

# Preventing Disruptive Behavior in Early Elementary Schoolchildren

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**Preventing Disruptive Behavior in Early Elementary Schoolchildren:  
Impact of a Universal Classroom-Based Preventive Intervention**

Preventie van disruptief gedrag in lagere schoolkinderen:  
effecten van een universele klassikale preventieve interventie

**Proefschrift**

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So, let us not be blind to our differences – but let us also direct our attention to our common interests and to the means by which those differences can be resolved. And if we cannot end now our differences, at least we can help make the world safe for diversity. For, in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal.

*- John Fitzgerald Kennedy, June 10, 1963 -*



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# 1

## Introduction



## Introduction

Childhood disruptive behavior is one of the most damaging phenomena to the development of the child and to society. A young child that is characterized by high levels of disruptive or rule breaking behavior is at risk for maintaining high levels of these behaviors across childhood (Mesman, Bongers, & Koot, 2001), into adolescence (Nagin & Tremblay, 1999) and adulthood (Caspi, Moffitt, Newman, & Silva, 1996; Moffitt, Caspi, Harrington, & Milne, 2002). Several serious poor outcomes are associated with early childhood disruptive behavior. These outcomes include greater risk for poor relations with peers in early elementary school and association with deviant peer groups (Coie, Dodge, Terry, & Wright, 1991), Conduct Disorder (Loeber, Green, Keenan, & Lahey, 1995) juvenile delinquency (Nagin & Tremblay, 1999), conviction for violent crimes (Jeglum-Bartusch, Lynam, Moffitt, & Silva, 1997; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Moffitt et al., 2002), increased risk for school failure and academic difficulties (Fergusson, Lynskey, & Horwood, 1997; Moffitt et al., 1996), poor job performance or unemployment (Moffitt et al., 1996; Moffitt et al., 2002), early initiation of substance use (Milberger, Biederman, Faraone, & Chen, 1997), substance dependence (Moffitt et al., 1996), and increased risk for mental disorders (Caspi, Moffitt, Newman, & Silva, 1998) and social dysfunction in adulthood (Farrington, 1993). It is clear that any effort should be made to prevent these outcomes. Both clinical and preventive intervention programs aim at normalizing the development of disruptive behavior. The aim of clinical interventions is to prevent a full escalation in children or adolescent who are already highly disruptive and at risk for these poor outcomes. Preventive interventions aim to intervene in the development of disruptive behaviors at an early stage, to prevent a full blown mental disorder and the associated outcomes. This study reports about the characteristics and development of disruptive behaviors and the impact of a classroom based preventive intervention targeting disruptive behavior in young elementary schoolchildren.

### *Disruptive behavior and disruptive disorder: a definition*

A number of different definitions and terms are used to describe disruptive behaviors in children and adolescents. The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV; American Psychiatric Association, 1994) listed three disruptive behavior disorders, namely Conduct Disorder (CD), Oppositional Defiant Disorder (ODD) and

Attention-Deficit/Hyperactivity Disorder (ADHD). The essential difference between CD and ODD is that CD is characterized by norm-violating and antisocial behavior whereas ODD is characterized by recurrent patterns of negativistic, defiant, disobedient and hostile behavior toward authority figures. ADHD is characterized by a persistent pattern of inattentive and/or hyperactive behavior. In a sample of 13-18-year-olds from the general Dutch population, the prevalence for any of these three disruptive disorders was 7.9%, according to parent and child interviews (Verhulst, van der Ende, Ferdinand, & Kasius, 1997).

In empirically based rating scales, such as the Child Behavior Checklist (CBCL/4-18) and the Teacher's Report Form (TRF/6-18; Achenbach, 1991a, 1991b) the syndrome scales Attention Problems, Delinquent Behavior and Aggressive Behavior are used. In these instruments, the term Externalizing is used which comprises of the Delinquent Behavior and Aggressive Behavior scales, but not the Attention Problems scale. More recently, three CBCL-DSM-IV oriented scales, namely Conduct Problems, Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems were defined (Achenbach, Dumenci, and Rescorla, 2001; Achenbach and Rescorla, 2001). Unlike the syndrome scales of the CBCL and TRF that were statistically derived, the CBCL-DSM-IV scales are based on items of the CBCL and TRF that experienced psychiatrists and psychologists judged as very consistent with DSM-IV diagnostic categories.

In the current project, the broad spectrum of children's disruptive behaviors, including Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems and Conduct Problems was studied. For this, the term disruptive behavior was used, although sometimes specific terms, like aggression or antisocial behavior, will be used when referring to these specific behaviors.

### *Development of disruptive behaviors in young childhood*

Although the stability of disruptive problems from childhood into adolescence and adulthood is substantial, Moffitt et al. (1996, 2002) reported that 7 - 10% of all males develop life-course persistent antisocial behavior. Similarly, Nagin and Tremblay (1999) reported that approximately 4% of all boys develop chronically high levels of physical aggression, opposition or hyperactivity throughout adolescence. Reid and Eddy (1997) delineated a theoretical model for the development of aggressive and antisocial behavior

(Figure 1.1). The model depicts the life-course trajectory from infancy toward antisocial behavior and serious delinquency in early childhood.

### *Prenatal period*

Factors in the development of children that increase the risk for disruptive behaviors and the associated negative outcomes start well before the child is born. Nagin and Tremblay (2001) reported that children following a developmental trajectory of chronically high physical aggression were likely to be born from teenage mothers. Similar findings were reported by Jaffee, Caspi, Moffitt, Belsky, and Silva (2001) who found that children born from teenage mothers are at increased risk for adverse outcomes, such as early school drop-out, unemployment, early parenthood and violent offending in young adulthood. Mother characteristics, such as intellectual functioning, academic capabilities, as well as conviction history and family variables, such as low socioeconomic status, caretaker changes, single-motherhood and parent-child interaction styles, accounted for the effect of teenage childbearing on the adverse outcomes of their offspring.

Several risk factors operating during the pregnancy of the unborn have been found to predict disruptive behavior in children and adolescents. For instance, fetal exposure to substances increases the risk for disruptive behavior and academic difficulties for the newborn. Milberger, Biederman, Faraone, Chen et al. (1996) reported 20% of the 6-18 year old offspring of mothers who smoked during pregnancy to have Attention-Deficit/Hyperactivity Disorder compared to 8% of the children of non-smoking mothers. Similarly, Wakschlag and Hans (2002) and Wakschlag, Pickett, Cook, Benowitz, and Leventhal (2002) found increased risks for conduct problems in school-aged boys who were prenatally exposed to tobacco. Olson et al. (1997) followed 464 newborns until adolescence and found that fetal exposure to alcohol, even at social levels of intake, increased the risk for negative outcomes. Adolescents who had been exposed to alcohol early in pregnancy were at risk for antisocial behavior, school problems, and learning difficulties. Fried, (1996) and Fried, Watkinson, and Gray (1998) reported that prenatal exposure to marijuana negatively influenced executive functioning tasks that required impulse control and visual analysis/hypothesis testing in 9-12-year-olds.

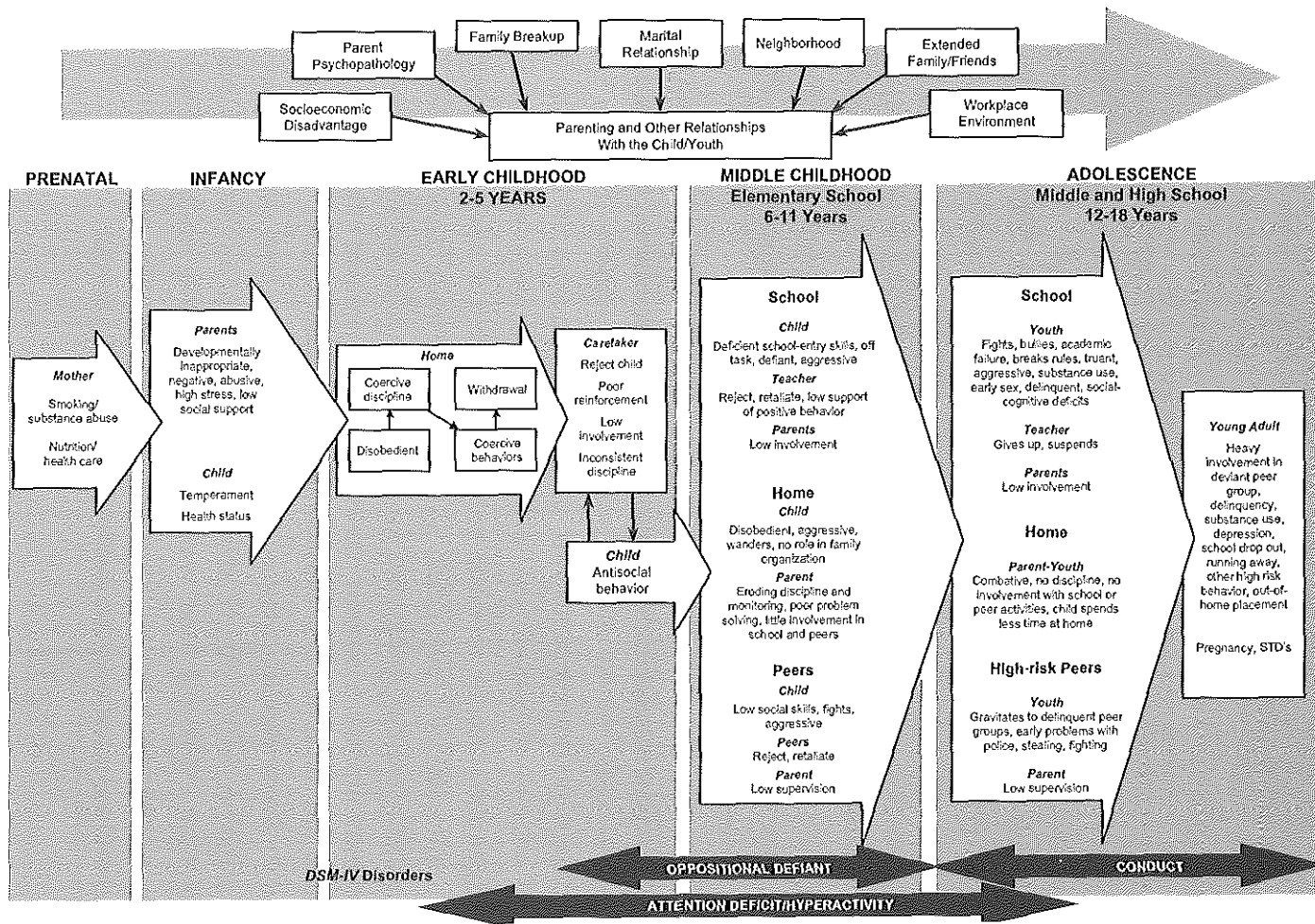


Figure 1.1 Illustrative developmental model of child antisocial behavior. From "The prevention of antisocial behavior: Some considerations in the search for effective interventions," by Reid, J. B., & Eddy, J. M. In Stoff, D. M., Breiling, J. and Maser, J.D., (Eds) (1997). *Handbook of antisocial behavior*, p. 346. © John Wiley & Sons, Inc.

*Infancy and Preschool period*

In the first years after birth, unrealistic expectations about the infant's development, poor responsiveness to the newborn, limited verbal engagements, little empathy, little capacity for coping with the stress related to the newborn by the parents and abuse are markers for later disruptive behavior. Early child maltreatment results in a poor affect regulation of the child and an inadequate attachment (Cicchetti & Toth, 1995). Shaw, Owens, Vondra, and Keenan (1996) reported that clinical levels of aggression at age 5 were found in children with insecure attachment in their first year who were raised by mothers with a personality disorder or raised in families with disagreement about child-rearing in the first two years.

The antisocial, oppositional and aggressive patterns that characterize children who develop Conduct Disorder later in life is often observed as early as in the preschool period. Antecedents and correlates of later antisocial behavior in this period fall into three categories: characteristics of the child, ineffective parenting, and distal variables. The child variables include a difficult temperament, and oppositional and attention problems. Kingston and Prior (1995) demonstrated that children with stable, high levels of aggression through middle childhood were perceived as having a difficult temperament and more hostile interactions with siblings. Similarly, Shaw, Owens, Giovannelli, and Winslow (2001) reported that children with ADHD and ODD and/or CD at age 6 were temperamentally difficult, had more attention problems and were oppositional, aggressive and destructive from ages 1.5 to 3.5 years, compared to non-problem children. Parents of young highly disruptive children in turn respond with harsh discipline practices such as use of physical force (Shaw et al., 2001) or with non-physical discipline techniques such as control via guilt or anxiety provoking (Kingston & Prior, 1995). These parental responses to highly disruptive children are often inconsistent and thus unpredictable for the child (Feehan, McGee, Stanton, & Silva, 1991). The child's behavioral characteristics and parental response result in a process characterized by coercive behavior of both parents and children. Reid, Patterson, and Loeber (1982) showed that children's aversive behavior correlated highly with their parents' aversive responses. Parents of children who are difficult to manage, and who show coercive behaviors respond with coercive, and ineffective, parenting styles to retain control over the child. In this way coercive behavior by the child is reinforced. As a result, preschool children at risk for later disruptive behaviors are in conflict with their parents from day to day, and their parents are highly involved in this process (Patterson, Reid, & Dishion, 1992). Ultimately, the parents will withdraw from their caretaker role and reject the child.

There are several familial/environmental factors in this phase that are related to the development of disruptive behaviors of the child. These children are often raised by depressed or easily irritated mothers (Barling, MacEwen, & Nolte, 1993) and come from families with social and economical disadvantages (Dodge, Pettit, & Bates, 1994). Moreover, early disruptive children often have witnessed a family-breakup (Forehand, Biggar, & Kotchick, 1998; Japel, Tremblay, Vitaro, & Boulerice, 1999) or come from single-parent families (Jaffee et al., 2001) or adolescent mothers (Nagin & Tremblay, 2001), and are exposed to antisocial, abusive and drug-abusing parents (Patterson et al., 1992). In addition, Moffitt and Caspi (2001) reported neurocognitive problems to be associated with children following a life-course persistent antisocial path since these children have significant lower intelligence scores at school entry than the remaining children. Similarly, Nagin and Tremblay (2001) found that children who enter elementary school with high levels of physical aggression have lower intelligence scores than non-aggressive peers. The authors also reported that high levels of aggression, which persisted throughout adolescence, were predicted by low intelligence scores of the mother. Teenage mothers with low educational attainment may lack the skills needed to create a context in which children learn to regulate physical aggression. These mothers often have to raise difficult to manage children. In addition to the neurocognitive problems, children that followed a persistently high antisocial behavioral trajectory were found to have temperamental and early behavioral problems (Moffitt & Caspi, 2001). The neurocognitive problems found in children with persistent high antisocial behavior result in deficient academic skills of the child. Therefore, by the time that the high-risk child is ready to enter elementary school, it has an aggressive and coercive behavioral style that is deviant from that of the child's peers. The child also has deficient cognitive skills, which greatly enhances the risk for poor school entry.

#### *Middle childhood: elementary school period*

Could risk factors in the preschool years be primarily found in the context of the home, the social context of the school expands the risks for the development of stable high levels of disruptive behavior through a series of troublesome early school experiences. The interaction with classmates and peers is a crucial determinant of the emergence, manifestation and maintenance of Conduct Disorder (Coie & Jacobs, 1993). Children with a hard to manage temperament, who are raised by unskilled and overstressed parents often enter elementary school with deviant emotional control (Shaw et al., 1996) and with



deficits in social and social-cognitive skills (Dodge, Pettit, Bates, & Valente, 1995). The same coercive interaction style that is characteristic for the interaction between the disruptive child and his or her parents, is also used in the interaction with peers (Dishion, Duncan, Eddy, Fagot, & et al., 1994). The aggressive child's acts of coercion, physical force and threats are reinforced by the child's peers by backing down and by allowing the child to succeed (Coie et al., 1991). As a result, aggressive children are more inclined than non-aggressive children to believe that aggression has positive consequences. Classmates are well aware of the deviant behavior of the aggressive young child at school entry and they retaliate by rejecting the child. Coie and Kupersmidt (1983) found that when aggressive, elementary schoolchildren were brought in contact with non-aggressive peers and none of the children knew each other previously, the aggressive children were swiftly and decisively rejected. Rejected sociometric status is very stable. Even when previously rejected children improved their social behavior toward peers, these behavioral changes did not lead to an improved sociometric status (Bierman, 1990). Especially the combination of aggressive behavior and rejected sociometric status is a strong predictor for future poor outcomes (Coie, Terry, Lenox, Lochman, & Hyman, 1995; Coie, Lochman, Terry, & Hyman, 1992; Deater-Deckard, 2001; Newcomb, Bukowski, & Pattee, 1993).

Teachers easily identify young children at risk for developing stable high levels of disruptive behavior at school entry. In the early school years, disobedience, coercion, many corrections and punishments, and low support for positive behavior characterize the interaction between disruptive young children and their teachers. Classroom observations, for instance, have shown that of all interactions of teachers with disruptive children, only 11% involved support for appropriate behavior compared to 82% of the interactions with non-disruptive classmates (Walker & Buckley, 1973). As a result, a negative spiral with emphasis on disruptive behavior will develop (Reid, 1993). Ultimately, the teacher rejects the child, will cease spending time and energy in efforts to correct the child, and will suspend the child.

Early learning problems in turn contribute to disruptive behaviors, possibly through feelings of alienation, frustration and through low self-esteem (Hawkins & Lishner, 1987). Studies on the relationship between early learning problems and disruptive behaviors found separate pathways: (1) the early disruptive behavior in combination with early learning problems result in a continuation of academic difficulties, and (2) the disruptive behavior itself leads to prolonged conduct problems and to juvenile delinquency (Fergusson & Horwood, 1995; Tremblay et al., 1992). The ultimate consequence of the

troublesome school entry for the young, disruptive, academically deficient and disliked child is that it is left with few social settings that provide correction of the disruptive behavior. The behavioral patterns of coercion and aggression lead to maladaptive associations with similarly deviant children (Patterson et al., 1992; Warman & Cohen, 2000), to an increase in antisocial and internalizing problems in the long-term (Coie et al., 1995; Jalongo, Vaden-Kiernan, & Kellam, 1998; Pulkkinen & Pitkaenen, 1993) and to poor academic achievement (Wentzel & Asher, 1995).

*Middle elementary school, adolescence and outcomes in young adulthood*

During the elementary school period and the subsequent middle and high school period, the parental involvement with the school and their support or supervision in learning activities is low. The relation between the parent and child is characterized by eroding discipline, by little involvement with friends of the child or peer activities, and by low supervision of the child's activities. The disruptive youth will gravitate to delinquent peer groups or gangs and will participate in physically aggressive acts. In adolescence, the disruptive child will start with new forms of antisocial behavior, such as stealing, resulting in early contacts with police, early initiation of sexual contact and experimentation with substances. For instance, life-course persistent antisocial boys were more likely to have had police contacts or arrests, convictions in court and convictions for violent offences in adolescence than non-aggressive males (Moffitt et al., 1996). Patterson, Dishion, and Yoerger (2000) reported the importance of peer group affiliation in this period. The authors found that the involvement with similarly deviant peers in childhood resulted in the engagement of adolescence related forms of antisocial behavior, such as substance use, health-risking sexual behavior and police contacts. However, engagement in these forms of antisocial behavior was mediated by the rates of reinforcement for deviancy, by the amount of time spent with deviant peers, and by the deviancy level of the peer group. This indicates that it is especially the impact of deviant peer groups which explains why antisocial children move on to the engagement in new forms of antisocial behavior, as observed in adolescence.

The now chronic antisocial adolescent or young adult is at risk for all the negative outcomes as described in the beginning of this chapter. And these risks are substantial. Moffitt et al. (2002) found 10% of all males to follow a life-course persistent antisocial behavior trajectory from early childhood until age 26. These life-course persistent (LCP) males accounted for 53% of the violent offences (e.g. assault, robbery) committed by the

entire sample, according to self-reports. This was substantiated by official court conviction records in which males on the life-course persistent trajectory accounted for 40% of all drug convictions and 43% of all convictions for violent offences. The authors also found that more than half of the LCP males had no high school qualifications and only one (2%) attended college. This resulted in higher levels of unemployment, lower status jobs and more conflicts at work than males that did not follow the LCP trajectory. One-third of the LCP men was unhappy with their relationship at age 26. These men accounted for 62% of all convictions for violence against women. Additionally, the authors reported that LCP men were more likely to have fathered babies early in life than other men. The association between disruptive behavior and early pregnancies were previously reported by Bardone et al. (1998) who found that Conduct Disorder in 15-year-old girls predicted teenage pregnancies. Teenage pregnancies together with risk behavior during pregnancy such as cigarette smoking and substance use, the poor parenting skills 'learned' during their own childhood and the increased risk for negative familial/environmental factors greatly enhance the risk for a poor development of the newborn generation.

### **Opportunities for intervention**

The stages in the development of disruptive behaviors as described previously, suggest several opportunities to intervene. Three types of preventive interventions are described by the Institute of Medicine (1994): *universal* preventive interventions, which focus on an entire population, *selective* or *targeted* interventions, which focus on subgroups of children in need for intervention, and *indicated* interventions, which focus on children with detectable symptoms that presage mental disorders. Both universal and selective preventive programs aim at preventing the early development of mental disorders. Indicated interventions resemble treatments for mental disorders. Their objective is to prevent further development to a complete and possible chronic mental disorder.

It is apparent that the focus of the intervention varies in the different stages of the development of disruptive behavior. In the prenatal phase, interventions should primarily focus on preventing risk-behavior of the pregnant mother. Interventions in the early childhood years, when the key antecedents are the interactions between the child, parents and siblings, focus on the promotion of children's development and on promoting parenting skills. By the time the child moves to elementary school, interventions in multiple settings can be employed, targeting antecedents at home, in the classroom, and the peer group. In

late childhood or adolescence, interventions are aimed at preventing the further escalation of disruptive behavior of at-risk adolescents. Examples are after-school programs, recreation programs and mentoring. Other examples are interventions aimed at improving involvement between the at-risk adolescent, the family and school, by improving self-regulation of the adolescent and intervention aimed at desisting contact with deviant peer groups. Finally, out-of-home placements and behavioral therapy are examples of more rigorous interventions in this period

Since the scope of the present study is on disruptive behaviors in the early elementary school years, emphasis will be given to interventions in this period. Examples of effective preventive intervention programs targeting disruptive behaviors in these children from the last decade will be given. However, first a few intervention projects in earlier phases in the development of children will be mentioned. For a complete overview of preventive intervention programs in early childhood and school-age children and of the outcomes of these programs, see Greenberg, Domitrovich, and Bumbarger (2001) and the Blueprints For Violence Prevention publications (Elliott, 1998).

In the *prenatal and infancy phase*, the Prenatal and Infancy Home Visitation by Nurses intervention (Olds, 1998; Olds, Henderson, Chamberlin, & Tatelbaum, 1986; Olds, Henderson, Tatelbaum, & Chamberlin, 1986) deserves attention. First-time mothers were enrolled before the 30th week of pregnancy and randomly appointed to a control or intervention condition. In the prenatal period the intervention focused on improving maternal health and cessation of drugs and cigarettes. After birth, emphasis was on the child's health and mother's care of the infant by supporting her in utilization of health services, development of support systems and assisting the mother in family, education and occupancy planning. Large and significant intervention effects were found on many early risk factors for antisocial behavior, like a reduction in prenatal smoking, 75% fewer preterm deliveries among smoking mothers and improved diets, (Olds, Henderson, Tatelbaum et al., 1986). Less child abuse and neglect during the first two years were reported by (Olds, Henderson, Chamberlin et al., 1986). These positive results sustained through less child abuse up to age 15, fewer arrests of the children by their 15th birthday, and a reduction in pregnancies and welfare use of the mothers (Olds et al., 1997).

In the *early childhood phase*, the impact of the preschool Promoting Alternative Thinking Program (Kusche & Greenberg, 1994) was studied in 248 kindergarten children (Domitrovich, Cortes, & Greenberg, 2002). The program aims at improving children's self-control of behavior, developing awareness and communication skills regarding emotions,

improving problem solving skills and promoting positive peer relations and classroom atmosphere. Children improved on social skills and emotional regulation and had less socially withdrawn behaviors. Webster-Stratton, Reid, and Hammond (2001) studied the impact of the Dinosaur School curriculum, aimed at improving social skills, social cognition, and problem solving. Four through eight year old children for which the primary referral problem was child misconduct and who received a diagnosis of either Oppositional Defiant Disorder or Conduct Disorder. Children receiving the program had fewer externalizing problems, both at home and at school, more prosocial behavior with peers and more adequate conflict management strategies than control group children.

After *elementary school entry*, the development of antisocial behavior is affected increasingly by behavioral, social cognitive and contextual variables in multiple setting. The possibilities to intervene grow along with the expanding social context of the child. Examples of effective intervention projects in the young elementary school phase are in Table 1.1.

Several *universal* classroom management interventions have shown positive results in this period. The effectiveness of the Good Behavior Game intervention (GBG; Barrish, Saunders, & Wolfe, 1969; Dolan, Jaylan, Werthamer, & Kellam, 1989) was determined in two large-scale epidemiological based randomized controlled trials in Baltimore public schools. The GBG is a universal, team-based behavioral management program. The program attempts to promote prosocial behavior by rewarding groups of children that do not exceed predetermined maladaptive standards. For a full description of the GBG, see the following paragraphs of the introduction. After one year of intervention, significant reductions were found in teacher ratings of aggression for both boys and girls, peer ratings of aggression for boys, and teacher ratings of shy behavior among those children that received the Good Behavior Game, as compared to comparison groups (Dolan et al., 1993). After 5 years follow-up Kellam, Rebok, Ialongo, and Mayer (1994) reported significant reductions in teacher-rated aggression, but only for boys who were rated moderately or highly aggressive at baseline. In a second trial, the GBG was combined with the Family-School Partnership Intervention (FSP). The FSP aimed at enhancing parent-teacher contact and providing parents with effective behavioral management strategies. In accordance with the first trial, positive short-term effects on teacher ratings of aggression (Ialongo et al., 1999).

Table 1.1 Effective intervention programs in elementary school-age children

| study                                      | Sample   | Design                                 | Intervention  | Years studied | Main results   |
|--|--|--|---|---------------|--|
| Johns Hopkins Prevention trial             | 19 Baltimore, public schools, low and middle income areas, 693 first grade children, USA | Randomized controlled. Classroom level | Good Behavior Game: classroom management  | 6             | and long term in boys, reduction of shy behavior in girls; reduction in tobacco smoking  |
| Johns Hopkins Prevention trial             | 9 Baltimore public schools, low income areas, 678 grade 1 children, USA                  | Randomized controlled. Child level     | Good Behavior Game, Family-school partnership   | 6             | Short term reduction of aggression reduction in early onset tobacco smoking  |
| Bullying-Victim Problems program           | 112 grade 4-7 classes, 42 high schools, 2500 children, Norway                            | Quasi experiment                       | Bullying Prevention Program   | 3             | Reduction in bully / victim problems; 50% reduction in bullying; reduction in antisocial behavior; improved social class climate; reduction in new victims of bullying |
| Oregon Social Learning Center LIFT program | 12 elementary schools, low income area, 671 first and fifth grade children, USA          | Randomized controlled. School level    | LIFT program: social skills training, problem solving training; Good Behavior Game; Parent management training    | 1½            | better peer-preferred behavior, reduction in physical playground aggression, improvement in mother aversive verbal behavior  |
| CPPRG Fast track: universal program        | 54 schools, in four areas of US; 7560 grade 1 children, USA                              | Randomized controlled. School level    | PATHS universal program: Understanding/communicating emotions; increase positive behavior; social problem solving | 3             | Lower peer rated aggression, hyperactive-disruptive; More observed positive classroom environment  |

Table 1.1 continues

Table 1.1 (continued)

| study                                   | Sample   | Design  | Intervention   | Years studied | Main results   |
|---|--|---|--|---------------|--|
| Fast track: high risk sample            | 54 schools, in four areas of US, 845 identified as high-risk, USA    | Randomized controlled. School level   | PATHS program: 7 integrated universal and selective programs; parents and children   | 3             | increased child social cognition and reading; more positive peer interaction; improved parenting behavior; behavioral improvement, fewer aggressive behavior More children free of conduct-problem dysfunction |
| Tri-Ministry study                      | 60 schools, 2439 seven year old children, Ontario, Canada            | Randomized controlled. School level   | Social Skills Program (SS), Partner Reading Program (RE), SS + RE  | 5             | Improved observed prosocial behavior, improving teacher rated externalizing problems (SS+RE), improving parent rated eternalizing problems (SS)  |
| Seattle Social Development Project      | 8 Seattle, USA public schools, low income area, 598 grade 1 children | Nonrandomized controlled: full intervention, late intervention, control group | School: classroom management, cognitive and social skills training Home: child behavior management, academic support, drug use | 12            | Full intervention better school attachment, lower school misbehavior and less violent acts, sexual intercourse and heavy alcohol use than late intervention or control   |
| Collaborative Student Mediation Project | 3 primary division schools, Canada                                   | Multiple baseline design  | Student-mediated Conflict Resolution Program   | 2             | Reduction in physically aggressive playground behavior of 51% to 65%   |
| Montreal Prevention Experiment          | 53 schools, 243 high risk boys, Canada                               | Randomized controlled.  | Child: Social skills training Parent: effective child rearing training   | 8             | More age-appropriate grade level, reductions in aggression, less self reported delinquency up to age 15  |

Note: LIFT = Linking the Interest of Families and Teachers. CPPRG = Conduct Problem Prevention Research Group.

The GBG intervention was more effective in reducing disruptive behavior than the Family-School Partnership intervention. In both trials, fewer children receiving the GBG intervention started tobacco smoking than children in the control classes (Kellam & Anthony, 1998; Storr, Jalongo, Kellam, & Anthony, 2002).

The Seattle Social Development Project, (Hawkins, Catalano, Kosterman, Abbott, & Hill, 1999; Hawkins, Von Cleve, & Catalano, 1991) is a comprehensive universal prevention project. A school-based intervention was combined with a home-based intervention, with a strong emphasis on creating and maintaining strong school and family bonds. The classroom management intervention was combined with cognitive and social skills training in 1st grade and 6th grade and parent training that emphasized child behavior management in 1st or 2nd grade, academic support in 2nd or 3rd grade, and preventing drug use and antisocial behavior in 5th or 6th grade. To assess the effects, a nonrandomized controlled trial, with three conditions were created. A full intervention group, a late intervention group (5th and 6th grade interventions only) and a control group were present. Students in the full intervention group reported significantly stronger attachment to school, improved self-reported achievement and less involvement in school misbehavior than the other two conditions. In addition, significantly fewer subjects in the full intervention group had committed violent acts, reported heavy alcohol use and engaged in sexual intercourse at age 18 than subjects in the late intervention or control condition (Hawkins et al., 1999).

Universal interventions are also effective in reducing problems outside the classroom, such as in the playground. In the Linking the Interests of Teachers and Families (LIFT; Reid, Eddy, Fetrow, & Stoolmiller, 1999) a multi-domain and multi-component program, the GBG was adapted to a playground intervention to reduce inappropriate behavior. Additionally, LIFT aimed at promoting effective parenting, improving children's social and problems solving skills and helping them to resist negative peer group influences. Reductions of playground aggression, especially in high aggressive children, and improved family problem solving were found (Reid et al., 1999).

The Intervention Campaign Against Bullying-Victim Problems Prevention (Olweus, 1993) was a nationwide universal intervention program to reduce bullying and related victimization among elementary and middle schoolchildren in Norway. The program provided teachers knowledge about the cause and effects of school bullying. The program also provided teachers with detailed suggestions to reduce and prevent bullying. In a quasi-experimental study, Olweus (1994a, 1994b) reported the program to reduce bullying



and victimization by 50% or more, as well as reductions in antisocial behavior and improvements in the social climate in schools.

A specific playground intervention is the Collaborative Student Mediation Project (Cunningham, Cunningham, & Martorelli, 1997). In this project, grade 5 children mediate in playground conflicts between groups of children. The program was introduced in three schools after 11 weeks of baseline observations. Physically aggressive playground behavior was reduced by 51% to 65% in the three schools and this effect sustained after one-year follow-up (Cunningham et al., 1998). However, the limited number of schools and the absence of a control condition warrant some caution.

Universal preventive interventions aimed at improving social skills of children have also been employed in this phase. The Fast Track project (Conduct Problems Prevention Research Group, 1992) studied the impact of the Promoting Alternative THinking Program (PATHS; Kusche & Greenberg, 1994) on 7560 grade 1 children in 54 schools in the US. PATHS promotes social/emotional competence through cognitive skill-building. Several positive effects including reductions in aggression and hyperactivity, and an improved classroom environment were found (Conduct Problems Prevention Research Group, 1999b). The Tri-Ministry project combined a social skills intervention with a program aimed to improve reading skills and found improvements in prosocial behavior and reductions in externalizing problems (Boyle et al., 1999; Hundert et al., 1999).

Several *selective* or *targeted* interventions have also proven to effectively reduce externalizing problem behavior in young, elementary schoolchildren. Within the Fast Track project, 845 children were identified at risk for developing disruptive disorder. These children received a more intensive program, consisting of the universal part of the PATHS program and, additionally, interventions aimed at training social skills, improving parent-child interaction and parental involvement with school, and improving academic functioning. After one year of intervention, results showed an increase in children's social-cognition and reading skills and more positive peer interactions. Lower levels of aggressive behavior of the child and improvements in parenting behavior, such as reductions in use of physical punishment, more positive involvement with the child and more consistent discipline, and parenting satisfaction were also reported (Conduct Problems Prevention Research Group, 1999a). At the end of grade 3, after 3 years of intervention, the improvement in the children's conduct problems and parenting behavior improvements sustained. Thirty-seven percent of the intervention children were classified

as free of serious conduct-problems dysfunction, compared to 27% of control group children (Conduct Problems Prevention Research Group, 2002a).

In the Montreal Prevention Experiment, Tremblay and colleagues, (Tremblay et al., 1991; Tremblay, Pagani-Kurtz, Masse, Vitaro, & Pihl, 1995; Vitaro & Tremblay, 1994) studied the impact of a child and parent intervention, aimed at improving social skills and effective child rearing. Two hundred forty-three elementary school-age boys at risk for developing disruptive disorder were studied up to age 15. No immediate positive impacts were found. In the follow-up assessments, however, increasing positive effects were found on teacher rated aggression between intervention and control boys. The proportion of intervention boys that had ever engaged in delinquent acts, such as vandalism and stealing, was significantly lower than the proportion of control boys that engaged in these behaviors. At age 12, peer nominations of aggression from the best friends of boys in the treatment group were lower than the nominations of aggression in the control group's best friends. In adolescence, intervention boys reported less delinquent behaviors.

### **Aims of the project**

Knowledge about the development of children with disruptive behaviors, leading to disruptive disorders and related poor outcomes, guides prevention research in the development and evaluation of preventive interventions. The overview of effective interventions in this chapter showed that several effective intervention strategies are available to intervene in the development of disruptive behavior. Most of the development and evidence for effective prevention programs is based on studies conducted in the USA. Consequently, these prevention programs are developed for use in the USA. It was therefore decided to develop a universal, classroom based preventive intervention for use in the Netherlands and determine the impact of this intervention.

The main purpose of the present study was to examine the impact of Good Behavior Game (GBG; Barrish et al., 1969; Dolan et al., 1989) on the development of disruptive behaviors in young elementary schoolchildren in the Netherlands. The GBG is a universal, classroom based preventive intervention program. In addition, the purpose was to study risk factors in the child, familial and parenting domain that predict whether children will or will not respond to the intervention. The secondary purpose of this study was to further our knowledge about developmental psychopathology. This was done by studying the characteristics of groups of children with similar patterns of disruptive behaviors and by

studying developmental trajectories of children's aggression, the characteristics at onset as well as the consequences for following a specific developmental trajectory.

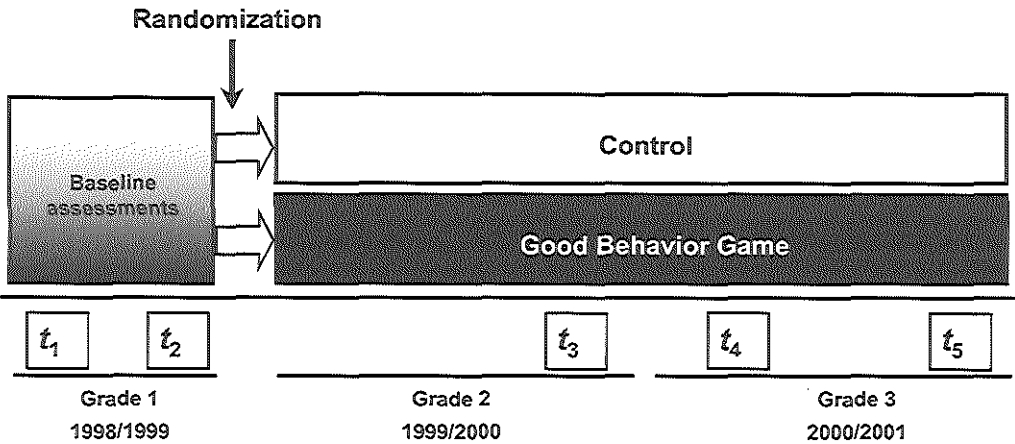
The following specific research questions are addressed in the subsequent chapters of the present manuscript:

1. Given the conceptualization of three DSM-IV diagnoses of disruptive disorders, how many classes of children with similar patterns of disruptive behaviors can be identified in young elementary schoolchildren; what are the behavioral characteristics of children in each of the classes; how can the identification be optimized and what is the risk status for future disruptive behaviors in children in each of the classes?
2. What is the predictive accuracy of classifying children at risk for disruptive disorders through a parent screen, and can the screening procedure be improved (a) by including risk factors in the child and family context in the initial classification of children at risk and (b) by using the risk factors in the family context as a second gate in a multiple gating procedure?
3. How many developmental trajectories of peer nominated aggression can be identified in young, elementary schoolchildren; what are the characteristics of the identified developmental trajectories; what are the behavioral characteristics at elementary school entry of children following a specific trajectory, and what are the outcomes predicted by the different developmental trajectories?
4. What is the impact of a universal classroom based intervention program, the Good Behavior Game, on children's disruptive behaviors for children identified to follow a specific developmental trajectory?
5. Which risk factors due to the behavior of the child, risk factors in the familial/environmental and risk factors in parenting practices of early elementary schoolchildren discriminate between children that fully responded to the intervention, compared to children that partially responded to the preventive intervention?

### *Project design*

The present study reports on the results of the Good Behavior Game intervention study in a sample of 666 elementary schoolchildren followed from grade 1 through grade 3. Figure 1.2 gives an overview of the project. Thirteen schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999. The

Figure 1.2 Good Behavior Game project design



Note:  $t_1 - t_5$  are times of assessment

original target sample consisted of 794 first grade children. Parents were informed about the project and invited to participate in the study. When parents did not respond, a reminder was sent and a research assistant made telephone calls when the parents did not respond to the reminder. If the research assistants were unable to reach the parent, teachers reminded the parents about the project. Parents of minority children were informed through brochures in their native language (Turkish, Moroccan, and Portuguese).

Table 1.2 Respondents at each time of assessment and percentage of original sample included at grade 1

|          | Grade 1                |                | Grade 2 |     |           | Grade 3 |    |           |        |     |           |
|----------|------------------------|----------------|---------|-----|-----------|---------|----|-----------|--------|-----|-----------|
|          | spring/early summer    |                | spring  |     |           | fall    |    |           | spring |     |           |
|          | n                      | % total sample | n       | %   | % grade 1 | n       | %  | % grade 1 | n      | %   | % grade 1 |
| Teachers | 644 (666) <sup>a</sup> | 89             | 639     | 100 | 96        | 578     | 99 | 87        | 574    | 100 | 86        |
| Children | 644 <sup>b</sup>       | 87             | 639     | 100 | 96        | -       | -  | -         | 574    | 100 | 86        |
| Parents  | 623                    | 84             | 565     | 94  | 91        | -       | -  | -         | 496    | 92  | 80        |

Note: <sup>a</sup> including 22 children that repeated grade 1 at start of the project. <sup>b</sup> 22 children that repeated grade 1 at the start of the project could not be included in baseline child assessment, but were included in the grade 2 and grade 3 assessments

Then interviewers who spoke the parents' native language went to their homes to give additional information and asked the parents to participate in the study.

Table 1.2 summarizes the number of participants and informants included at each time of assessment. Since the project had a longitudinal design, only the 722 children who moved on to second grade were eligible for inclusion. In addition, 22 children who repeated the second grade in 1999 were included in the sample, making the total sample 744 children. All 744 parents or parent substitutes were approached and 623 (83.7%) agreed to participate and to be interviewed. At the interview, a written informed consent was obtained. Parents who refused to be interviewed were asked to agree their child to participate and additional 43 parents granted their child's participation in the study. Informed consent from these parents was obtained by mail. In total, 666 parents agreed that their child participated in the study, which was 89.5% of the target sample. Over the

**Table 1.3** Demographics of Good Behavior Game intervention study sample

|                                 | Sample n=636 |
|---------------------------------|--------------|
| Mean age grade 1 (years)        | 6.9 (0.6)    |
| Male gender (%)                 | 51           |
| Family socioeconomic status (%) |              |
| Low                             | 36           |
| Middle                          | 36           |
| High                            | 28           |
| Employment status (%)           |              |
| Unemployed                      | 11           |
| Family structure (%)            |              |
| Single mother                   | 8            |
| Number of children (%)          |              |
| 1-2                             | 64           |
| 3-4                             | 34           |
| 5 or more                       | 2            |
| Ethnicity (%)                   |              |
| Caucasian                       | 69           |
| Turkish                         | 10           |
| Moroccan                        | 9            |
| Surinam/Dutch Antilles          | 5            |
| Other                           | 7            |

Note: Standard deviation in parenthesis

period of this study, 92 children were lost to follow-up because they either left school or were kept down a grade. Demographics of the sample at baseline are in Table 1.3. Sixty-nine percent of the children were Caucasian; 51% of the children were male. The sex distribution did not differ by ethnic group ( $\chi^2 = 4.67$ ,  $df = 7$ ,  $p > .05$ ). Mean age of the children in grade 1 was 6.9 years (SD 0.6).

Characteristics of the participating schools are shown in Table 1.4. Each of the 13 schools had at least two grade 1 classes at the start of the project. Within one school, classes were randomly appointed to the intervention or control condition during the summer holiday between grade 1 and grade 2. Of the 31 grade 2 classes in the 13 schools, 16 became intervention class, resulting in 363 children receiving the GBG program and 303 control group children. The GBG intervention started in the fall of grade 2. Table 1.5 gives an overview of the variables measured and measurements used at each of the assessments.

**Table 1.4** Schools, number of grade 1 classes, percentage immigrants and neighborhood SES of the school

| school | School          |              |              |
|--------|-----------------|--------------|--------------|
|        | grade 1 classes |              | neighborhood |
|        | n               | % immigrants | SES          |
| 1      | 3               | 100          | low          |
| 2      | 2               | 93           | low          |
| 3      | 2               | 90           | low          |
| 4      | 2               | 86           | low          |
| 5      | 3               | 30           | low          |
| 6      | 3               | 25           | average/high |
| 7      | 2               | 20           | average/high |
| 8      | 2               | 13           | average/high |
| 9      | 2               | 11           | average/high |
| 10     | 5               | 11           | average/high |
| 11     | 2               | 8            | low          |
| 12     | 3               | 6            | average/high |
| 13     | 2               | 0            | average/high |

Note. SES = socioeconomic status. Neighborhood socioeconomic status based on Netherlands Central Bureau of Statistics (1993). Schools are made anonymous.

**Table 1.5** Variables and measures used at each time of assessment

| Variables                | Grade 1            |                 | Grade 2            | Grade 3            |                 |
|--------------------------|--------------------|-----------------|--------------------|--------------------|-----------------|
|                          | spring             | early<br>summer | spring             | fall               | spring          |
| Teacher reports          |                    |                 |                    |                    |                 |
| Problem behavior         | TRF/6-18           | TRF/6-18        | TRF/6-18           | PBSI               | TRF/6-18 + PBSI |
| Child reports            |                    |                 |                    |                    |                 |
| Aggressive behavior      | peer nominations   |                 | peer nominations   | peer nominations   |                 |
| Peer status              | sociometric status |                 | sociometric status | sociometric status |                 |
| Parent reports           |                    |                 |                    |                    |                 |
| Problem behavior         | CBCL/4-18          |                 | CBCL/4-18          | CBCL/4-18          |                 |
| Parental psychopathology | GHQ-28             |                 | GHQ-28             | GHQ-28             |                 |
| Life-events              | LEQ                |                 | LEQ                | LEQ                |                 |
| Parenting stress         | PSI                |                 | PSI                | PSI                |                 |
| Parenting behavior       | APQ                |                 | APQ                | APQ                |                 |
| Family characteristics   | Interview          |                 | -                  | -                  |                 |

*Note:* TRF/6-18 = Teacher's Report Form for 6-18-years-olds; PBSI = Problem Behavior at School Interview; CBCL/4-18 = Child Behavior Checklist for 4-18-years olds; GHQ-28 = General Health Questionnaire 28 item version; LEQ = Life Events Questionnaire; PSI = Parenting Stress Index; APQ = Alabama Parenting Questionnaire.

### *Intervention: Good Behavior Game*

The Good Behavior Game (GBG; Barrish et al., 1969; Dolan et al., 1989) is a classroom-based behavior management strategy that promotes prosocial and reduces disruptive behavior. Teachers discuss the necessity of formulating class rules and choose with their students the rules for their class. The positively formulated rules are accompanied by pictograms, which are attached to the blackboard. After observing children on well-defined behaviors in the class, teachers assign children to one of three or four teams. Teams contain 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 and teams are rewarded when at the end of a 15- to 60-minutes period at least one card remains on their desk. Teachers, however, take a card when a student violates one of the rules. Teams and students are always rewarded with compliments. Initially, winning teams receive also tangible rewards (sticker) directly after each game. Later, teams received week rewards (if they won at least two out of three games that week) and month rewards. In the first intervention year, the GBG was implemented in three different stages. In the

*introduction stage*, the GBG was played for three times a week during approximately 10 minutes. The goal was to make children and teachers experienced with the GBG. The introduction phase lasted for about two months. In the *expansion stage*, teachers were encouraged to expand the duration of the GBG (up to three times one-hour per week), expand the settings in which the GBG was played, and expand the behaviors targeted by the GBG. Rewards were delayed till the end of the week and month. The expansion phase lasted until the early spring of the school year. In the final phase, the *generalization phase*, emphasis was on promoting prosocial behavior outside GBG moments. In this phase, children were explained that the rules used during the GBG were also applicable when the game was not in process. Children received compliments for appropriate behavior by their teachers. The GBG-sessions were used as a booster. The same three phases were used in the second intervention year, but, since children were already familiar with the GBG, teachers swiftly moved to the expansion and generalization phase.

The GBG was played in second and third grade. Teachers received two afternoons of GBG training prior to the intervention and one afternoon of instruction in the middle of the year. During the first intervention year, teachers were coached in their classroom during ten 60-minutes classroom observations by well-trained advisors from the school advisory services. During the second intervention year, teachers were either supervised during ten school visits by these advisors or were supervised by their schools' internal supervisor.

The GBG had to be adapted for use in the Dutch school system to ensure a proper implementation in Dutch schools (Van der Sar, 2002; Van der Sar & Goudswaard, 2001). In contrast to the U.S. GBG, Dutch teams do not compete for weekly winners and teachers do not mention children violating GBG rules. Also, children in the teams are encouraged to actively support each other in behaving appropriately.

The GBG promotes prosocial behavior through (1) explicitly defining and systematically rewarding appropriate behavior, thus placing emphasis on positive rather than on negative behavior, and (2) by facilitating the interaction between disruptive and non-disruptive children through a team-based approach. The program results in a consistent, predictable and safe classroom environment. The GBG is listed as 'promising' for the reduction of aggressive behavior by Blueprints For Violence Prevention (Elliott, 1998) and was awarded the Exemplary Substance Abuse Prevention Award by the Substance Abuse and Mental Health Services Administration (SAMHSA, 2002)



## Structure of the present thesis

In *chapter 1*, the development of disruptive behavior, from early childhood to young adulthood is described. Opportunities to intervene, and effective intervention programs in different stages in the development of disruptive behaviors are discussed. In *chapter 2*, young children are empirically classified to groups of children differing in their manifestation of disruptive behaviors through Latent Class Analyses. It is examined whether the identified patterns of disruptive behavior of these groups were in accordance with the conceptualization of disruptive disorders as described in DSM-IV. In *chapter 3*, the predictive accuracy of classifying children at risk for disruptive disorders through Latent Class Analyses is evaluated. Children incorrectly classified (false positive and false negative) are compared to correctly classified children (true positive and true negative) on risk factors in the family context, to test whether the screening procedure can be improved through a multiple gating procedure. In *Chapter 4*, the developmental trajectories of aggression from grade 1 through grade 3 and the behavioral characteristics of children at elementary school entry following these trajectories are examined. Peer nominations of aggression scores are used for the developmental trajectories. The consequences of following a specific developmental trajectory are studied. In *chapter 5*, the impact of the GBG intervention program on developmental trajectories of attention deficit/hyperactivity problems, oppositional defiant problems and conduct problems is studied. A step-wise approach is used to study this impact. First the overall impact of the program on attention deficit/hyperactivity problems is analyzed. Then the impact on groups of children differing in developmental trajectories of attention deficit/hyperactivity problems, oppositional defiant problems and conduct problems is analyzed. In *chapter 6*, predictors for responsiveness to the GBG intervention are studied. Problem behavior and risk factors for disruptive behavior problems in the child, family and parenting domains are examined. It is studied how differences between these groups of children on these risk factors can be used to decide on the focus and timing of prevention programs to achieve optimal impact on children's disruptive behavior. Finally, in *chapter 7*, the results presented in the foregoing chapters are integrated and discussed on their implications for research on disruptive behavior, for preventive interventions targeting disruptive behavior, and for treatment of disruptive behavior.



## 2 | Classes of Disruptive Behaviour in a Sample of Young Elementary Schoolchildren

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## Chapter 2

# Classes of Disruptive Behaviour in a Sample of Young Elementary Schoolchildren

### Abstract

*The objectives were to (1) classify young children to groups differing in disruptive behaviour, (2) determine whether the patterns of disruptive behaviour in these groups are in accordance with the conceptualisation of disruptive disorders as described in DSM-IV, and (3) optimise the classification of children in groups. Disruptive behaviour of 636 seven-year-old elementary schoolchildren was assessed with the CBCL/4-18. Using CBCL items rated as very consistent with DSM-IV categories Conduct Disorder, Oppositional Defiant Disorder and Attention-Deficit/Hyperactivity Disorder, Latent Class Analyses were applied to identify classes of children differing in patterns of disruptive behaviour. Three classes were identified: (1) high levels of oppositional defiant problems (ODD problems) and attention deficit/hyperactivity problems (ADH problems) and intermediate levels of Conduct problems. (2) intermediate ODD problems and ADH problems and low levels of Conduct problems symptoms. (3) low levels on all disruptive behaviours. No classes were identified in which children were marked by only symptoms of Conduct problems, ODD problems or ADH problems. Covariates (socio-economic status, gender, parenting stress) improved the classification of children. The findings are discussed in terms of implications for classification, identification of children at risk, prevention and treatment of disruptive behaviour in young children.*

### Introduction

Three distinct syndromes of disruptive behaviour, namely Conduct Disorder (CD) Oppositional Defiant Disorder (ODD) and Attention-Deficit/Hyperactivity Disorder (ADHD) are listed in DSM-IV (American Psychiatric Association, 1994). The essential difference between CD and ODD is that CD is characterised by norm-violating and antisocial behaviour whereas ODD is characterised by recurrent patterns of negativistic, defiant, disobedient and hostile behaviour toward authority figures. ADHD is characterised by a persistent pattern of inattentive and/or hyperactive behaviour. In research, it is common practice to classify children in groups differing in disruptive behaviour through the

conceptualisation of DSM-IV disruptive disorders (e.g. children with only CD, ODD or ADHD). The classification is typically based on predetermined cut-off scores on instruments assessing children's psychopathology and not on actual DSM-IV diagnoses as set by a clinician (see e.g. Babinski, Hartsough, & Lambert, 1999; Campbell, 1994; Campbell, Pierce, Moore, & Marakovitz, 1996; Gresham, MacMillan, Bocian, Ward, & Forness, 1998; MacDonald & Achenbach, 1996; Pierce, Ewing, & Campbell, 1999; Stormshak et al., 1998; Verhulst & van der Ende, 1993). The question is whether classifying children based on DSM-IV categorisation is in accordance with empirically identified patterns of disruptive behaviour in children. Therefore, the purpose of this study is (1) to classify children assessed with a standardised parent rating scale (Child Behavior Checklist/4-18; Achenbach, 1991a) to groups with similar patterns of disruptive behaviour, (2) to examine whether the behaviour of these children warrants the formation of groups of children based on the conceptualisation of disruptive disorders as described in DSM-IV and (3) to optimise the classification of children in groups by including information outside the behaviour of the child.

Although DSM-IV describes CD, ODD and ADHD as three distinct syndromes, the categorisation does not imply that children will display symptoms of only one disorder. The co-occurrence of ADHD, ODD and CD is, for instance, greater than expected by chance (Loeber & Keenan, 1994). Loeber et al. (1995) reported a temporal relation between ODD and CD because 80% of new cases of CD in clinically referred boys met the criteria of ODD prior to the onset of CD. Lahey, Loeber, Quay, Frick et al. (1992) found a hierarchical relationship between these types of syndromes because "clinic-referred youths with CD exhibit the same symptoms as youths with ODD and differ only by also exhibiting more serious antisocial behaviour" (p. 540). The presence of ADHD predicts the early onset of CD (Loeber et al., 1995). ADHD, ODD and CD do not only often coexist, they are also associated with similar social-emotional maladjustment (Matthys, Cuperus, & Van Engeland, 1999; Paternite, Loney, & Roberts, 1995).

The many relationships between the three syndromes raise the question of whether young children can be identified that display symptoms of just one DSM-IV defined form of disruptive disorder. These relationships also challenge the validity of distinguishing specific disruptive syndromes in young children (Paternite et al., 1995). By classifying children in groups with similar patterns of disruptive behaviour, the validity of these distinctions can be tested. Inspection of the behavioural patterns of children in the identified groups will inform us whether a classification with predominantly symptoms of only one disruptive disorder is

appropriate in young, elementary schoolchildren. Knowledge about classification is important for several reasons. First, early childhood is a frequently used period for the identification of children at risk for future disruptive disorder (Bennett, Lipman, Racine, & Offord, 1998) and the implementation of interventions aimed to prevent or divert the development of disruptive disorder (see e.g. Hawkins et al., 1991; Kellam et al., 1994; Tremblay et al., 1995; Vitaro & Tremblay, 1994). This knowledge will guide researchers in the further development of preventative programs which are tailored to the 'needs' of young children, and the development of programs aimed at the identification of children at risk for future disruptive disorder. Second, the study of factors associated with and outcomes related to empirically derived groups of young, elementary schoolchildren will improve our understanding of the mechanisms leading to these forms of disruptive behaviour.

Factors in the child and the family are related to disruptive behaviour. Boys are more at risk than girls (Zoccolillo, 1993). In the familial context, low social-economic status (Farrington, 1993), family stress (Verhulst & van der Ende, 1997), parental psychopathology, stressful life events and single parent families (Florsheim, Tolan, & Gorman-Smith, 1998) are associated with disruptive disorder. Bennett et al. (1999) showed that the predictive accuracy of teacher-reported externalising problem behaviour can be significantly improved by combining externalising behaviour with child and familial risk factors like gender, family income and maternal depression.

In the current study, the following questions were examined: (1) how many classes of children with similar patterns of disruptive behaviour can be identified, and, given these classes, (2) what is the risk status of children in each of these classes? (3) Do these empirically identified classes of children support the categorisation as defined by DSM-IV? We further examined whether (4) the inclusion of covariates improved the classification of children and, if so, (5) how covariates are related to each of the classes of disruptive behaviour.

## **Methods**

### *Subjects and procedure*

As part of a school based preventative intervention study targeting disruptive behaviour in young elementary schoolchildren, 13 schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999. The original target

sample consisted of 794 first grade children. Parents were informed about the project and invited to participate in the study. When parents did not respond, a reminder was sent and they were called by a research assistant when they did not respond to the reminder. If the research assistants were unable to reach the parent, teachers reminded the parents about the project. Parents of minority children were informed through brochures in their native language. Then interviewers who spoke the parent's native language went to their homes to give additional information and asked the parents to participate in the study.

Since the project has a longitudinal design, only the 722 children who moved on to second grade were eligible for inclusion. In addition, 22 children who repeated the second grade were included in the sample, making the total sample 744 children. All 744 parents or parent substitutes were approached and 623 (83.7%) agreed to be interviewed. Of the children who repeated first grade, 13 parents had already participated in the study before they were informed that their child would repeat the grade. These 13 children were included making it a total of 636 children. 69% of the children were Caucasian, 10% Turkish, 9% Moroccan, 5% Surinam/Dutch Antilles and 7% from other ethnic groups. 51% of the children were male, which did not differ for ethnic groups ( $\chi^2 = 4.67$ ,  $df = 7$ ,  $p > .05$ ). Mean age of the children was 6.9 years (SD 0.6).

All parents were visited at home for a baseline assessment interview. Fifteen interviewers were trained to provide information to the parent, to obtain informed consent and to conduct a structured interview. During the interview, all questions were read aloud and parents responded. Parents of other than Dutch ethnic groups were approached by a well trained, native language speaking interviewer and the interview was conducted in the native language of the parents. All interviews were completed before the start of the intervention. Parents received a gift voucher worth 10 Dutch guilders for their cooperation with the interview.

### *Measures*

*Children's disruptive behaviour.* Children's problem behaviours over the last 6 months were assessed with the Child Behavior Checklist/4-18 (Achenbach, 1991a) which contains a list of 120 problem items. Parents rate their child's behaviour on a three point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). The CBCL has been translated and validated for use in the Netherlands (Verhulst, Van der Ende, & Koot, 1996).



### *Covariates*

*Socioeconomic status* was scored on the basis of current parental occupation and highest level of education completed. Socioeconomic status was coded as 1 = low, 2 = intermediate and 3 = high socioeconomic status (Netherlands Central Bureau of Statistics, 1993).

*Parental stress around parenting.* Parents completed the Nijmegen Parenting Stress Index (NPSI), which is the Dutch version of Abidin's Parenting Stress Index (Abidin, 1983) measuring the level of parental stress originating from several child and parent characteristics within the caregiver context (De Brock, Vermulst, Gerris, & Abidin, 1992). The items are scored on a 6-point Likert scale, ranging from completely agree to completely disagree. The short, 25-item form was applied. Only the 14 items assessing parental stress originating from the child's behaviour or temperament (De Brock et al., 1992) were included in the analysis. Cronbach's alpha was .88.

*Parental psychopathology* was assessed with the Dutch translation of the General Health Questionnaire 28 item version (GHQ-28; Goldberg, 1972; Koeter & Ormel, 1991). The GHQ-28 consists of four seven-item scales measuring Somatic Symptoms, Anxiety/Insomnia, Social Dysfunctioning and Severe Depression in which the parents rate their own mental health over the last two weeks on a 4-point likert scale. The total problem scale was used.

*Life events* were rated on the Life Events Questionnaire (LEQ; Berden, 1992). Parents filled out a questionnaire containing 10 stressful life events. All 10 items state or imply a negative event. The items had a yes/no format to indicate whether or not an event had occurred during the last five years. The items' scores were summed to a total life-event score.

*Single parent family status* was included as a covariate.

### *Statistical approach*

To construct a model reflecting DSM-IV defined syndromes of disruptive behaviour, the following procedure was used. First, CBCL items reflecting a similar content as DSM-IV criteria for CD, ODD and ADHD were used in the analysis (Achenbach & Rescorla, 2001). Second, since we used binary data in the latent class analyses, CBCL items were dichotomised where 0 = not true and 1 = somewhat/sometimes or often true. Third, items with a frequency of less than 2.5% were excluded. Such rare observations caused

problems in the latent class analyses. Fourth, the remaining items were submitted to a confirmatory factor analysis to determine whether the three dimensions of interest in this study, (Conduct problems, Oppositional Defiant problems and Attention deficit/hyperactivity problems) could be extracted. The categorical data module of Mplus version 2.02 (Muthén & Muthén, 2000b) was used for the factor analysis.

Children with similar patterns of behaviour were identified through latent class analyses (LCA; McCutcheon, 1987). LCA describe the probabilities of a set of observed categorical variables across groups of individuals when group membership of the individuals is unknown. The primary objective of LCA is to find the smallest number of classes of individuals with similar patterns of disruptive behaviour that can explain the relationships among a set of observed variables. In the analysis, classes are added stepwise until the model fits the data well. If the patterns of disruptive behaviour would be in accordance with three separate disruptive syndromes, at least four different classes are hypothesised: one class reflecting a low symptom endorsement profile throughout the entire disruptive spectrum, and three classes reflecting predominantly behaviours of one of the three syndromes with lower probabilities for behaviours on the other two syndromes. Given the high comorbidity between disruptive disorders, additional classes reflecting combinations of disorders are anticipated. If, on the other hand, the patterns are not characterised by only one type of disruptive behaviour, classes reflect differences in severity: one class reflecting low item probabilities on all items and successive classes reflecting endorsement profiles with higher item probabilities throughout the entire spectrum of disruptive behaviours.

The estimated parameters of the latent class model are latent class membership probabilities, which give the probability for an individual to belong to each of the classes, and class-specific symptom endorsement profiles, which give the conditional probabilities for individuals in a particular class to have any specific item endorsed. Latent class analysis with covariates (Dayton & Macready, 1988) is an extension of normal LCA in that covariates are included in the estimation of the model.

Models derived by LCA with different numbers of classes are not nested. Therefore a likelihood-ratio chi-square test for comparison of fit cannot be used and a Bayesian Information Criterion (BIC; Kass & Raftery, 1993; Schwartz, 1978) was applied. An overall goodness of fit statistic is difficult to interpret in these data because, with a large number of variables, many non-observed patterns emerge in which the distribution of the overall goodness of fit statistic is unknown. Model improvement by including covariates can be

tested with the likelihood-ratio chi-square test. Covariates were included if the variable predicted class membership at  $p < .05$  level. Latent Class Analyses were conducted with Mplus version 2.02 (Muthén & Muthén, 2000b).

## Results

### *Scores above CBCL-DSM clinical cut-off*

The number of children above the clinical cut-off on the CBCL- DSM-IV scales reflecting Conduct Disorder (designated here as Conduct problems), Oppositional Defiant Disorder (ODD problems) and Attention-Deficit/Hyperactivity Disorder (ADH problems) (Achenbach & Rescorla, 2001) were identified. No cut-off scores for the Dutch population are currently available but we generated cut-off scores (score in the 98th percentile) on the data from the Dutch general population which were used for norms of the CBCL/4-18 (Verhulst et al., 1996). Sixty-five children met the clinical cut-off score on the CBCL-DSM-IV scales. Forty-six were above the clinical cut-off score on one scale: 7 on Conduct problems, 22 on ODD problems and 17 on ADH problems. The remaining 19 children were above this score on more than one scale (10 ADH problems with ODD problems, 5 Conduct problems with ODD problems and 4 Conduct problems, ODD problems and ADH problems).

### *Model of disruptive disorder*

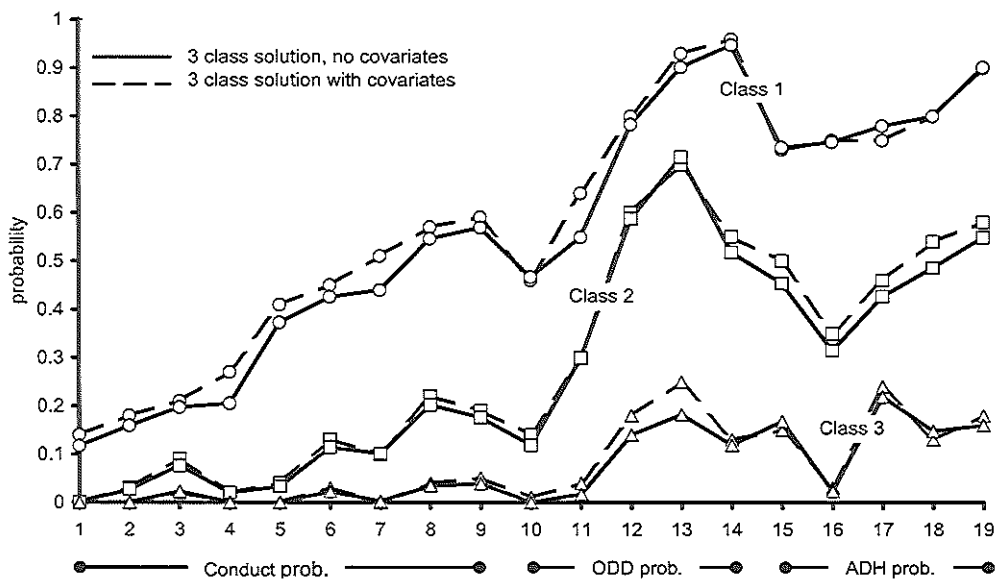
We used the 26 items of the CBCL-DSM-IV scales Conduct problems, ODD problems and ADH problems. Six items (*sets fires, steals at home, steals outside the home, truancy - skips school, threatens people, vandalism*) had frequencies of occurrence below 2.5% and were excluded. The remaining Conduct problems items, ODD problems items and ADH problems items were submitted simultaneously to a confirmatory factor analysis. The three factors were allowed to correlate. The item *runs away from home* had a factor loading below .4 and was considered to be a poor representative of the scale. This item was excluded from further analyses. The frequency of occurrence and factor loadings of the nineteen remaining items of the final model are displayed in Table 2.1. The model with three scales had a good fit to the data,  $\chi^2 = 155.14$ ,  $df = 80$ ,  $p < .01$ . In large samples such as this,  $\chi^2$  may become significant. Three other fit indices were used to examine model fit: Root Mean Square Error of Approximation = .04, Comparative Fit Index = .96, Tucker Lewis Index = .97. The values of all three indices showed a good fit. The correlations between the three scales were high (.76 - .87).

**Table 2.1** Percentage of children having a score of 'somewhat true' or 'often true' and factor loading on confirmatory factor analyses for CBCL/4-18 items reflecting DSM-IV Conduct problems, Oppositional Defiant problems and Attention Deficit Hyperactivity problems

| Factors  | Frequency (%) | Factor loading |
|--|---------------|----------------|
| Conduct problems                                   |               |                |
| 15. Cruel to animals                               | .03           | .83            |
| 16. Cruelty, bullying or meanness to people        | .10           | .80            |
| 21. Destroys others things                         | .05           | .70            |
| 26. Does not seem to feel guilty after misbehaving | .15           | .63            |
| 37. Gets in many fights                            | .15           | .73            |
| 39. Hangs around with others who get in trouble    | .09           | .41            |
| 43. Lying or cheating                              | .22           | .66            |
| 57. Physically attacks people                      | .05           | .60            |
| 90. Swearing or obscene language                   | .23           | .61            |
| Oppositional Defiant problems                      |               |                |
| 3. Argues a lot                                    | .60           | .68            |
| 22. Disobedient at home                            | .49           | .80            |
| 23. Disobedient at school                          | .16           | .67            |
| 86. Stubborn, sullen, or irritable                 | .50           | .60            |
| 95. Temper tantrums or hot temper                  | .28           | .63            |
| Attention deficit/hyperactivity problems           |               |                |
| 8. Can't concentrate, can't pay attention for long | .43           | .57            |
| 10. Can't sit still, restless, or hyperactive      | .51           | .76            |
| 41. Impulsive or acts without thinking             | .45           | .63            |
| 93. Talks too much                                 | .44           | .55            |
| 104. Unusually loud                                | .32           | .79            |

### *Latent class analysis*

Bayesian Information Criterion (BIC) values indicated that a three-class solution would best fit the data. Moving from two to three classes resulted in a BIC drop of 108 points which results in a Bayes factor  $< 1/10$  (Kass & Wasserman, 1995; Schwartz, 1978). This is a strong evidence for model improvement according to Jeffrey's scale for evidence of Bayes factors (Wasserman, 1997). When moving to a four-class solution, BIC increased with 56 point resulting in a Bayes factor  $> 10$  which is a strong evidence against the four-



**Conduct Problems**

1. Cruel to animals
2. Physically attacks people
3. Hangs around with others who get in trouble
4. Destroys things belonging to his/her family or others
5. Cruelty, bullying, or meanness to others
6. Does not seem guilty after misbehaving
7. Gets in many fights
8. Swearing or obscene language
9. Lying or cheating

**ODD Problems**

10. Disobedient at school
11. Temper tantrums or hot temper
12. Stubborn, sullen, or irritable
13. Argues a lot
14. Disobedient at home

**ADH Problems**

15. Can't concentrate, can't pay attention for long
16. Unusually loud
17. Talks too much
18. Impulsive or acts without thinking
19. Can't sit still, restless, or hyperactive

**Figure 2.1** Probability of endorsement for Conduct problems, Oppositional Defiant problems and Attention deficit/hyperactivity problems for each of 3 classes of disruptive behaviour estimated without and with covariates

class model. Children were classified to a latent class based on their highest class-membership probability. Class sensitivity, the average class-membership probability after classifying children, was high (.90 - .92), which showed that children were well classified to their particular class.

*Classes of disruptive behaviour estimated without covariates*

Class specific endorsement probabilities are shown in Figure 2.1 (closed lines). One hundred and thirty-three (21%) children were in *class 1* and 90 (68%) were boys. Children in *class 1* had intermediate probabilities for Conduct problems (.12 - .57), high probabilities for ODD problems (.40 - .98), and ADH problems (.62 - .82). According to their parents, children in this class scored on average 3.1 (SD 1.7) Conduct problem items (Table 2), 3.8 (SD 0.8) ODD problem items and 4.0 (SD 1.0) ADH problem items. To assess the risk status of these children, children in the borderline range (*T* score 60-63) and above the clinical cut-off (*T* score > 63) on CBCL Externalising were identified. Scores in the deviant range on the CBCL Externalising scale predict future poor outcomes such as academic problems, school behaviour problems, use of mental health services and police contacts (Verhulst, Koot, & Van der Ende, 1994). Of children in *class 1*, 55% score in the clinical range and an additional 17% in the borderline range on CBCL Externalising. Therefore, children with a *class 1* endorsement profile can be regarded as being highly disruptive. Children in *class 2* are different from children in *class 1* in that they have intermediate probabilities for ODD problems (.12 - .75) and intermediate probabilities for ADH problems (.32 - .55). The important difference between children in *class 2* versus *class 1* are the low probabilities for having Conduct problems endorsed (0 - .20) of children in *class 2*. Less than 15% of *class 2* children were in the borderline or clinical range of the CBCL Externalising scale, with fewer children in the clinical than borderline range. Children in this class had average disruptive behaviour symptoms, and it is of interest that this class should be regarded as the normative class since 49% of all children in the sample are classified in this class with a boy-girl ratio approximately reflecting the sample.

One hundred eighty-eight (30%) were classified in *class 3*; 116 of them (62%) were female. Children in this class had low probabilities for Conduct problems (0 - .04), ODD problems (.04 - .18), and ADH problems (.02 - .22) and had on average less than one symptom on Conduct problems, ODD problems or ADH problems. These children were low on disruptive behaviour as is shown by the low percentages in the borderline (1%) or clinical range (0%) on CBCL Externalising (Table 2.2).

**Table 2.2** Mean levels of Conduct problems, ODD problems and ADH problems, percentage of children above CBCL clinical cut-off and in borderline range, and prevalence estimates and gender distribution per latent class for 3 class model without covariates

|         | CBCL – DSM-IV categories |           |           | CBCL Externalising |            | Prevalence<br>% | Boys<br>% | Girls<br>% |
|---------|--------------------------|-----------|-----------|--------------------|------------|-----------------|-----------|------------|
|         | Conduct                  | ODD       | ADH       | %                  | %          |                 |           |            |
|         | problems                 | problems  | problems  | Clinical           | Borderline |                 |           |            |
| Class 1 | 3.1 (1.7)                | 3.8 (0.8) | 4.0 (1.0) | 55                 | 17         | 21              | 68        | 32         |
| Class 2 | 0.8 (0.9)                | 2.3 (1.0) | 2.2 (1.2) | 3                  | 11         | 49              | 52        | 48         |
| Class 3 | 0.1 (0.3)                | 0.4 (0.6) | 0.7 (0.8) | 0                  | 1          | 30              | 38        | 62         |

*Note:* Standard deviations are in parentheses. Means for Conduct problems, ODD problems and ADH problems for pairs of latent classes were compared using Duncan's post hoc comparison. All means were significantly different at  $p < .01$  ( $F$  value for Conduct problems=394.7, ODD problems=616.5, ADH problems=372.6;  $df=2, 633$ ).

### *Improving identification: inclusion of covariates*

To explore whether the identification of children at risk could be improved, covariates were included in the estimation of the three-class model. Covariates were included if the likelihood chi-square difference test showed improvement of the model and if the variable predicted class membership at  $p < .05$  level. Gender, parental stress and SES were included whereas parental psychopathology, life events and single parent families were excluded. The average class-membership probabilities of the model with covariates were slightly higher (.91 - .93) than the average probabilities for the model with three classes without covariates (.90 - .92).

Comparison of the item-endorsement profiles in both models (figure 2.1; dotted lines) revealed that the probabilities to have a particular item endorsed were very similar but slightly higher for the model with than without covariates. The mean number of problem behaviours scored for Conduct problems, ODD problems and ADH problems and the percentages of children in CBCL Externalising borderline and clinical range (Table 2.3) were slightly higher in the model with covariates than without covariates, but these differences were not significant (details available from the first author upon request).

Of importance is that the model with covariates classified less children in the first, high-risk class compared to the model without covariates (113 children, 18%; compared to 133, 21%). When comparing children classified in the model with and without covariates,

**Table 2.3** Mean levels of Conduct problems, ODD problems and ADH problems, percentage of children above CBCL clinical cut-off and in borderline range, and prevalence estimates and gender distribution per latent class for 3 class model with additional covariates

|         | CBCL – DSM-IV categories |           |           | CBCL Externalising |            | Prevalence<br>% | Boys<br>% | Girls<br>% |
|---------|--------------------------|-----------|-----------|--------------------|------------|-----------------|-----------|------------|
|         | Conduct                  | ODD       | ADH       | %                  | %          |                 |           |            |
|         | Problems                 | Problems  | Problems  | Clinical           | Borderline |                 |           |            |
| Class 1 | 3.4 (1.6)                | 3.8 (0.9) | 4.0 (1.0) | 60                 | 19         | 18              | 75        | 25         |
| Class 2 | 0.8 (0.9)                | 2.3 (1.1) | 2.5 (1.3) | 5                  | 12         | 50              | 52        | 48         |
| Class 3 | 0.1 (0.4)                | 0.6 (0.8) | 0.7 (0.8) | 0                  | 1          | 32              | 37        | 63         |

*Note:* Standard deviations are in parentheses. Means for Conduct problems, ODD problems and ADH problems for pairs of latent classes were compared using Duncan’s post hoc comparison. All means were significantly different at  $p < .01$ . ( $F$  value for Conduct problems=472.4, ODD problems=424.9, ADH problems=331.0;  $df=2, 633$ ).

children that persisted in their class had higher probabilities of belonging to that particular class compared to children that changed from one class to the other with the inclusion of covariates. Of the 113 children classified to class 1 in the model with covariates, 110 were also classified to class 1 in the model without covariates. These 110 children had an average probability of belonging to class 1 of .95 in the model without covariates. The 23 children that changed from class 1 in the model without covariates to class 2 in the model with covariates had a significant lower average probability of belonging to class 1 (.74) in the model without covariates. Moreover, children that persisted in class 1 had significant higher CBCL Externalising scores (mean 19.6, SD 6.9) than children that changed to class 2 (mean 12.4, SD 3.5)

**Table 2.4** Association between probability of class membership and gender, SES and parental stress

|                 | Class 1 vs. Class 3 | Class 2 vs. Class 3 | Class 1 vs. Class 2 |
|-----------------|---------------------|---------------------|---------------------|
| Gender          | 5.8 (1.7-20.1)**    | 1.6 (0.8-3.3)       | 3.6 (1.4-9.0)**     |
| SES             | 0.3 (0.2-.06)**     | 0.6 (0.4-0.97)*     | 0.5 (0.3-0.8)*      |
| Parental stress | 1.6 (1.4-1.9)**     | 1.4 (1.2-1.7)*      | 1.14 (1.1-1.2)**    |

*Note:* class 1 = high disruptive; class 2 = average disruptive; class 3 = low disruptive. All associations are given as multiple odds ratios (95% confidence interval). Two sets of multinomial logistic regression analysis were performed: first probability of class 1 and class 2 versus class 3 and, second, probability of class 1 versus class 2. \* $p < .05$ . \*\* $p < .01$



The probability of being classified in class 1, compared to the probability of being classified in class 3, is related to male gender, to lower socio-economic status and to higher parental stress ratings (Table 2.4). The probability of being classified in class 2, compared to class 3 is only predicted by socio-economic status and parental stress ratings. Finally, the probability of being classified in class 1 compared to class 2, is predicted by male gender, lower SES and higher parental stress.

#### *Classes of disruptive behaviour and scores above CBCL-DSM clinical cut-off*

Of the 65 children above the clinical cut-off on the CBCL-DSM scales, 47 were in class 1, the remaining 18 were in class 2. As affirmed by the behaviour endorsement profiles of the classes, these 18 children were above the clinical cut-off on either ODD problems or ADH problems. Children above the clinical cut-off on Conduct problems or on more than one scale including Conduct problems were all in class 1.

### **Discussion**

Patterns of disruptive behaviour in young, elementary schoolchildren were studied. The findings are partly in accordance with the syndromes of disruptive behaviour as formulated by DSM-IV, but also question the validity of the DSM-IV conceptualisation of disruptive disorders to form groups of children marked by only one type of disruptive disorder.

The good fit of the disruptive behaviour model of DSM-IV derived syndromes using CBCL/4-18 items, as shown in the confirmatory factor analysis, indicated that in the spectrum of disruptive behaviours three separate, but highly correlated syndromes can be recognised. The syndromes correspond with Attention-Deficit/Hyperactivity Disorder, Oppositional Defiant Disorder and Conduct Disorder as formulated in DSM-IV. However, latent class analysis revealed that only three classes of children can be found: a first class with Conduct problems, ODD problems and ADH problems, a second class with ODD problems and ADH problems, and a third class with no symptoms of disruptive behaviour. No classes were identified that were specifically characterised by only Conduct, ODD or ADH problems. These findings are in accordance with other studies showing high levels of comorbidity between syndromes of disruptive behaviour (Loeber & Keenan, 1994) and the evidence of a comorbid sub-classification of ADHD with CD/ODD (Jensen, Martin, & Cantwell, 1997).

Children in class 1 have high probabilities for ODD problems and ADH problems, and intermediate probabilities for Conduct problems. A class with high probabilities for Conduct problems was not identified in the sample, which is in accordance with research reporting that the symptoms of Conduct Disorder become visible when children grow older (Loeber & Keenan, 1994). Both ADHD and ODD predict later conduct problems (Loeber et al., 1995). Moreover, approximately 70% of the children in class 1 have CBCL Externalising scores in the borderline and clinical range with the majority in the clinical range. These scores are approximately five times higher than found in the 'general' Dutch population (Verhulst et al., 1996). Therefore, children in this class are at risk for developing higher levels of conduct problems or even Conduct Disorder in the future.

Children in class 2 have intermediate probabilities for ODD problems and ADH problems and low probabilities for Conduct problems. Of interest is that approximately 50% of all children were classified in this class. Less than 15% of class 2 children score in the borderline or clinical range of CBCL Externalising, with the majority in the borderline range. These percentages are similar to the percentages in the Dutch population (Verhulst et al., 1996). This result suggests that moderate levels of oppositional defiant problems and attention-deficit/hyperactive behaviours should be considered the norm in young, elementary schoolchildren. Children in the third class had low probabilities throughout the entire spectrum of disruptive behaviours and only very few score in the borderline or clinical range on CBCL Externalising.

Gender, socio-economic status and parental stress due to the child's behaviour improved the estimation of the model and were subsequently included in the analyses. Class sensitivity indicated that children are better classified to latent classes when including covariates, although the improvement was small. Twenty-three children moved out of class 1 once covariates were included in the model. These children were less well classified to class 1 in the model without covariates and had lower CBCL Externalising scores compared to children that persisted in class 1. This indicates that adding covariates resulted in the exclusion of children with less certain classification to the problematic class 1.

Higher ratings of parental stress predicted higher probabilities of becoming classified in successive classes of problematic disruptive behaviour. Male gender and lower socio-economic status were also associated with a higher probability for being classified to class 1, compared to the probability for being classified in class 2 or class 3.

This is in accordance with earlier findings on disruptive behaviour, gender, socio-economic status and parental stress (Farrington, 1993; Verhulst & van der Ende, 1997).

Some aspects of this study deserve further comment. A first comment regards the instrument and informants used. Patterns of disruptive behaviour in CBCL-items were studied by using the DSM-IV described spectrum of disruptive disorders as a guideline. However, actual DSM-IV diagnostic information was not available for analyses and instead items of the CBCL were grouped on the basis of child psychiatrists' and psychologists' judgement whether CBCL-items described DSM-IV categories (Achenbach & Rescorla, 2001). Although not all behavioural criteria as formulated by DSM-IV were available, Lengua, Sadowski, Friedrich and Fisher (2001) demonstrated that the DSM-IV based scales of the CBCL/4-18 accurately predict DSM-IV diagnoses in a clinical sample. Also, CBCL items were dichotomised where 0 = not true and 1 = 'somewhat/sometimes' or 'very true or often true'. Another cut-point could have been chosen, such as considering only 'very true or often true' as an indication for the presence of a behaviour. However, the use of this cut-point would have resulted in low frequencies of occurrence, which would have resulted in the exclusion of all but one of the Conduct problem items. Parent reported data were used and parents are well able to report on the presence or absence of their children's behaviour but they may not be able to differentiate between the three DSM-IV described syndromes of disruptive disorder. The fact, however, that children met the criteria for only one disruptive disorder, based on cut-off scores, suggests that this distinction was made by the parents.

A second comment concerns the sample of children used in this study with their narrow age range and normal boy-girl ratio. Studies about the development and co-occurrence of disruptive behaviours often use clinic-referred samples of children with a broader age range and often exclude or under-include girls, which hinders comparisons with these studies. However, Hudziak, Wadsworth, Heath and Achenbach (1999) studied CBCL attention problems in a normal and a clinical sample of children through latent class analyses. Three classes were identified in both samples and the major difference between the clinical and non-clinical sample was that no 'absence of attention problems' class was found for the clinical sample and no 'severe attention problems' class was found in the normal sample. In both samples a 'mild' and a 'moderate' attention problems class was identified. Children in these 'mild' and 'moderate' classes had qualitatively similar symptom endorsement profiles for attention problem behaviours in the normal as in the clinical sample. Also, the use of this sample of children from the general population resulted in the

exclusion of several items measuring mainly covert aggressive behaviour. Covert aggressive behaviour, such as stealing, truancy or vandalism, should be discriminated from overt aggressive behaviour, such as fights or bullying and has very low base rates in young children (Frick, Lahey, Loeber, Tannenbaum, & et al., 1993). Loeber and Lahey (1989) emphasised therefore that covert aggressive behaviour is not indicative for aggression in young children.

Although the patterns of disruptive behaviour are not consistent with the presence of one specific DSM-IV diagnosis, it is of interest that 46 of the 65 children in this study that had scores above the clinical range on the disruptive behaviour scales had this on only one scale. The clinical cut-off for these scales was at the 98th percentile. Children above this cut-off were mostly classified to class 1. This indicates that if children had scores on one disruptive behaviour scale above the 98th percentile, their scores on the comorbid disruptive behaviour scales were so high that most were classified to the high-risk class 1. The findings of this study do not imply that patterns characterised by single diagnosis cannot be found once these children become older. Loeber and Keenan (1994) reported, for instance, that the co-occurrence of the DSM-IV diagnoses CD and ODD with ADHD decreased with age. However, Verhulst and van der Ende (1993) used the DSM categorisation to form syndrome specific groups of 4- through 11-year-old children from the general population and found no 'pure' syndrome groups which were high on one syndrome and low on all others. Therefore, the results of the present study coincide with the findings in samples of children with a wider age-range and in clinical samples. The timing of identifying children at risk for disruptive disorder in first grade is very relevant because early childhood is an important period for screening and the implementation of preventative interventions targeting disruptive behaviour.

The findings of this study have several implications for research and for clinical practice. First, in studies about the aetiology, the consequences and the treatment of disruptive disorders in young children a person-centred approach such as LCA rather than a classification based on predetermined cut-off scores should be used. The classification of children being high versus low on either Conduct problems, ODD problems or ADH problems is not in accordance with the finding that classes of children with pure Conduct problems, ODD problems or ADH problems were not identified in this sample of young children. Second, children at risk for future disruptive behaviour and poor outcomes are marked by high levels of ODD problems and ADH problems and only moderate levels of Conduct problems. The identification of children at risk for future disruptive behaviour

through a screening procedure should therefore focus on children exhibiting oppositional defiant and attention deficit/hyperactivity problems as well as conduct problems rather than focussing only on conduct problems. Third, interventions to prevent or divert the development of disruptive behaviour in young children should focus on conduct problems as well as on attention deficit/hyperactivity problems and oppositional defiant problems. Fourth, the improvement in classification when adding covariates is only small and very similar endorsement profiles and risk-statuses are found for the models with and without covariates. This could argue for using the more parsimonious model. However, latent class analyses bases the classification of children on the highest probability and the improvement in classification of the model with covariates suggests that those children that were not classified with high precision in the model without covariates are more accurately classified once covariates are added to the model. The difference in quality of classification in both models becomes of importance once those models are used to screen children for interventions. The costs of including 3 additional measures (gender, SES, parenting stress) should be compared to the costs of including 23 children (17%) who were classified to the high-risk class with only moderate accuracy in an intervention. To further examine whether the inclusion of covariates is also predictive for high levels of disruptive behaviour in the future, the predictive accuracy over time should be studied. It may well be that the inclusion of covariates will result in an improved predictive value for children now classified as being at risk, which was previously demonstrated by Bennett et al. (1999).

Finally, 18% of all children were classified in the high disruptive behaviour class whereas Moffitt et al. (1996) found that approximately 7% of males will develop life-course persistent antisocial conduct problems. Although only males were studied these results imply that not all of the children in the high disruptive behaviour class will develop life-course persistent disruptive behaviour. A long-term follow-up of these children is needed to assess which of them will maintain high levels of ODD problems and ADH problems and develop increasing levels of Conduct problems in the future.



# 3 | Screening for Disruptive Behavior Syndromes in Children: The Application of Latent Class Analyses and Implications for Prevention Programs

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## Chapter 3

# Screening for Disruptive Behavior Syndromes in Children: The Application of Latent Class Analyses and Implications for Prevention Programs

### **Abstract**

*The predictive accuracy of classifying children at risk for disruptive disorders through Latent Class Analyses was evaluated. CBCL/4-18 items, reflecting symptoms of DSM-IV defined disruptive disorders, alone and in combination with other child and familial risk-factors were used to predict children's risk for disruptive disorder. Predictive accuracy reached a positive predictive value of 69%. Children incorrectly classified (false positive and false negative) were compared to correctly classified children (true positive and true negative) on risk factors in the family context to test whether the screening procedure could be improved through a multiple gating procedure. The differences in familial context factors between these children were limited and no clear indications were found on how to use familial context factors to improve the screening procedure after the initial classification by LCA. The findings are discussed in light of their implications for applying preventive interventions in young children.*

### **Introduction**

Many preventive intervention programs aimed at disruptive behavior in children target only those children in need for intervention. This implies that those children have to be identified prior to the preventive intervention program through a screening procedure. In the current study, young children's disruptive behavior, as rated by their parents, combined with additional information from the familial context was used (1) to identify children in need for a preventive intervention, (2) to optimize the predictive accuracy of the model used to identify children at risk, and (3) to identify indicators from the familial context that, in addition to the models used, could improve the correct identification of children at risk for future disruptive disorder.

Childhood disruptive behavior is a strong predictor for serious negative health and psychosocial outcomes. These outcomes include conduct disorder, antisocial behavior,

substance abuse, depression, poor school performance, school dropout and poor job performance (Caspi et al., 1998; Tremblay, Pihl, Vitaro, & Dobkin, 1994). Preventive interventions aim to intervene in the development of disruptive behaviors at an early stage, before the behavioral patterns found in the home context become more strongly integrated in the broader social context of school and deviant peers (Coie et al., 1992; Patterson et al., 1992).

Three types of preventive programs are described by the Institute of Medicine (1994): *universal* preventive interventions, which focus on an entire population, *selective* or *targeted* interventions, which focus on subgroups of children in need for intervention, and *indicated* interventions, which focus on children with detectable symptoms that presage mental disorders. Both universal and selective preventive programs aim at preventing the early development of mental disorders. These programs include parent- and family-oriented programs, aimed at the interaction between the parent and the child within the family context, social-cognitive programs, focussing on the relation between cognition, affect and behavior, and peer- and school-based preventive intervention programs, focussing on the role of peer relations and school performance in the development of disruptive disorder (Offord & Bennett, 1994). Programs have used both universal approaches (Dolan, Kellam, Brown, Werthamer-Larsson, & et al., 1993; Hawkins et al., 1991; Jalongo et al., 1999; Kellam et al., 1994; Muthén et al., in press) or selective approaches (Conduct Problems Prevention Research Group, 1999a; Tremblay et al., 1991; Tremblay et al., 1995; Vitaro & Tremblay, 1994). Indicated interventions resemble treatments for mental disorders. Their objective is to prevent further development to a complete and possible chronic mental disorder.

Selective preventive interventions have the advantage over universal programs in that they are more efficient since they focus only on children in need of the interventions (Offord, Kraemer, Kazdin, Jensen, & Harrington, 1998). However, selective interventions rely on the correct identification of children at risk for future disruptive disorder. When screening for children at risk for disruptive disorders, it is common practice to define high- and low-risk groups on a single criterion, namely the presence of externalizing symptoms above a pre-specified cutoff score. Bennett et al. (1998) explored the predictive accuracy of 17 studies and concluded that sensitivity and specificity were so low that, given the prevalence of disruptive disorder, the positive predictive value was likely to be below 50%. Consequently, the majority of the children identified at risk at the screen were either false-positive or false-negative. False-positive cases are unnecessarily exposed to the

intervention and the risks associated with labeling. False-negative cases do not receive the intervention they could benefit from.

Using a cutoff on total scores has a number of limitations. First, it may result in detection artifacts (Caron & Rutter, 1991). For instance, when using a cutoff on a total score on a measure of externalizing behavior reflecting multiple constructs of disruptive behavior, e.g. symptoms of DSM-IV Conduct Disorder (CD), Oppositional Defiant Disorder (ODD) and Attention-Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association, 1994), an over-inclusion of children with few or moderate symptoms on a number of different syndromes but not necessarily at a pathological level, over children with symptoms of only one disorder is possible. This can be overcome by using symptoms of one single disruptive disorder (e.g. only aggression) which may, however, result in missing valuable information. The presence of ADHD for example, predicts early onset of CD (Lahey et al., 1999; Loeber et al., 1995) and CD is more persistent when it co-occurs with ADHD (Moffitt, 1990). ODD is a developmental precursor of CD (Lahey, Applegate, Barkley, Garfinkel, & et al., 1994). Second, cutoff scores by definition subdivide the sample in two groups: children at high- or low-risk for disruptive disorder. More groups differing in risk profiles may well be found in the sample. The application of Latent Class Analysis (LCA; for description of LCA, see method section) may be a more flexible approach. In LCA, children are classified to (latent) classes directly by the model, thus overcoming the use of predetermined cutoff points. The patterns of disruptive behavior for each identified class are given by the model. These patterns provide detailed insight in the disruptive behaviors of children in each of the classes and may include multiple constructs of disruptive behavior. This is an advantage over regression analyses or logistic regression analyses that use total scores or cutoff scores which do not give this detailed information. Risk-status for each of the classes can be identified by examination of the disruptive behavior patterns of the children in the classes and by relating the classes to outcomes.

In addition to symptoms of disruptive behavior, other child characteristics and familial factors are associated with future symptoms of disruptive disorders. Boys are more at risk for disruptive disorders than girls (Zoccolillo, 1993). Low social-economic status and poor parenting practices (Farrington, 1993; Shelton, Frick, & Wootton, 1996), family stress (Verhulst & van der Ende, 1997), parental psychopathology, and stressful life events (Florsheim et al., 1998) are associated with disruptive problem behavior. Bennett et al. (1999) showed the inclusion of covariates to improve the predictive accuracy for future disruptive behavior in high-risk children.

Following the above outlined procedure, Van Lier, Verhulst, van der Ende and Crijnen (in press) submitted parent-reported problem behavior items reflecting symptoms of DSM-IV defined disruptive disorders (CD, ODD and ADHD; from this point on referred to as Conduct problems, ODD problems and ADH problems) to Latent Class Analyses. One class of children who were high on disruptive behavior and had problematic outcomes were identified in addition to two classes of children that were considered to be at low risk. Children in the high-risk class were of lower SES, were predominantly boys, and evoked higher levels of parenting stress in their parents than children in other classes.

In addition to the inclusion of child and familial factors as covariates in the classification of children, other factors in the child and familial domain can be applied in a multiple gating procedure (Loeber, Dishion, & Patterson, 1984). The classification of children in the high- or low-risk group could serve as the first gate. Aggravating child, familial and environmental factors could serve as the second gate. Lochman (1995) used a multiple gating procedure and concluded that the inclusion of a second gate did improve the predictive accuracy.

In the current study, young children's disruptive behavior as rated by their parents on a one-year interval was studied to answer the following questions: (1) what is the predictive accuracy of a parent-screen measuring disruptive behavior for identifying children at risk for future disruptive behavior; (2) does the inclusion of covariates improve the predictive accuracy for the identification of children at risk? We hypothesized that adding information from the child and family context would result in an improved predictive accuracy of identifying children with stable, high levels of disruptive behavior. Predictive accuracy will be studied in terms of sensitivity, specificity, positive predictive value and negative predictive value. Then children classified incorrectly (false-positives, false-negatives) were compared to adequately classified children (true-positives, true-negatives) to answer two additional questions: (3) can false-positively classified children be discriminated from true-positive children and can true-negatively classified children be discriminated from false-negative children in terms of latent class membership and level of disruptive behavior and if so, (4) are there any indications in the familial context to improve screening through a multiple gating procedure?

## Methods

### *Study Sample*

As part of a school based preventive intervention study targeting disruptive behavior in a sample of young elementary schoolchildren, 13 schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999 (Van Lier, Verhulst, van der Ende, et al., in press). The original target sample consisted of 794 first grade children. Since the project has a longitudinal design, only the 722 children who moved on to second grade were eligible for inclusion. In addition, 22 children who repeated in second grade were included in the sample, making the total sample 744 children. All 744 parents or parent substitutes were approached and 622 (83.6%) agreed to participate in the study. 69% of the children were Caucasian. 51% of the children were male which was the same for Caucasian or non-Caucasian children ( $\chi^2 = 4.67$ ;  $df = 7$ ;  $p > .05$ ).

### *Measures*

At *parent-screen* and *one-year follow-up* the following questionnaires were rated by the parent:

*Children's disruptive behavior.* Children's problem behaviors over the last 6 months were rated on the Child Behavior Checklist/4-18 (CBCL-4/18; Achenbach, 1991a) which contains a list of 120 behavior items. Parents rate their child's behavior on a three point scale (0 = not true, 1 = somewhat true, 2 = very true or often true). The CBCL has been translated and validated for use in the Netherlands (Verhulst et al., 1996).

*Socioeconomic status* was scored on the basis of current parental occupation and highest level of education completed. Socioeconomic status was coded as 1 = low, 2 = intermediate and 3 = high socioeconomic status (Netherlands Central Bureau of Statistics, 1993).

*Familial factors.*

*Parental stress around parenting.* Parents completed the Nijmegen Parenting Stress Index (NPSI), which is the Dutch version of Abidin's Parenting Stress Index (Abidin, 1983) measuring the level of parental stress originating from several child and parent characteristics within the caregiver context (De Brock et al., 1992). The items are scored on a 6-point Likert scale, ranging from completely agree to completely disagree. The short, 25 item form was applied. For the present article, only the 14 items assessing parental

stress originating from the child's behavior or temperament (De Brock et al., 1992) were included in the analysis. Cronbach's alpha, derived from the sample at baseline, was .88.

*Parental psychopathology* was assessed with the Dutch translation of the General Health Questionnaire-28 item version (GHQ-28; Goldberg, 1972; Koeter & Ormel, 1991). The GHQ-28 consists of four seven-item scales measuring Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression in which the parents rate their own health over the last two weeks on a 4 point likert scale. Following Goldberg and Williams' (1988) procedure for scoring the 28-items GHQ, the scoring was transformed into a yes/no format by re-coding 0 (better than usual) and 1 (same as usual) into 0 (no) and 2 (worse than usual) or 3 (much worse than usual) into 1 (yes). Then all items were summed to a total score.

*Parenting practices* were assessed with the global report form of the Alabama Parenting Questionnaire (APQ; Shelton et al., 1996). The APQ is a 42-item questionnaire in which parents rate on a 5-point Likert scale how often they display the described parenting behavior. The APQ consists of 5 parenting domains: Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline and Corporal Punishment. The 7 items of the Other Discipline Practices were not included in the study. High scores represent better scores for the Involvement and Positive Parenting scales and poorer scores for the other three scales.

*Life events* were rated on the Life Events Questionnaire (LEQ; Berden, 1992). Parents filled out a questionnaire containing 10 stressful life events. All 10 items state or imply a negative event. The items had a yes/no format to indicate whether or not an event had occurred during the last five years at the *parent-screen*. The item scores were summed to a total life-event score.

### *Procedures*

The first assessment (from this point on indicated as *parent-screen*) was conducted in the spring/early summer of 1999. All parents were visited at home for an interview. Fifteen interviewers were trained to provide information to the parent, to obtain informed consent and to conduct a structured interview. During the interview, all questions were read aloud and parents responded. Interviews with immigrant parents were conducted in their native language. Mean age of the children was 6.9 years (SD 0.6) at the *parent-screen*.

One year after the screen, parents were approached for the second assessment (from this point on indicated as *one-year follow-up*) following the same procedure. 26 out of 622 families had moved to another school, making the target sample for the follow-up 596 children. Parent interviews of 560 children (94%) were completed. This was 75% of the total sample (744). Characteristics of responders and non-responders were compared. For the child characteristics, mean disruptive behavior scores were compared using Analyses of Variance (ANOVA). No differences were found. Non-responding parents were more likely to be unemployed or single mother families than responders at *parent-screen*. For 471 of the 560 children (84%), the interview was conducted with the same parent at both assessments. The mean follow-up interval was 355 days (SD 45 days). Parents received a gift certificate of 10 Dutch guilders for their cooperation with the interview.

### *Defining Risk status at parent-screen and at one-year follow-up*

High-risk status was defined as being in the high disruptive (latent) class at *parent-screen*. Children were classified to this class through Latent Class Analyses. CBCL items rated as very consistent with DSM-IV categories by 22 experienced child psychiatrist and psychologists from 16 cultures were used (Achenbach & Rescorla, 2001). CBCL items were dichotomized, where 0 = not true and 1 = somewhat/sometimes or very/often true. Items with a frequency of less than 2.5% were excluded. Low frequencies caused problems during the latent class analyses. In the present study, seven items (*Cruelty to animals, sets fires, steals at home, steals outside the home, truancy skips school, threatens people, vandalism*) were excluded. The remaining items were submitted to a confirmatory factor analyses to determine whether the three dimensions of interest in this study (Conduct Problems, Oppositional Defiant Problems and Attention Deficit Hyperactivity Problems) could be extracted. Items with a factor loading below 0.4 were excluded, which resulted in the exclusion of the item 'Runs away from home'. For a more detailed description of the procedure, see chapter 2.

Confirmatory factor-analyses on the remaining 18 items indicated the existence of three dimensions of disruptive behavior both at *parent-screen* (CFI=.97, TLI=.98, RMSEA=.04) and *one-year follow-up* (CFI=.98, TLI=.98, RMSEA=.04), Children with similar patterns of behavior were identified by Latent Class Analysis. Then covariates were included in the estimation of the model (LCA with covariates; Dayton & Macready, 1988) only if they were related to class-membership at a  $p < .05$  level and only if they improved

model fit (determined through the loglikelihood chi-square difference test). Socioeconomic status, gender and parental stress due to the child's behavior were related to class membership, improved model fit, and were subsequently included.

Risk status at *one-year follow-up* (indicated as *poor-outcome*) was defined as being in the high disruptive behavior (latent) class at the *one-year follow-up*. To ensure comparability with the *parent-screen*, the same covariates were included in the estimation of the model at *one-year follow-up*.

### *Latent Class Analyses*

Latent Class Analyses (McCutcheon, 1987) describe the probabilities of a set of observed categorical variables across groups of individuals when group membership of the individuals is unknown. The primary objective of LCA is to find the smallest number of classes of individuals with similar patterns of disruptive behavior that can explain the relationships among a set of observed variables. In the analysis, classes are added stepwise until the model fits the data well. Since models with a different number of latent classes are not nested, the usual Chi-square difference test cannot be used. Instead a Bayesian Information Criterion (BIC; Kass & Raftery, 1993; Schwartz, 1978) was used. Lower BIC values indicate improvement over the previous model with k-1 latent classes. The estimated parameters of the latent class model are latent class membership probabilities, which give the probability for an individual to belong to each of the classes, and class-specific symptom endorsement profiles, which give the conditional probabilities for individuals in a particular class to endorse any specific item. LCA with covariates is an extension to normal LCA in that covariates are included in the estimation of the model. Latent Classes Analyses were conducted using Mplus version 2.02 (Muthén & Muthén, 2000b).

## **Results**

### *Data-analytic approach*

The following procedure was used. First, children's risk status was determined on disruptive behavior items with and without additional covariates at *parent-screen*. The same procedure was followed to determine poor-outcome at *one-year follow-up*. Second, predictive accuracy was studied. Third, true-positive (high-risk at *parent-screen* and poor-outcome at *one-year follow-up*), true-negative (low-risk and adequate outcome), false-

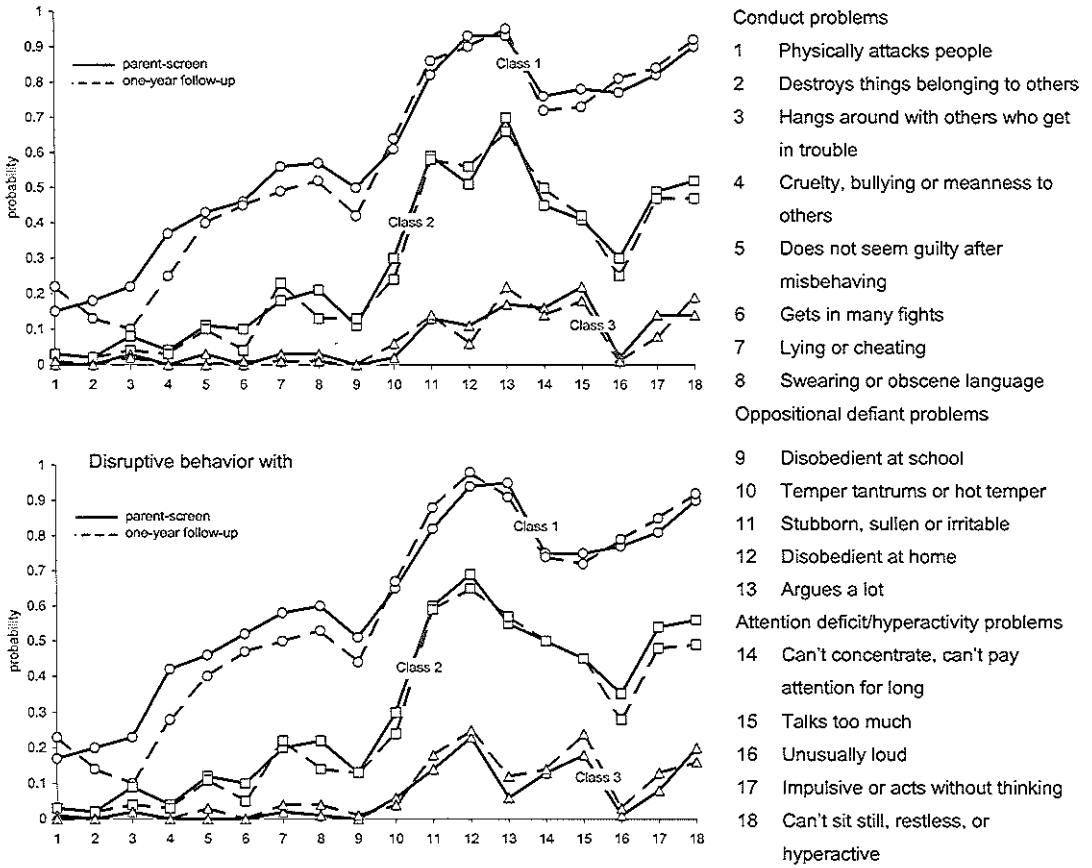


positive (high-risk but adequate outcome) and false-negative (low-risk but poor-outcome) classified children were compared on latent class membership and on observed disruptive behavior to explore whether these groups of children could be discriminated despite their classification to a latent class. Fourth, additional family factors were used to examine whether screening could be improved through a multiple gating procedure.

Approximately half of the children received a school based universal preventive program targeting disruptive behavior. Classrooms were randomly appointed to either the intervention or control condition. Means of the parent reported behavior scales and familial factors or covariates for intervention versus control children were compared using Analyses of Variance (ANOVA). No significant differences were found between intervention and control children at *parent-screen* or *one-year follow-up* (results available by the authors upon request).

#### *(1) Determination of risk status at parent-screen and one-year follow-up*

First, the model on disruptive behavior only was analyzed. At the *parent-screen*, BIC values indicated that a three-class solution would best fit the data. Moving from two to three classes resulted in a BIC drop of 91 points. Using Schwartz' (1978) and Kass and Wasserman's (1995) method for calculating the Bayes factor, this resulted in a Bayes factor  $< 1/10$ . According to Jeffrey's scale for evidence of Bayes factors (Wasserman, 1997), this is strong evidence for model improvement. BIC increased with 48 points when moving to a four class solution, resulting in a Bayes factor  $> 10$  which is strong evidence against the four class model. Then the model on disruptive behavior including covariates was tested. Gender, socioeconomic status and parenting stress improved model fit ( $\chi^2 = 175.60$ ;  $df = 6$ ;  $p < .05$ ), were significant at  $p < .05$ , and were included in the 3 class model. To control for shrinkage, the beta's of the covariates found in the entire sample, were cross-validated in two randomly drawn sub-samples. First, the beta's of the covariates were freely estimated in the sub-samples. Then, the beta's of the covariates were fixed at the values found in the entire sample. Loglikelihood chi-square difference test indicated that the models with freely estimated beta's of the sub-samples were similar to the models with the beta's fixed at the values found in the entire sample (sub-sample 1:  $\chi^2 = 3.35$ ;  $df = 6$ ;  $p > .05$ ; sub-sample 2:  $\chi^2 = 6.32$ ;  $df = 6$ ;  $p > .05$ ). Membership of this class was predicted by being boy, by lower socioeconomic status, and by higher parental stress scores.



**Figure 3.1** Disruptive behavior endorsement profiles for children for model on disruptive behavior only (top), and for model on disruptive behavior with covariates (bottom) for the *parent-screen* and *one-year follow-up*. Children in class 1 are considered at risk for disruptive disorder; children in class 2 and 3 are considered at low- or no-risk for disruptive disorder.

Children were classified to a latent class based on their highest estimated class probability. Symptom endorsement profiles for models with and without covariates are presented in figure 3.1. The endorsement profiles of children were highly comparable. Children in class 1 have high probabilities for ODD problems (range of probabilities: .51 - .95) and ADHD problems (.75 - .90) and intermediate probabilities for Conduct problems (.17 - .60).

To assess the risk status, children in the borderline range (*T* score 60-63) and above the clinical cutoff (*T* score > 63) on the CBCL Externalizing scale were identified. Scores in the deviant range on the CBCL are predictive for future poor outcomes such as

academic problems, school behavior problems, use of mental health services and police contacts (Verhulst et al., 1994). Percentages of children above the clinical cutoff or borderline range were similar for models with and without covariates. Therefore, only outcomes for the model based on disruptive behavior with additional covariates are given (Table 3.1). Of children in class 1, 63% were scored above the clinical cutoff and 17% in the borderline range of the CBCL Externalizing scale, which is approximately 4 to 5 times higher than found in a representative sample of children from the Dutch general population (Verhulst et al., 1996). Children in class 1 were regarded as highly disruptive currently and at risk for high levels of disruptive behaviors in the future (Loeber et al., 1995; Van Lier, Verhulst, van der Ende et al., in press) and were identified as high-risk children at the *parent-screen*.

**Table 3.1** Mean level of Conduct problems, ODD problems, ADH problems and percentages of children above CBCL clinical cut-off and in borderline range for *parent-screen* and *one-year follow-up* for model on disruptive behavior with additional covariates

| Class                    | parent-screen |            |            | one-year follow-up |           |            |      |            |     |     |
|--------------------------|---------------|------------|------------|--------------------|-----------|------------|------|------------|-----|-----|
|                          | 1<br>n=97     | 2<br>n=287 | 3<br>n=176 | 1<br>n=105         |           | 2<br>n=268 |      | 3<br>n=187 |     |     |
| CBCL-DSM-IV categories   |               |            |            |                    |           |            |      |            |     |     |
| Conduct problems         | 3.3 (1.5)     | 0.8 (0.9)  | 0.1 (0.4)  | 2.7 (1.7)          | 0.7 (0.9) | 0.1 (.02)  |      |            |     |     |
| ODD problems             | 3.9 (0.8)     | 2.3 (1.1)  | 0.6 (0.8)  | 3.9 (0.9)          | 2.2 (1.2) | 0.5 (0.7)  |      |            |     |     |
| ADH problems             | 4.0 (1.0)     | 2.4 (1.3)  | 0.7 (0.8)  | 4.1 (1.0)          | 2.2 (1.3) | 0.6 (0.8)  |      |            |     |     |
| CBCL borderline/clinical |               |            |            |                    |           |            |      |            |     |     |
| Externalizing (%)        | C 63          | B 17       | C 4        | B 10               | C 0       | B 1        | C 55 | B 23       | C 3 | B 8 |
|                          |               |            |            |                    |           |            |      |            |     |     |

*Note:* Standard deviation in parentheses; C = clinical range; B = borderline range; ODD problems = Oppositional Defiant Disorder problems; ADH problems = Attention Deficit Hyperactivity problems; CBCL = Child Behavior Checklist. Means for Conduct problems, ODD problems and ADH problems between latent classes were compared using Bonferroni multiple comparisons. All means were significantly different at  $p < .01$

At *one-year follow-up*, BIC values indicated that a three-class solution would best fit the data and the same three covariates were included. Children in class 1 had high probabilities for ODD problems and ADH problems and intermediate probabilities for Conduct problems. Of these children, 55% were scored above the clinical cutoff and 23%

in the borderline range of the CBCL Externalizing scale, which was similar in the model with and without covariates.

The major difference between the models with and without covariates was that more children were classified in class 1 by the model without covariates, both at *parent-screen* (113 vs 97) and *one-year follow-up* (120 vs 105). At both the *parent-screen* and *one-year follow-up*, children in the other two classes had disruptive behavior profiles showing no Conduct problems and intermediate or low levels of ODD problems and ADH problems. The percentage scoring above the borderline cutoff on CBCL Externalizing scale was approximately similar to that found for children in the general Dutch population for children in class 2, whereas for children in class 3 this percentage was much smaller (Verhulst et al., 1996). Children in classes 2 and 3 were considered to be at low or no risk for future disruptive disorder (Verhulst et al., 1996). At the *parent-screen* and *one-year follow-up* approximately 50% and 30% of the total sample were in class 2 and class 3 respectively. Categorization to classes of disruptive behavior was the same for children in the intervention and control condition at *parent-screen* ( $\chi^2 = 1.12$ ;  $df = 2$ ;  $p > .05$ ) and *one-year follow-up* ( $\chi^2 = 1.29$ ;  $df = 2$ ;  $p > .05$ ) for the model based on disruptive behavior only, and at *parent-screen* ( $\chi^2 = 2.92$ ;  $df = 2$ ;  $p > .05$ ) and *one-year follow-up* ( $\chi^2 = 0.11$ ;  $df = 2$ ;  $p > .05$ ) for the model with covariates.

## *(2) Predictive accuracy for model without covariates*

The predictive accuracy of identifying children at risk for disruptive disorder was studied by comparing the classification at *parent-screen* and at *one-year follow-up*. Results are given in Table 3.2. Of the 120 children with a poor-outcome at *one-year follow-up*, 69 were identified as being at risk at *parent-screen* (true positive), and 51 were not identified as being at risk (false negative). This resulted in a predictive sensitivity (children with problematic outcome at *one-year follow-up* and identified at risk at parent screen) of 58%. Of the 440 children with adequate outcome, 396 had no risk indication at the *parent-screen* (true negative), resulting in a specificity (children with adequate outcome and not at risk) of 90%. Of the 113 children identified at risk at *parent-screen*, 44 had an adequate outcome at *one-year follow-up* (false-positive), resulting in a Positive Predictive Value (PPV; children classified at risk at *parent-screen* and with a problematic outcome at one-year follow-up) of 61%. Of the 447 children with no risk at *parent-screen*, 396 had

adequate outcome, resulting in a Negative Predictive Value (NPV; children not at risk with adequate outcome) of 89%.

**Table 3.2** Children classified at risk at parent-screen and *one-year follow-up* and predictive accuracy for model on disruptive behavior and for model on disruptive behavior including covariates

| Model                            | parent-screen (n) |          | one-year follow-up (n) |    |          |     | predictive accuracy (%) |    |     |     |
|----------------------------------|-------------------|----------|------------------------|----|----------|-----|-------------------------|----|-----|-----|
|                                  | positive          | negative | problematic            |    | adequate |     | SE                      | SP | PPV | NPV |
|                                  |                   |          | TP                     | FN | FP       | TN  |                         |    |     |     |
| Disruptive behavior              | 113               | 447      | 69                     | 51 | 44       | 396 | 58                      | 90 | 61  | 89  |
| Disruptive behavior + covariates | 97                | 463      | 67                     | 38 | 30       | 425 | 64                      | 93 | 69  | 92  |

Note: TP = true positive; FN = false negative; FP = false positive; TN = true negative; SE = sensitivity; SP = specificity; PPV = positive predictive value; NPV = negative predictive value.

#### *Predictive accuracy by including covariates.*

105 children were in the poor-outcome class at *follow-up* of whom 67 were identified as being at risk at *parent-screen* resulting in 38 false negative classified children (sensitivity 64%). Of the 455 children with adequate outcome at *follow-up*, 425 had no risk indication at the *parent-screen* resulting in a specificity of 93%. Of the 97 children at risk at *parent-screen*, 30 had an adequate outcome, resulting in a PPV of 69%. Of the 463 children with no risk, 425 had adequate outcome, resulting in a NPV of 92%. Predictive accuracy improved from 61% to 69% when covariates were included despite the decrease of the prevalence of children at risk. Therefore, the model based on disruptive behavior with additional covariates was used for the remaining of the analyses.

### *(3) Screen misclassification: comparing true positive and true negative versus false positive and false negative classified children*

#### *Classes of disruptive behavior and screen misclassification.*

Figure 3.2 shows how children persist in or change from latent classes from *parent-screen* to *one-year follow-up*. Almost all of the 30 false-positive children (22 + 8) moved from the high-risk class at *parent-screen* to the low-risk class 2 at *follow-up*; only 7 children moved from class 1 at *parent-screen* to class 3 at *follow-up*. A similar change in risk-status was found for false-negative children who were predominantly in class 2 at *parent-screen* (37 out of 38; 97%). 250 of the 425 (59%) true-negative children compared to 97% of the false

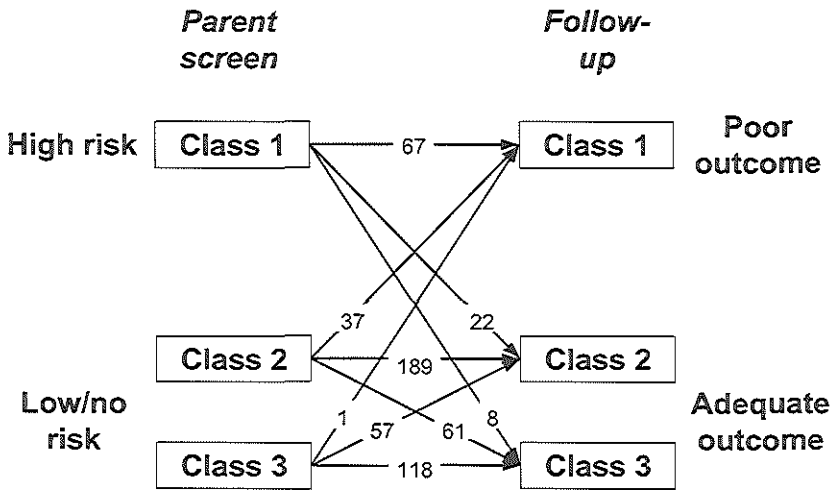


Figure 3.2 Number of children that persist in or change from latent class between parent-screen and one-year follow-up.

negative children were in class 2 at *parent-screen*. Persistence in classes of disruptive behavior was similar for children in the intervention as for children in the control condition ( $\chi^2 = 0.22$ ;  $df = 2$ ;  $p > .05$ ).

*Children’s observed behavior and screen misclassification*

True-positive and false-positive children had similar disruptive problem scores at *parent-screen* (Table 3.3, top). True-negative children had less ODD problems and ADHD problems, and lower total disruptive behavior scores than false-negative children. At *one-year follow-up*, false-negative children had less Conduct problems than true-positive children (Table 3, bottom). False-positive children had more ADHD problems and higher total disruptive behavior scores than true-negative children. Therefore, false-negative children seem to be less disruptive than true-positive children at *one-year follow-up* and false-negative children more disruptive than true-negative children at *parent-screen*.

**Table 3.3** Mean level and standard deviations of high disruptive class probability and parent rated disruptive behaviors for true-positive, false-positive, true-negative and false-negative classified children at parent-screen and one-year follow-up separately

| Parent-screen               | true positive | false positive | false negative         | true negative          |
|-----------------------------|---------------|----------------|------------------------|------------------------|
|                             | n=67          | n=30           | n=38                   | n=425                  |
| High-risk class probability | .94 (0.1)     | .92 (0.1)      | -                      | -                      |
| Conduct problems            | 3.4 (1.7)     | 3.1 (0.9)      | 0.7 (0.7)              | 0.6 (0.8)              |
| ODD problems                | 4.0 (0.8)     | 3.7 (0.9)      | 2.5 (1.1) <sup>a</sup> | 1.6 (1.3) <sup>a</sup> |
| ADH problems                | 4.1 (1.0)     | 3.7 (1.0)      | 3.2 (1.3) <sup>b</sup> | 1.6 (1.4) <sup>b</sup> |
| Total disruptive behavior   | 11.5 (2.2)    | 10.6 (1.6)     | 6.4 (2.1) <sup>c</sup> | 3.7 (2.5) <sup>c</sup> |

| One-year follow-up             | true positive          | false negative         | false positive         | true negative          |
|--------------------------------|------------------------|------------------------|------------------------|------------------------|
|                                | n=67                   | n=38                   | n=30                   | n=425                  |
| Poor-outcome class probability | .96 (0.1) <sup>d</sup> | .89 (0.1) <sup>d</sup> | -                      | -                      |
| Conduct problems               | 2.9 (1.8) <sup>e</sup> | 2.3 (1.5) <sup>e</sup> | 0.8 (1.1)              | 0.4 (0.7)              |
| ODD problems                   | 4.0 (1.0)              | 3.7 (0.8)              | 1.8 (1.4)              | 1.5 (1.3)              |
| ADH problems                   | 4.1 (1.0)              | 4.1 (1.2)              | 2.3 (1.6) <sup>f</sup> | 1.5 (1.4) <sup>f</sup> |
| Total disruptive behavior      | 11.0 (2.2)             | 10.1 (1.9)             | 5.0 (2.8) <sup>g</sup> | 3.3 (2.5) <sup>g</sup> |

Note: Identical letters in superscript within each row indicate that the groups differ significantly at  $p < .01$  in pair-wise comparison.

#### (4) Comparison of true positive, true negative, false positive and false negative classified children on measures within the familial context

Results are shown in Table 3.4. To improve screening through a multiple gating procedure, false-positive children have to be discriminated from true-positive children and false-negative children from true-negative children. Surprisingly, false-positive children obtained scores indicating significantly poorer functioning on the Positive Parenting and Poor Monitoring scales than true-positive children at *parent-screen*. False-negative children had scores indicating poorer functioning than true-negatives on Parental Involvement scale only. As shown in Table 3.5, the change in risk status from high-risk at *parent-screen* to low-risk at *one-year follow-up* of false-positive children was accompanied by a significant reduction in parental psychopathology, and improvements on Parental Involvement, Positive Parenting and Poor Monitoring scales. The change in risk status reflecting less adequate functioning of false-negative children from *parent-screen* to *one-*

year follow-up was accompanied by significant poorer functioning on the Poor Monitoring scale only.

**Table 3.4** Comparison of level of parenting behavior, life-events and parental psychopathology at parent-screen for true positive, false positive, false negative and true positive classified children base on disruptive behavior including covariates

| Familial context         | Disruptive behavior with covariates |                          |                         |                          | F      | df    |
|--------------------------|-------------------------------------|--------------------------|-------------------------|--------------------------|--------|-------|
|                          | true positive<br>n=67               | false positive<br>n=30   | false negative<br>n=38  | true negative<br>n=425   |        |       |
| Parenting:               |                                     |                          |                         |                          |        |       |
| Involvement              | 36.9 (5.8)                          | 33.8 (7.9) <sup>a</sup>  | 35.9 (6.4) <sup>b</sup> | 38.8 (5.5) <sup>ab</sup> | 10.9** | 3,556 |
| Positive Parenting       | 23.8 (3.6) <sup>a</sup>             | 21.5 (4.8) <sup>ab</sup> | 22.9 (3.9)              | 23.4 (3.5) <sup>b</sup>  | 3.0*   | 3,556 |
| Poor Monitoring          | 15.7 (5.1) <sup>a</sup>             | 20.0 (8.0) <sup>ab</sup> | 14.2 (3.3) <sup>b</sup> | 13.7 (3.4) <sup>a</sup>  | 26.2** | 3,555 |
| Inconsistent Discipline  | 16.9 (3.9) <sup>a</sup>             | 16.7 (2.6) <sup>b</sup>  | 15.0 (3.7)              | 13.6 (3.4) <sup>ab</sup> | 23.9** | 3,556 |
| Corporal Punishment      | 5.8 (2.0) <sup>a</sup>              | 5.4 (1.6)                | 5.0 (1.5)               | 4.8 (1.6) <sup>a</sup>   | 9.2**  | 3,555 |
| Life events              | 0.7 (0.9)                           | 1.1 (1.4) <sup>a</sup>   | 0.7 (1.1)               | 0.5 (0.9) <sup>a</sup>   | 5.1**  | 3,553 |
| Parental Psychopathology | 3.9 (5.1) <sup>a</sup>              | 3.8 (5.0)                | 2.9 (3.5)               | 2.3 (3.8) <sup>a</sup>   | 4.0**  | 3,556 |

Note: Standard deviations in parentheses. Identical superscript letters within each row indicate that the groups differ significantly at  $p < .05$  using Bonferroni multiple comparisons. \*  $p < .05$ , \*\*  $p < .01$

**Table 3.5** Comparison of level of parenting behavior and parental psychopathology at parent-screen and one-year follow-up false positive and false negative classified children

| Familial context        | false-positive |            |                    | false-negative |            |                    |
|-------------------------|----------------|------------|--------------------|----------------|------------|--------------------|
|                         | parent-screen  | follow-up  | t-value<br>(df=29) | parent-screen  | follow-up  | t-value<br>(df=37) |
| Parenting:              |                |            |                    |                |            |                    |
| Involvement             | 33.8 (7.9)     | 37.3 (6.8) | -2.9**             | 35.9 (6.4)     | 35.7 (6.0) | ns                 |
| Positive Parenting      | 21.5 (4.8)     | 23.3 (4.0) | -2.1*              | 22.9 (3.9)     | 22.6 (3.3) | ns                 |
| Poor Monitoring         | 20.0 (8.0)     | 17.0 (5.3) | 2.9**              | 14.2 (3.3)     | 15.3 (4.2) | -2.2*              |
| Inconsistent Discipline | 16.7 (2.6)     | 15.7 (2.9) | ns                 | 15.0 (3.7)     | 15.8 (3.2) | ns                 |
| Corporal Punishment     | 5.4 (1.6)      | 4.9 (2.1)  | ns                 | 5.0 (1.5)      | 5.3 (1.9)  | ns                 |
| Parental                | 3.8 (5.0)      | 1.6 (3.1)  | 2.9**              | 2.9 (3.5)      | 2.6 (4.5)  | ns                 |
| Psychopathology         |                |            |                    |                |            |                    |

Note: Standard deviations in parentheses. ns = not significant. \*  $p < .05$ , \*\*  $p < .01$



## Discussion

The predictive accuracy of procedures for identifying children at risk for disruptive disorder was examined in this study. Children in the high-disruptive class had a disruptive behavior endorsement profile and outcomes that placed them at risk for prolonged disruptive disorder. Children at risk were predominantly of lower SES, male gender and had higher ratings of parental stress once covariates were added to the model. Children in the second and third class of disruptive behavior were at low or at no risk for disruptive disorder in the future.

Based on items of disruptive behavior only, 61% of the 113 children identified at high-risk at *parent-screen* had a poor-outcome at *one-year follow-up*. When covariates were added, the predictive accuracy improved to 69% of children correctly classified. Predictive accuracy was improved despite a lower frequency of poor-outcome (21% vs 19%). This beneficial effect of including covariates in a screen for disruptive behavior syndromes is in accordance with other studies although the predictive accuracy was better than reported in any previous study (Bennett et al., 1999; Bennett et al., 1998).

The gain in accuracy once covariates were included has to be evaluated against the costs acquiring additional information. From a parsimony perspective it can be argued that the improvement in predictive accuracy is only marginal. The inclusion of covariates resulted in an improved PPV of 8 percent points, and a decrease in false-positives and false-negatives. In a multiple gating procedure, false-negative children at the first gate will be excluded from further investigation in subsequent gates and will not receive the intervention they could benefit from. Since the model with covariates resulted in a better predictive accuracy and in less false-negatives, this model is preferred over a model without covariates.

False-negatives and false-positives were compared to true-negatives and true-positives on the children's observed disruptive behavior and latent class membership. False-negatives were more disruptive than true-negatives at *parent-screen*. Moreover, false-negatives were almost all classified in the low-risk class 2 at the *parent-screen*. True-negatives had a much higher chance for being classified in the no-risk class 3. However, once the false-negatives were in the poor-outcome class (*one-year follow-up*), they had less Conduct problems than true-positives. This could imply that these children will not remain in this high-disruptive class over time. At *one-year follow-up*, false-positives almost all moved to the low-risk class 2, but they had higher disruptive behavior ratings than true-

negatives. This indicates that true-positives and true-negatives are at different risks for future disruptive disorder than false-positives and false-negatives with true-positives being at highest risk, false-positives and false-negatives at intermediate risk and true-negatives at lowest risk.

Loeber (1990) recommended multiple-gating procedures as cost-effective stepwise screening mechanisms to improve the identification of children at risk. One previously suggested gate is the assessment of risk factors in the familial context like parental psychopathology and child rearing practices (Lochman, 1995). No clear indications on what additional information from the familial context should be included to improve the classification were found in this study. At parent screen, true-negatives were different from false-negatives only on parental Involvement, but not on any other familial context factor, and surprisingly, false-positives had scores reflecting poorer functioning in the parenting scales Poor Monitoring and Positive Parenting than true-positives. Lower parental psychopathology and better parental child rearing styles accompanied the decline in disruptive behaviors of false-positives from parent-screen to follow-up. This indicates that the behavior of these children may be a reflection of troublesome contextual factors, which further reinforces the conclusion that false-positive children are at different risk for future disruptive disorder than true-positive children. However, the improved familial context could also be the *result* of the reduction in disruptive behavior of the child.

Aspects of the study deserve further comments. First, latent class analyses were applied twice to identify children at risk at *parent-screen* and children with poor-outcome at *one-year follow-up*. It would have been possible to use the disruptive symptom endorsement probabilities found at *parent-screen* to construct the screen at follow-up. However, Verhulst and Van der Ende (1995) reported that mean parent-reported children's problem scores decreased at a follow-up assessment which indicates that a second assessment is not directly comparable to the first one because of measurement or developmental influences. The application of LCA on both time points was thus necessary. Second, CBCL items were dichotomized with 0 = not true and 1 = 'somewhat/sometimes' or 'very/often true'. If we had considered the very/often true score reflecting the presence of behavior only, the 2.5% frequency criterion for inclusion of an item would have resulted in the exclusion of all but one of the Conduct problem items. Third, most children that switched from class over the follow-up period changed to a proximal status, i.e. from class 1 to class 2 and from class 2 to class 1. This would argue for relative small changes in behavior rather than substantial shifts in symptoms of disruptive behavior. A number of

findings argue against this. First, the total disruptive behavior scores of false-positive children dropped from 10.6 at *parent-screen* to 5.0 at follow-up, and the total disruptive behavior scores of false-negative children increased from 6.4 at *parent-screen* to 10.1 at *one-year follow-up*. This implies that children's change in behavior is really substantial when they change from class 1 to class 2 and vice versa. Second, children in class 2 may be considered qualitatively different from children in class 1 in that these children differ in the absence or presence of Conduct problems. Levels of Conduct problems of false-negative children increased approximately 3 times from *parent-screen* (0.7) to *one-year follow-up* (2.3) while the scores of ODD and ADH problems of false-negatives did increase over this period but much less than the Conduct problems did. Third, the percentages children in the borderline and clinical range on the CBCL Externalizing scale, was approximately 4 to 5 times higher for children in class 1 than in a representative sample of children from the Dutch general population. These percentages were comparable for children in class 2 versus children in the general population (Verhulst et al., 1996). A fourth comment relates to the time frame between *parent-screen* and *follow-up* of only one year. A longer follow-up period was not possible given the data available and actual poor outcomes related to disruptive behavior, such as school drop-out or police contacts, are not available since these children are still very young. Disruptive problem behavior at elementary school has proven to be highly predictive for poor outcomes in adolescence (Verhulst et al., 1994) and places these children at risk. Fifth, 298 children of the sample received a school-based preventive intervention targeting disruptive behavior. No differences were found between intervention children or control group children on any of the variables measured at home, and class-membership or screen-misclassification was the same for the school-based intervention and control-group children. Finally, not all parents participated in the follow-up interview. Parents who did not participate were more likely to be unemployed or from single-parent families at *parent-screen*. However, children were classified by their parent reported disruptive behavior, and these scores were similar for children who participated versus those who declined to participate at follow-up.

The results from this study have implications for the identification and allocation of children to preventive intervention programs targeting disruptive behavior. Although a 69% positive predictive value is high, which could argue for using a screening procedure combined with selective preventive interventions, some caution is warranted. It is not evident that characteristics of disruptive disorders meet all the criteria for being used in screening programs (Derogatis & Lynn, 1998). Screening was originally developed for

detecting the presence or absence of highly specific medical conditions, that could be detected in a benign pre-symptomatic stage and for which adequate treatment is available. Disruptive disorders, in contrast, lack this specificity and do not have unitary underlying conditions. Also, disruptive disorders do not have a well-delineated onset after which the disorder can be validly detected (Loeber et al., 1995; Loeber & Keenan, 1994). When considering this, it is of interest that approximately 17% of all children in this study were considered screen positives. Moffitt et al. (1996) found that approximately 7% of all males will develop life-course persistent antisocial conduct problems which means that the developmental trajectories of children currently identified as being at risk for future disruptive disorder do not all lead to these poor outcomes in adolescence and early adulthood.

It may be possible to further improve predictive accuracy with the currently available methods for screening of disruptive disorders. Information could be obtained from multiple informants to determine pervasiveness, or assessments can be repeated over time to determine persistence of problem behavior. Offord, Boyle, Racine, Szatmari et al. (1996) showed, however, that parents and teachers do not identify the same children as being at high-risk, and Bennett et al. (1999) reported that the inclusion of pervasiveness during screening did not improve predictive accuracy. Regarding recurrent assessments, Nagin and Tremblay (1999) examined the developmental trajectories of children with disruptive behaviors. The authors found stable, high levels of disruptive behavior in a small group of children. In addition, the authors identified a second group of children with high levels of disruptive behavior in young childhood but with declining levels at older ages. The finding from the current study that the disruptive behavior in false-positive and false-negative classified children possibly reflects poor familial contextual factors suggests that the inclusion of the developmental and interactional nature of disruptive behavior could improve predictive accuracy. Taking into account the developmental nature of disruptive behavior would imply postponing the introduction of selective preventive interventions which may negatively influence the malleability of disruptive problem behavior since children are longer exposed to the effects of displaying disruptive behavior (Patterson et al., 1992). A third possibility would be to combine screen- and outcome-measures with a universal intervention. True-positives are likely to be the ones with poor-outcomes despite the universal intervention (Offord et al., 1998).





# 4 | Risk-status and subsequent developmental trajectories for aggressive behavior in elementary-schoolchildren

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*Submitted for publication*

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## Chapter 4

# Risk-status and subsequent developmental trajectories for aggressive behavior in elementary-schoolchildren

### Abstract

*Expressions of conduct problems in young childhood that precede different developmental trajectories of aggression were studied. Conduct problems of 287 grade 1 children were rated by their teachers. Peer nominations of aggression were annually obtained from grade 1 to grade 3. Three developmental trajectories were identified: a high-increasers trajectory with children marked by physical aggression and intermediate levels of other conduct problems at baseline and a subsequent development of high levels of peer nominated aggression at onset and increasing levels throughout follow-up. A moderate-persistent trajectory with intermediate physical aggression and moderate but persistent levels of aggression over time. A third trajectory without conduct problems and normative development. Outcomes indicated children following the high-increasers trajectory at high risk for chronic aggressive behavior.*

### Introduction

Childhood aggressive behavior is a strong predictor for serious negative health and psychosocial outcomes. These outcomes include depression, conduct disorder, antisocial behavior, substance abuse, peer rejection, poor school performance, school dropout and poor job performance (Caspi et al., 1998; Tremblay et al., 1994). Despite the high stability of aggressive behavior from childhood into adolescence and young adulthood, many aggressive children will not persist in their behavior. Tremblay et al. (1999) reported for instance that 80% of all 17-months-old toddlers showed physical aggressive behavior, whereas Nagin and Tremblay (1999) found that only 4% of all boys have chronic physically aggressive behavior through adolescence. Moffitt et al. (1996) reported similar findings with only 7% of males developing life-course persistent antisocial conduct problems. The question arises how children with persistent forms of aggressive behavior can be identified as early as possible. Nagin and Tremblay (1999) identified for instance two groups of children with high levels of aggression in early childhood: one group with persistent high levels of physical aggression and a second group with declining levels of aggression when

children grow older. Mothers of children with stable high levels of aggression were less educated and more likely to be a teen-age mother than mothers of children with declining levels of aggression (Nagin & Tremblay, 2001)

Aggressive children display various forms of aggressive behavior. The criteria for DSM-IV Conduct Disorder (American Psychiatric Association, 1994), for instance, include behaviors reflecting physical aggression, destructive aggression, deceitfulness or theft and serious violations of rules. Nagin and Tremblay (1999) examined developmental trajectories of disruptive behavior and found that physical aggression best predicted serious delinquency in adolescence and Loeber et al. (1995) reported that physical aggression in young children best predicted Conduct Disorder in adolescence. To further our understanding of the development of aggressive behavior across childhood and to provide a firm base for prevention, we examined what expressions of conduct problems in young childhood were associated with different developmental trajectories of aggression. To examine this question information was required on (1) the various expressions of conduct problems in early elementary school, (2) the subsequent developmental trajectories of aggression that children follow and (3) the outcomes of these trajectories.

In studies on risk factors for aggression, emphasis has been given to child characteristics, like impulsivity and poor self-control, and parental characteristics, like poor parenting practices and parental psychopathology. It may well be, however, that the influence of the child's broader social context, referring to the interaction with classmates and peers, plays a crucial role in the emergence, the manifestation and the maintenance of aggressive behavior (Coie & Jacobs, 1993). Coie et al. (1991) showed that peers reinforce the aggressive child's acts of coercion, physical force and threats by backing down and allowing them to succeed. As a result, aggressive children believe that aggression has positive consequences, resulting in prolonged aggressive and coercive behavior. Non-aggressive peers become increasingly mistrustful of aggressive children and reject the aggressive child (Newcomb et al., 1993). The aggressive and disliked child is left with few social settings that provide correction on their behavior and ultimately drifts towards similarly deviant peers (Coie et al., 1992; Patterson et al., 1992). The responses of peers towards aggressive children initially result in positive outcomes for the aggressive child. The resulting behavioral patterns of coercion and aggression however lead to maladaptive associations with similarly deviant children (Warman & Cohen, 2000) and increasing antisocial and internalizing problems in the long-term (Coie et al., 1995; Jalongo et al., 1998; Pulkkinen & Pitkaenen, 1993).

Information about the characteristics of children differing in the risk for aggressive behavior and the trajectories along which these children will develop (risk-trajectories) is very helpful for our understanding of aggression and the effectiveness of preventive programs. First, the information will guide researchers in tailoring preventive interventions so that these programs will target specific expressions of aggressive behavior and the subsequent events characteristic for specific developmental trajectories. Second, knowledge about the association between trajectory and expected outcome will guide professionals in prevention and mental health by deciding on the type and intensity of the prevention program for these children. Third, targeted interventions use screening tools to identify children at risk for aggressive behavior to include these children in the program. According to Bennett et al. (1998) the predictive accuracy of screening methods is so low that these programs would miss the majority of the children in need of intervention.

In the present study the following questions were addressed: (1) how many and which classes of children differing in teacher rated conduct problems are identified in a general population sample of elementary schoolchildren? (2) How many and which developmental trajectories are identified in peer nominated aggression over a two-year period? (3) How are the classes of children differing in aggressive behavior connected with the subsequent developmental trajectories? (4) What are the outcomes of these developmental trajectories in terms of teacher rated problem behavior and peer sociometric status? In this study, peer nominations were used because they have a number of advantages over teacher or parent reports of aggression: they are based on multiple informants (Coie, Dodge, & Kupersmidt, 1990; Crick & Grotpeter, 1995), they are the reflection of the social context on the behavior of a child (Patterson et al., 1992), and they report about aggressive acts outside the presence of adults.

## **Methods**

### *Study Sample*

Analyses were performed on a control-group of children of a school based, preventive intervention study targeting disruptive behavior in young children in the Netherlands (Van Lier, Verhulst, van der Ende et al., in press). The 722 children who moved on from first to second grade were eligible for inclusion. Parents of 645 children (89.3%) signed a written informed consent granting their child's participation in the study. 69% of the children were Caucasian and 51% male.

Within one school, classes were randomly allocated to the intervention or control condition. 304 (47%) were control group children. After one-year intervention, the three grade 2 classes of one school were merged to two grade 3 classes during the summer break. At the start of grade 3, one class was randomly appointed to the intervention condition, which resulted in 17 children moving from a control-class to an intervention-class. These 17 children were excluded, making the sample 287 children. 46 children were lost to follow up because they left school or due to grade retention. Loss to follow-up was not related to gender of the child or teacher ratings of conduct problems. Peer nominated aggression scores at baseline were higher for children that were lost to follow-up ( $F(1, 286) = 6.454, p < .05$ ). Mean age of the children was 6.9 years (SD 0.6) at baseline.

### *Measures*

*Children's problem behaviors* over the last 2 months were assessed with the Teacher's Report Form (TRF/6-18; Achenbach, 1991b) which contains a list of 120 problem items. Teachers rate the child's behavior on a three point scale (0 = not true, 1 = somewhat true, 2 = very true or often true). The TRF has been translated and validated for use in the Netherlands (Verhulst, Van der Ende, & Koot, 1997).

*Peer nominations of aggressive behavior* were obtained through four behavioral descriptions. Children were asked to nominate all classmates of either sex that fit each of the four descriptions: 'starts fights', 'angers easily', 'says mean thing to peers' and 'is disruptive' (Coie & Dodge, 1988). The four scores were divided by the number of children in the class minus one (nominating yourself was not allowed) and then summed to a total score.

### *Outcomes*

*Problem behavior* in third grade was indicated by sum-scores and percentages of children in the borderline range or above the clinical cutoff on the TRF/6-18 Externalizing scale and total problems score.

*Peer Rejection* was based on a combination of liked-most and liked-least nominations. Children were asked to nominate the three children in their class who fitted these two descriptions best. Liked-most and liked-least scores were standardized within the classroom and standardized social preference scores were computed by subtracting the liked-most z score from the liked-least z score. This social preference score was then

standardized within the classroom. 'Rejected' children had social preference scores less than  $-1.0$  SD, standardized liked-most scores less than zero, and standardized liked-least scores greater than zero (Coie & Kupersmidt, 1983). All remaining children were 'not rejected'.

### *Procedure*

Teacher assessments were conducted in first grade (spring 1999) and third grade (spring 2001). Five forms with preprinted names were sent to the teacher per 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 five weeks. Teachers received a gift certificate of DFL 100,-.

Peer nominations were conducted annually by two trained research assistants starting in grade1 (spring 1999). Children filled out the peer nomination forms in groups of six in a separate place in the school, supervised by the research assistants. Children were separated to ensure that they would not influence peers while filling out the forms. Children were asked whether they understood the description and, if necessary, an example was given. All children in the study completed the peer nomination forms at baseline and at the two follow-up assessments.

### *Statistical approach*

To identify classes of children with different expressions of aggression at baseline, Latent Class Analyses (LCA; McCutcheon, 1987) were used. LCA describe the probabilities of a set of observed categorical variables across groups of individuals when group membership of the individuals is unknown.

Developmental trajectories were analysed using Growth Mixture Modeling (GMM; Muthen, 2001; Muthén & Muthén, 2000a; Muthen & Shedden, 1999). The objective of GMM is to find the smallest number of classes of individuals with similar developmental trajectories of aggressive behavior. GMM estimates mean growth curves, i.e. initial status (intercept) and change (slope), for each class of children and captures individual variation around these growth curves by the estimation of factor variances for each class.

GMM can be incorporated into a more general framework, General Growth Mixture Modeling (GMMM; Muthén & Muthén, 2000a), that allows combinations of models. In this framework, developmental trajectories (GMM) and distinct patterns of conduct problems

(LCA) are estimated simultaneously to identify patterns of young children's conduct problems at baseline that precede subsequent developmental trajectories of aggression.

For the LCA on items of teacher rated Conduct problems, the following procedure was used. TRF/6-18 items reflecting similar content as DSM-IV criteria for Conduct Disorder (American Psychiatric Association, 1994) were used in the analysis (Achenbach & Rescorla, 2001). Items were dichotomized where 0 = not true and 1 = somewhat/sometimes or very true or often true.

To explore the data, the number of classes in conduct problems at onset (LCA) and the number of developmental trajectories of peer nominated aggression (GMM) were identified separately. Then the LCA and GMM solutions were combined into one General Growth Mixture Model. The estimated parameters of the GGMM are: (1) latent class membership probabilities, which gives the probability for each individual to belong to each of the classes, (2) class-specific symptom endorsement profiles which give the probabilities for individuals in a class to endorse conduct problem items, and (3) means and variances of the growth factors (intercept and slope) for each of the classes.

The overall GGMM and separate LCA and GMM were analyzed with Mplus 2.02 (Muthén & Muthén, 2000b). The Mplus missing data module was used to optimally use the data available and to take into account that children that were lost to follow-up had different levels of initial peer nominated aggression than the remaining children.

Three different considerations may be used in deciding on the optimal number of classes (Muthén & Muthén, 2000a, 2000b). The first is Bayesian Information Criterion (BIC; Kass & Raftery, 1993; Schwartz, 1978) and lower BIC values indicate improvement compared to the previous model which one class less. The second is the classification quality of the model; high average posterior probabilities indicate that the model is well able to classify each child to one particular class. The third is the usefulness of the classes, which can be determined by comparing development trajectories, number of children in each class and differences in outcomes between classes.

## Results

Frequency of occurrence of 'somewhat/sometimes' or 'very true or often true' for TRF/6-18 Conduct problems are displayed in Table 4.1. Mean peer nominated aggression scores for all children was .73 at baseline, .83 at one-year follow-up and .64 at outcome. The correlation between teacher rated Conduct problems and peer nominated aggression

**Table 4.1** Frequency of occurrence of TRF/6-18 Conduct problem items

| TRF item   | %  |
|--|----|
| 26. Does not seem to feel guilty after misbehaving (NoGuilt) | 18 |
| 57. Physically attacks people (Attacks)                      | 15 |
| 37. Gets in many fights (Fight)                              | 14 |
| 16. Cruelty, bullying or meanness to people (Mean)           | 14 |
| 43. Lying or cheating (LieCheat)                             | 13 |
| 39. Hangs around with others who get in trouble (BadComp)    | 8  |
| 90. Swearing or obscene language (Swears)                    | 6  |
| 97. Threatens people (Threat)                                | 4  |
| 101. Truancy or unexplained absence (Truant)                 | 3  |
| 82. Steals (Steals)  | 2  |
| 21. Destroys property belonging to others (DestOthr)         | 2  |
| 73. Behaves irresponsibly (Irrespons)                        | 2  |

Note: Names in parenthesis are abbreviations used in figure 4.1 (top).

ranged from .48 to .60 ( $p < .01$ , two-tailed).

The optimal number of classes on teacher rated conduct problems was identified. LCA indicated a two class (BIC 1444; sample size adjusted BIC 1364) or three class solution (BIC 1469; adjusted BIC 1348) to best fit the data. The percentages of children in the classes were 6, 12 and 82 for the three-class solution.

Exploration of the peer nomination data indicated that fixing the variances of the observed peer nomination scores to be equal over time improved model fit. Following the procedure described by (Muthén & Muthén, 2000b) to find the optimal number of developmental trajectories, the variances of the continuous growth factors and the covariance between the growth factors were initially set to zero. A three-class (BIC 1198, adjusted BIC 1168) or four-class model (BIC 1177, adjusted BIC 1139) best fitted the data. The difference between the three and four class solution was an additional class with only 4.5% of the children. Allowing for random variation of the growth factors in the four-class model resulted in non-converged solutions and it was concluded that the fourth trajectory class was accounted for by the random variation in the growth factors in the three-class model. Therefore the model with three developmental trajectories was chosen. Percentages of children in the three classes were 5, 22 and 74. Since LCA and GMM analyses both pointed towards three classes, these models were combined in a three class GGMM.

In the GGMM, starting values generated in the separate analyses were used. Variances of the growth factors and covariance between the growth factors were initially set to zero. Based on likelihood ratio chi-square testing, the variance for the intercept and covariance between the intercept and slope for the overall model were freed and it was found that the variances for the intercept and slope for class 1 needed to be different from the overall model. The average class-membership probability for the final model was .99 for children in class 1, .95 for children in class 2 and .98 for children in class 3 indicating that the final model classified all children to one of the classes with high precision.

### *Developmental trajectories and conduct problem endorsement profiles*

Seven percent of all children were classified in class 1 (Table 4.2) and 74% were boys. These children had on average 7.0 out of 12 Conduct problem items endorsed by their teachers in grade 1. Symptom endorsement profiles for the three classes are in Figure 4.1 (top). Children in class 1 were marked by physical forms of conduct problems, especially '*Physically attacks people*', '*Cruelty, bullying, or meanness to others*' and '*Gets in many fights*'. The probabilities for having these items endorsed were above .9, which means that almost all of the children in this class showed these forms of conduct problems at baseline. Children in class 1 had intermediate (*Lying or cheating, swears*) and low (*Truancy or unexplained absence*) probabilities for items reflecting more covert forms of conduct problems.

**Table 4.2** Number, gender distribution, mean Conduct problems and mean Peer-nominated aggression for High-increasers, Moderate-persisters and Normative children

| Class               | children |    |       | TRF Conduct Problems   | Peer-nominations (max = 4) |                        |                        |
|---------------------|----------|----|-------|------------------------|----------------------------|------------------------|------------------------|
|                     | n        | %  | % boy | Baseline<br>(max = 12) | baseline                   | one year<br>follow-up  | two year<br>follow-up  |
| High-increasers     | 19       | 7  | 74    | 7.0 (1.5) <sup>a</sup> | 1.9 (0.8) <sup>a</sup>     | 2.3 (1.0) <sup>a</sup> | 2.5 (0.9) <sup>a</sup> |
| Moderate-persisters | 41       | 14 | 73    | 2.9 (1.4)              | 1.3 (0.7)                  | 1.5 (0.7)              | 1.2 (0.7)              |
| Normative children  | 227      | 79 | 45    | 0.2 (0.4)              | 0.5 (0.4)                  | 0.6 (0.6)              | 0.4 (0.5)              |

Note: TRF= Teacher's Report Form. Standard deviations in parentheses. <sup>a</sup> Mean scores are different at  $p < .01$  for all three classes using Bonferroni multiple comparisons.



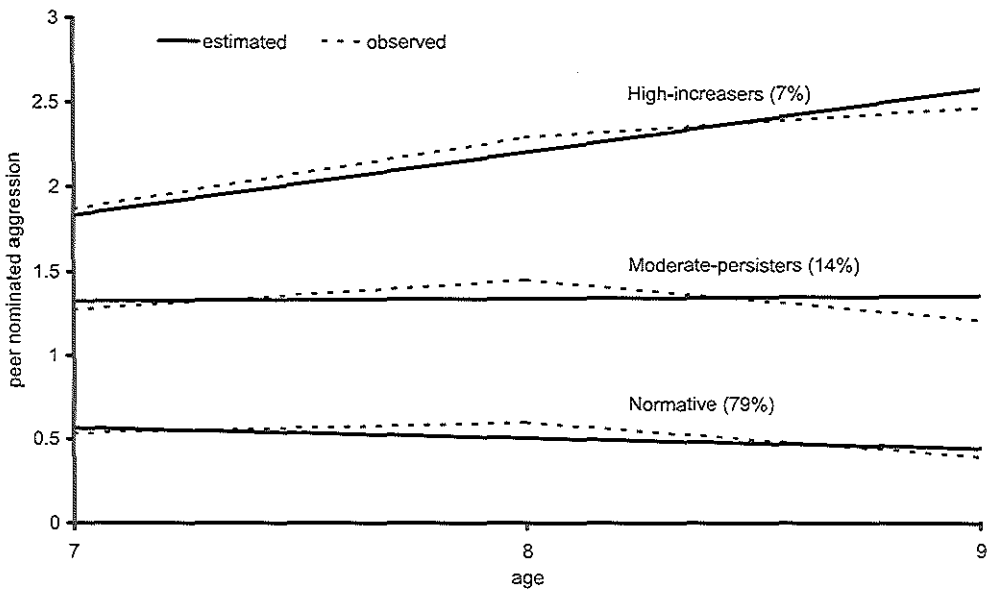
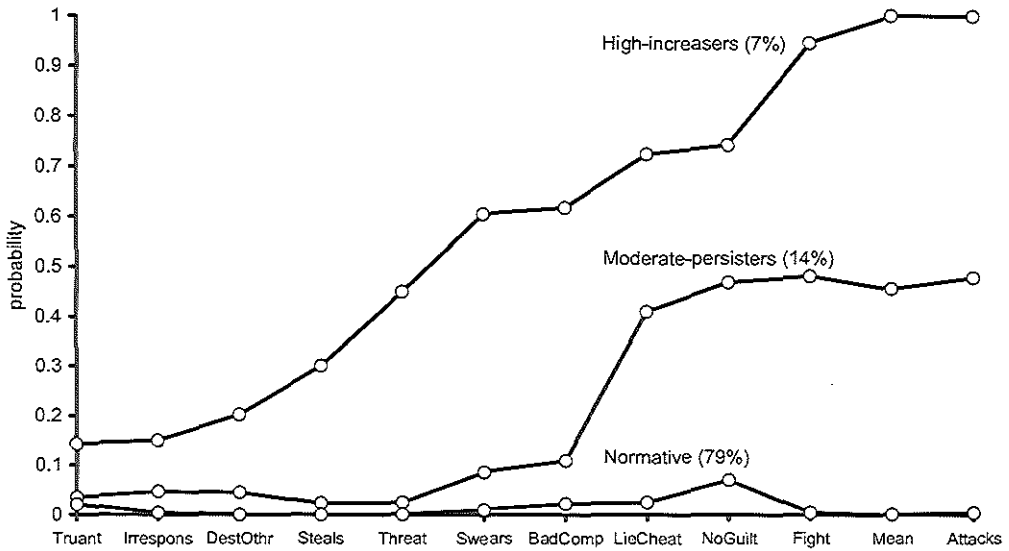


Figure 4.1 Results of the GGMM: conduct problem endorsement profiles (top) and subsequent developmental trajectories (bottom) for High-increasers, Moderate-persisters and Normative children

The developmental trajectories of peer nominated aggression are shown in Figure 4.1 (bottom). In grade 1, class 1 children were nominated by each of their peers on average for 1.9 out of 4 aggressive roles. In grade 3, this increased to 2.5 out of 4 aggressive roles. Class 1 children were therefore characterized by high levels of aggression in grade 1 and an increase in the level of aggression, as rated by their peers,

when they grow older. The developmental trajectory of class 1 children was best characterized as a 'high-increasers' trajectory.

Children in class 2 had intermediate probabilities for physical forms of conduct problems which means that on average they will show some of these forms of conduct problems. They were characterized by low probabilities for *truancy*, *destruction*, *threatening other people*. 14% of all children were classified to class 2 and 73% of them were boys. These children had 2.9 (SD 1.4) out of 12 aggressive items endorsed by their teachers in grade 1. Class 2 children were nominated on average for 1.3 of the 4 aggressive roles throughout the follow-up period. The developmental trajectory of peer nominated aggression was best characterized by moderate but persistent levels.

The remaining 79% of children were classified in class 3. Class 3 children had low probabilities on all of the conduct problem behaviors. These children were nominated on average 0.5 times in grade 1 and this level decreased slightly throughout the follow-up period. Since 79% of all children were in this class, these children are considered to have a normative conduct problem endorsement profile and subsequent developmental trajectory.

**Table 4.3** Teacher rated Conduct problems, ODD problems and ADH problems for High-increasers, Moderate-persisters and Normative children

| Class               | Teacher reported               |                           |                            |
|---------------------|--------------------------------|---------------------------|----------------------------|
|                     | Conduct problems<br>(12 items) | ODD problems<br>(4 items) | ADH problems<br>(13 items) |
| High-increasers     | 8.7 (2.9) <sup>a</sup>         | 3.4 (2.0) <sup>a</sup>    | 12.9 (5.0) <sup>a</sup>    |
| Moderate-persisters | 3.4 (2.1)                      | 1.7 (1.5)                 | 7.2 (6.0)                  |
| Normative children  | 0.2 (0.6)                      | 0.2 (0.5)                 | 1.6 (2.7)                  |

*Note:* ODD problems = Oppositional Defiant Disorder problems. ADH problems = Attention Deficit/Hyperactivity problems. Standard deviations in parentheses. <sup>a</sup>Means of children for all three classes are different at  $p < .01$  using Bonferroni multiple comparisons.

### *Classes of risk-trajectories and comorbid disruptive behavior conditions*

Mean levels of teacher rated conduct problems, Oppositional Defiant Disorder problems (ODD problems) and Attention Deficit/Hyperactivity problems (ADH problems) are in Table 4.3. Means are based on the original TRF scoring format and scales represent DSM-IV symptoms of Conduct Disorder, Oppositional Defiant Disorder and Attention Deficit/

Hyperactivity Disorder (Achenbach & Rescorla, 2001). High-increasers (class 1 children) had not only the highest levels of conduct problems, but also the highest levels of comorbid ODD problems and ADH problems. In moderate-persistent children (class 2) intermediate levels of ODD problems and ADH problems were found. Normative children (class 3) are low on all disruptive behavior syndromes.

### *Classes of risk-trajectories and teacher rated problematic outcomes and peer rejection*

Teacher reported externalizing and total problem behavior and peer rejected sociometric status at two-year follow-up are summarized for each class in Table 4.4. Outcomes are given only for children present at the two-year follow-up. The three classes predicted significantly different mean teacher rated externalizing and total problem scores at outcome. To assess the clinical relevance of these problem scores, the percentages of children within each class scoring above the borderline or clinical cutoff on TRF/6-18 Externalizing and total problems were calculated. Of the high-increasers, 64% were above the clinical cutoff and an additional 21% above the borderline range on TRF Externalizing, indicating that almost all of the children with a high-increasers developmental trajectory are in the borderline range or above the clinical cutoff of the TRF/6-18 Externalizing scale. On the total problems, 50% of the high-increasers had scores above the clinical cutoff and 29% in the borderline range.

For moderate-persisters, mean Externalizing and total problems scores were significantly lower than of class 1 children. However, still 47% of class 2 children had scores in the borderline or clinical range on TRF Externalizing, but the majority was in the borderline range. On TRF total problems, 22% of the children were scored in the borderline or clinical range. Normative children had the lowest on teacher rated problem scores in grade 3, which is affirmed by the low percentages of children in the borderline or clinical range on the TRF Externalizing and total problems scales.

Fifty-seven percent of the children following the high-increasers developmental trajectory had a rejected sociometric status at two-year follow-up in contrast to only 17% with a moderate-persisters developmental trajectory and only 6% of normative children. To further explore peer rejected sociometric status, stable rejection and ever-rejected children were identified. Stable rejected was defined as being rejected on all three assessments,

**Table 4.4** Mean TRF Externalizing and total problems scores and percentage children in borderline and clinical range at outcome, percentage rejected sociometric status for High-increasers, Moderate-persisters and Normative children

| Class               | TRF Externalizing |                 |               | TRF total problems |                 |               | Rejected % |      |        |
|---------------------|-------------------|-----------------|---------------|--------------------|-----------------|---------------|------------|------|--------|
|                     | mean <sup>a</sup> | borderline<br>% | clinical<br>% | mean <sup>a</sup>  | borderline<br>% | clinical<br>% | outcome    | ever | stable |
| High-increasers     | 23.4 (11.9)       | 21              | 64            | 51.0 (28.3)        | 29              | 50            | 57         | 90   | 42     |
| Moderate-persisters | 10.8 (7.1)        | 25              | 22            | 23.8 (16.3)        | 11              | 11            | 17         | 46   | 5      |
| Normative           | 2.9 (5.4)         | 4               | 5             | 12.4 (13.3)        | 4               | 5             | 7          | 26   | 2      |

Note. TRF= Teacher's Report Form. Standard deviations in parentheses. High-increasers (n = 14), Moderate-persisters (n = 36), Normative (n = 191). <sup>a</sup> Means of children in all three classes are different at  $p < .01$  using Bonferroni multiple comparisons

or, if lost to follow-up, being rejected at the first two assessments and lost to follow-up at outcome. Ever rejected was defined as rejected at, at least one assessment. Of the children with the high-increasers developmental trajectory, 90% were ever rejected and 42% were stable rejected. Of the children in the moderate-persisters trajectory, in contrast, 46% were ever rejected and only 5% (2 children) stable rejected. Of the normative children, 26% were ever rejected and only 2% (4 children) were stable rejected.

## Discussion

Three classes of elementary schoolchildren with class-specific conduct problems at baseline and class-specific subsequent developmental trajectories were identified in this study. Physical forms of conduct problems marked children in the first class and a developmental trajectory characterized as already high on peer nominated aggressive behavior at onset with increasing levels throughout follow-up. Only 7% of all children had this conduct problem endorsement profile and followed the high-increasers developmental trajectory. The identification of a class of children of this size is in accordance with previously reported findings on developmental pathways of antisocial behavior and aggression (Moffitt et al., 1996; Nagin & Tremblay, 1999). Children in this class had the highest levels of comorbid oppositional defiant disorder problems and attention deficit/hyperactivity problems at baseline. Several poor outcomes were found for these children: 57% percent had a rejected peer sociometric status after two-year follow-up, 90% was rejected at least once over the follow-up period and 42% was rejected on all three assessments. Almost all of class 1 children scored in the borderline or clinical range of the

TRF Externalizing and total problems scales at outcome, with the majority in the clinical range. These percentages are approximately 5 times higher than those found in the general Dutch population (Verhulst et al., 1997). According to Coie et al. (1992, 1995), the combination of aggressive behavior with peer rejection in childhood is the strongest predictor for prolonged externalizing problem behavior into adolescence and adulthood.

The finding that physical aggression is a marker for children with high and increasing levels of aggression is substantiated in other studies. Loeber et al. (1995) found that physical fighting in childhood best predicted the onset of Conduct Disorder in adolescence of all Conduct Disorder symptoms, and Nagin and Tremblay (1999) reported that physical aggression best predicts juvenile delinquency. Therefore, the symptom endorsement profile of class 1 children, the high comorbid oppositional defiant problems and attention deficit/hyperactivity problems and the poor outcomes at grade 3 all indicate that these children are at risk for various poor outcomes later in life. The developmental trajectory and the proportion of the total sample suggest that these children resemble children that were called 'life-course persistent' by Moffitt (1993) or 'chronic' by Nagin and Tremblay (1999) and whose outcomes are associated with psychopathic personality traits of alienation, impulsivity and callousness (Moffitt et al., 1996), juvenile delinquency (Nagin & Tremblay, 1999) and conviction for violent crimes (Jeglum-Bartusch et al., 1997; Moffitt et al., 1996).

Fourteen percent of the sample had a 'moderate-persistent' developmental trajectory. These children had intermediate probabilities for physical aggression and low probabilities for the remaining conduct problems. These children's outcomes were better than those for high-increasers. Of concern is that still 47% of class 2 children score in the borderline or clinical range of TRF Externalizing which is approximately 3 times higher than the percentage found in the general population (Verhulst et al., 1997). Although many children were scored in the borderline range on Externalizing problems and not in the clinical range as were the high-increasing children, these children are nonetheless still at risk for poor outcomes in the future (Verhulst et al., 1994).

Finally, a third class of children was identified without any conduct problems and a development characterized by stable low levels of aggression. The low-risk status of this risk-trajectory was substantiated by the outcomes. Since 79% of all children were in this class, these children are considered to have a normative developmental trajectory.

The findings of the current study have to be regarded within the context of limitations. The developmental trajectories were based on assessment on only three time-

points. This enabled us to specify only a basic growth model with an intercept and one, linear term. It is well understood that the development of class 1 children cannot continue to follow the linear growth path with increasing aggression. A closer examination of the observed trajectory of the chronic physical aggression group identified by Nagin and Tremblay (1999) showed that children following this path had increasing levels of aggression in young childhood which were singled out by their later development, resulting in a persistently high aggression group. This may imply that the same can be found once the follow-up period of these children is further extended into adolescence.

Children were approximately seven years old at baseline and were followed for two years. Although the developmental trajectories and outcomes of especially children with the high-increasers developmental trajectory indicate that these children are at risk for prolonged high levels of aggressive behavior with the associated poor outcomes, these children still have to enter adolescence when the expected poor outcomes become apparent. The predictive power of the identified risk-trajectories, although important for early physical aggression, is therefore limited to a poor developmental outcome of aggressive behavior across childhood only.

The findings have implications for our understanding of the development of aggression, preventive programs targeting aggression in young children, and clinical practice. First three qualitatively different developmental trajectories were identified. Significant differences in aggression between the classes were already identified in grade 1, indicating that peers are well aware of aggressive behavior in classmates as early as entry at elementary school. Second, children with poor outcomes all showed pronounced (high-increasers) or milder (moderate-persisters) forms of physical aggression in first grade, which suggests that especially these forms of aggression predict poor developmental outcome. Third, peers increasingly regard children following the high-increasers developmental trajectory as being an aggressive child. The high percentage rejected status and the poor behavioral outcomes indicate that children that enter elementary school with a behavioral pattern of coercion and physical violence undergo a process in their social environment that is characterized by an increasingly pronounced status of being an aggressive child, high levels of non-acceptance and mistrust by their classmates and social problems with their classmates, and increasing deviance from the normative social peer group.

Results were obtained that have implications for prevention programs and clinical practice. First, preventive programs should primarily focus on the early prevention of

physical aggression but should differ in (1) the intensity in which they target the physical aggression and in (2) whether they also target covert and relational forms of aggressive behavior. Children in the high-increasers path are in need for intensive programs targeting all types of conduct problems. Children in the moderate-persisters pathway may also be considered for intervention, but these interventions should target physical aggression only and not covert forms of conduct problems. Second, the trajectory of high-increasers shows that these children undergo the social consequence of their aggressive behavior. Preventive programs and clinicians should therefore try to actively divert the developmental process (1) by making aggressive young children aware of their social status, (2) by trying to break the cycle of emphasis on negative behavior, which is characteristic for these aggressive children (Coie & Jacobs, 1993; Patterson et al., 1992) and (3) by making young aggressive children aware of the consequences of their behavior. Classroom based programs aimed at improving the interaction between aggressive and non-aggressive peers are indicated for actively altering the poor social development of high-aggressive young children.

The importance of physical aggression on the development of aggressive behavior suggests that screening programs should focus on these forms of aggression. However, although various forms of physical aggression marked children from the high-increasers class, clear *markers* for identifying children following the high-increasers developmental trajectory were not identified. Clear *markers* for following a high-increasers trajectory would have been expressions of conduct problems that children in class 1 (almost) all had and (almost) none of the children in the other two classes. The probabilities of physical aggression were much lower for moderate-persisters, but they still indicated that these children showed on average half of these forms of aggressive behavior. The subsequent developmental trajectory and outcomes however suggest that these children are at much lower risk for the negative outcomes associated with conduct problems than children following the high-increasers developmental trajectory.





# 5 | Preventing disruptive behavior in elementary schoolchildren: The impact of a universal, classroom-based intervention

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*Submitted for publication*

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## Chapter 5

# Preventing disruptive behavior in elementary schoolchildren: I impact of a universal, classroom-based intervention

### Abstract

*A population based, randomized universal classroom intervention trial for the prevention of disruptive behavior (i.e. attention deficit/hyperactivity problems, oppositional defiant problem and conduct problems) is described. Impact on developmental trajectories in young elementary schoolchildren was studied. Three trajectories were identified with children having high, intermediate or low levels of problems on all three disruptive behaviors at baseline. The intervention had a positive impact on the development of all disruptive behavior problems in children with intermediate levels of these problems at baseline. Effect sizes of mean difference at outcome were medium or small. In children with the highest levels of disruptive behavior at baseline, a positive impact of the intervention was found for conduct problems.*

### Introduction

Attention deficit/hyperactivity problems (ADH problems) conduct problems and oppositional defiant problems (ODD problems) in childhood are associated with many negative outcomes in adolescence and adulthood. These outcomes include greater risk for school failure and academic difficulties (Fergusson et al., 1997), poor relations with peers (Coie et al., 1991), early initiation of substance use (Milberger et al., 1997), Conduct Disorder (Loeber et al., 1995) juvenile delinquency (Nagin & Tremblay, 1999), conviction for violent crimes (Jeglum-Bartusch et al., 1997; Moffitt et al., 1996) and increased risk for mental disorders in adulthood (Caspi et al., 1998). In this study, the impact of a universal, classroom-based preventive intervention, on the reduction of disruptive behavior in young, elementary-schoolchildren was examined.

Attention deficit/hyperactivity problems are the most frequently found of all disruptive behavior problems in young children (Loeber & Keenan, 1994). The prevalence of Attention-Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association, 1994) however, decreases when children move into adolescence and young adulthood (Hill & Schoener, 1996) while the prevalence of Oppositional Defiant Disorder (ODD; American

Psychiatric Association, 1994) and Conduct Disorder (CD) increases (Loeber & Keenan, 1994). Despite these differences in development across age, the co-occurrence of ADHD with ODD and CD is substantial (Loeber, Green, Lahey, Frick, & McBurnett, 2000). Furthermore, ADHD predicts the early onset of CD (Loeber et al., 1995). Van Lier, Verhulst, van der Ende and Crijnen (in press) found that in seven-year-old elementary-schoolchildren, comorbidity of ADH problems, ODD problems and conduct problems is the rule rather than the exception. Moreover, children that remained highly disruptive over a one-year follow-up were marked by especially ADH problems and ODD problems at school entry (Van Lier, Verhulst and Crijnen (in press). Therefore, research on the impact of preventive interventions on disruptive behavior in young, elementary schoolchildren should focus on the impact on all disruptive syndromes, with emphasis on those forms of disruptive behavior most applicable to these children.

In studies on risk factors for the development of disruptive problems in childhood, emphasis has been given to early child characteristics, such as coercion, impulsivity and poor self-control, as well as to parental characteristics, such as poor parenting practices, parental psychopathology and substance abuse. Although these factors are important in the early development of disruptive behaviors, the social context of children becomes of importance as the number and intensity of relations with peers and teachers increase with the transition from early childhood to elementary school age. These relations play a crucial role in the emergence, the manifestation and the maintenance of disruptive syndromes (Coie & Jacobs, 1993; Patterson et al., 1992). Research has shown that young children are well aware of differences in levels of disruptive behavior in their peers as early as elementary school entry (Van Lier & Crijnen, submitted for publication). Coie et al. (1991) reported that peers reinforce the disruptive or aggressive child's acts by backing down and allowing them to succeed. As a result, disruptive children believe that their behavior has positive consequences ensuing in a prolongation of disruptive and coercive behavior. As disruptive children grow older, they are increasingly regarded as deviant by their non-disruptive peers and frequently rejected by them (Van Lier & Crijnen, submitted for publication). The disruptive and increasingly disliked child is finally left with few social settings that provide correction on their behavior and will ultimately drift towards similarly deviant peers (Patterson et al., 1992; Reid & Eddy, 1997). The interaction between disruptive children and their teachers is characterized by disobedience, coercion and many corrections and punishments, resulting in a negative spiral of emphasis on disruptive behavior (Reid, 1993). Classroom observations, for instance, have shown that of all

initiations of teachers with disruptive children, only 11% involved support for appropriate behavior compared to 82% of the initiations with non-disruptive classmates involving support for appropriate behavior (Walker & Buckley, 1973). Therefore, the interaction between the disruptive, early elementary school child and his or her peers and teachers will ultimately result in stable patterns of coercive and aggressive behavior, in maladaptive associations with similarly deviant children (Warman & Cohen, 2000), and in poor outcomes associated with disruptive behavior in adolescence and adulthood. Programs aimed at the reduction of disruptive behavior in the social context of the classroom are therefore important for the prevention of disruptive behaviors.

The Good Behavior Game (GBG; Barrish et al., 1969; Dolan et al., 1989) is a classroom-based, behavior management program aimed to improve children's behavior. The GBG promotes prosocial behavior through (1) explicitly defining and systematically rewarding appropriate behavior, thus placing emphasis on positive rather than on negative behavior, and (2) by facilitating the interaction between disruptive and non-disruptive children through a team-based approach. The program results in a positive and safe classroom environment. In studies in the United States, the GBG was proven effective in the reduction of disruptive behavior in elementary schoolchildren (Dolan et al., 1993; Kellam et al., 1994; Rebok, Hawkins, Krener, Mayer, & Kellam, 1996; Reid et al., 1999), and to delay the experimentation with tobacco in early adolescence (Kellam & Anthony, 1998; Storr et al., 2002). The GBG is listed as 'promising' for the reduction of aggressive behavior by Blueprints for Violence Prevention (Elliott, 1998) and was awarded the Exemplary Substance Abuse Prevention Award by the Substance Abuse and Mental Health Services Administration (SAMHSA; 2002)

It is common knowledge that children may differ in the age of onset and subsequent development of disruptive behavior. Moffitt (1993) for instance recognized three different patterns in the development of aggressive behavior: an early onset (life-course persists), a late onset, and a stable, low-aggressive pattern, whereas Nagin and Tremblay (1999) identified four groups of children differing in initial level and change over time of their disruptive behavior. Information on the early characteristics of children following a specific developmental trajectory, on the sequences in their development and on the malleability of their disruptive behavior would greatly enhance our knowledge of the syndromes of disruptive behavior and would further the basis for prevention science. To gather this information, a study is required (1) on the characteristics of disruptive behavior for groups of young children differing in patterns of disruptive behavior, (2) on children's

developmental trajectories and (3) on the impact of a preventive intervention on these developmental trajectories.

Since attention deficit/hyperactivity problems are the most frequently occurring disruptive behaviors in young children, emphasis is primarily given on the early detection and the impact of a preventive intervention on these problems and secondarily on the impact of the intervention on oppositional defiant problems and conduct problems. In the current study the following questions were addressed: (1) is there an effect of the GBG preventive intervention on the developmental trajectory of teacher-rated attention deficit/hyperactivity problems in young, elementary-schoolchildren; (2) how many developmental trajectories of attention deficit/hyperactivity problems can be identified across early elementary school; (3) what are the characteristic attention deficit/hyperactivity problems of children following a specific developmental trajectory at baseline; (4) what is the impact of the GBG intervention on each of the developmental trajectories of attention deficit/hyperactivity problems, and (5) what is the impact of the GBG intervention on comorbid oppositional and conduct problems?

## Methods

### *Study sample and Design*

In the spring of 1999, 13 schools in the metropolitan areas of Rotterdam and Amsterdam, the Netherlands, were recruited. In these 13 schools, the 794 children attending first grade were assessed in the spring of 1999. However, only the 722 children who moved on to second grade were eligible for inclusion in the study. 22 children who repeated second grade in 1999 and moved into the study cohort were included in the sample, making the total sample 744 children. All 744 parents or parent substitutes were approached to obtain written informed consent; 666 parents (89.5%) agreed their child to participate in the study. 69% of the children were Caucasian, 10% Turkish, 9% Moroccan, 5% Surinam/Dutch Antilles and 7% from other ethnic groups. 51% of the children were male, which did not differ for ethnic groups ( $\chi^2 = 4.67$ ,  $df = 7$ ,  $p > .05$ ). Mean age of the children at baseline was 6.9 years (SD 0.6).

Since this study aimed to determine the impact of a school-based program, only data of children that remained in the control or intervention classes over the intervention period were used. 92 children were lost to follow-up because they either left school or were kept down a grade. Loss to follow-up was not related to gender nor intervention

status of the child. However, loss to follow-up children had higher teacher rated ADH problems ( $F(1, 665)=18.751, p<.05$ ), ODD problems ( $F(1, 665)=8.243, p<.05$ ) and conduct problems ( $F(1, 665)=9.733, p<.05$ ) at baseline.

At the start of the trial, each of the 13 schools had at least two grade 1 classes. During the summer vacation between first and second grade, classes within one school were randomly appointed to either the intervention or control condition. Of the 31 classes in the 13 schools, 16 became intervention and 15 control classes, resulting in 363 children receiving the GBG program and 303 children attending the control condition. Shortly after the summer vacation, teachers were instructed about the GBG intervention that started in the fall of grade 2.

### *Preventive intervention*

The Good Behavior Game is a classroom-based behavior management strategy that promotes prosocial and reduces disruptive behavior. Teachers discuss the necessity of formulating class rules and choose with their students the rules for their class. The positively formulated rules are accompanied by pictograms that are attached to the blackboard. After observing children on well-defined behaviors in the class, teachers assign children to one of three or four teams. Teams contain equal numbers of disruptive and non-disruptive children. Children are encouraged to manage their own and their teammates behavior through a process of group reinforcement and through mutual self-interest. Each team receives a number of cards and teams are rewarded when at the end of a 15- to 60-minutes period at least one card is remaining on their desk. Teachers, however, take a card when a student violates one of the rules. Teams and students are always rewarded with compliments. Initially, winning teams receive also tangible rewards (sticker) directly after each game. Later, teams received week rewards (if they won at least two out of three games that week) and month rewards. In the first intervention year, the GBG was implemented in three different stages. In the *introduction stage*, the GBG was played for three times a week during approximately 10 minutes. The goal was to make children and teachers experienced with the GBG. The introduction phase lasted for about two months. In the *expansion stage*, teachers were encouraged to expand the duration of the GBG (up to three times one-hour per week), expand the settings in which the GBG was played, and expand the behaviors targeted by the GBG. Rewards were delayed till the end of the week and month. The expansion phase lasted until the early spring of the school year. In the

final phase, the *generalization phase*, emphasis was on promoting prosocial behavior outside GBG moments by explaining children that the rules used during the GBG were also applicable when the game was not in process. Children received compliments for appropriate behavior by their teachers. The GBG-sessions were used as a booster. The same three phases were used in the second intervention year, but, since children were already familiar with the GBG, teachers swiftly moved to the expansion and generalization phase.

The GBG was played in second and third grade. Teachers received two afternoons of GBG training prior to the intervention and one afternoon of instruction in the middle of the year. During the first intervention year, teachers were coached in their classroom during ten 60-minutes classroom observations by well-trained advisors from the school advisory services. During the second intervention year, teachers were either supervised during ten school visits by these advisors or were supervised by their schools' internal supervisor.

The GBG had to be adapted for use in the Dutch school system to ensure a proper implementation in Dutch schools (Van der Sar, 2002; Van der Sar & Goudswaard, 2001). In contrast to the U.S. GBG, Dutch' teams do not compete for weekly winners and children violating GBG rules are not mentioned by the teachers. Also, children in the teams are encouraged to actively support each other in behavior appropriately.

### *Measures*

*Children's problem behaviors* over the last 2 months were rated with the Teacher's Report Form (TRF/6-18; Achenbach, 1991b) which contains a list of 120 behavior items. Teacher rate the child's behavior on a three point scale (0 = not true, 1 = somewhat true, 2 = very true or often true). The TRF has been translated and validated for use in the Netherlands (Verhulst et al., 1997).

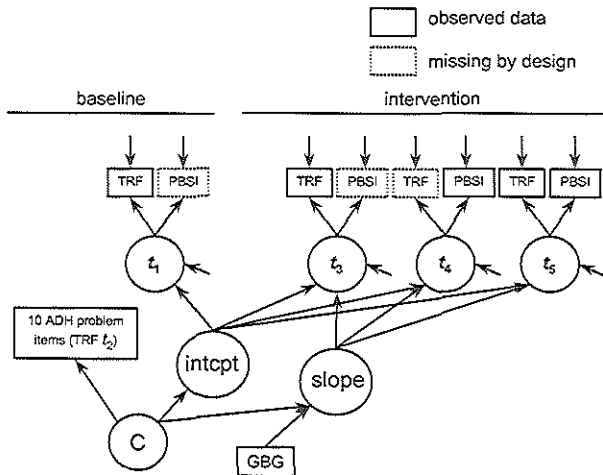
*Problem behavior at school* was assessed with the Problem Behavior at School Interview (PBSI; Erasmus MC, 2000). The PBSI is a 32-items teacher interview assessing disruptive behavior and shy/withdrawn behavior in children. Teachers rated the child's behavior on a 5 point likert scale (never applicable – often applicable). The ADH problems scale consists of 8 items. Items include '*this child has difficulty with concentration*', '*this child is impulsive*, or '*this child finds it hard to sit still*'. The inter-rater reliability of the ADH problems scale was .45, ( $p < .01$ , two tailed). The ODD problems scale consists of 8 items, which include



the items *'this child argues frequently'* and *'this child disobeys teachers' instructions'*, and the CD problems scale consists of 13 items, which include the items *'this child fights'*, *'this child attacks other children physically'* and *'this child is truant'*. Cronbach's alpha was .94 for the ADH problem scale and .91 for both the ODD problems and CD problems scales.

**Procedure**

Teacher assessments at baseline were conducted in the spring (t1) and early summer (t2) of grade 1. During intervention, a 12-month assessment (t3; end of first year of intervention), 18-months assessment (t4) and 24-months assessment (t5; end of second year of intervention) was conducted. At the pre-intervention (t1 and t2), 12-month (t3) and 24-month assessment (t5), the TRF/6-18 was completed for all students by the teachers. Five forms with preprinted names were sent to the teacher per 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 five weeks. For this, teachers received a gift certificate of about \$50. At the 18-month and 24-month assessment, teachers were interviewed at school with the PBSI by trained research-assistants. Interviews were completed for all children attending these teachers' classes.



**Figure 5.1** Observed and latent variables to analyze the impact of the Good Behavior Game intervention on the development of ADH problems

### *Statistical Analyses*

The developmental trajectories of ADHD problems were analyzed first, followed by analyses of ODD problems and Conduct problems. In this section, the analyses of ADHD problems will be described. However, the same procedure was followed for ODD problems and Conduct problems. The TRF/6-18 and PBSI scales were used. The model used to analyze ADHD problems is given in Figure 5.1. To account for the missing by design data, the ADHD scale scores of the TRF/6-18 and PBSI were integrated. Items from the TRF/6-18 and PBSI reflecting similar content were selected, which resulted in the selection of 8 ADHD problem items from both the TRF and PBSI. These 8 items were summed to a total ADHD problems score for the TRF and PBSI separately. Total ADHD problem scores were computed for the first baseline assessment (t1) and the three assessments during intervention (t3, t4 and t5).

To study change in a common construct across time, the following approach was used. A latent variable was considered for each of the four time-points. The four continuous latent variables served as the indicators for the continuous growth factors (intercept and slope). Indicators for these latent variables were the observed total ADHD problem scores of the TRF and the PBSI at the given time-points. ADHD problem scores from both the TRF and PBSI were present at t5; at the other assessments either the scores from the TRF or PBSI were present. Measurement invariance of the construct across the four time points is approached as follows. (1) To put the four latent 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 at 1, by default. To reflect measurement invariance, the factor loading for PBSI was held equal across time points 4 and 5. (2) The measurement intercepts are held equal across time for both the TRF and PBSI scores. (3) The residual variances of the observed ADHD problem scale of the TRF and PBSI were held equal over time.

The following procedure was used to answer the research questions. We started by defining the model needed to describe the relations between the observed data with conventional growth modeling. The fit of the model was determined on the control group and then on the intervention group. The overall effect of the GBG intervention on the developmental trajectory of ADHD problems was determined in a multiple group analysis. We then moved to growth mixture modeling (GMM; Muthén, 2001; Muthén & Shedden, 1999) to determine the number of developmental trajectories needed to describe the data

in the control and intervention group separately. The objective of GMM is to find the smallest number of classes of individuals with similar developmental trajectories. GMM estimates mean growth curves, i.e. initial status (intercept) and change (slope), for each class of children and captures individual variation around these growth curves by the estimation of factor variances for each class. Since models with different numbers of trajectories are not nested, the usual loglikelihood chi-square difference test cannot be used. Instead, Bayesian Information Criterion values (BIC; Kass & Raftery, 1993) were used with lower BIC values indicating improvement over the previous model with one class less.

To analyze the effects of the intervention on the development of ADHD problems, ODD problems and Conduct problems, GMM was incorporated into a more general framework, general growth mixture modeling (GMMM; Muthén & Muthén, 2000a; Muthén et al., in press). In this framework, the slope of the developmental trajectories is regressed on intervention status.

To assess the baseline characteristics of children in a particular class, the GGMM on ADHD problems was estimated simultaneously with a latent class analysis (LCA; McCutcheon, 1987) on items of TRF/6-18 Attention Deficit/Hyperactivity Problems at baseline. LCA describes the probabilities of a set of observed categorical variables across groups of individuals when group membership of the individuals is unknown. First, the GGMM of the GBG intervention on children's disruptive behavior was modeled without the LCA. The LCA was then combined with the GGMM on intervention effects. In this overall (LCA) GGMM, characteristic patterns of Attention Deficit/Hyperactivity Problems in young elementary schoolchildren following subsequent developmental trajectories of ADHD problems, which may or may not be influenced by the GBG intervention, were identified. The estimated parameters of the final GGMM are: (1) latent class membership probabilities giving the probability for each individual to belong to each of the classes, (2) class-specific symptom endorsement profiles giving the probabilities for individuals in a class to endorse Attention Deficit/Hyperactivity Problems at baseline, (3) means and variances of the continuous growth factors for each of the classes, and (4) estimates of the regression coefficient of the GBG on the slope for each of the classes.

For the LCA on items of teacher-rated Attention Deficit/Hyperactivity Problems, TRF/6-18 items reflecting similar content as DSM-IV criteria for Attention-Deficit/Hyperactivity Disorder were used (Achenbach & Rescorla, 2001). Items were dichotomized where 0 = not true and 1 = somewhat/sometimes or very true or often true. Teacher reports of the early summer assessment at grade 1 (t2) were used for the LCA.

The overall GGMM, the GMM's, and multiple group analysis were analyzed with Mplus 2.02 (Muthén & Muthén, 2000b). The Mplus missing data module was used to optimally use the data available and to take into account that children that were lost to follow-up had higher levels of initial disruptive behavior than the remaining children.

## Results

### *Implementing the GBG*

Teachers were willing to comply with the basic assumptions underlying the GBG intervention although some found it difficult to emphasize positive behavior and not to respond immediately to negative behavior. To enhance support for the program, teachers were invited to attend training sessions in which hard-to-manage classroom situations were discussed and solutions sought. Almost all teachers attended these sessions. Teachers frequently reported the GBG to be an effective tool to manage children's behavior in their class and using the GBG in situations when children were required to work quietly. Teachers also reported that children enjoyed the GBG and that they put in a great effort to win every session. Children were involved in deciding on the rewards, especially the week or month rewards; dress-up day or washing the teachers' car are examples of interesting rewards children came up with.

To determine the level of implementation, the external school advisor evaluated whether the school implemented all phases of the GBG program in the two intervention years. Of the 13 schools, 9 implemented the GBG program completely. Three schools implemented the program, but did not move on to the generalization phase. In one school, the GBG was implemented poorly, only the introduction phase was utilized.

In general, teachers and children were satisfied with the program, although some children had difficulties to accept that cards were withdrawn from their team without the child himself violating a GBG rule. As a result, a few parents called to complain about the GBG program. An explanation about the function of the card, which is to remind children about the rules of GBG, and about the procedure that withdrawal of a card from the group does not immediately result in not receiving a reward, indicating that children had actually behaved very well, satisfied parents. It was then agreed with parents that when a child would come home complaining about cards being withdrawn, they would be complemented with their behavior if the group did not miss the reward.

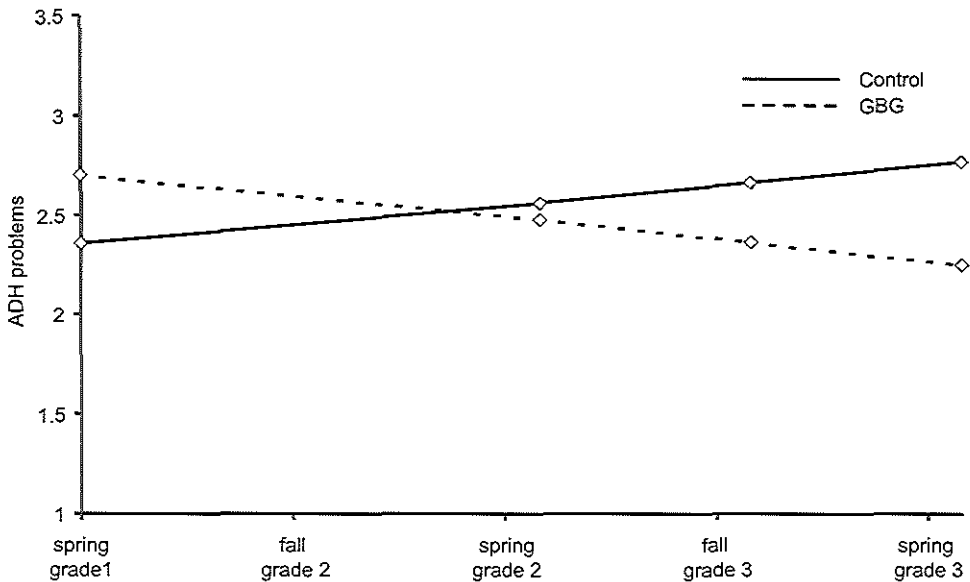
Teachers in the control-condition were asked about their knowledge of the GBG program. Although they were aware of the project, they did not indicate having specific knowledge about the GBG-instructions, nor did they implement the GBG or part of the program in their class. After one-year intervention, the three grade 2 classes of one school were merged to two grade 3 classes during the summer vacation. The research team had no influence on placing children in a particular class. However, at the start of grade 3, one class was randomly appointed to the intervention condition, which resulted in 17 children moving from a control-class to the intervention-class. In the analyses, these children were included in the intervention group.

### *Model of Attention Deficit/Hyperactivity problems*

Exploration of the data indicated that a linear slope was needed to describe the relationships between the repeatedly measured ADH problem scores, both for children in the control- and intervention-condition. Allowing for correlations between the adjacent assessments and freely estimating the variance of the continuous latent, repeatedly measured, ADH problems improved model fit. The final model had a good fit to the data for the control group  $\chi^2 = 13$ ,  $df = 6$ ,  $p > .01$ ; CFI = .99; TLI = .98; RMSEA = .06 and for the intervention group  $\chi^2 = 11$ ,  $df = 6$ ,  $p > .01$ ; CFI = .99; TLI = .99; RMSEA = .05.

### *Multiple group analysis*

Intervention children had slightly, but not significantly higher, ADH problem scores at baseline as can be seen in Figure 5.2. The development of children in the intervention classes was characterized by significantly decreasing levels of ADH problems, while children in the control classes had significantly increasing levels of ADH problems. To assess whether there was an overall GBG intervention effect on the development of ADH problems, the slopes of ADH problems in the intervention group and control group were held equal and model fit was examined. The chi-square difference test showed that the difference in slopes between children in the intervention and control group was significant ( $\chi^2 = 11$ ,  $df = 1$ ,  $p < .01$ ) indicating that, on average, children in the control classes followed a significantly different developmental trajectory of teacher-rated ADH problems than children in the intervention classes.



**Figure 5.2** Results of the multiple group analysis: developmental trajectories for control group children and GBG children

### *Mixture modeling*

The number of developmental trajectories of ADH problems was identified in control- and intervention-class children separately. Following the procedure described by (Muthén & Muthén 2000b) to find the optimal number of trajectories, the variances of the continuous growth factors and the covariance between the growth factors were initially set to zero. Moving from two to three trajectories resulted in a drop in BIC-points of 90 for the control and 35 for the intervention condition. Four trajectories resulted in non-converging solutions in both the control and intervention group. The model with three developmental trajectories was therefore used for the remaining analyses. The three trajectories had respectively high, intermediate and low levels of ADH problems at baseline.

Developmental trajectories and intervention effects were first modeled without the baseline characteristics. In this GGMM, starting values of the separate GMM's were used. Again, the variances of the continuous growth factors and the covariance between the growth factors were initially set to zero. The slopes were regressed on intervention status for each class separately to allow for class-specific intervention effects. Children were classified to one of the three developmental trajectories based on their highest membership probability. The average class-membership probability was .94 for children in class 1, .86 for children in class 2 and .97 for children in class 3.

Then the baseline characteristics of ADHD problems were taken into account in the analyses. The LCA was therefore included in the GGMM. For the LCA part of the model, starting values were set negative for class 1 (high ADHD problems trajectory), which indicated high probabilities to endorse Attention Deficit/Hyperactivity Problems were anticipated, neutral for class 2 (intermediate trajectory) and positive for class 3 (low trajectory). Based on likelihood ratio chi-square testing, the variance of the slope and covariance between intercept and slope were freed in the overall model. Children were classified with higher precision when the baseline characteristics of ADHD problems were included in the analyses. 73.3% of the children remained in the same class across both models. Children that changed from class from the first to the second model were the ones that were classified with less precision in the first model. The average class-membership probability of the final model was .95 for children in class 1, .93 for children in class 2 and .97 for children in class 3. These high average probabilities indicated that all children were classified to one of the classes with high precision.

**Table 5.1** Number and percentage, gender distribution, mean TRF/6-18 Attention Deficit/Hyperactivity Problems, parameter estimates for the developmental trajectories, impact and effect size of the GBG for ADHD problems for High, Intermediate and Normative children

| Class                  | children |    |       | ADH Problems<br>in grade 1 | Developmental trajectory |        |                 |     |
|------------------------|----------|----|-------|----------------------------|--------------------------|--------|-----------------|-----|
|                        | N        | %  | % boy | M (SD)<br>(max = 13)       | intercept                | slope  | slope on<br>GBG | ES  |
| High (class 1)         | 92       | 14 | 78    | 9.3 (2.0)                  | 9.53                     | -1.75* | .04             | -   |
| Intermediate (class 2) | 176      | 26 | 62    | 4.1 (1.8)                  | 3.24                     | .76*   | -.81*           | .71 |
| Normative (class 3)    | 398      | 60 | 42    | 0.4 (0.6)                  | .67                      | .28*   | -.28            | -   |

Note: TRF= Teacher's Report Form. ADH Problems = Attention Deficit/Hyperactivity Problems. GBG = Good Behavior Game. ES = effect size. Standard deviations in parentheses. \* significant at  $p < 0.5$

### *Attention Deficit/Hyperactivity Problems at baseline, developmental trajectories and impact of GBG intervention*

Fourteen percent of the children were classified in class 1 and 78% of them were boys (Table 5.1). On average, class 1 children had 9.3 of the 13 Attention Deficit/Hyperactivity Problems scored by their teachers. Symptom endorsement profiles for each of the three classes are in Figure 5.3 (top). Items are from the TRF/6-18. Children in class 1 had the

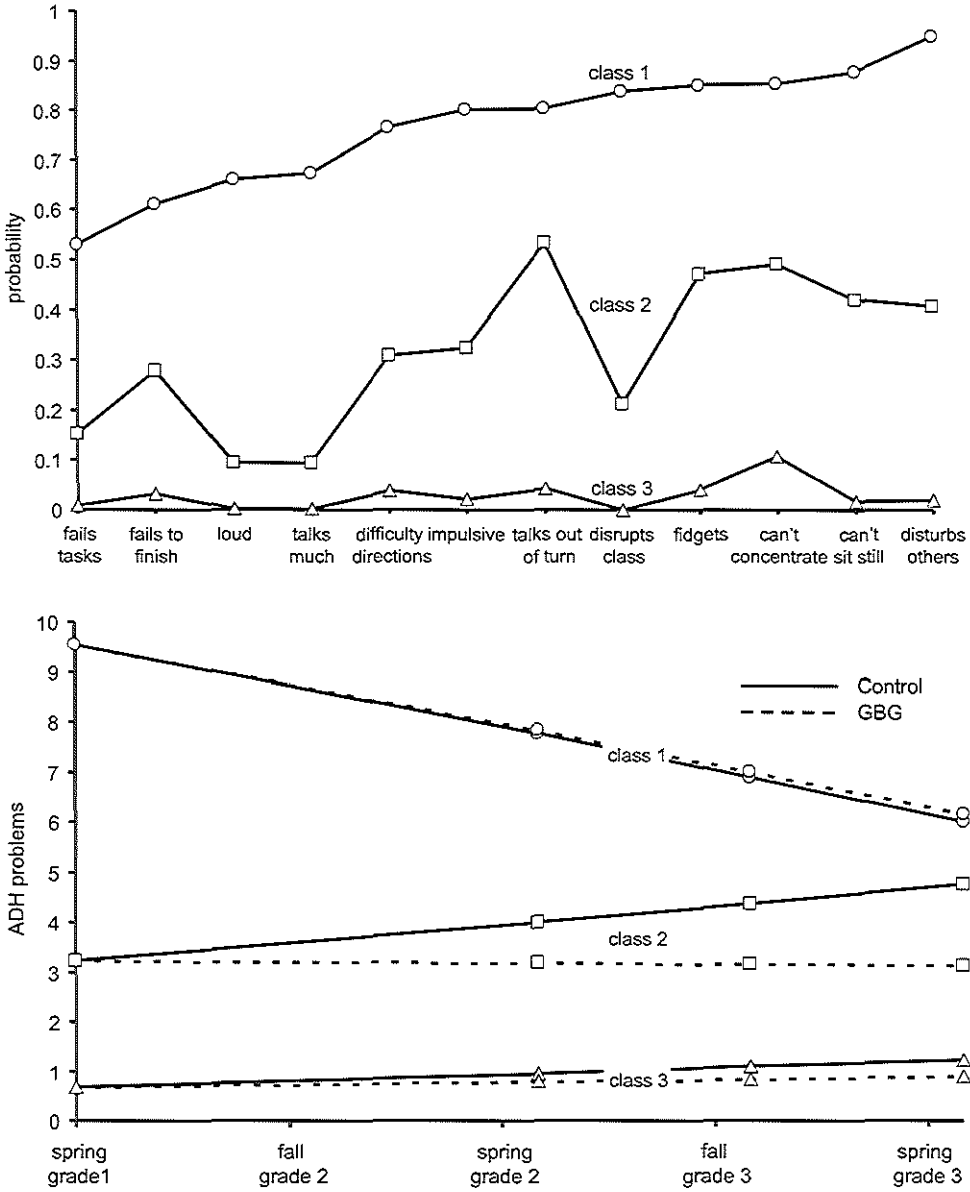


Figure 5.3 Results of the GGM: Attention Deficit/Hyperactivity Problems endorsement profiles (top) and developmental trajectories (bottom) for control group and GBG children

highest probabilities of all children to have Attention Deficit/Hyperactivity Problems endorsed. These children had especially high probabilities for 'Impulsive or acts without thinking', 'Disrupts class discipline', 'Fidgets', 'Can't concentrate, can't pay attention for



*long*, *'Can't sit still, restless, or hyperactive'* and *'Disturbs other pupils'*. The probabilities to endorse these items were all above .8, which indicates that almost all of the children in this class showed these Attention Deficit/Hyperactivity Problems. The developmental trajectories are shown in Figure 5.3 (bottom). Class 1 children were characterized by high levels of ADH problems in grade 1, followed by a significant decrease in ADH problems over the intervention period. The regression coefficient of GBG on the slope was not significant (Table 5.1), indicating that the decline in ADH problems was similar for control and intervention children.

One hundred seventy-six children (26%) were classified in class 2, 62% were boys. The probabilities for class 2 children to have Attention Deficit/Hyperactivity Problems endorsed were all lower than for children in class 1. However, the probabilities for *'Talks out of turn*', *'Fidgets*', *'Can't concentrate, can't pay attention for long*', *'Can't sit still, restless, or hyperactive'* and *'Disturbs other pupils'* still indicate that children in this class show on average half of these symptoms. Control children had significantly increasing levels of ADH problems over time. The coefficient of GBG on this slope was negative and significant indicating that class 2 intervention children had a significant better development than their control group counterparts. This indicates that the increase in levels of ADH problems found for class 2 control children was not found in class 2 children receiving the GBG intervention. To assess the clinical relevance, the effect size (Cohen's *d*) for the estimated mean difference at outcome (spring grade 3) was calculated by dividing the difference in estimated mean ADH problems of intervention and control-group children by the standard deviation of the estimated mean at outcome. Cohen's *d* = .71, which is a medium effect size (Cohen, 1988).

The remaining 398 children were in class 3 with 42% boys. Children in this class have on average 0.4 Attention Deficit/Hyperactivity Problems endorsed, which is also shown by the very low probabilities. Low levels throughout the intervention period characterized the developmental trajectory of ADH problems in these children, which was not different for intervention children as for control children.

### *Implications for comorbid Conduct problems and ODD problems*

The impact of the GBG intervention on Conduct problems (9 items) and ODD problems (4 items) for children classified in each of the three classes was assessed. Exploration of the data indicated that a linear slope was needed for ODD problems whereas a quadratic

slope was needed for Conduct problems. Allowing for correlation between the adjacent assessments improved model fit for both ODD problems and conduct problems. Freely estimating the variances of the continuous latent variables improved model fit for ODD problems, but not for Conduct problems; variances held at zero. Fit indices indicated good fit for ODD problems CFI = .97, TLI = .95, and for CD problems CFI = .99, TLI = .96. A three-class solution was analyzed for both ODD problems and Conduct problems.

**Table 5.2** Parameter estimates for the developmental trajectories, impact and effect size of the GBG for ODD problems and Conduct problems for High, Moderate and Normative children

| Class        | ODD problems |       |              |     | Conduct problems |        |        |                   |     |
|--------------|--------------|-------|--------------|-----|------------------|--------|--------|-------------------|-----|
|              | intercept    | slope | slope on GBG | ES  | intercept        | slope  | Qslope | slope on GBG      | ES  |
| High         | 2.35         | -.22  | -.06         | -   | 3.88             | -2.00* | .72*   | -.37 <sup>a</sup> | .55 |
| Intermediate | .67          | .35*  | -.17*        | .41 | 1.07             | -.43*  | .41*   | -.28*             | .42 |
| Normative    | .15          | .07*  | -.00         | -   | .30              | -.19*  | .11    | -.01              | -   |

Note: ODD problems: oppositional defiant disorder problems. GBG: Good Behavior Game. ES: Effect Size. Qslope: Quadratic slope. \* significant at  $p < 0.5$ . <sup>a</sup>  $p = 0.6$

Table 5.2 gives the parameter estimates for ODD problem and Conduct problems. Figure 5.4 (top) gives the developmental trajectories for ODD problems and Figure 5.4 (bottom) for CD problems. Children classified in class 1 on ADH problems had the highest comorbid ODD problems and Conduct problems in grade 1. As found in ADH problems, the developmental trajectory of ODD problems was similar for intervention as for control group children (Table 5.2). Although the estimate of the slope was negative, it was not significantly different from zero (95% C.I. -0.49, 0.06). In contrast to ADH problems and ODD problems, a trend towards significance was found for de coefficient of GBG on the slope for Conduct problems in class 1 children (estimate/S.E.=1.84,  $p=0.6$ ) indicating lower levels of Conduct problems for intervention children. The effect size of the mean difference at outcome ( $d = .55$ ) is medium according to Cohen’s criteria.

Class 2 children had intermediate levels of ODD problems and Conduct problems at baseline. The finding that class 2 intervention children had a significant different developmental trajectory on ADH problems was substantiated by their development on both Conduct problems and ODD problems. Control group children showed an increase in levels of ODD problems and Conduct problems, while this was not found in children receiving the GBG program. The effect sizes of the intervention effect were small for ODD

problems ( $d = .41$ ) and small for Conduct problems ( $d = .42$ ). Class 3 children had low levels of comorbid CD problems and ODD problems, which was the same for control group children and children that received the GBG.

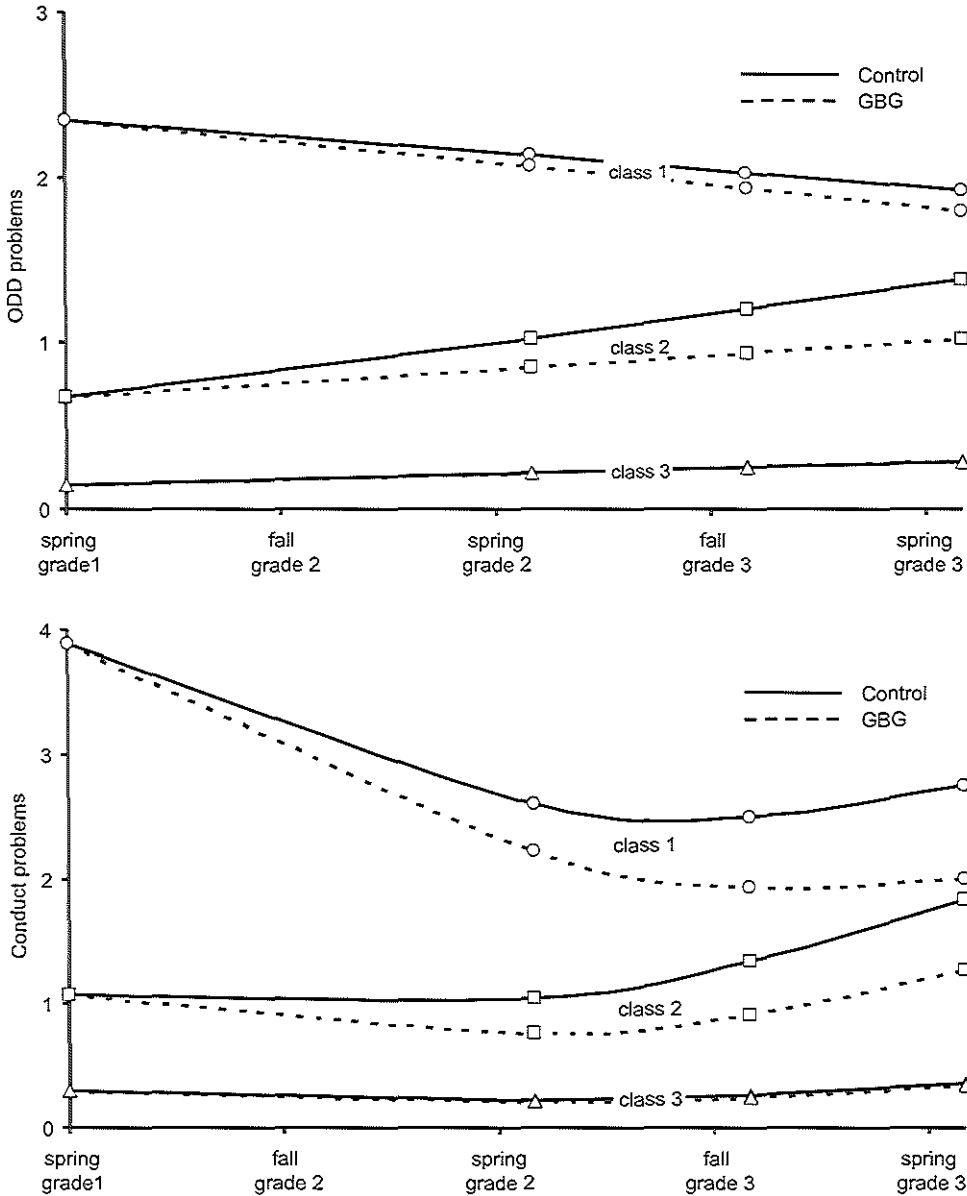


Figure 5.4 Developmental trajectories for oppositional defiant problems (top) conduct problems (bottom) for control group and GBG children

## Discussion

The impact of a universal, classroom based preventive program targeting young children's disruptive behavior was examined. We used a step-wise approach to study this impact by first analyzing the overall impact of the program followed by analyses of this impact on groups of children differing in developmental trajectories of attention deficit/hyperactivity problems. The development of ADH problems, as determined in the control group, was characterized by an increase in the level of problems over the intervention period. Intervention children, in contrast, showed on average a decrease in levels of ADH problems. The difference in slopes was significant indicating an overall effect of the GBG intervention on ADH problems.

Since we anticipated groups of children with different levels of ADH problems in grade 1 and a different development of ADH problem over the intervention period, classes of children following different trajectories were identified. Three classes were found. Children in class 1 had the highest probabilities of all children for having any Attention Deficit/Hyperactivity Problem behavior endorsed. These probabilities were always the highest for children in class 1, intermediate for children in class 2 and the lowest in class 3. In a general population sample studied by Hudziak et al.(1999), similar classes of children differing in ADH problems were found. Of the three developmental trajectories of ADH problems that were identified, the GBG had a positive effect on children with intermediate ADH problems across grades 1 to 3. The size of the effect at the end of the intervention period is medium. This effect is best described as a preventative effect since the increase in levels of ADH problems found in control children was transformed in stable levels of ADH problems in intervention children.

The impact of the intervention effect on Conduct Problems and Oppositional Defiant Problems was then examined. In line with the many relationships between the three disruptive behavior syndromes reported in the literature, class 1 children had the highest levels of comorbid Conduct problems and ODD problems, followed by intermediate levels in class 2 children, and very low levels in class 3 children. For class 2 children, preventative effects on Conduct problems and ODD problems substantiated the previously found preventative effect on ADH problems for class 2 children. The effect sizes however were small. In addition, class 1 children had a trend towards significant improvement on Conduct problems, indicating lower levels of these problems as a result of the intervention. The size of this effect at outcome was medium. Of interest is that the decrease in level of

CD problems of class 1-intervention children resulted in a similar level of conduct problems at the end of grade 3 as class 2 children in the control condition.

The fact that the GBG intervention resulted in preventative effects on the three disruptive behavior syndromes warrants further attention. Nagin and Tremblay (1999) identified groups of children characterized by intermediate levels of aggression, opposition and hyperactivity at age 6, an increase in levels through age 10, followed by a decrease in levels into adolescence. This could imply that the GBG may largely affect children following this trajectory. Although the outcomes for these children in the Nagin and Tremblay study, in terms of self reported delinquency and juvenile infractions, were better than the outcomes for consistently high-disruptive children, these children had still considerable levels of delinquency and juvenile infractions in adolescence.

There are limitations to this study. First, teacher ratings were used to study the impact of the intervention, but teachers also implemented the intervention. Independent observers did thus not conduct these ratings. However, a class had generally a new teacher at the start of every grade and in none of the classes the teacher moved along with the grade over the entire intervention period. This indicates that the developmental trajectories and impact of the GBG on these trajectories are based on ratings of on average three different teachers per class. Second, no data were yet available to assess the impact of the currently found positive effects on the manifestation of disruptive problems when children grow older. It is not correct to assume a priori that the short-term positive intervention effect will consistently be found in follow-up assessments. A short-term impact of the GBG on aggressive behavior was reported by Dolan et al. (1993). However, a 'sleeper effect' was found in the follow-up period, in which levels of disruptive behavior of GBG children increased after the intervention ended, but decreased again once these children grew older. This decrease in disruptive behavior was not found in control group children (Kellam, Ling, Merisca, Brown, & Jalongo, 1998). The positive GBG effects resulted also in less children starting tobacco smoking six years after the intervention (Kellam & Anthony, 1998; Storr et al., 2002). This suggests that a long follow-up period is needed to tap the impact of the currently found positive effects. Third, the decline in levels of ADH problems for class 1 children, with the highest attention deficit/hyperactivity problems at grade 1, suggests a good prognosis for these children. This decline in levels of ADH problems is in accordance with studies showing decreasing levels of attention deficit/hyperactivity problems when children grow older (Hill & Schoener, 1996; Loeber & Keenan, 1994). However, some caution is warranted, because Nagin and

Tremblay (1999) identified a group of young children with stable, high levels of hyperactivity through adolescence. The developmental trajectories in our study were based on a two-year period. When repeatedly measured variables correlate less than perfectly, subjects that are at one extreme on the first assessment will be less extreme on the second, referred to as regression to the mean (Cohen & Cohen, 1983). This implies that the high levels of disruptive behavior of class 1 children in grade 1 were expected to decrease in the next assessment. With the limited number of assessments due to the relatively short time period of this study, this influence is relatively large. It may well be that once follow-up assessments are added the trajectory of class 1 children will show a stable level or a less pronounced decrease in level of attention deficit/hyperactivity problems. Symptoms of oppositional defiant problems and conduct problems are expected to increase in high risk children (Loeber & Keenan, 1994), a patterns which was not clearly reflected in children in this study. However, the coefficient of the slope of ODD problems for class 1 children was not significantly different from zero, and the slope of class 2 control children was significantly positive, indicating increasing ODD problems. The slope of conduct problems became positive when children grew older for class 1 and class 2 children, which suggests the developmental trajectories to be in accordance with earlier findings. Regardless of this, the good fit of the models used indicates that the short-term development and impact of the GBG is well described by the estimated developmental trajectories.

### *Implications*

The findings of this study have implications for research on syndromes of disruptive behavior, for preventative programs, and for the identification of children developing disruptive behavior. Although a preventative effect of the GBG on the development of ADHD problems was found, this effect was mainly accounted for by a sub-sample of 26% of all children, with intermediate levels of disruptive behavior. Children with high levels of disruptive behavior were partially affected by the intervention since the positive impact was limited to reductions in conduct problems. Preventative interventions like the GBG are thus effective at intermediate levels of disruptive behavior problems and partially effective at high levels of disruptive problems. Second, the GBG intervention 'prevented' an increase in levels of disruptive problems, which enhances the importance for applying these programs as early as possible. Third, Offord et al. (1998) argued that children at high-risk

are likely the ones that will remain high on disruptive problems despite a preventative program. The partial impact on the high-disruptive children argues for combinations of universal and selective programs, in which a classroom intervention is combined with more intensive efforts to reduce disruptive behavior in children at highest risk. These selective interventions could use the universal intervention as a screenings phase to detect children in need for more intensive intervention. To detect children at risk at an earlier stage (elementary school entry), the behavior endorsement profiles of children in each of the classes, shown in figure 2 (top) are of importance. Although the differences in the behavior endorsement profiles of the children are best described as differences in severity of Attention Deficit/Hyperactivity Problems, children that responded to the universal program were the ones that occasionally showed Attention Deficit/Hyperactivity Problems in grade 1. In contrast, children showing all types of Attention Deficit/Hyperactivity Problems at grade 1 mark children in need for selective programs.

The GBG has now been proven to be effective in both the United States and in the Netherlands. Crijnen, Achenbach and Verhulst (1997, 1999) reported cross-cultural similarities and differences in levels of parent reported disruptive problems between children in the U.S., the Netherlands and 10 other countries. In both the USA and the Netherlands, the intervention effects of the GBG were determined through a randomized controlled trial. The fact that the GBG has been proven to be effective in multiple cultures indicates that despite cross-cultural differences in levels of disruptive behavior, cross-cultural consistency exists in the malleability of disruptive behavior problems in young, elementary schoolchildren.

Finally, the outcomes of this study can be used to improve the efficacy of prevention programs by relating the developmental trajectories as identified in this study to the risk factors identified in models on the development of disruptive behavior. By comparing children with high disruptive behavior and a partial response to the intervention with children whose disruptive behavior was effectively targeted by the GBG intervention on risk factors in the child-, familial- and parenting- domains, more effective preventive intervention programs, tailored to the needs for this specific group of children can be developed.

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# 6 | Preventing disruptive behavior in elementary schoolchildren: II child, family and parental predictors for responsiveness to a universal classroom-based intervention

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Pol van Lier and Alfons Crijnen

*Submitted for publication*

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## Chapter 6

# Preventing disruptive behavior in elementary schoolchildren: II child, family and parental predictors for responsiveness to a universal classroom-based intervention

### **Abstract**

*Risk factors for the development of disruptive behavior in the child, family and parenting domains were studied to predict responsiveness to a universal preventive intervention. Risk factors operating in the school context predicted which children followed the trajectory that could effectively be transformed by the intervention. Risk factors in the school and in the home context, in combination with poor relations with peers, predicted children whose disruptive behavior could only partially be influenced by the intervention. If risk factors are found in multiple settings, a universal intervention is only partially effective in altering disruptive behavior. Additional interventions, targeting disruptive behavior at school and at home, social skills, relations with peers and academic skills are indicated for these children.*

### **Introduction**

Because of the well documented stability of disruptive behavior problems from childhood into adolescence (Campbell, 1995) and young adulthood (Caspi et al., 1996) and the associated negative outcomes (see for instance Farrington, 1991; Farrington, 1993; Moffitt et al., 2002; Reid & Eddy, 1997; Verhulst & van der Ende, 1997), prevention programs have been developed to target disruptive behavior in childhood. Intervention research has focussed on the evaluation of intervention effects (Durlak, Wells, Cotton, & Johnson, 1995). This resulted in a variety of empirically based effective intervention programs for children and adolescents (Greenberg et al., 2001). The next step in prevention research will be the identification of children that will, will not or will only partially benefit from the prevention programs (Brestan & Eyberg, 1998). Knowledge about the antecedents of children who respond to a preventive intervention compared to children who partially or do not respond can help in the decision on the target objectives (e.g. behavioral management, social skills, academic skills), and the type, intensity, and the setting of the

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interventions that specifically target the factors that predict why children follow a high disruptive problem trajectory is indicated for these children.

The development of disruptive behavior problems is determined by multiple factors. Early externalizing behavior of the child (Mesman and Koot, 2001; Mesman et al., 2001) and high evoked stress in the family due to the child's behavior or temperament (Kingston & Prior, 1995) increase the child's risk for prolonged disruptive behavior. In addition to this, types of parenting practices that have been associated with the development of child disruptive behavior include low supervision, harsh and inconsistent discipline and poor involvement (Campbell, 1995; Farrington, 1993). Contextual family factors such as low socioeconomic status, low education of the parents, single-parenthood and negative life events promote a poor development of disruptive behavior (Farrington, 1993; Florsheim et al., 1998).

In the school context, troublesome peer relations and academic difficulties are key contributors to the maintenance of disruptive behavior. Disruptive children, raised by unskilled and overstressed parents, often enter school with academic deficiencies and a behavioral pattern that is deviant from that of the peer group. In the initial interaction with peers, the disruptive child's acts of coercion, physical force and threats are reinforced by their peers who are backing down and allow the disruptive child to succeed (Coie et al., 1991), resulting in an overestimation of the positive consequences of his or her behavior. Classmates are not only well aware of the deviant behavior of the disruptive young child at school entry, they increasingly regard the deviant child as disruptive and ultimately reject the child (Newcomb et al., 1993; Van Lier & Crijnen, submitted for publication). Peer rejection is decisive and stable, even if a child is no longer disruptive (Bierman, 1990). Early learning problems contribute to disruptive behavior possibly through feelings of alienation, frustration and through low self-esteem (Hawkins & Lishner, 1987). The early disruptive behavior, in combination with early learning problems result in prolonged academic difficulties and the disruptive behavior itself leads to juvenile delinquency (Fergusson & Horwood, 1995; Tremblay et al., 1992). The ultimate consequence of the troublesome school entry for the young, disruptive, academically deficient, and disliked child is that it is left with few social settings that provide correction of the behavior. The behavioral patterns of coercion and aggression lead to maladaptive associations with similarly deviant children (Patterson et al., 1992; Warman & Cohen, 2000), to increasing antisocial and internalizing problems (Coie et al., 1995; Jalongo et al., 1998; Pulkkinen & Pitkaenen, 1993) and to poor academic achievement (Wentzel & Asher, 1995).

Internalizing problems are often correlated with disruptive problems in children. For instance, Verhulst and van der Ende (1993) reported positive cross-sectional correlations between the Child Behavior Checklist (CBCL; Achenbach, 1991a) scales Attention Problems and Aggressive Behavior with the Social Problems scale and Internalizing problems. Longitudinal positive correlations were found between both the Aggressive Behavior and Attention Problems scales with the Internalizing and Social Problems scales 6 years later (Verhulst & van der Ende, 1993). Some studies suggest that the development of disruptive behavior is poorer if it co-occurs with anxiety problems. For instance, Jalongo, Edelsohn, Werthamer-Larsson, Crockett, and Kellam (1996) reported that children who were both aggressive and anxious were more likely to remain aggressive than children who were aggressive only.

The present study examined whether the differential impact of the GBG intervention as reported in chapter 5 are predicted by preexisting characteristics within the child, family and parenting domain. The results of this study enhance our understanding of the generalizability of the GBG intervention findings and can indicate areas for future intervention development or refinement. Specifically, risk factors in early elementary schoolchildren are studied that (1) discriminate between stable low and high disruptive children and that (2) discriminate between children who responded to the universal classroom based intervention and children who responded partially and are in need more intensive interventions. In line with the developmental model, information from peers, teachers and parents was used to establish risk factors related to the behavior of the child and to the social consequences of this behavior, risk factors in the family environment, and risk factors in the parenting practices domain.

## **Methods**

### *Study sample and Design*

Thirteen schools in the metropolitan area of Rotterdam and Amsterdam, the Netherlands, were recruited in the spring of 1999. The original target sample consisted of 794 first grade children. Parent, teacher and children assessments were completed in the spring of 1999 when the children were in grade 1. Since the project has a longitudinal design, only the 722 children who moved on to second grade were eligible for inclusion. 22 children who repeated second grade in 1999 and moved into the study cohort were included in the sample, making the total sample 744 children. All 744 parents or parent substitutes were



approached to obtain written informed consent and 666 (89.5%) of them agreed their child to participate in the study. 69% of the children were Caucasian, 10% Turkish, 9% Moroccan, 5% Surinam/Dutch Antilles and 7% from other ethnic groups. 51% of the children were male, which did not differ for ethnic groups ( $\chi^2 = 4.67$ ,  $df = 7$ ,  $p > .05$ ). Mean age of the children at baseline was 6.9 years (SD 0.6).

Each of the 13 schools had at least two grade 1 classes at the start of the project. Within one school, classes were randomly appointed to the intervention or control condition. Of the 31 classes in the 13 schools, 16 became intervention class, resulting in 363 children receiving the GBG program and 303 control group children. The GBG intervention started in the fall of grade 2.

### *Intervention*

The Good Behavior Game is described in detail elsewhere (chapter 5). In short, the Good Behavior Game (GBG) is a team-based behavioral management strategy that promotes appropriate behavior in the classroom by rewarding teams that do not exceed maladaptive behavioral standards. After baseline measurements of precisely defined behaviors, children were assigned to one of three or four groups by their teacher. Each team contained an equal number of disruptive and non-disruptive children. The goal of the GBG was to encourage children in each team to manage their own and their teammates' behavior through a process of group reinforcement. The GBG was played during grade 2 and grade 3.

### *Measures of child, family and parental risk factors*

All measures were completed in the spring of 1999, at the baseline assessment of the project.

#### *Child behavioral ratings and social consequences*

*Peer nominations of aggressive behavior* were obtained through four behavioral descriptions. Children were asked to nominate all classmates of either sex that fit each of the four descriptions: 'Starts fights', 'Angers easily', 'Says mean thing to peers' and 'Is disruptive' (Coie & Dodge, 1988). The four scores were divided by the number of children in the class minus one (nominating yourself was not allowed) and then summed to a total score.

*Peer rejected status* was based on a combination of liked-most and liked-least nominations. Children were asked to nominate the three children in their class who fitted these two descriptions best. Liked-most and liked-least scores were standardized within the classroom and standardized social preference scores were computed by subtracting the liked-most z score from the liked-least z score. This social preference score was then standardized within the classroom. 'Rejected' children had social preference scores less than  $-1.0$  SD, standardized liked-most scores less than zero, and standardized liked-least scores greater than zero (Coe & Kupersmidt, 1983).

*Parent and teacher ratings of children's problems* were obtained through the Child Behavior Checklist/4-18 (CBCL/4-18; Achenbach, 1991a) and Teacher's Report Form (TRF/6-18; Achenbach, 1991b). The CBCL and TRF contains a list of 120 behavior items on which the child's behavior is rated on a three point scale (0 = not true, 1 = somewhat true, 2 = very true or often true). The CBCL and TRF have been translated and validated for use in the Netherlands (Verhulst et al., 1996, 1997). The eight syndrome scales of the CBCL and TRF are Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior and Aggressive Behavior. In addition, the DSM-IV oriented CBCL and TRF scales Affective Problems, Anxiety Problems, Somatic Problems, Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems and Conduct Problems were constructed (Achenbach & Rescorla, 2001). For the present study, the Conduct Problems and Oppositional Defiant Problems scales from the CBCL and the Withdrawn, Somatic Complaints, Social Problems and Anxiety Problems scales from the TRF are used.

*Poor school functioning* was based on a rating by the teacher of sometimes true or very or often true on the item 'Poor school work' of the Teacher's Report Form. Since the Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems and Conduct Problems scales of the TRF were used to study the impact of the GBG intervention, these scales were not used as predictor variables.

*Parental stress around parenting* was obtained through the Nijmegen Parenting Stress Index (NPSI), which is the Dutch version of Abidin's Parenting Stress Index (Abidin, 1983) measuring the level of parental stress originating from several child and parent characteristics within the caregiver context (De Brock et al., 1992). The items are scored on a 6-point Likert scale, ranging from completely agree to completely disagree. The short, 25-item form was applied. For the present article, only the 14 items assessing parental

stress originating from the child's behavior or temperament (De Brock et al., 1992) were included in the analysis. Cronbach's alpha was .88.

From the above described measures the binary variables '*High Aggression*', '*High Withdrawn*', '*High Somatic Complaints*', '*High Social Problems*', '*High Anxious*', '*High Conduct Problems*', '*High Oppositional Defiant Problems*', and '*High Evoked Stress*' were computed. Each identifies children with scores in the upper quartile on each of the respective sample distributions.

#### *Family environment:*

*Socioeconomic status* was scored on the basis the highest current parental occupation and highest level of education completed. Socioeconomic status was coded as 1 = low, 2 = intermediate and 3 = high socioeconomic status (Netherlands Central Bureau of Statistics, 1993).

*Low education* was defined as completing elementary school or less.

*Life events* were rated on the Life Events Questionnaire (LEQ; Berden, 1992). Parents filled out a questionnaire containing 10 stressful life events. All 10 items state or imply a negative event. The items had a yes/no format to indicate whether or not an event had occurred during the last five years. Item scores were summed to a total life event score. High life events were defined as having 2 or more life events in the last five years.

*Parental psychopathology* was assessed with the Dutch translation of the General Health Questionnaire-28 item version (GHQ-28; Goldberg, 1972; Koeter & Ormel, 1991). The GHQ-28 consists of four seven-item scales measuring Somatic Symptoms, Anxiety/Insomnia, Social Dysfunction and Severe Depression in which the parents rate their health over the last two weeks on a 4 point Likert scale. Following Goldberg and Williams' (1988) procedure for scoring the 28-items GHQ, the scoring was transformed into a yes/no format by re-coding 0 (better than usual) and 1 (same as usual) into 0 (no) and 2 (worse than usual) or 3 (much worse than usual) into 1 (yes). Then all items were summed to a total score. High parental psychopathology was defined as having a total score of 5 or higher (Koeter & Ormel, 1991).

#### *Parenting characteristics*

*Parenting practices* were assessed with the global report form of the Alabama Parenting Questionnaire (APQ; Shelton et al., 1996). The APQ is a 42-item questionnaire in which parents rate on a 5-point Likert scale how often they display the described parenting

behavior. The four parenting domains are Involvement, Poor Monitoring/Supervision, Inconsistent Discipline and Corporal Punishment. High scores represent better scores for the Involvement scale and poorer scores for the other three scales. Poor parenting practices were defined as a score in the upper quartile on each of the respective sample distributions.

## Results

As a reference, Table 6.1 summarizes the developmental trajectories of disruptive behavior and the impact of the GBG intervention as identified and described in chapter 5.

**Table 6.1** Baseline level of disruptive behaviors and impact of GBG (effect size) for ADH problems, ODD problems and Conduct problems for Partial responders, Full responders and Low disruptive behavior children

| Class                    | Baseline            | GBG impact (ES) |              |                  |
|--------------------------|---------------------|-----------------|--------------|------------------|
|                          | disruptive behavior | ADH problems    | ODD problems | Conduct problems |
| Partial responders (14%) | high                | -               | -            | .55              |
| Full responders (26%)    | intermediate        | .71             | .41          | .42              |
| Low disruptive (60%)     | low                 | -               | -            | -                |

*Note:* ADH problems: attention deficit/hyperactivity problems. ODD problems: oppositional defiant disorder problems. GBG: Good Behavior Game. ES: Effect Size.

Table 6.2 gives the prevalence of each risk factor for children in each of the three identified trajectory groups at baseline. For the child variables, High Aggression and Rejected Status as rated by the peers, Poor School Performance, High Withdrawn, High Somatic Complaints and High Social Problems as rated by the teachers, and High Conduct Problems, High Oppositional Defiant Problems and High Evokes Stress as rated by the parents, significantly distinguished the trajectory groups at baseline. For instance, peers rated 67.5% of the children who partially responded to the intervention as high aggressive, compared to 36.5% of the children who fully responded to the intervention and only 10.6% of the low disruptive behavior children. Similarly, more than 60% of the partially responding children had Poor School Performance according to their teacher. Of the partial responders, 38.6% was rejected by their peers. This percentage was much higher than the

**Table 6.2** Percentage risk factors in child, family and parenting domain by trajectory groups

| Variable                     | GBG impact: | Trajectory groups |                           |                  | test     |      |
|------------------------------|-------------|-------------------|---------------------------|------------------|----------|------|
|                              |             | High<br>(n = 92)  | Intermediate<br>(n = 176) | Low<br>(n = 398) | $\chi^2$ | $p$  |
|                              |             | partial           | full                      | not needed       |          |      |
| <b>Child variable</b>        |             |                   |                           |                  |          |      |
| Peer reports:                |             |                   |                           |                  |          |      |
| High Aggression              |             | 67.5              | 36.5                      | 10.6             | 136.4    | <.01 |
| Rejected                     |             | 38.6              | 16.2                      | 3.0              | 94.4     | <.01 |
| Teacher reports:             |             |                   |                           |                  |          |      |
| Poor School Performance      |             | 60.9              | 30.1                      | 10.6             | 115.5    | <.01 |
| High Withdrawn               |             | 29.3              | 21.0                      | 17.3             | 6.9      | <.05 |
| High Somatic Complaints      |             | 23.9              | 21.6                      | 12.3             | 12.1     | <.01 |
| High Social Problems         |             | 50.0              | 23.9                      | 7.3              | 100.7    | <.01 |
| High Anxious                 |             | 15.0              | 15.3                      | 17.1             | 4.1      | .13  |
| Parent reports:              |             |                   |                           |                  |          |      |
| High Conduct Problems        |             | 40.5              | 22.1                      | 10.9             | 43.8     | <.01 |
| High Oppositional Problems   |             | 40.5              | 27.0                      | 17.8             | 21.4     | <.01 |
| High Evoked Stress           |             | 42.9              | 26.4                      | 18.4             | 23.6     | <.01 |
| <b>Family variable</b>       |             |                   |                           |                  |          |      |
| Low SES                      |             | 44.0              | 41.7                      | 31.6             | 7.8      | <.05 |
| Unemployment                 |             | 14.3              | 10.4                      | 9.8              | 1.4      | .49  |
| Single parent family         |             | 10.7              | 6.1                       | 7.2              | 1.8      | .42  |
| Low education father         |             | 16.0              | 18.2                      | 11.9             | 3.8      | .15  |
| Low education mother         |             | 17.9              | 24.1                      | 14.9             | 6.5      | <.05 |
| High life events             |             | 25.3              | 15.4                      | 10.4             | 9.3      | <.01 |
| Parent psychopathology       |             | 27.4              | 26.4                      | 20.0             | 3.9      | .15  |
| <b>Parenting practices</b>   |             |                   |                           |                  |          |      |
| High Involvement             |             | 14.3              | 20.2                      | 23.4             | 3.6      | .17  |
| High Inconsistent Discipline |             | 28.6              | 13.5                      | 15.7             | 9.9      | <.01 |
| High Harsh Discipline        |             | 31.0              | 24.7                      | 17.3             | 9.4      | <.01 |
| Low Supervision              |             | 19.0              | 29.6                      | 21.0             | 5.6      | .06  |

percentage for full responders (16.2%) or for low disruptive children (3%). Large differences were also found on teacher rated social problems with 50% of the partial responders having this risk, compared to 23.9% of the full responders and only 7.3% of the low disruptive children.

In general, the family/environmental and parenting practices variables less profoundly distinguished the three trajectory groups than the child variables. However, of the family/environmental variables, low socioeconomic status, low education by the mother and high levels of life events significantly distinguished the partial responders, full responders and low disruptive behavior group. Of the parenting practices, high inconsistent discipline and high harsh discipline parenting practices significantly distinguished the three trajectory groups.

### *Logistic regression*

To identify risk variables that discriminate between the three trajectory groups, child, family and parenting variables that significantly distinguished the three groups were submitted to a multivariate logistic regression. Three sets of logistic regression were performed; (1) low disruptive behavior versus full responders, (2) full responders versus partial responders and (3) low disruptive versus partial responders. The child variables, family variables and parenting variables were submitted simultaneously to a logistic regression analyses (method = forward LR). Since boys over-represented the partial responders and full responders and under-represented the low disruptive groups, gender was included in the analyses. Risk factors were included in the model at a  $p < .05$  level. Table 6.3 gives the magnitude of the impact of the risk factors, expressed as odds ratios.

Male gender, high peer rated Aggression, Poor School Functioning, High Social Problems and low socioeconomic status discriminated low disruptive behavior children from full responding to intervention children. The child risk variables increased the odds for becoming classified in the responding to intervention group by a 2 to almost 4 fold. Although the odds ratio for the low socioeconomic status of the family was lower, it still indicated that low SES increased the odds for moving from the low to the responding group by 69%. Peer rated Aggression, Poor School Functioning, Social Problems and Conduct Problems predicted moving from the full responders to the high disruptive and partial responders groups. As was found for moving from the low disruptive behavior group to the intermediate disruptive but full responding group, the child risk variables increased the odds for moving from the full responding group to the partial responding group by a 2 to almost 4 fold. Finally, as might be anticipated by the large differences in disruptive behavior between the low disruptive behavior and the partial responders group, the largest odds ratios were found between these two groups. Male gender, High Aggression and

**Table 6.3** Child, family and parental predictors of low disruptive behavior versus full responders, full responders versus partial responders and low versus partial responders

|                                     | Trajectory groups      |                                       |                           |
|-------------------------------------|------------------------|---------------------------------------|---------------------------|
|                                     | Low vs Full responders | Full responders vs Partial responders | Low vs Partial responders |
| <b>Child variable</b>               |                        |                                       |                           |
| male gender                         | 2.0 (1.3-3.2)          | -                                     | 2.8 (1.2-6.7)             |
| High Aggression (peers)             | 3.5 (2.1-5.9)          | 3.7 (1.9-6.9)                         | 7.0 (3.1-15.8)            |
| Rejected (peers)                    | -                      | -                                     | 3.1 (1.0-9.5)             |
| Poor School Performance (teacher)   | 3.2 (1.8-5.5)          | 3.3 (1.7-6.2)                         | 10.1 (4.4-22.9)           |
| High Withdrawn (teacher)            | -                      | -                                     | -                         |
| High Somatic Complaints (teacher)   | -                      | -                                     | -                         |
| High Social Problems (teacher)      | 3.8 (2.0-7.1)          | 2.5 (1.3-4.7)                         | 5.4 (2.2-13.1)            |
| High Conduct Problems (parent)      | -                      | 2.0 (1.0-3.8)                         | 4.7 (2.1-10.8)            |
| High Oppositional Problems (parent) | -                      | -                                     | -                         |
| High Evoked Stress (parent)         | -                      | -                                     | -                         |
| <b>Family variable</b>              |                        |                                       |                           |
| Low SES                             | 1.7 (1.1-2.6)          | -                                     | -                         |
| Low education mother                | -                      | -                                     | -                         |
| High life events                    | -                      | -                                     | 2.5 (1.0-6.4)             |
| <b>Parenting variable</b>           |                        |                                       |                           |
| High Inconsistent Discipline        | -                      | -                                     | -                         |
| High Harsh Discipline               | -                      | -                                     | -                         |

Note: Entries are odds ratio's (95% confidence interval). Informant for child variables are in parentheses.

Entries not significant at  $p < .05$  are not given.

rejection as rated by the peers, Poor School Functioning, Social Problems as rated by the teachers and Conduct Problems and life events indicated by the parents, discriminated between the low disruptive behavior children and the high disruptive/partial responders. Especially peer rated aggression and poor school functioning were profoundly predictive and increased the odds for becoming classified to the partial responders group by a 7 and 10 fold respectively.

In general, the child variables best discriminated the three trajectory groups. High peer rated Aggression, Poor School Performance and high Social Problems discriminated children between all three trajectory classes. Parent rated Conduct Problems predicted membership of the high disruptive and partial responding group compared to both other groups. Low socioeconomic status 'uniquely' discriminated between low disruptive children

from full responders. Peer rejection and life events 'uniquely' predicted moving from the low disruptive to the partial responders group. However, none of the risk factors alone or a combination of risk factors definitively identified the high disruptive/partial responding group. For instance, although the two 'unique' risk factors for membership to this group (rejection and life events) together increased the odds for belonging to this group by 7.5, these predictors still fell well short of definitively identifying partial responders. Only 8.5% of the partial responders had none of these two risk factors, but of the 24 children that had both of these risk factors, only 50% were in the partial responding group.

## Discussion

The aim of the present study was to determine risk factors that discriminated between three empirically identified groups of children: stable low disruptive children, intermediate disruptive children that responded positively to a universal preventive intervention, and high disruptive children who partially responded to the universal intervention. In line with the theory on the development of disruptive behavior syndromes, risk factors from the child, family and parent context were used. A number of findings stand out. First, the most powerful predictors of membership were the child variables, especially high-perceived aggression by their peers, Rejection, Poor School Functioning and Social Problems. Family and parenting variables either did not or less profoundly distinguish children from the three groups. Second, the child variables that were the strongest predictors for membership discriminated between all three groups of children; only rejected sociometric status and parent rated Conduct Problems uniquely predict membership. No single risk variable or combinations of risk variables were found that definitively identified all children classified in one of the three groups to this particular group. The identification of biological or genetic risk factors for the development of disruptive behavior may result in markers for children following a high disruptive behavior trajectory. In a recently published study, Caspi et al. (2002) found that maltreated children with a genotype conferring high levels of monoamine oxidase A (MAOA) were less likely to develop antisocial problems. Third, risk factors referring to internalizing problems, such as Anxiety or Withdrawn, did not predict group membership once the other variables were included in the analyses. Fourth, risk factors that distinguish low disruptive behavior from intermediate but full responding to intervention children were peer or teacher reported risk factors. Parent reported child risk factors only discriminated between the partial responders versus the other two groups.



This indicates that risk factors reported both in the school and home setting, indicating pervasiveness of disruptive behavior problems, are important markers for resiliency to the impact of a preventive intervention program.

Classmates, teachers and parents reported the presence of risk factors in high disruptive and partially responding to intervention children, which indicates that their disruptive behavior is pervasive. Classmates reported these children to be highly aggressive and likely to be rejected. Teachers reported these children to have troubles in their social interaction with classmates and indicated these children to have academic difficulties already in early elementary school. Parents indicated high levels of Conduct Problems for these children. Taking into account the developmental models for disruptive behavior, these findings suggest substantial risk for future prolonged disruptive behavior and the poor outcomes associated with this (Caspi et al., 1998; Coie et al., 1995; Patterson et al., 1992; Reid, 1993). For instance, Coie et al. (1995) reported that especially the combination of early peer rated aggressive behavior and rejected sociometric status to predict prolonged externalizing behavior into adolescence. Individually, these risk factors increased the odds for membership in the partial responder class with 7.0 (peer aggression) and 3.1 (peer rejection). The combination of these two risk factors increased the odds for becoming member of this class with 21.5, compared to non-disruptive children. Regarding the family context, high disruptive and partial responding children were more likely to have had negative life events like family breakup, serious health problems by the parents or child, death in the family or conviction to jail for one of the parents. The presence these risk factors have to be regarded in conjunction with the finding from the Van Lier et al. (chapter 5) study. These children had the highest levels of attention deficit/hyperactivity problems, oppositional defiant problems and conduct problems at school entry. Furthermore, their level of disruptive behavior was only partially responsive, and thus resilient, to the impact of a universal preventive intervention. Offord et al. (1998) argued that children who are at risk for the development of disruptive behavior are likely the ones that remain high disruptive despite a universal intervention. Therefore, these partially responding children are in need for more a more intensive intervention program.

The findings of this study should be regarded in the context of limitations. The risk factors and baseline assessments of disruptive behavior were measured simultaneously. Many risk factors were present or can be hypothesized to have been present far before we started to measure them. For instance, low education of the mother and inconsistent and harsh parenting discipline did discriminate between the three classes, but did not remain

predictive once they were analyzed together with the child variables. It is well conceivable that low educated mothers support their child poorly, resulting in learning difficulty in early elementary school. Also, inadequate and harsh parenting styles of unskilled parents may result in disruptive behavior in young children with poor social skills. Therefore, the importance of these family and parenting variables may well be underestimated. Second, the developmental trajectories and impact of the GBG on the development were based on teacher ratings of disruptive behavior syndromes, which could therefore not serve as risk factors. Indices of disruptive behavior from other informants were used. However, the peer ratings of aggression were assessed at school, which is the same context as the dependent variables of this study. Parents on the other hand reported about the child's behavior in the home setting. The correlation between teacher and parent rated problem behavior of the same child in a different setting is on average .27 (Achenbach, McConaughy, & Howell, 1987). This implies that the importance of parent rated conduct problems and oppositional defiant problems may be underestimated. The fact that parent rated conduct problems did discriminate despite the difference in setting in which the ratings were obtained argues for the importance of parent rated problems in predicting resiliency to the impact of a school based preventive intervention program.

The findings of this study have implications for prevention programs, identification of children at risk, policy makers and clinicians. First, it is important to notice that, at elementary school entry, powerful predictors are present that distinguish children both on the initial levels of disruptive behavior and whether or not these children will respond fully or only partially to a universal, classroom based preventive intervention program. Especially high levels of aggression as perceived by classmates, problems in the interaction with classmates and academic difficulties at school entry consistently discriminate between children in all three trajectory classes.

Second, intermediate numbers of risk factors reported in the school setting only are predictive for intermediate levels of disruptive behavior at elementary school entry. However, these levels of disruptive behavior can be effectively targeted by the Good Behavior Game, a preventive intervention program that can be easily incorporated in the normal curriculum of young elementary schoolchildren. The advantage of this intervention is that it does not expose these children to the negative effects associated with labeling, which is an inevitable negative side effect of selective intervention. Low household SES predicted becoming member of this class. This indicates that the GBG could effectively be

applied as a preventive program in neighborhoods with predominantly low SES families to prevent an increase in the levels of disruptive behavior problems.

Third, the finding that partial response to intervention was predicted by risk factors reported by all informants in multiple settings implies several possibilities to intervene. The fact that disruptive behavior of these children was, to a degree, resilient to change decisively indicates that these children should be considered for more intensive interventions. These interventions should target multiple facets in the development of disruptive behavior syndromes. Within the school context, these programs should target (a) the behavior of the disruptive child itself and (b) promote adequate social interactions with peers. These children should be made aware of how peers perceive their behavior and the consequences this has and they should be made aware of their already existing poor social status. These children should be trained in using adequate, non-coercive, non-disruptive and non-aggressive interaction styles with classmates. In addition, the intervention program should actively create possibilities for positive social interactions between these children and their classmates to break the negative cycle. A combination of the GBG with more intense, selective programs is indicated. The selective intervention could stimulate these children to behave appropriately and to teach them appropriate social interaction styles. The conjunct GBG could then serve to create the positive social environment to 'practice' the acquired skills with their classmates through the team based approach of the GBG with its emphasis on precisely defined appropriate classroom behavior. In addition to improving their own behavior and the relationship with peers, these children also need assistance in their academic functioning. Finally, behavioral management training by their parents is indicated for these children to subsequently promote appropriate behavior in the home setting. The Fast Track project (Conduct Problems Prevention Research Group, 1992, 1999a, 1999b, 2002a, 2002b) is an example of a prevention program that contains both universal and selective components. The project has been shown effective in reducing the level of disruptive behavior of the child and in improving parenting behavior. As a result, 37% of the intervention children, identified as high risk prior to the project, were free of serious conduct-problem dysfunction, in contrast to 27% of the control-group children (Conduct Problems Prevention Research Group, 2002a).

Fourth, many risk factors with sizable magnitude were found to predict the group of young elementary schoolchildren with levels of disruptive behavior that were resilient to change. This implies that starting with preventive intervention at elementary school entry

may be too late for these children. Interventions in the preschool phase, aimed at breaking the coercive cycle that is characteristic for the early development of disruptive behavior syndromes, for instance through parent management training, through improving the social skills of young children and through cognitive stimulation of the child are indicated. An effective program in this period is the Promoting Alternative THinking Program (PATHS; Kusche & Greenberg, 1994) for kindergarten children. Domitrovich et al. (2002) reported improvements in children's social skills, emotional regulation and social interactions. Other possibilities to intervene early are prepartum interventions, aimed at reducing parental risk behaviors that are predictive for disruptive behavior syndromes such as prenatal exposure to tobacco (Milberger et al., 1996; Wakschlag & Hans, 2002; Wakschlag et al., 2002), alcohol (Olson et al., 1997) and marijuana or other illegal drugs (Fried, 1996; Fried et al., 1998). Postpartum intervention aimed at promoting appropriate use of health care facilities, good nutrition and preventing poor early child rearing styles, child abuse or neglect and reducing familial stress due to the newborn, which is often found in high risk families are additional opportunities to intervene. The Prenatal and Infancy Home Visitation by Nurses program (Olds, 1998) is a proven effective intervention in this period.

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# 7

## General Discussion





## Chapter 7

### General Discussion

The impact of a universal, classroom based preventive intervention program targeting the development of disruptive behavior in young elementary schoolchildren was studied in this thesis. In addition, risk factors in the child, familial and parenting domains that predict responsiveness of children to the intervention were studied. In the general discussion, emphasis will first be given to the outcomes of the preventive intervention. However, prevention programs may include additional, important outcomes for prevention science. For instance, knowledge about the characteristics of children at risk for developing disruptive behavior and associated negative outcomes is of importance. This to identify those children eligible for inclusion in selective or targeted preventive intervention programs. Knowledge about the developmental trajectories of disruptive behavior and outcomes related to these trajectories is also of importance. This to provide a firm scientific basis for prevention science. Therefore, emphasis was also given to the identification of groups of children with similar patterns of disruptive behavior and to the quality of a screening method for disruptive behaviors. In addition, developmental trajectories of aggressive behavior in elementary schoolchildren, the characteristics at onset and the outcomes predicted by the trajectories were studied.

#### *Preventing disruptive behavior problems in children*

The Good Behavior Game (GBG) intervention was implemented at 13 schools in the Netherlands. The aim of the GBG is to create a consistent, predictable and safe classroom environment. Teachers were willing to comply with the basic assumptions underlying the GBG intervention although some found it difficult to emphasize positive behavior and not to respond immediately to negative behavior. Teachers frequently reported the GBG to be an effective tool in managing children's behavior in their class. They frequently used the GBG in situations when children were required to work quietly. Teachers also reported that children in general enjoyed the GBG and that they put in a great effort to win every session.

The impact of the Good Behavior Game intervention on the developmental trajectories of attention deficit/hyperactivity problems, oppositional defiant problems and

conduct problems of elementary schoolchildren commencing from grade 1 through grade 3 was determined in chapter 5. To analyze the impact of the GBG, we used a step-wise approach. First the impact on the total sample was analyzed. Then the impact of the GBG on children following different developmental trajectories of disruptive behavior problems was analyzed.

The development of attention deficit/hyperactivity problems, as determined in all children in the control group, was characterized by an increase in the level of these problems over the studied period. Intervention children, however, showed on average a decrease in levels of attention deficit/hyperactivity problems in this period. This trajectory differed significantly from that of the children in the control classes. The GBG therefore proved to be powerful in reducing elementary schoolchildren's attention deficit/hyperactivity problems.

In line with recent studies on the developmental trajectories of disruptive behavior, we anticipated that groups of children would follow different developmental trajectories of attention deficit/hyperactivity problems over the intervention period. Three developmental trajectories were identified. Children following the first trajectory had the highest levels of attention deficit/hyperactivity problems in grade 1. Fourteen percent of all children followed this trajectory. Children following the second trajectory had intermediate levels of attention deficit/hyperactivity problems over the intervention period. This trajectory was followed by 26% of all children. The remaining 60% of the children followed the third, normative, developmental trajectory, with low levels or even absence of attention deficit/hyperactivity problems throughout the intervention period.

The GBG had a positive impact on children following the intermediate developmental trajectory with an effect size of .71. This is a medium effect according to Cohen's criteria (chapter 5). Interestingly, the effect for the children following the intermediate developmental trajectory is best described as a preventative effect. The increase in levels of attention deficit/hyperactivity problems that was found in children in the control group was transformed in stable levels of attention deficit/hyperactivity problems in children who received the GBG intervention. The GBG did not positively influence attention deficit/hyperactivity problems for children following the high developmental trajectory. The development of attention deficit/hyperactivity problems for children following the low developmental trajectory was the same for children in the control classes as for children receiving the GBG intervention.

Next, the impact of the GBG intervention on conduct problems and oppositional defiant problems for the three identified developmental trajectories was examined. Children with the highest levels of attention deficit/hyperactivity problems also had the highest levels of conduct and oppositional defiant problems. Positive effects on the development of conduct and oppositional defiant problems substantiated the effect found for children following the intermediate disruptive behavior developmental trajectory. The effect sizes for conduct and oppositional defiant problems were small (chapter 5). In addition, children following the high trajectory had a positive trend towards significance for conduct problems, indicating fewer of these problems over the intervention period. The effect size was medium (chapter 5). Of interest is that the improvement for children who were high on conduct problems and who received the GBG intervention resulted in similar levels of conduct problems at the end of grade 3, compared to children in the control condition with intermediate conduct problems at grade 1.

In chapter 1, several poor outcomes, resulting from a deviant disruptive behavior development, were discussed. It was concluded that any effort should be made to prevent these outcomes. The overall conclusion of the GBG intervention was that creating a consistent, predictable and safe classroom environment, as is done with the GBG protocol, resulted in several positive impacts on the development of disruptive behaviors in young children. No data were available to determine whether the positive impact of the GBG intervention will sustain and how the positive impact affects disruptive problems and poor outcomes at older ages. However, the fact that disruptive behavior in children was reduced in a sensitive period in the development of children, the early school period, is of significant importance.

The impact was most positive in children following an intermediate disruptive behavior developmental trajectory. The disruptive behavior of children following a high trajectory partially improved. A positive impact on conduct problems was found, but not on attention-deficit/hyperactivity and oppositional problems. Therefore, although the GBG proved to be a powerful tool to manage children's behavioral problems at school, predictors for responsiveness to the GBG intervention were studied to more optimally address the disruptive behavior of children in the high disruptive behavior trajectory.

### *Important predictors*

Predictors for responsiveness to the GBG intervention were studied in chapter 6. Risk factors in the behavior and consequences of the behavior of the child, family and parenting domains were studied. Especially risk factors in the child discriminated between children that followed a low versus an intermediate versus a high disruptive behavior developmental trajectory. Risk factors operating in the school context predicted which children would follow the trajectory that could effectively be transformed by the GBG. Risk factors in the school and in the home context, in combination with poor relations with peers, predicted children whose disruptive behavior could only partially be influenced by the GBG intervention. This indicates that if risk factors for disruptive behavior were found in multiple settings, the GBG intervention is only partially effective in positively influencing disruptive behavior. In addition to the GBG intervention, selective preventive intervention programs that more intensively target disruptive behavior of these children at school, and interventions targeting the social skills, relations with peers, academic skills and the disruptive behavior at home are indicated for children following a high disruptive behavior trajectory.

### *Developmental trajectories of children's aggression*

The characteristics at onset as well as the consequences for children following different developmental trajectories of aggression were studied in chapter 4. Three developmental trajectories were identified. (1) Seven percent of all children followed the high-increasers trajectory. These children were marked by physically aggressive behavior and intermediate, but the highest of all children, levels of other Conduct Problems at grade 1. These children followed a developmental trajectory of high level of peer-nominated aggression already in grade 1 with a further increase in these levels to middle elementary school. (2) Fourteen percent of the children followed the moderate-persisters trajectory. Intermediate levels of physical aggression and low levels of other Conduct Problems at onset, and moderate but persistent levels of aggression across the follow-up period characterized children following this trajectory. (3) The absence of Conduct Problems at grade 1 and low levels of aggression over the follow-up period characterized a third trajectory, followed by the remaining 79% of the children.

Children following the high-increasers trajectory also had high levels of comorbid Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems. Outcomes

indicated that children following the high-increasers trajectory were likely to be rejected by their peers and to have elevated levels – approximately clinical levels – of TRF Externalizing and Total Behavior Problems when entering middle elementary school.

The results from chapter 4 clearly indicate that children who enter elementary school with high levels of Conduct Problems, especially physical aggression, and high levels of Oppositional Defiant and Attention Deficit/Hyperactivity Problems will experience the social consequences of their deviant behavior. These children increasingly obtain the status of being an aggressive child. Classmates of these children develop high levels of non-acceptance and mistrust. The physically aggressive children experience social problems with their classmates, and increasingly deviate from the normative social peer group. These social consequences enhance the risk for various poor outcomes in adolescence and young adulthood. The characterization of these young physically aggressive children, the developmental trajectory, and their number suggest that these children resemble children called 'life-course persistent' by Moffitt (1993) or 'chronic' by Nagin and Tremblay (1999). The outcomes are associated with low academic achievement (Moffitt et al., 2002), psychopathic personality traits of alienation, impulsivity and callousness (Moffitt et al., 1996), juvenile delinquency (Nagin & Tremblay, 1999) and conviction for violent crimes (Jeglum-Bartusch et al., 1997; Moffitt et al., 1996; Moffitt et al., 2002).

### *Typology of disruptive behavior*

In chapter 2 symptoms of Conduct Problems, Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems reflecting diagnoses of DSM-IV disruptive behavior were used to identify children differing in disruptive behavior. The objective was to classify children to groups of children differing in disruptive behavior and to determine the risk-status of children in each of these classes.

Three classes were identified: one class with high levels of Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems and intermediate levels of Conduct Problems. A second class with intermediate levels of Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems and low levels of Conduct Problems. A third class with low levels on all disruptive behaviors. No classes were identified in which children were marked by only symptoms of Conduct Problems, Oppositional Defiant Problems or Attention Deficit/Hyperactivity Problems. To study whether the classification could be

improved, covariates (gender, SES and parenting stress) were included and it was found that children could be classified with higher precision when these covariates were included. Particularly children in class 1 were considered at risk for developing stable, high levels of disruptive behavior.

The finding that the behavioral characteristics of children in the identified classes reflected only comorbid symptoms yields several novel and interesting implications for research, preventative interventions and for clinical practice. These implications will be discussed later in this chapter.

### *Screening for disruptive behavior problems*

Many preventive programs are so-called selective programs (Institute of Medicine, 1994). Selective programs target only children at risk for disruptive behavior and the associated poor outcomes. These programs have the advantage over universal programs that they are more efficient. Only children in need for intervention are included. However, selected interventions need a screening procedure to identify children in need for the preventive program. Bennett et al. (1998) explored the predictive accuracy of screening methods used to identify children at risk for disruptive disorder. The authors concluded that sensitivity and specificity were so low that given the prevalence of disruptive disorder, the positive predictive value was likely to be below 50%. Consequently, the majority of the children identified to be at risk at the screen are either false positive or false negative. False positive cases are unnecessarily exposed to the intervention and the risks associated with labeling. False negative cases do not receive the intervention they could benefit from. Findings from the present study can contribute to the design of more efficient screening methods.

The findings in chapter 2 indicate that the identification of children at risk for future disruptive behavior through a screening procedure should focus on children exhibiting Oppositional Defiant and Attention Deficit/Hyperactivity Problems as well as Conduct Problems rather than focussing only on Conduct Problems. In chapter 3, the predictive accuracy of the screening method proposed in chapter 2 was evaluated. CBCL/4-18 items, reflecting symptoms of DSM-IV defined disruptive disorders, alone and in combination with child and familial risk factors were used to predict children's risk for disruptive disorder. The predictive accuracy improved when the familial risk factors were included in the parent screen. The predictive accuracy reached a positive predictive value of 69%. This was

considerably higher than found in 17 other studies (Bennett et al., 1998). Then, children that were incorrectly classified at the parent screen (false positive and false negative), were compared to correctly classified children (true positive and true negative) on risk factors in the family context. This to test whether the screening procedure could be improved through a multiple-gating procedure. The differences in familial context factors between these children were limited. No clear indications were found on how to use familial context factors to improve the screening procedure after the initial classification. Comparison of the behavior of the children and risk factors in the family domain indicated that true-positives and true-negatives are at different risks for future disruptive disorder than false-positives and false-negatives. True-positives were at highest risk, false-positives and false-negatives at intermediate risk and true-negatives at lowest risk.

In chapter 4, developmental trajectories of peer-nominated aggression were identified. The behavioral characteristics that precede these trajectories, as rated by the teachers, were determined. The findings indicate that children who are marked by physical aggression items from the TRF Conduct Problems scale, like *'Physically attacks people'*, *'Cruelty, bullying, or meanness to others'* and *'Gets in many fights'* in addition to covert items, like *'Lying or cheating'*, *'Swears'* and *'Truancy or unexplained absence'* are at risk for following a high aggressive developmental trajectory. These children were found to be at risk for poor outcomes such as peer rejection and clinically elevated TRF Externalizing and Total Behavioral Problem scores across childhood. Physical forms of aggression at school entry are therefore markers for children at risk for developing disruptive disorder.

Offord et al. (1998) argued that children who are at risk are likely to be the ones who will remain high on disruptive problems despite a universal preventative program. Fourteen percent of all children had levels of disruptive behavior that could only partially be reduced by the GBG intervention. These children were marked by various symptoms of TRF Attention Deficit/Hyperactivity Problems at elementary school entry. Behaviors such as *'Impulsive or acts without thinking'*, *'Disrupts class discipline'*, *'Fidgets'*, *'Can't concentrate, can't pay attention for long'*, *'Can't sit still, restless, or hyperactive'* and *'Disturbs other pupils'* characterize these children. Also, classmates, teachers and parents reported about the presence of risk factors for these children. These children were perceived as having high levels of aggressive behavior at school and Conduct Problems at home, having social problems with classmates, were likely to be rejected by their peers, and had learning difficulties. This indicated that their disruptive behavior is present at school and at home. The pervasiveness-issue argues for including informants from

multiple settings in the identification of children at risk. Risk factors in the child behavioral domains appeared to be the strongest predictors for levels of disruptive behavior in children whose behavior was only partially influenced by the GBG intervention. However, these factors were also found in children whose levels of disruptive behavior were effectively targeted by the GBG intervention. Only peer rejection and parent rated conduct problems uniquely predicted which children were only partially affected by the intervention. However, no risk factor alone or combinations of risk factors were found that definitively identified all children following the developmental trajectory that could only be partially affected by the GBG intervention.

Therefore, although contributions were made to improve screening methods for the early detection of children at risk for disruptive behavior and poor associated outcomes in this study, no *markers* were found that definitely identified these children. Characteristics of disruptive disorders do not meet all the criteria for being used in screening programs (Derogatis & Lynn, 1998). Screening was originally developed to detect the presence of specific medical conditions, that were detected in a benign pre-symptomatic stage and for which adequate treatment is available. Disruptive disorders do not have unitary underlying conditions and lack the specificity of the medical conditions. Disruptive disorders also do not have a well-delineated onset (Loeber et al., 1995; Loeber & Keenan, 1994) after which the disorder can be validly detected.

Future screening procedures may be improved by the identification of biological or genetic markers for the development of disruptive behavior. In a recently published study Caspi et al. (2002) studied a large sample of male children from birth to adulthood to determine why some maltreated children grew up to develop antisocial behavior, whereas others did not. The authors found that maltreated children with a genotype conferring high levels of monoamine oxidase A (MAOA) were less likely to develop antisocial problems. This provides epidemiological evidence that genotypes can moderate children's sensitivity to environmental insults.

The results of this study, however, indicate that researchers and policy makers should not chose *between* selective or universal interventions, but should *combine* these two types of intervention. A universal program like the GBG can effectively target children following an intermediate disruptive behavior trajectory and positively influence children following a high disruptive behavior developmental trajectory. A consistent, safe and predictable classroom environment as is achieved with the GBG will not harm the remaining children in the classroom. The selective programs should then target those



children in which a positive impact should be achieved with additional intervention efforts. The selective parts of this combined intervention package will need a screening procedure and the predictive accuracy is likely not to be optimal. However, although false negative children from that screen may not receive the optimal intervention, they will receive an effective universal program, rather than not receiving any preventive intervention.

### *Strengths and Limitations*

The strength of the current study is that a general population sample was used which enhances the generalizability of the reported findings to other children (Verhulst, 1995). Second, a randomized controlled design was used, with classes in a school randomly assigned to an intervention or control condition. Within one school, at least one control class and one intervention class were present for optimal comparison between the developmental trajectories of disruptive behavior for children in the control classes and intervention condition (Brown & Liao, 1999). Third, a universal preventive intervention program was used and all children in the intervention condition received the program, not only 'high-risk' children. Also, analyses in this study were performed on all children and not limited to just high-risk children or to boys. Although boys were more likely to have higher disruptive behavior scores than girls, this was not exclusively found in boys.

A consequence of the application of universal interventions and the inclusion of all children in the analyses is that the majority of children will not respond positively to the intervention. This majority of the children has absence of disruptive behavior, is not at risk and is not in need of intervention. If main effects are found in a universal intervention study, this is presumably due to improvements in behavior in a minority of children with elevated levels of disruptive behavior. Therefore, groups of children were formed to analyze the impact of universal interventions. Formation of groups was, until recently, based on gender or on differences in a priori levels of disruptive behavior (see for instance Kellam et al., 1994). This did not take into account differences in the developmental trajectories of these groups. We approached this issue by analyzing classes of children following different developmental trajectories. We used a new statistical approach to analyze the impact of the GBG intervention in which the identification of classes of children was based on differences in both the initial level and the subsequent development of disruptive behavior. This approach has two advantages. First it overcomes the use of predetermined, usually arbitrary cutoff points. Classification of children to a particular

developmental trajectory was done directly by the model. Second, it enabled us to analyze the impact of the GBG directly on the *development* of disruptive behavior rather than on differences in disruptive behavior scores between intervention and control children only at outcome.

A limitation to this study is the time frame. This study began when children were in grade 1 and continued to when these children were in grade 3. The consequence is that no data were available to determine whether the positive impact of the GBG intervention will sustain and how the positive impact affects disruptive problems and poor outcomes at older ages. Therefore, the results of this study have to be appreciated for their importance regarding the manifestation, the development and the malleability of disruptive behavior in childhood only.

A second limitation refers to the age at which the intervention was implemented. Marked differences in the level of disruptive and aggressive behavior were found in grade 1 children. In addition, many risk factors were already present or can be hypothesized to have been present far before we started to measure them. As a result, the mechanisms leading to the differences in disruptive behavior as found at the start of this project cannot, or only partly, be explained by this project. For instance, low education of the mother and inconsistent and harsh parenting discipline were found to discriminate between groups of children differing in levels of disruptive behavior when univariately tested (chapter 6). However, these risk factors lost their predictive power once they were analyzed together with child variables. It is conceivable that genetic factors as well as the poor support given by low educated mothers, results in learning difficulties in early elementary school. Inconsistent and harsh parenting styles of unskilled parents may also result in disruptive behavior in young children with poor social skills. Therefore, to fully understand the mechanisms leading to the differences in levels and malleability of disruptive behavior found in this study, children should be included at an earlier stage, preferably during infancy of even before birth.

### *Implications of this study*

This study provides several implications for prevention science and clinical practice:

1. Interventions aimed at creating a consistent, safe and predictable classroom environment, such as the Good Behavior Game intervention, are effective in reducing levels of disruptive behavior in children with intermediate and high levels of these

behaviors. However, to more effectively target the levels of disruptive behavior in children following a high disruptive behavior trajectory, an intervention package containing both universal and selective components is needed. The selective components should specifically target the needs for highly disruptive children. These components should more intensively target their disruptive behavior at school, teach them in using appropriate social interaction styles with their peers and help them in their academic functioning. In addition, parents of these highly disruptive children should be supported in managing their child at home. The universal component should create a predictable, safe and consistent social environment to create possibilities for highly disruptive children to 'practice' the acquired skills from the selective components with their classmates. The universal component itself is sufficient for children with milder forms of disruptive behaviors. Future research should focus on analyzing the unique contribution of each of these intervention programs. This to develop combinations of preventive programs that can optimally target the development of disruptive behavior problems in children;

2. Three developmental trajectories of aggressive behavior can be identified in a general population sample of early elementary schoolchildren. Children are well aware of differences in aggressive behavior between peers. Peers will approach children with high levels of aggressive behavior by mistrusting them, by increasingly regarding them as aggressive children, and they will retaliate by not accepting and rejecting these children. This process increases the risk for a further prolongation of aggressive behavior and the associated negative outcomes. Future research should therefore focus on the mechanisms leading to these differences in disruptive behavior at elementary school entry;
3. The GBG intervention is now proven to effectively target disruptive behavior in children in both the Netherlands as in the U.S.A. Small cross-cultural differences in levels of disruptive behaviors between children in the U.S. and the Netherlands were reported. Despite these cross-cultural differences in levels of disruptive behavior, the effectiveness of the GBG in both cultures indicates that cross-cultural consistency exists in the malleability of disruptive behavior in elementary schoolchildren;
4. Risk factors with sizable effect were found to predict which young schoolchildren followed a high disruptive developmental trajectory that was only partially affected by the intervention. Implementing an intervention at elementary school may therefore be too late to prevent the development of disruptive behavior. Prevention science should

therefore also focus on interventions in early childhood, aimed at breaking the coercive cycle that is characteristic for the early development of disruptive. Other opportunities include prepartum interventions aimed at the reduction of risk factors such as prenatal exposure to substances. Additionally, postpartum interventions aimed at the appropriate use of health facilities, the use of good nutrition and the prevention of poor early child rearing styles, child abuse or neglect and the reduction of familial stress due to the newborn are indicated;

5. Preventive intervention programs and research on disruptive behavior problems in young children should focus on all three disruptive behavior syndromes. Classes of children with pure conduct problems, oppositional defiant problems or attention deficit/hyperactivity problems were not identified in this general population sample of young elementary schoolchildren;
6. Although children following a developmental trajectory high on disruptive behavior are different from children with lower levels of disruptive behavior in many ways, no *markers* are currently available that definitively identify these children at an early stage. This indicates that screening procedures, to identify children in need for intervention will remain inaccurate. This could argue for the use of universal preventive programs that do not need a screening procedure. The findings from the current study, however, suggest that prevention science should not focus on choosing *between* a universal or selective intervention, but should focus on the development of programs with both universal and selective components.

### *Conclusion*

In the present study it was shown that disruptive behavior in young elementary schoolchildren can successfully be targeted by a universal, classroom based preventive intervention. The intervention was developed for use in the Netherlands. However, children with the highest levels of disruptive behavior only partially responded to the intervention. This indicated that their level of disruptive behavior was, to a degree, resilient to this type of intervention. This warrants the implementation of comprehensive intervention strategies for these children, targeting the specific risk factors present for these children. Prevention science should focus on the development and evaluation of the impact of comprehensive intervention strategies in the elementary school years. Combining the GBG with a social skills training, a playground intervention aimed at reducing disruptive behavior and a

parent management intervention is an example of such a comprehensive intervention strategy.

Regarding the typology and course of disruptive behavior, three findings from this study stand out. First it was found that in studies on the etiology, the consequences and the treatment of disruptive disorders and preventive intervention should focus on conduct problems as well as on attention deficit/hyperactivity problems and oppositional defiant problems. Second, especially physical aggression at school entry places children at risk for the development of disruptive behavior and associated poor outcomes. Third, marked differences in the level of disruptive behavior between children were found at elementary school entry. Many risk factors for the development of future disruptive behavior were found at this age. It remains difficult, however, to validly identify children at risk for disruptive behavior at an early stage.

Future research should focus on the mechanisms leading to the differences in disruptive behavior in elementary schoolchildren. For this, emphasis should be placed on the peer influences during the kindergarten years and on the effects of early risk factors such as substance use of the mother on a poor development of children. In addition, emphasis should be given on the identification of genetic and biological markers and on the unique contribution of the genetic and biological factors and the family/environmental factors on the development of disruptive behavior in children. Apart from emphasis on the elementary school period, prevention science should focus on the development and evaluation of preventive programs during pregnancy, infancy and early childhood. This to prevent the development of levels of disruptive behavior that, in this study, were already found to be less susceptible to intervention.



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## Summary



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## Summary

The objective of the present study was to examine the characteristics and development of disruptive behavior and the impact of a classroom based preventive intervention targeting disruptive behavior in young elementary schoolchildren.

In *chapter 1*, the development of disruptive behavior, from infancy to adolescence and young adulthood, was described. Opportunities to intervene in this process and examples of effective preventive intervention programs were discussed. The background and the main aims of the current study were presented. These aims were:

- to examine the impact of a universal, classroom based preventive intervention program on the development of disruptive behaviors in young elementary schoolchildren;
- to compare the characteristics of children who responded successfully to the intervention with the characteristics of children in need for more intensive interventions, to further improve preventive intervention programs;
- to further our knowledge about developmental psychopathology (1) by identifying developmental trajectories of aggression, the characteristics at onset as well as the consequences for children following different trajectories (2) by the identification of classes of young elementary schoolchildren with similar disruptive behavior.

In *chapter 2*, young children were classified to groups differing in disruptive behavior. Three classes of children were identified: (1) children with high levels of Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems and intermediate levels of Conduct Problems, (2) children with intermediate levels of Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems and low levels of Conduct Problems and (3) children with low levels on all disruptive behaviors.

No classes were identified in which children were marked by only symptoms of Conduct Problems, Oppositional Defiant Problems or Attention Deficit/Hyperactivity Problems. The findings indicate that young elementary schoolchildren at risk for future disruptive behavior and poor outcomes are marked by high levels of Oppositional Defiant Problems and Attention Deficit/Hyperactivity Problems and moderate levels of Conduct Problems. Children were classified with higher precision when covariates (gender, SES, parenting stress) were included. The identification of children at risk for future disruptive behavior through a screening procedure and interventions to prevent or divert the

development of disruptive behavior in young children should focus on Conduct Problems as well as on Attention Deficit/Hyperactivity Problems and Oppositional Defiant Problems.

In *chapter 3*, the predictive accuracy of classifying children at risk for disruptive disorders was evaluated. Predictive accuracy improved when the risk factors from the child and family context were combined with the behavioral items. The predictive accuracy reached a positive predictive value of 69%. This was higher than found in previous studies, where the positive predictive value was likely to be below 50%.

We then studied whether the screening procedure could be improved through a multiple gating procedure. For this, children incorrectly classified (false positive and false negative) were compared to correctly classified children (true positive and true negative) on risk factors in the family context. The differences in familial context factors between these children were limited. No clear indications were found on how to use familial context factors to improve the screening procedure after the initial classification.

In *chapter 4*, developmental trajectories of peer nominated aggressive behavior, the characteristics at onset as well as the outcomes were studied. Three developmental trajectories were identified. (1) A high-increasers trajectory in which children were marked by physical aggression and intermediate levels of other Conduct Problems at onset, as rated by their teachers. Their developmental trajectory was characterized by high levels of peer-nominated aggression at onset and increasing levels throughout follow-up. Only 7% of the children, predominantly boys, followed this developmental trajectory. (2) A moderate-persistent trajectory was identified with intermediate levels of physical aggression at onset. Children following this trajectory had moderate but persistent levels of peer-nominated aggression over time. Fourteen percent of the children followed this trajectory. (3) The remaining children followed the third developmental trajectory. These children had no Conduct Problems at onset. They followed a normative, low aggressive developmental trajectory.

Children following the high-increasers trajectory were likely to have clinically elevated Externalizing problem scores when entering middle elementary school. In addition, these children were likely to be rejected by their classmates. Therefore, when children enter elementary school with a behavioral pattern of physical aggression, they will experience the social consequences of their deviant behavior. These physically aggressive children increasingly obtain the status of being an aggressive child. Their classmates develop high levels of non-acceptance and mistrust. The physically aggressive children will experience social problems with their classmates, and they will increasingly deviate

from the normative social peer group. As a result, these children are at risk for affiliation with similar deviant peers and for developing chronic aggressive and antisocial behavior with the associated negative outcomes. Children following the high-increasers developmental trajectory are indicated for intensive intervention programs.

In *chapter 5*, the impact of the Good Behavior Game (GBG) was studied. The GBG is a universal classroom-based intervention targeting children's disruptive behavior. The GBG is a team-based behavioral management program that is integrated in the normal curriculum of elementary school. The aim of the GBG is to create a consistent, positive and safe classroom environment. Children work together in teams when the GBG is in process. During the GBG, teams are encouraged to comply with well-defined and positively formulated classroom rules. Children in the teams are rewarded for positive behavior through compliments and through tangible rewards. The GBG was played during grade 2 and 3 in 13 elementary schools in Rotterdam and Amsterdam.

The impact of the GBG was studied on the development of disruptive behavior in elementary schoolchildren commencing from grade 1 through grade 3. The impact on Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems and Conduct Problems was examined.

The development of control group children's Attention Deficit/Hyperactivity Problems was compared to these problems for intervention children. Control group children showed increasing Attention Deficit/Hyperactivity Problems over the study period. Intervention children, in contrast, showed decreasing levels of Attention Deficit/Hyperactivity Problems. This difference in development was significant, indicating an overall effect for the GBG intervention on Attention Deficit/Hyperactivity Problems.

We then analyzed the impact of the GBG on children following different developmental trajectories of Attention Deficit/Hyperactivity Problems. Three developmental trajectories were identified. Children in these trajectories had high (class 1; 14% of the sample), intermediate (class 2; 26%) or low levels (class 3; 60%) of Attention Deficit/Hyperactivity Problems at grade 1.

The GBG intervention had a positive impact on the development of Attention Deficit/Hyperactivity Problems for the children following the intermediate developmental trajectory (class 2). The effect sizes of the mean difference at outcome was medium (*chapter 5*). The impact is best described as a preventative effect. The increase in levels of Attention Deficit/Hyperactivity, as found in children in the control group, was transformed in stable levels of these problems in children who received the GBG intervention.

The development of Attention Deficit/Hyperactivity Problems for children following the high developmental trajectory (class 1) was similar for intervention and control group children. Similarly, the GBG did not influence Attention Deficit/Hyperactivity Problems for children following the low developmental trajectory (class 3). This was expected due to the low level of these problems in grade 1.

The impact on Oppositional Defiant Problems and Conduct Problems was then examined. Positive impacts on both Oppositional Defiant Problems and Conduct Problems substantiated the positive impact found for Attention Deficit/Hyperactivity Problems for children following the intermediate developmental trajectory (class 2). Effect sizes were small. A positive response on Conduct problems was found in children following the high disruptive behavior developmental trajectory (class 1). The effect size was medium.

The Good Behavior Game intervention created a consistent and predictable classroom environment. This proved to be a powerful tool to intervene in the development of disruptive behavior for both children with intermediate (class 2) and high levels of disruptive behavior (class 1) at elementary school entry. Children with intermediate levels of disruptive behavior fully responded to the GBG intervention; a positive impact on all three disruptive behavior problems was found. However, children following a high disruptive behavior developmental trajectory only partially responded. Only a positive impact on Conduct problems was found. Therefore, these children are in need for additional interventions.

In *chapter 6*, predictors for responsiveness to the GBG intervention were studied. Problem behavior and risk factors for the development of disruptive behavior in the child, family and parenting domains were examined. Risk factors operating in the school context predicted which children would follow the trajectory that could effectively be transformed by the GBG. Risk factors in the school and in the home context, in combination with poor relations with peers, predicted which children were only partially affected by the GBG intervention. The GBG intervention is therefore only partially effective in children for whom risk factors for disruptive behavior are found in multiple settings. These children are in need for a combination of the GBG intervention with additional, selective interventions. The selective interventions should target specific risk factors. At school, the intervention program should more intensely target the behavior of the child itself. The program should teach these children in starting adequate, non-coercive, non-disruptive and non-aggressive social relations with peers. Additional support for the academic functioning of these children is needed. In addition, parent management training's are indicated for these

children. The GBG itself should serve to create a positive social environment. Partial responders could 'practice' the acquired skills from the selective intervention components with their classmates through team based approach of the GBG with it's emphasis on well-defined appropriate classroom behavior.

In *chapter 7*, the main findings and conclusions of the previous chapters were summarized and discussed. It became apparent that disruptive behavior in young elementary schoolchildren can successfully be targeted by the GBG intervention. However, children with the highest levels of disruptive behavior (class 1) only partially responded to the intervention. This warrants the implementation of comprehensive intervention strategies, targeting the specific risk factors present in these children.

A number of additional findings are of importance. It was argued that studies on the etiology, the consequences and the treatment of disruptive disorders and preventive intervention should focus on all three disruptive behavior problems. Additionally, it was found that especially physical aggression at school entry places children at risk for the development of disruptive behavior and associated poor outcomes. Various contributions were made in this study to improve the identification of children at risk for high levels of disruptive behavior. Despite this, it remains hard to identify children at risk for developing disruptive behavior and the associated poor outcomes at an early stage.

Considering the results of this study, it appears very important (1) for future research to focus on the mechanisms leading to the differences in disruptive behavior in elementary schoolchildren. Emphasis should be placed on the peer influences during the kindergarten years and the effects of early risk factors such as substance use (cigarets, alcohol) of the mother during pregnancy on the development of disruptive behavior in young children. In addition, emphasis should be given to the identification of genetic and biological markers and on the unique contribution of the genetic and biological factors and the family/environmental factors on the development of disruptive behavior in children. (2) For prevention science it appears important to develop and study the impact of comprehensive intervention strategies during elementary school. Combining the GBG with social skills training, with a playground intervention aimed at reducing disruptive behavior and with a parent management training is an example of such a comprehensive intervention strategy. Finally, (3) prevention science should focus on the development and evaluation of preventive programs during pregnancy, infancy and early childhood. This to prevent the development of high levels of disruptive behavior in at risk young elementary schoolchildren who were found to be less susceptible to intervention.





## | Samenvatting



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## Samenvatting

Het doel van de huidige studie was de kenmerken en ontwikkeling van disruptief gedrag en het effect van een klassikale preventieve interventie gericht op het vermijden van disruptief gedrag te onderzoeken in kinderen van de basisschool.

In *hoofdstuk 1* wordt de ontwikkeling van disruptief gedrag van de kindertijd tot de adolescentie en jong volwassenheid beschreven. Mogelijkheden om in dit proces te interveniëren en voorbeelden van effectieve preventie programma's zijn beschreven. De achtergronden en hoofddoelen van de huidige studie zijn gepresenteerd. Deze doelen zijn:

- te onderzoeken wat het effect van een universele, klassikale preventieve interventie bij basisschoolkinderen op de ontwikkeling van disruptieve gedragingen is;
- te onderzoeken wat de kenmerken zijn van kinderen die succesvol reageren op de preventieve interventie in vergeleking tot de kenmerken van kinderen die in aanmerking komen voor intensievere interventies, ten einde preventieve interventies te verbeteren;
- de kennis van ontwikkelingspsychopathologie te verbeteren (1) door het identificeren van groepen van basisschoolkinderen met overeenkomstig disruptief gedrag en (2) door het bestuderen van ontwikkelingstrajecten van agressief gedrag, de kenmerken van kinderen aan het begin van deze trajecten en de consequenties voor kinderen die verschillende trajecten volgen.

In *hoofdstuk 2* werden kinderen geïdentificeerd in groepen die verschilden in disruptief gedrag. Drie groepen van kinderen werden geïdentificeerd: (1) kinderen met hoge niveaus van Oppositioneel-opstandige Problemen en Aandachtstekort/Hyperactiviteitsproblemen en matige niveaus van Gedragsproblemen, (2) kinderen met matige niveaus van Oppositioneel-opstandige Problemen en Aandachtstekort/Hyperactiviteitsproblemen en lage niveaus van Gedragsproblemen, en (3) kinderen met lage niveaus van alle disruptieve gedragingen.

Er werden geen groepen van kinderen geïdentificeerd met uitgesproken symptomen van uitsluitend Gedragsproblemen, Oppositionele Deviante Problemen of Aandachtstekort/Hyperactiviteitsproblemen hadden. De bevindingen geven aan dat basisschoolkinderen die een verhoogd risico lopen op toekomstig disruptief gedrag worden gekenmerkt door hoge niveaus van Oppositioneel-opstandige Problemen en Aandachtstekort/Hyperactiviteitsproblemen en gematigde niveaus van Gedragsproblemen.

De classificatie van kinderen verbeterde wanneer rekening werd gehouden met het geslacht, de sociaal economische status en de ouderlijke stress als gevolg van het gedrag van het kind. De identificatie van kinderen die risico lopen op toekomstig disruptief gedrag via een screeningsprocedure en interventies die de ontwikkeling van disruptief gedrag proberen te voorkomen of te veranderen moeten zich richten op zowel Gedragsproblemen als Aandachtstekort/Hyperactiviteitsproblemen en Oppositioneel-opstandige Problemen.

In *hoofdstuk 3* werd de predictieve waarde van het classificeren van kinderen die risico lopen op toekomstig disruptief gedrag geëvalueerd. De voorspellende waarde verbeterde wanneer risico factoren binnen het kind en de familie werden gecombineerd met de gedragsitems. De voorspellende waarde bereikte een positieve predictieve waarde van 69%. Deze was hoger dan in voorgaande studies, waar de positieve predictieve waarde doorgaans onder de 50% lag.

Daarna werd de mogelijkheid de screeningsprocedure te verbeteren via een 'multiple gating' procedure bestudeerd. Hiervoor werden kinderen die incorrect waren geclassificeerd (fout positieven en fout negatieven) vergeleken met correct geclassificeerde kinderen (juist positieven en juist negatieven) op risico factoren in de familie context. De verschillen in de familie context tussen deze kinderen waren beperkt. Er werden geen duidelijke aanwijzingen gevonden hoe de factoren uit de familie context te gebruiken om de screeningsprocedure te verbeteren na de initiële classificatie.

In *hoofdstuk 4* werden de ontwikkelingstrajecten van agressief gedrag, de kenmerken van kinderen in deze trajecten bij aanvang van de studie en de gevolgen van het volgen van een bepaald ontwikkelingstraject bestudeerd. Er werden drie ontwikkelingstrajecten onderscheiden. (1) Een 'hoog-toemenend' traject, waarin kinderen uitgesproken vormen van fysieke agressie en de hoogste niveaus van andere gedragsproblemen hadden in groep 3, zoals aangegeven door leerkrachten. De ontwikkeling van deze kinderen werd gekenmerkt door hoge niveaus van agressie aan het begin en verder toename over de vervolperiode, zoals aangegeven door medeleerlingen. Slechts 7% van de kinderen, vooral jongens, volgden dit ontwikkelingstraject. (2) Een 'persistent-gematigd' traject werd gevonden met gematigde niveaus van fysieke agressie in groep 3. Kinderen die dit traject volgden hadden gematigde maar persistente niveaus van agressie gedurende de vervolperiode volgens hun medeleerlingen. Veertien procent van de kinderen volgde dit traject. (3) De overgebleven kinderen volgde het derde traject. Deze kinderen hadden geen gedragsproblemen in groep 3. Zij volgden een normatief, laag agressief ontwikkelingstraject.

Kinderen die het hoog-toenemende traject volgden hadden een grote kans op klinisch verhoogde scores op Externaliserend probleemgedrag in de middenbouw van de lagere school. Deze kinderen hadden ook een grote kans verworpen (rejected) te worden door hun medeleerlingen. Wanneer kinderen op de basisschool komen met een gedragspatroon gekenmerkt door fysieke agressie, dan ondervinden deze kinderen de sociale consequenties van hun gedrag aan den lijve. Deze fysiek-agressieve kinderen krijgen in toenemende mate de status als zijnde een agressief kind; klasgenootjes wantrouwen deze kinderen en accepteren ze niet. De fysiek-agressieve kinderen hebben sociale problemen met hun klasgenootjes en komen in toenemende mate af te staan van het normatieve sociale gedrag van de leeftijdsgenootjes. Als gevolg hiervan lopen deze kinderen het risico in contact te komen met leeftijdsgenootjes die hetzelfde deviante gedrag vertonen en lopen ze de kans op de ontwikkeling van chronisch agressief en antisocial gedrag met de geassocieerde negatieve uitkomsten. Kinderen die het hoog-toenemende agressieve traject volgen zijn geïndiceerd voor intensieve interventie programma's.

In *hoofdstuk 5* werd het effect van het Taakspel (Engels: Good Behavior Game) bestudeerd. Het Taakspel is een universele klassikale interventie gericht op het verminderen van disruptief gedrag bij kinderen. Het Taakspel is een gedragsprogramma dat wordt geïntegreerd in het normale curriculum van basisscholen. Het doel van het Taakspel is het creëren van een consistent, positief en veilig klassenklimaat. Tijdens het Taakspel werken kinderen samen in groepjes. Gedurende het Taakspel worden deze groepjes gestimuleerd zich aan duidelijk omschreven en positief geformuleerde klassenregels te houden. Kinderen worden beloond voor positief gedrag via complimentjes en beloningen. Het Taakspel werd gedurende groep 4 en 5 in toenemende intensiteit in 13 scholen in Rotterdam en Amsterdam gespeeld.

Het effect van het Taakspel op de ontwikkeling van disruptief gedrag werd bestudeerd bij kinderen van de basisschool over een periode beginnend in groep 3 tot en met groep 5. Het effect werd bestudeerd voor Aandachtstekort/Hyperactiviteitsproblemen Oppositioneel-opstandige Problemen en Gedragsproblemen.

De ontwikkeling van Aandachtstekort/Hyperactiviteitsproblemen van kinderen in de controleconditie werd vergeleken met deze ontwikkeling voor kinderen die het Taakspel speelden. Kinderen in de controleconditie vertoonden een stijging van Aandachtstekort/Hyperactiviteitsproblemen over de bestudeerde periode. Interventiekinderen vertoonden juist een daling van Aandachtstekort/Hyperactiviteitsproblemen over dezelfde periode. Dit

verschil in ontwikkeling van significant, hetgeen betekent dat er een 'overall effect' is van het Taakspel op Aandachtstekort/Hyperactiviteits-problemen.

Daarna analyseerden we het effect van het Taakspel op kinderen die verschillende ontwikkelingstrajecten van Aandachtstekort/Hyperactiviteitsproblemen volgden. Drie ontwikkelingstrajecten werden geïdentificeerd: een traject met veel (klasse 1; 14% van de alle kinderen), een traject met matige (klasse 2; 26%) en een traject met weinig (klasse 3; 60%) Aandachtstekort/Hyperactiviteitsproblemen aan het begin van de studie.

Het Taakspel had een positief effect op de ontwikkeling van Aandachtstekort/Hyperactiviteitsproblemen voor kinderen die het ontwikkelingstraject met matige (klasse 2) problemen volgden. De grootte van het effect was medium (hoofdstuk 5). Dit effect is het best te beschrijven als een preventief effect. De toename in het niveau van Aandachtstekort/Hyperactiviteitsproblemen, zoals gevonden bij kinderen in de controleconditie, werd veranderd in stabiele niveaus van problemen voor kinderen die het Taakspel in de groep speelden.

De ontwikkeling van Aandachtstekort/Hyperactiviteitsproblemen voor kinderen die het ontwikkelingstraject volgden met veel problemen (klasse 1) aan het begin van deze studie was gelijk voor interventie- en controlegroep kinderen. Het Taakspel had ook geen effect op Aandachtstekort/Hyperactiviteitsproblemen voor kinderen in het ontwikkelingstraject met weinig problemen (klasse 3). Dit laatste was verwacht gezien het lage niveau van deze problemen in groep 3.

Het effect op Oppositioneel-opstandige Problemen en Gedragsproblemen werd daarna bestudeerd. Positieve effecten voor zowel Oppositioneel-opstandige Problemen als Gedragsproblemen versterkten het gevonden effect op Aandachtstekort/Hyperactiviteitsproblemen voor kinderen in het ontwikkelingstraject met matige problemen (klasse 2). De grootte van deze effecten was klein. Een aanvullend positief effect werd gevonden voor Gedragsproblemen bij kinderen die het ontwikkelingstraject met veel problemen (klasse 1) volgden. De grootte van dit effect was medium. Geen positieve effecten op Oppositioneel-opstandige Problemen en Gedragsproblemen werden gevonden voor kinderen met weinig disruptieve problemen (klasse 3) wat niet te verwachten was gezien het lage niveau van deze problemen.

De Taakspelinterventie creëerde een consistent en voorspelbaar klassenklimaat. Dit bleek een effectieve manier te zijn om in de ontwikkeling van disruptief gedrag van kinderen in te grijpen. Kinderen met matige niveaus van probleemgedrag reageerden volledig op de Taakspelinterventie; een positief effect op alle drie de disruptieve

gedragingen werd gevonden. Echter, kinderen die het ontwikkelingstraject met veel disruptief gedrag volgden reageerden maar gedeeltelijk op de interventie. Er werd alleen een positief effect op Gedragsproblemen gevonden. Daarom hebben deze kinderen aanvullende interventies nodig.

In *hoofdstuk 6* werden voorspellers voor het positief reageren op de Taakspel-interventie bestudeerd. Disruptief gedrag en risicofactoren voor het ontwikkelen van disruptief gedrag bij het kind, de familie en in het ouderlijk opvoedgedrag werden onderzocht. Risicofactoren binnen de schoolsetting voorspelden welke kinderen het traject volgden dat effectief werd aangepakt door de Taakspelinterventie (klasse 2). Risicofactoren binnen de schoolsetting en in de thuiscontext, alsook slechte relaties met andere kinderen voorspelden welke kinderen slechts gedeeltelijk konden worden beïnvloed door het Taakspel (klasse 1). De Taakspelinterventie was slechts gedeeltelijk effectief bij kinderen bij wie risicofactoren voor disruptief gedrag werd gevonden in verschillende settings. Deze kinderen komen in aanmerking voor de Taakspelinterventie, aangevuld met selectieve interventies. De selectieve interventies moeten zich richten op de specifieke risicofactoren. Op school moeten deze interventies het disruptieve gedrag van deze kinderen intensiever aanpakken. Het interventieprogramma moet deze kinderen helpen in het aangaan van adequate, niet-dwingende, niet-disruptieve en niet-agressieve sociale relaties met medeleerlingen. Aanvullende steun in het functioneren op school is nodig voor deze kinderen. Daarnaast is een oudercursus gericht op het effectief omgaan met het gedrag voor deze kinderen geïndiceerd. Het Taakspel moet gebruikt worden om een positief sociaal klimaat te creëren. Kinderen die slechts gedeeltelijk reageerden op de Taakspelinterventie alleen kunnen zo de geleerde vaardigheden van de selectieve interventies oefenen met hun klasgenootjes via het Taakspel waarbij de nadruk ligt op het werken in groepjes en op goed omschreven wenselijk gedrag in de klas.

In *hoofdstuk 7* werden de belangrijkste bevindingen en conclusies van de voorafgaande hoofdstukken samengevat en bediscussieerd. Het werd duidelijk dat disruptief gedrag in kinderen van de basisschool succesvol kan worden aangepakt met de Taakspelinterventie. Echter, kinderen met de hoogste niveaus van disruptief gedrag reageerden slechts gedeeltelijk op de interventie. Dit rechtvaardigt de implementatie van uitgebreide interventiestrategieën, gericht op specifieke risicofactoren die in deze kinderen aanwezig zijn.

Een aantal aanvullende bevindingen zijn van belang. De bevindingen van deze studie geven aan dat studies naar de etiologie, consequenties en behandeling van

disruptieve stoornissen en preventieve interventies zich moeten richten op alle drie de disruptieve stoornissen. Daarnaast werd gevonden dat kinderen die fysiek agressief zijn aan het begin van de basisschool een risico lopen op het ontwikkelen van gedragstoornissen en de geassocieerde negatieve uitkomsten. De studie leverde een bijdrage aan de identificatie van kinderen die een hoog risico vertonen op het ontwikkelen van disruptief gedrag. Echter, het blijft moeilijk om kinderen die risico lopen disruptief probleemgedrag te ontwikkelen met de daaraan geassocieerde negatieve uitkomsten reeds op jonge leeftijd te identificeren.

De resultaten van deze studie overwegende blijkt het erg belangrijk (1) dat toekomstig onderzoek zich richt op de mechanismen die leiden tot de verschillen in disruptief gedrag van kinderen bij aanvang van de basisschool. Aandacht moet hierbij worden gegeven aan de interactie tussen kinderen gedurende de kleuterschoolperiode en op het effect van vroege risicofactoren zoals middelengebruik (roken, alcohol) van de moeder tijdens de zwangerschap op de ontwikkeling van gedragsproblemen bij kinderen. Daarnaast moet aandacht worden gegeven op de identificatie van genetische en biologische 'markers' en op de unieke contributie van genetische en biologische factoren enerzijds en de familie en omgevingsfactoren anderzijds op een slechte ontwikkeling van kinderen. (2) Voor preventieonderzoek is het van belang om tijdens de basisschoolperiode diverse interventiestrategieën te ontwikkelen en de effecten daarvan te bestuderen. Het combineren van het Taakspel met een sociale vaardigheidstraining, een interventie gericht op de reductie van disruptief gedrag op de speelplaats en een ouderlijke opvoedcursus is een voorbeeld hiervan. Als laatste (3) zou preventieonderzoek zich moeten richten op de ontwikkeling en evaluatie van preventieve programma's tijdens de zwangerschap, baby-, peuter- en kleutertijd. Dit om de ontwikkeling van disruptief probleemgedrag te voorkomen bij kinderen die op 6-jarige leeftijd reeds minder gevoelig blijken te zijn voor een interventieprogramma.







| Dankwoord  
Curriculum Vitae



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## Dankwoord

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## Curriculum Vitae

Pol Adriaan Cornelis van Lier werd op 12 maart 1971 in Wageningen geboren. In 1992 behaalde hij het V.W.O. diploma aan het Hendrik Pierson College te Zetten. In 1993 begon hij met de studie Gezondheidswetenschappen aan de Universiteit van Maastricht, afstudeerrichting Geestelijke Gezondheidskunde, waar het doctoraal werd behaald in april 1998. Tijdens zijn studie deed hij gedurende een jaar onderzoek naar de invloed van geslacht en leeftijd op het dagelijks functioneren van kinderen die verwezen zijn naar instellingen voor geestelijke gezondheidszorg in de Verenigde Staten bij The Institute for the Study of Children, Families and Communities van Eastern Michigan University te Ypsilanti, Michigan, USA (Prof.dr. K. Hodges). Zijn praktijkstage deed hij bij het Centaal Coördinatiepunt Autisme in Heerlen (dr. P. Steerneman).

Vanaf maart 1998 tot en met juli 2002 was hij als assistent in opleiding (AIO) verbonden aan de afdeling kinder- en jeugdpsychiatrie van het Erasmus MC – Sophia Kinderziekenhuis Rotterdam (hoofd: Prof.dr. F.C. Verhulst). In deze periode werd het onderzoek naar de effecten van een preventieve interventie, gericht op de reductie van disruptief gedrag bij kinderen van de lagere school uitgevoerd (projectleider: dr. A.A.M. Crijnen), waarvan de resultaten in dit proefschrift zijn beschreven.

Sinds juli 2002 is hij werkzaam als wetenschappelijk onderzoeker op de afdeling kinder- en jeugdpsychiatrie van het Erasmus MC – Sophia Kinderziekenhuis Rotterdam.

