% of the mothers). Mothers who employed a cold/coercive parenting style were predominantly of lower SES, and reported higher levels of anxiety/depression, withdrawn, and aggressive behavior than warm mothers. Child behavioral and emotional problems were most prevalent among children whose parents employed the cold/coercive parenting style. Because it is very important for clinical and intervention purposes to have a thorough understanding of parenting styles inducing an optimal development of the child, as well as of parenting styles that are associated with child behavioral and emotional problems, we recommend that our empirical approach should be replicated in other studies.

In *Chapter 7*, the main findings and conclusions of this thesis were summarized and discussed. In this randomized controlled prevention trial, a large general population sample of Dutch elementary schoolchildren was followed from age 6 to 13 years. This study design

enabled us not only to study and demonstrate the effectiveness of the GBG intervention in preventing the development of ADHD symptoms and associated early-onset experimentation with smoking, but also to test the role of hypothesized risk factors in the pathways to ADHD symptoms, relational aggression, and symptoms of anxiety and depression. Therefore, this study marked an important extension of the research on the prevention of disruptive behavior problems in elementary schoolchildren, as well as on research on the pathways to ADHD symptoms, relational aggression, and symptoms of anxiety and depression from middle childhood to early adolescence.

Samenvatting

Samenvatting

Het doel van deze studie was om meer inzicht te krijgen in de sekse-specifieke ontwikkelingspaden van psychopathologie vanaf de kindertijd tot de vroege volwassenheid. In *hoofdstuk 1* werd de achtergrond van de Taakspelstudie (Engels: Good Behavior Game) uitgelegd. De Taakspelstudie betrof een gerandomiseerde interventiestudie die in 1998 startte met 666 kinderen van 6 jaar, afkomstig van dertien basisscholen in de omgeving van Rotterdam en Amsterdam. De Taakspel-interventie is een universele klassikale interventie die gericht is op het reduceren van probleemgedrag en het bevorderen van sociaal gedrag bij kinderen in de basisschoolleeftijd. In *hoofdstuk 1* schetsten wij hoe de inbedding van deze gerandomiseerde preventieve interventie ons in staat stelde om de invloed te testen van mogelijke risicofactoren op sekse-specifieke ontwikkelingspaden van externaliserend en internaliserend probleemgedrag vanaf de midden kindertijd tot de vroege volwassenheid (van 6- tot 13-jarige leeftijd). Met deze methode onderzochten wij: (1) de invloed van roken tijdens de zwangerschap op het ontwikkelingspad naar symptomen van Aandachtstekort/Hyperactiviteit tijdens de midden en late kindertijd, (2) de invloed van gedrags-, emotionele, en sociale problemen tijdens de midden kindertijd op de ontwikkeling van relationele agressie vanaf de late kindertijd tot de vroege volwassenheid, en (3) de invloed van het slachtoffer zijn van fysieke en relationele agressie tijdens de midden kindertijd op de ontwikkelingspaden van angst en depressie in de vroege volwassenheid. Tot slot onderzochten wij typologieën van ouderlijke opvoedvaardigheden en hun relatie met psychopathologie van kinderen.

In *hoofdstuk 2* onderzochten wij in hoeverre 7-jarigen, die prenataal waren blootgesteld aan roken van de moeder, meer symptomen van Aandachtstekort/Hyperactiviteitsproblemen (ADHD) vertoonden. Vervolgens onderzochten wij in hoeverre de effecten van prenatale blootstelling aan roken van de moeder op de ontwikkeling van ADHD-symptomen van 7- tot 9-jarige leeftijd, en op het daaraan gerelateerde risico op vroeg experimenteergedrag met roken op 10- en 11-jarige leeftijd, zouden voortduren ondanks de positieve invloed van de Taakspel-interventie op de omgeving van deze kinderen. Op 7-jarige leeftijd vertoonden prenataal blootgestelde kinderen meer ADHD-symptomen. De Taalspel-interventie had geen positief effect op de ontwikkeling van de ADHD-symptomen van deze 7- tot 9-jarige kinderen, en op hun kans op vroeg experimenteergedrag met roken. Bij kinderen die niet prenataal waren blootgesteld aan het rookgedrag van de moeder tijdens de zwangerschap had het Taakspel een positief effect op afname van ADHD-symptomen van deze 7- tot 9-jarige kinderen, en de

Taakspel-interventie reduceerde met 50% de kans op vroeg experimenteergedrag met roken. Onze studie is de eerste die aantoont dat kinderen die prenataal zijn blootgesteld aan roken van de moeder niet vatbaar zijn voor de positieve impact van een universele interventie op het reduceren van ADHD-symptomen en het daarmee geassocieerde risico op vroeg experimenteergedrag met roken; de studie benadrukt daarmee de riskante invloed van prenatale blootstelling aan roken van de moeder op de ontwikkeling van kinderen.

In *hoofdstuk 3* onderzochten wij of relationele agressie van 10- tot 12-jarige leeftijd voorspeld kon worden door gedrags- en emotionele problemen, sociometrische classificaties (een verworpen, genegeerde, controversiële, en populaire sociometrische status), en het behoren tot het vrouwelijk geslacht. Meisjes scoorden consistent hoger op relationele agressie van 10- tot 12-jarige leeftijd dan jongens. Alleen fysiek agressief gedrag en een controversiële sociometrische status op 7-jarige leeftijd waren voorspellend voor relationele agressie van 10- tot 12-jarige leeftijd. Deze voorspellende verbanden golden voor zowel jongens als meisjes. Emotionele problemen waren niet voorspellend voor relationele agressie. Gegeven de negatieve gevolgen van relationele agressie (zoals somatische klachten, angst, depressie), en het feit dat er nog weinig bekend is over de ontwikkelingspaden van relationele agressie, is het bijzonder relevant voor toekomstig onderzoek om een breed scala aan mogelijke risicofactoren in verschillende contexten en ontwikkelingsperioden te bestuderen om zo meer inzicht te krijgen in de oorzaken van relationele agressie.

In *hoofdstuk 4* testten wij door middel van de Taakspel-interventie de rol van disruptief probleemgedrag (openlijke agressie, ADHD, en oppositioneel opstandig gedrag) tijdens de midden kindertijd in de ontwikkeling van relationele agressie vanaf de late kindertijd tot de vroege adolescentie. Daarnaast onderzochten wij in hoeverre de rol die deze disruptieve probleemgedragingen speelden in de ontwikkeling van relationele agressie sekse-specifiek was. Het design van de Taakspelstudie stelde ons in staat om te onderzoeken in hoeverre verandering in deze disruptieve probleemgedragingen, als een direct effect van de Taakspel-interventie, het lange-termijn effect van de interventie op relationele agressie zou beïnvloeden. Om precies te zijn bood de Taakspelstudie de gelegenheid om te testen in hoeverre de afname van openlijke agressie, ADHD, en oppositioneel opstandig gedrag tijdens de midden kindertijd de afname van relationele agressie van de late kindertijd tot de vroege adolescentie zou beïnvloeden. Dergelijke bevindingen leveren het bewijs dat deze hypothetische risicofactoren een causale rol spelen in de ontwikkeling van relationele agressie. Onze resultaten lieten zien dat bij jongens openlijke agressie een risicofactor was in de ontwikkeling van relationele agressie van 10- tot 12-jarige leeftijd, terwijl bij meisjes ADHD-symptomen voorspellend

waren voor de ontwikkeling van relationele agressie. Deze bevindingen leveren het bewijs voor de rol van disruptief probleemgedrag in de ontwikkelingspaden van relationele agressie, en suggereren daarnaast dat preventieprogramma's gericht op de reductie van relationele agressie sekse-specifiek moeten zijn. Echter, omdat deze studie de eerste is die het ontwikkelingspad van disruptief probleemgedrag naar relationele agressie door middel van een interventie heeft getest, moet benadrukt worden dat verder onderzoek nodig is om preventieprogramma's vorm te kunnen geven.

In *hoofdstuk 5* onderzochten wij met behulp van de Taakspel-interventie sekseverschillen in de invloed van het slachtoffer zijn van fysiek en relationeel agressief gedrag op de ontwikkeling van angst- en depressiesymptomen in de vroege adolescentie. Onze resultaten toonden aan dat het slachtoffer zijn van relationeel agressief gedrag een risicofactor vormde voor de ontwikkeling van angst- en depressiesymptomen bij meisjes, terwijl het slachtoffer zijn van fysiek agressief gedrag een risicofactor vormde bij jongens. Deze bevindingen onderschrijven het belang van het maken van een onderscheid tussen slachtoffer zijn van fysieke en relationele agressie in de ontwikkelingspaden van angst en depressie. Verder toonde deze studie aan dat meisjes kwetsbaar zijn voor de invloed van relationele agressie, terwijl jongens kwetsbaar zijn voor de invloed van fysieke agressie in het ontstaan van ontstaan van angst- en depressiesymptomen. Deze bevindingen suggereren dat het van belang is om bij de ontwikkeling van angst en depressie bij meisjes te kijken welke rol het ondergaan van relationele agressie heeft gespeeld, terwijl bij jongens aandacht besteed dient te worden aan het ondergaan van fysieke agressie. Hoewel deze studie de eerste is die deze ontwikkelingspaden door middel van een interventie heeft getest, is het noodzakelijk dat onze bevindingen gerepliceerd worden in toekomstig onderzoek.

In *hoofdstuk 6* identificeerden wij op empirische wijze verschillende opvoedstijlen door middel van Latente Profiel Analyse. Daarnaast valideerden wij deze empirisch geïdentificeerde opvoedstijlen door de associaties te bestuderen met risicofactoren in de omgeving van het kind, en psychopathologie van moeder en kind. Wij identificeerden vier verschillende stijlen: een warme opvoedstijl (aanwezig bij 25% van de moeders), een koude/dwingende opvoedstijl (aanwezig bij 16% van de moeders), een gemiddelde opvoedstijl (aanwezig bij 41% van de moeders), en tot slot een ambivalente opvoedstijl (aanwezig bij 18% van de moeders). Moeders met een koude/dwingende opvoedstijl hadden hoofdzakelijk een lage socio-economische status, en rapporteerden over zichzelf hogere niveaus van angst/depressiviteit en teruggetrokken en angstig gedrag dan moeders met een warme opvoedstijl. Gedrags- en emotionele problemen manifesteerden zich het meest bij kinderen van moeders met een

koude/dwingende opvoedstijl. Omdat het zowel vanuit klinisch als vanuit interventieperspectief erg belangrijk is om gedegen kennis te hebben van die opvoedstijlen die een optimale ontwikkeling van kinderen bevorderen, en van opvoedstijlen die geassocieerd zijn met gedrags- en emotionele problemen, pleiten wij ervoor dat onze empirische aanpak gerepliceerd wordt in vervolgonderzoek.

In *hoofdstuk 7* werden de belangrijkste bevindingen en conclusies van dit proefschrift samengevat en bediscussieerd. In dit gerandomiseerde preventieonderzoek werd een grote onderzoeksgroep, afkomstig uit de algemene bevolking en bestaande uit Nederlandse basisschoolkinderen in de leeftijd van 6 tot 13 jaar, gevolgd. Dit onderzoek stelde ons niet alleen in staat om de effectiviteit van de Taakspel-interventie op de ontwikkeling van ADHD symptomen en het daaraan gerelateerde vroege experimenteergedrag met roken te bestuderen en aan te tonen, maar ook om de invloed van risicofactoren ten aanzien van de ontwikkelingspaden van ADHD, relationele agressie, en angst- en depressiesymptomen te testen. Op deze wijze levert deze studie zowel een belangrijke bijdrage aan onderzoek naar de preventie van disruptief probleemgedrag bij kinderen in de basisschoolleeftijd, als aan het onderzoek naar de ontwikkelingspaden van ADHD, relationele agressie, en angst- en depressiesymptomen vanaf de midden kindertijd tot de vroege volwassenheid.

Dankwoord

Curriculum Vitae

Dankwoord

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Curriculum Vitae

Patricia Vuijk werd geboren op 9 maart 1973 te Rotterdam. In 1991 behaalde zij haar VWO-diploma aan de Openbare Scholengemeenschap J.C. de Glopper te Capelle aan den IJssel. In 1996 behaalde zij haar PABO-diploma aan de Hogeschool Rotterdam & Omstreken te Rotterdam. Tussen 1996 en 2001 werkte zij als leerkracht Speciaal Onderwijs op S.B.O. de Bouwsteen, en als leerkracht op O.B.S. West, beiden te Capelle aan den IJssel. Daarnaast werkte zij in 1999 tevens een half jaar bij de Onderwijs Begeleidings Dienst te Rotterdam. Vanaf 1997 studeerde zij Orthopedagogiek aan de Universiteit Leiden, waar zij in februari 2002 het doctoraal examen haalde. Haar afstudeerscripties hadden als onderwerp 'Gevoelige thema's in de studie Orthopedagogiek' (begeleid door dr. F.J.H. Harinck) en 'Familiar variables as predictors for differentiation in physical aggression trajectories in Dutch elementary schoolchildren' (begeleid door Prof.dr. I.A. van Berckelaer-Onnes).

Vanaf april 2001 tot augustus 2006 was zij als assistent in opleiding (AIO/promovenda) verbonden aan de afdeling Kinder- en Jeugdpsychiatrie van het Erasmus MC-Sophia te Rotterdam (hoofd: Prof.dr. F.C. Verhulst).

Vanaf 1 maart 2006 is zij werkzaam bij de afdeling Orthopedagogiek aan de Universiteit Leiden.