

Jocelyne Posthumus

Preventive effects and  
cost-effectiveness of the  
**Incredible Years**  
program for parents  
of preschoolers with  
**aggressive**  
**behavior**

# **Preventive effects and cost-effectiveness of the Incredible Years program for parents of preschoolers with aggressive behavior**

Het preventieve effect en de kosteneffectiviteit van oudercursus Incredible Years voor kleuters met agressief gedrag

(met een samenvatting in het Nederlands)

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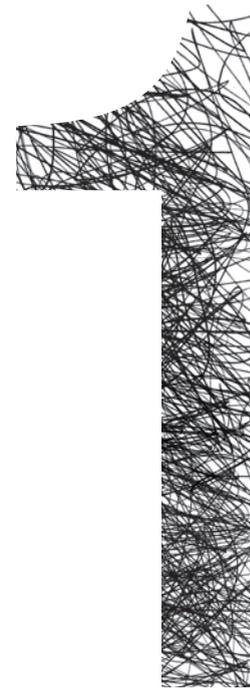
*Voor Elisa*

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**Preschoolers  
with aggressive  
behavior; correlates,  
consequences and  
prevention.**

**A general introduction**



Many people are greatly concerned about aggression in society, most likely because aggression directly interferes with our basic need of safety. Although aggression can be viewed as an inevitable, intrinsic part of society, the search for approaches in order to handle aggression is maintained. Physical aggression in children is a major public health problem, because of the consequences for victims, but also for the children themselves, who are at greater risk of drug abuse, violence, crime, spouse abuse and abusive parenting (Maughan & Rutter, 2001; Farrington, 2005). The general idea is that the better we are able to identify and treat early signs of aggression, the safer our communities will be.

Parenting problems and child behavior problems are being viewed as putative precursors of adult criminal and violent behavior. In the Netherlands, the government attempts to execute various policy lines in order to develop a preventive policy to deal with behavioral problems in children (Ministry of Youth and Families, 2007). According to the Ministry of Youth and Families, all parents and families must have access to an approachable, recognizable point of care close to home where they can get advice and help in a wide range of parenting issues. Therefore, the Ministry of Youth and Families intends to develop one central organization per community, a Center for Youth and Family. By developing these centers, the government aims for fast, effective and coordinated advice and help for families tailored to their specific situation. Every center will offer basic preventive youth policy services, youth health care, developmental support and family coaching (Ministry of Youth and Families, 2007). In many countries, early detection and the prevention of conduct problems have become important goals for authorities in child development and those who provide community mental health services. Hence, intervention programs specifically designed to prevent the development of conduct problems in at risk children have been developed.

### **Aggression: the terrible twos**

In 25% of the interactions toddlers have some kind of physical aggression is involved (Tremblay et al., 2004). These high aggression rates among toddlers are most likely due to the fact that they lack the means to communicate in more constructive ways. No adult group, not even violent delinquents or gang members, resorts to physical aggression 25% of the time (Tremblay et al., 2004). The rates of physically aggressive behavior reach a peak around the second and third year of life, and generally decline after the third birthday of the child (Alink et al., 2006; Tremblay, Hartup & Archer, 2005; Tremblay et al., 2004). Normally, children learn to regulate the use of physical aggression during the preschool years.

If children do not learn to regulate their aggressive behavior and continue to show a high level of aggression, they are at risk for the development of a chronic pattern of aggressive behavior problems (Shaw, Lacourse & Nagin, 2005) and even of developing Oppositional

Defiant Disorder (ODD) or Conduct Disorder (CD) (Moffitt, Caspi, Harrington & Milne, 2002). The essential feature of ODD is a recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward authority figures which leads to impairment (American Psychiatric Association, 2000). The essential feature of CD is a repetitive and persistent pattern of behavior in which the basic rights of others and major age-appropriate societal norms or rules are violated (APA, 2000). The term Disruptive Behavior Disorder (DBD) encompasses both ODD and CD. Besides, comorbidity of DBD with Attention Deficit Hyperactivity Disorder (ADHD) is high (Angold, Costello & Erkanli, 1999).

### **Stability of aggression**

Although media attention is primarily focused on instances of extreme violence during adolescence and adulthood (the junior high kid causing a massacre, the offender committing a crime on probational leave), violence rarely is an isolated event. Moreover, most adolescents and adults who show aggressive behavior already displayed a substantial level of aggression during childhood (Moffitt et al., 2002). Recent work into the development of aggression (Broidy et al., 2003, Campbell, Spieker, Burchinal, Poe & the NICHD Early Child Care Research Network, 2006; Côté, Vaillancourt, LeBlanc, Nagin, Tremblay, Schaeffer, 2006, Shaw et al., 2005), reinforces the notion that multiple possible pathways of aggressive behavior may be observed, but all studies identified a so-called chronic trajectory; a trajectory in which children show a persistently high aggression level from an early age onwards. This chronic trajectory could even be identified in infants and toddlers (Alink et al., 2006; Tremblay et al., 2004).

### **Prevalence of aggression**

The prevalence of preschool aggression in the Netherlands is 14% (Alink et al., 2006). Studies into prevalence rates of DBD in the Netherlands are scarce. One study in 6 to 8-year old children in a southern province of the Netherlands revealed a DBD prevalence of nearly 13%, based on a structured psychiatric interview (Kroes et al., 2001). Taking into account the degree of impairment instead of only taking into account the number of symptoms, resulted in a major decrease in diagnoses (Kroes et al., 2001). Prevalence estimates of ODD and CD in previous studies in the US and the UK have had a wide range (2-15%) (Loeber, Burke, Lahey, Winters & Zera, 2000; Meltzer, Gatward, Goodman & Ford, 2000; Messer, Goodman, Rowe, Meltzer & Maughan, 2006; Nock, Kazdin, Hiripi & Kessler, 2007). Differences in prevalence rates can be explained by the use of small, nonrepresentative samples and inconsistent diagnostic criteria. In an extensive review, prevalence rates of 3.2% for ODD and 2.0% for CD were reported (Lahey, Miller, Gordon & Riley, 1999). DBD are among the most prevalent disorders in children and adolescents (Lahey et al., 1999) and constitute one of the main reasons for referral to mental health services (Kazdin & Weisz, 2003; Loeber et al., 2000).

### **Do girls also show aggressive behavior problems?**

During the preschool years, the prevalence of physical aggression is comparable for boys and girls (Alink et al., 2006). A review of studies on the developmental trajectories of anti-social behavior in girls revealed that trajectories identified in girls are similar to trajectories identified in boys (Fontaine, Carbonneau, Vitaro, Barker & Tremblay, 2009). Although trajectories may be the same in boys and girls, as soon as children enter primary school, prevalence rates of boys and girls start diverging. School aged and adolescent boys are more likely to show aggressive behavior problems or to suffer from DBD than girls (Lahey et al., 1999). A study into the prevalence of DBD among 5 to 10-year old children in the UK revealed prevalence rates of 2.4% for girls and 6.0% for boys (Messer et al., 2006). The differences in prevalence rates of boys and girls might be due to gender differentiated socialization processes whereby caregivers and teachers discourage girls from adopting externalizing behavior (Keenan & Shaw, 1997). With respect to gender differences it is known that girls are more likely to show relational aggression, such as malicious gossiping, whereas boys are more likely to show physical aggression (Crick & Grotpeter, 1995; Little, Henrich, Jones & Hawley, 2003).

### **Consequences of aggression**

Early onset aggressive behavior is associated with a wide range of detrimental consequences. These consequences affect the child, the family and society at large. The child itself may experience immediate negative consequences of aggressive behavior such as rejection by peers or poor school achievements. Early conduct problems are also associated with consequences on the long term: children with conduct problems are at risk of a series of negative outcomes in adulthood, such as criminal behavior, social isolation, unemployment, family difficulties, substance abuse and an increased risk for depression (Maughan & Rutter, 2001; Fergusson, Horwood & Ridder, 2005; Kim-Cohen et al., 2003). Surprisingly, childhood DBD has been shown to be part of the developmental history of every adult psychiatric disorder (Kim-Cohen et al., 2003).

Families may also experience the adverse effects of the child's conduct problems: parents are hindered in their daily functioning at work, resulting in productivity losses, but are also hindered at home (Knapp, Scott & Davies, 1999; Raaijmakers, Posthumus, Van Hout, Van Engeland & Matthys, 2009; Romeo, Knapp & Scott, 2006). Moreover, child conduct problems have been associated with greater caregiver strain (Bussing et al., 2003a).

Negative consequences of aggressive behavior affect wider society, with children costing society at least ten times as much as normally developing children (Scott et al., 2001). Long term utilization of mental health and social services, special educational services,

state benefits (because of unemployment) and also the judicial and penal systems (because of property destruction, theft and incarceration) for children and adolescents with aggressive behavior problems have found to be high (Foster, Jones & the Conduct Problems Prevention Research Group, 2005; Scott et al., 2001), resulting in increased costs for public authorities (e.g., health insurance companies). It is alarming that children with aggressive behavior are more likely than others to provide an adverse rearing environment for their offspring (Rutter, Giller & Hagell, 1998). Because of these adverse outcomes on both the short and the long term, childhood aggressive behavior is a priority prevention target (Kim-Cohen et al., 2003).

Early onset aggressive behavior is stable and persistent over time, and both individuals and society pay a high price

### **Factors associated with the development and persistence of aggression**

The emergence and maintenance of behavior problems appears to be explained best by a combination of the interaction of early childhood characteristics, such as impulsivity and irritability, with non-optimal characteristics of the child's environment, such as parental conflict and inadequate parenting skills (Matthys & Lochman, 2009). More insight is needed into the risk factors that are associated with the development of DBD in preschool children. In this thesis, we focused on three individual characteristics of children with aggressive behavior: low autonomic arousal, poor social information processing (SIP) abilities and poor inhibitory control, and one environmental characteristic: parenting.

#### Individual characteristics

##### *Low autonomic arousal*

Biological factors have been found to be associated with aggressive behavior in children (Matthys & Lochman, 2009). Autonomic underarousal is one of the neurobiological correlates of aggressive behavior (Raine, 2002). Heart rate (HR) and skin conductance level (SCL) have been studied as indicators of underarousal in relation to aggressive behavior, both during baseline and in reaction to stimuli. Results of meta-analyses indicate that low resting HR and SCL, as well as skin conductance reactivity (SCR), are robust correlates of antisocial behavior in children, but there is less agreement regarding heart rate reactivity (HRR) (Lorber, 2004; Ortiz & Raine, 2004; Raine, 1996). Moreover, few studies regarding

autonomic nervous system (ANS) functioning have been conducted in preschoolers and results are inconsistent (Calkins & Dedmon, 2000; Crowell et al., 2006; Van Hulle, Corley, Zahn-Waxler, Kagan & Hewitt, 2000).

Low autonomic arousal may, next to appearing as an individual characteristic of children with aggressive behavior, also serve as a moderator of intervention effect. Indeed, low autonomic arousal may be associated with low sensitivity to punishment (Matthys, Van Goozen, Snoek & Van Engeland, 2004) and, as a result, with poor social conditioning and socialization (Raine, 1993; Van Goozen, Fairchild, Snoek & Harold, 2007).

##### *Poor SIP abilities*

When children first enter school, their repertoire of social strategies is limited because preschoolers did not have exposure to many challenging peer situations, yet. An important task in this age period is to learn to behave nonaggressively (Tremblay et al., 2004). It is assumed that children have to learn to inhibit their initial aggressive response to ambiguous provocations, thereby creating time to represent social information more in depth. Within the field of developmental psychopathology, the social information processing (SIP) model (Dodge, 1986; Crick & Dodge, 1994; Lemerise & Arsenio, 2000) is one of the theoretical frameworks to address the question which proximal cognitive factors give rise to aggression. This model proposes that social cognitive processes are key factors in explaining aggressive behavior. Socially competent behavior is proposed to require adequate processing in the following steps: encoding, representation, goal selection, generating responses, evaluating these responses and enacting selected responses. Specific deviations in each of these steps are believed to lead to aggressive behavior. Deviations in all steps have indeed been shown to be related to aggressive behavior problems in numerous studies with children in middle childhood and adolescence: children who are prone to aggression focus selectively on threatening aspects of actions by others, interpret hostile intent in neutral actions of others, and are more likely to select aggressive solutions to social challenges (see De Castro, Veerman, Koops, Bosch & Monshouwer, 2002; Dodge, 2006; Matthys & Lochman, 2005).

##### *Poor inhibitory control*

Executive functioning (EF) encompasses several neuropsychological concepts, e.g. inhibitory control, working memory, set shifting, planning, and verbal fluency (Senn, Espy & Kaufmann, 2004). Research suggests that EF is impaired in children with ADHD, but results for impaired EF in children with aggressive behavior problems are less clear. In children with ADHD, impairment in inhibitory control has been described as the core deficit (Barkley, 1997), whereas results in children with aggressive behavior problems show less

consistency: working memory, planning, semantic classification and inhibitory control have been found to be impaired (Hughes, Dunn & White, 1998; Hughes, White, Sharp & Dunn, 2000; Speltz, DeKleyn, Calderon, Greenberg & Fisher, 1999). In a previous study, carried out by our research team, working memory, inhibition, set shifting and verbal fluency were assessed in 82 4-year-old children with aggressive behavior problems compared to 99 control children (Raaijmakers, Smidts, et al., 2008). Children with aggressive behavior problems showed impaired inhibitory control, relative to controls, and girls outperformed boys. The association between impaired inhibitory control and aggressive behavior was maintained when attention problems were controlled (Raaijmakers, Smidts et al., 2008). In line with previous studies (Brophy, Taylor & Hughes, 2002; Oosterlaan, Logan & Sergeant, 1998), results indicated that impaired inhibitory control is an individual characteristic of aggressive behavior in the preschool period.

**Environmental characteristics and opportunity for change: parenting skills**  
Next to characteristics of the child, aggressive behavior can be explained by inadequate parenting skills (Matthys & Lochman, 2009). Parents may serve as aggressive models for the child. Indeed, children who display a high level of physical aggression from the preschool years onwards, appear to have mothers with a history of antisocial behavior during their school years (Tremblay et al., 2004). Empirical evidence supports the idea of parenting practices being linked to aggression. Harsh and inconsistent parenting have been shown to predict later CD (Yoshikawa, 1994) and Stormshak et al. (2000) found that punitive discipline by parents was a risk factor among aggressive and oppositional behaviors in children. Physically aggressive punishment was specifically linked with child aggression, and low parental warmth or involvement was specifically associated with oppositionality (Stormshak et al., 2000). However, parents with a greater capacity of effective discipline are able to respond to early mild problem behavior of the child in a consistent and predictable manner, leading to a decrease of negative child behavior and a return to adaptive functioning (Stormshak et al., 2000). Thus, parenting skills may serve as a risk factor in the development of aggressive behavior in children, but can also serve as a risk factor that can be changed.

#### *Bidirectional influences of parents and children: coercion*

According to the transactional model of Sameroff and Chandler (1975), the relationship between child and parent may be viewed as a series of transactions, in which the child and the care giving environment influence each other. The fundamental assumption of the transactional model is that development is facilitated by a bidirectional, reciprocal interaction between the child and its environment (Sameroff & MacKenzie, 2003), in which children act as active participants who affect the behavior and attitudes of their parents. A theoretically

and empirically well-developed example of transactional processes is the work by Patterson and colleagues. According to coercive theory (Patterson, 1982), children learn to escape or avoid parental commands or requests by escalating negative behavior. Thus, the child is trying to coerce the parent into terminating the, for the child, unpleasant request and repeated parental attempts to obtain child compliance are met with increasingly difficult behavior. If the process ultimately leads to the withdrawal of the parents' request, the child's aversive behavior is negatively reinforced. Patterson proposed that families characterized by unskilled parents, a child with a difficult temperament and the presence of stressors at multiple levels were at greater risk for the initiation of these so-called coercive cycles. Furthermore, the child indeed acts as an active participant: a difficult child is more likely to elicit harsh, inconsistent and negative socialization and as a result, a difficult temperament may ultimately develop into antisocial behavior (Patterson, Reid & Dishion, 1992).

Aggression is explained best by a combination of the interaction of child characteristics and characteristics of the child's environment, such as inadequate parenting skills

#### **Prevention of aggressive behavior problems**

As children normally learn to regulate their behavior during the preschool years, it is expected that interventions that target children who are at high risk of a chronic pattern of conduct problems would have more impact than interventions 5 to 10 years later, when physical aggression may have become a way of life. This gives rise to the idea that prevention of aggressive behavior problems, before aggression is full blown, will have larger effects. However, Mrazek and Haggerty (1994) state that if the preventive intervention occurs too early, its positive effects may be washed out before onset and if the preventive intervention occurs too late, the disorder may have already had its onset. That is to say, the timing of the intervention is crucial. A critical period of development for diminishing aggressive behavior is concentrated in the transition from preschool to the elementary school years (Loeber & Hay, 1997). Thus, by intervening during the preschool years, the trajectory of early aggressive behavior problems leading to adolescent delinquency and adult antisocial behavior may be corrected.

Two distinct approaches to preventing conduct problems in childhood can be distinguished (Mrazek & Haggerty, 1994). The universal approach is directed at the entire population

with the aim of reducing the incidence of conduct problems. An example of a universal preventive intervention program is violence prevention in schools (for a review, see Mytton, DiGuseppi, Gough, Taylor & Logan, 2002). The second major prevention strategy is targeted prevention, i.e. selective and indicated prevention. Selective preventive intervention programs are targeted at individuals at risk for a disorder due to the presence of biological, psychological and social risk factors associated with the onset of that particular disorder. Indicated prevention is targeted at children who are at high risk because of a predisposition for more serious behavior problems or at children who already show some symptoms of the disorder (Mrazek & Haggerty, 1994).

### Evidence for preventive effects

A number of empirical studies showed effects on the prevention of conduct problems and associated negative life outcomes (e.g., Boisjoli, Vitaro, Lacourse, Barker & Tremblay, 2007; Foster, Jones & Conduct Problems Prevention Research Group, 2006; Zonneville-Bender, Matthys, Van de Wiel & Lochman, 2007). A study in which a multicomponent preventive intervention targeted at 7-year-old boys at risk of later antisocial behavior was delivered, revealed that more boys in the intervention group completed high school education and generally fewer had a criminal record, relative to control group boys at 15-year follow up (Boisjoli et al., 2007). Another multicomponent prevention program designed to lower the incidence rates of serious conduct problems is the Fast Track program (Conduct Problems Prevention Research Group, 1992). Children were enrolled in this program from first grade to 10th grade, in which parent and child groups as well as a teacher training were delivered. Three year follow up data revealed significant reductions in the incidence of serious conduct problems. Long-term follow up results indicated preventive effects for the group of children who were at highest risk (Foster, Jones & Conduct Problems Prevention Research Group, 2006). In addition, an intervention designed to decrease the level of conduct problems showed a preventive effect on substance use (Zonneville-Bender, Matthys, Van de Wiel & Lochman, 2007). However, not all preventive interventions have been proven successful in reducing conduct problems. The Early Risers 'Skills for Success' prevention program targeted at serious conduct problems revealed that at 6-year follow up, children who received the intervention did not significantly differ from controls on number of CD symptoms, DSM-IV diagnoses of ODD and CD, or drug use (Bernat, August, Hektner & Bloomquist, 2007).

### Issues related to prevention studies

The establishment of prevention effects is hampered by the fact that a high number of children in prevention programs receive an intervention that they do not actually need. Despite the screening of at risk children in targeted prevention programs, results often show only small effect sizes, which is most probably due to a substantial number of 'false positives';

i.e. children inaccurately identified as being at risk (Bennett, Lipman, Racine & Offord, 1998). Screening procedures should have high positive predictive power; i.e. the proportion of children classified as at risk who will develop the disorder later in life (Hill, Lochman, Coie, Greenberg and Conduct Problems Prevention Research Group, 2004). Moreover, accurate screening is essential for the establishment of prevention effects.

It appeared that motivation to participate is a recurrent problem in intervention studies, especially when families of children with conduct problems are involved (Luk, Staiger, Mathai, Wong, Birlleson & Adler, 2001) and it seems to be difficult to keep families in interventions and to motivate them to complete the full program. This may hold true especially for families enrolled in prevention programs, as their need to participate may not be as high as in treatment programs. Even among children and families who begin outpatient treatment, 40 to 60% drop out of treatment prematurely (Kazdin, 1996a; Staudt, 2003). Therefore, it is important to identify barriers parents experience when they start an intervention.

### Incredible Years parent program

#### Incredible Years parent program reduces aggression

Behavioral Parent Training (BPT), which uses the parent as the primary agent for change, has been proven to be the most effective method in reducing aggressive behavior problems, particularly in young children (e.g., McCart, Priester, Davies & Azen, 2006; Eyberg, Nelson & Boggs, 2008; Scott, 2002). BPTs have their roots in social learning theory (Bandura, 1977), which states that children's behaviors are learned from their interactions with significant other persons in their lives, particularly their parents. The general purpose of BPTs is to alter the interactions between parents and children so that prosocial behavior rather than coercive behavior is modeled and reinforced by parents (Kazdin, 1987). One of the BPT programs is the Incredible Years parent program (IY parent program), a manualized behavioral parent training aiming at the improvement of parenting skills in order to reduce child aggressive behavior. The IY parent program consists of two components: the BASIC curriculum in which parenting skills are addressed, and the ADVANCE curriculum, which focuses on communication and problem solving. The IY parent program has been proven effective in improving parenting skills (e.g., an increased use of praise and decreased use of spanking and yelling) and reducing aggressive behavior in children with clinical levels of aggressive behavior problems by the program developer (e.g., Webster-Stratton, 1984, 1994; Webster-Stratton, Reid & Hammond, 2004). These findings have been replicated by independent investigators (e.g., Gardner, Burton & Klimes, 2006; Scott, Spender, Doolan, Jacobs & Aspland, 2001; Taylor, Schmidt, Pepler & Hodgins, 1998). In these studies, the Incredible Years parent program was used as treatment for referred families with a child displaying a substantial level of conduct disorder symptoms.

### Incredible Years parent program as a preventive intervention

From treatment studies, the IY parent program appeared to be effective in improving parenting skills and reducing child conduct problems. However, results from the Incredible Years parent program applied as preventive intervention are less clear. In a review of successful and unsuccessful intervention programs, the IY parent program was considered to be only partly successful because the modest reduction in observed conduct problems was not supported by parent and teacher report (LeMarquand, Tremblay & Vitaro, 2001). The IY parent program as a preventive intervention was therefore labeled "promising". Since this review, the IY parent program has been evaluated as an effective prevention program in disadvantaged and high-risk populations. Four-year old children whose parents were enrolled in Head Start, showed fewer observed and parent rated conduct problems, relative to control children (Webster-Stratton, Reid & Hammond, 2001). These findings were replicated in a sample of 3 to 5-year old children in Sure Start areas in Wales (UK); parents reported a significant decrease in disruptive child behavior at follow up, compared to control children (Hutchings et al., 2007). A good example of a selective preventive intervention study is the evaluation of preventive effects of the IY program in children who were considered to be at risk because they had an adjudicated older sibling (Brotman et al., 2008). Observed physical aggression of the child was reduced after parents participated in the IY program, but this positive effect was not corroborated by parent rated measures of aggression. Furthermore, it was shown that improvements in harsh parenting, responsive parenting and stimulating parenting partially mediated the effect on the child's physical aggression (Brotman et al., 2009). In conclusion, although the effectiveness of the IY parent program as treatment for children with conduct problems has been well-established in previous studies (Gardner et al., 2006; Scott et al., 2001; Taylor et al., 1998; Webster-Stratton et al., 2004), the effectiveness of the IY parent program as a preventive intervention is less convincing.

### Cost-effectiveness studies

As mentioned earlier, aggressive behavior in early childhood affects the quality of life of both the children and their families and has serious economic implications to society (Scott, Knapp, Henderson & Maughan, 2001), even from the preschool years onwards (Knapp, Scott & Davies, 1999; Raaijmakers, Posthumus, Van Hout, Van Engeland & Matthys, 2009). Long term utilization of mental health and social services, special educational services and also the judicial and penal systems for children and adolescents with aggressive behavior problems have been found to be high (Foster, Jones & Conduct Problems Prevention Research Group, 2005; Vostanis, Meltzer, Goodman & Ford, 2003; Scott et al., 2001), resulting in increased costs for public authorities and health insurance companies. It has been calculated that the prevention of a developmental trajectory of chronic aggressive behavior

and associated criminality in adolescence and adulthood would result in lifelong savings up to 1.7 to 2.3 million dollar per person (Cohen, 1998). As described earlier, evidence based interventions and prevention programs have proven to be effective in reducing aggressive behavior problems in children (e.g., McCart et al., 2006; LeMarquand, et al., 2001). Hence, the prevention of aggressive behavior at an early age may lead to a decrease in costs for the child, their families and society at large. The investment in delivering these mental health programs is believed to lead to large savings in the long term in mental health service use and in other sectors of the society. However, there is a need to determine the economic impact of preventive interventions because health insurers and other decision makers want to know which intervention gives best value for their money (Romeo, Byford & Knapp, 2005).

### RCTs: the golden standard

Randomized controlled trials are considered the most optimal design for evaluating effectiveness of interventions. In practice, however, conducting a randomized controlled trial is not always feasible. In the present study, randomization of families participating was not feasible because of geographical and motivational reasons, and therefore a case control design was used. In a separate study (Raaijmakers, Koffijberg et al., 2008), the performance of a case control design was compared to a randomized study design by simulating hypothetical intervention and control groups based on the data in the present study. Predefined intervention and control groups of families were matched on six key characteristics which have been proven to affect either the developmental course or to be a moderator of intervention effect. The quality of this match was then compared with the quality which is to be expected from a randomized study. The equivalence of the predefined groups resulted in a more equally balanced distribution of the six key characteristics in our matched predefined groups than in randomization in more than half of the simulated trials, indicating that matching in a case control design was a viable alternative for randomization for situations in which randomization is not feasible due to pragmatic constraints (Raaijmakers, Koffijberg et al., 2008).

### Aims and outline of the thesis

Since there are a large number of interventions aiming at the reduction of child aggressive behavior problems, it is important to investigate which interventions work and for whom these interventions work. In addition, there is a call for cost-effectiveness studies in mental health care. The aim of this thesis was to evaluate the two-year follow up effects of the indicated preventive intervention Incredible Years parent program in a population based sample of preschool children at risk for a chronic pattern of conduct problems. Alongside the study into the effects of Incredible Years in the Netherlands, we conducted a cost-effectiveness analysis of the IY parent program. Furthermore, our objective was to provide insight in

putative correlates of aggressive behavior in preschool children. We therefore conducted cross sectional studies into the psychophysiology and social information processing skills of preschool children with aggressive behavior. Five different studies were carried out and presented in this thesis.

Autonomic underarousal is one of the neurobiological correlates of aggressive behavior (Raine, 2002). Heart rate (HR) and skin conductance level (SCL) have been studied as indicators of underarousal in relation to aggressive behavior, both during baseline and in reaction to stimuli. In **chapter 2**, we report on the study into the psychophysiological correlates of aggressive behavior during the preschool years. We measured HR, SCL, as well as heart rate reactivity (HRR) and skin conductance reactivity (SCR), while children were watching a Bob the Builder film. We hypothesized that children with a high level of aggressive behavior would show lower basal levels of HR and SC, and decreased HR and SC responses when compared to children with a low level of aggressive behavior.

Intent attribution skills, part of the social information processing (SIP) model, are considered an important developmental task in the preschool years. Children with aggressive behavior problems more often believe other's behaviors toward them to be motivated by hostile intent; the so called hostile intent attribution (for a meta-analysis, see De Castro et al., 2002). Since hostile intent attribution has a relatively low impact in explaining aggressive behavior in children (De Castro et al, 2002), there is reason to consider other characteristics of the representation stage that may help to explain aggressive behavior. Recently, it has been argued that the ability to infer accidental intent may be an important developmental milestone in early childhood (Dodge, 2006), but virtually no research has been conducted on the relations between accidental intent attribution and behavior problems, nor on the discriminant validity of accidental intent attribution versus hostile intent attribution in early childhood. Inhibition problems may make it difficult for children to develop accidental intent attributions. Yet, little is known about accidental intent attribution in preschool children with aggressive behavior problems, especially in relation to inhibitory control. In **chapter 3**, we report on the study in which we investigated whether four-year-old children with aggressive behavior problems showed impairments in the generation of responses and whether they attribute intent differently than typically developing children. Furthermore, we aimed to test the relative contributions of SIP and inhibition to explaining individual differences in aggressive behavior. We hypothesized that children with aggressive behavior problems generated fewer responses to the social dilemma's and that they would attribute less accidental and more hostile intent, when compared to nonaggressive children. In addition, we explored whether SIP and inhibition were independent contributors to aggressive behavior or whether there was an interaction between SIP and inhibition in predicting aggressive behavior.

In **chapter 4** we provide explanations for non-participation of parents who were invited to participate in the Incredible Years parent program. In the present study, the Incredible Years parent program was offered as an indicated preventive intervention in order to reduce aggressive child behavior. Parents of the child were proposed to participate in an 18-week intervention program. However, a number of parents refused to participate. The main purpose of this study was to examine reasons of parents who refused to participate in the intervention program. We registered the reasons for refusal and scored these reasons according to the barriers to treatment model of Kazdin et al. (1997). For the families who refused to participate, we explored what the largest barriers for participation in the intervention program were. Furthermore, we compared families who refused and agreed to participate in the intervention on the stress level of the primary caregiver and the child's mental health problems. By doing so, we provide insight in reasons for non-participation. More information on refusal to participate could enhance our knowledge of how to engage families in interventions and might shed a light on the prerequisites of parental compliance to an intervention. This might be a valuable starting point to tailor the way of addressing families with a child at risk for a chronic pattern of conduct problems.

Early detection and the prevention of DBD have become important goals for authorities in child development and those who provide community health services. Hence, intervention programs specifically designed to prevent the development of a chronic pattern of conduct problems in children have been developed. Addressing the parenting skills has been proven effective in reducing aggressive behavior problems, especially when the intervention is offered when the children are young (McCart et al., 2006). While parent management training (PMT) programs have been proven effective in treatment settings (Brestan & Eyberg, 1998; Eyberg et al., 2008), the effectiveness of PMT in preventive settings has been studied less extensively and revealed inconsistent results. In **chapter 5**, results at two-year follow up (two years after termination of the intervention) of the Incredible Years parent program as an indicated preventive intervention are presented. Families who received the IY parent program were compared to families who received care as usual. We expected that the IY parent program would improve parenting skills and would reduce aggressive behavior of the children. Further, mediational processes were investigated. More specifically, we expected that aggressive behavior of the child would be reduced as a consequence of improvement in parenting skills. In addition, we explored whether bidirectional influences of parenting skills and child behavior over time were present, by means of a cross select longitudinal panel design, with four distinct moments in time. Since we regard it as vitally important to investigate which parents and children benefited most from the intervention, putative moderators of the intervention effect were examined.

In **chapter 6**, we present the cost-effectiveness analysis of the IY parent program in the Netherlands. In this study, the cost-effectiveness of parent program Incredible Years (IY) compared to care as usual (CAU) in preschoolers at risk of a chronic pattern of conduct problems was assessed. This economic evaluation was carried out alongside the evaluation of the IY parent program as an indicated preventive intervention (described in chapter 5), whereby data on direct and indirect costs were collected. In this paper we present the IY parent program costs per child, the child behavior outcomes of the IY parent program, and the costs generated by the IY and CAU families. In most economic evaluations of mental health programs, only intervention costs are monitored. However, the greatest cost burden is mostly borne by the family, as became apparent from an economic evaluation into who pays the costs incurred by children with antisocial behavior (Romeo, Knapp & Scott, 2006). Therefore, in the present study the assessment of costs and the cost-effectiveness analysis were conducted using different perspectives. First, the perspective of public authorities was taken, in which all costs by public authorities such as health insurance, education and community work are included. Second, the parents' perspective was taken, in which all costs paid by parents (i.e., damage caused by the child and travel costs) are included. Third, the societal perspective was taken, in which all costs of any stakeholder were considered, including all above mentioned costs and parental productivity losses.

In **chapter 7** findings described in the previous chapters are summarized and discussed. Furthermore, the implications for clinical practice and policy makers are discussed and we will give some recommendations for the implementation of the IY parent program.

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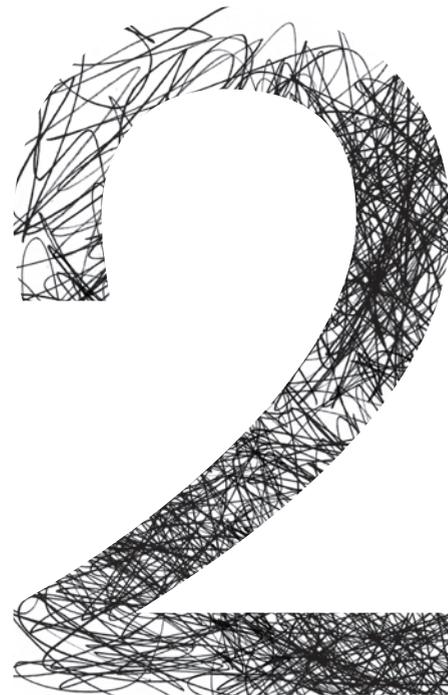
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**Heart rate and skin  
conductance in  
4-year-old children  
with aggressive  
behavior**



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## ABSTRACT

Autonomic underarousal, indicated by low heart rate (HR) and skin conductance level (SCL), is related to childhood aggression. However, results are inconsistent in preschoolers. We assessed HR, SCL, heart rate reactivity and skin conductance reactivity in four-year-old children. Comparisons were made between children with a high level and with a low level of aggressive behavior according to the Child Behavior Checklist 1½-5 as well as between children who were diagnosed with Oppositional Defiant Disorder or Conduct Disorder (ODD/CD) and children with a low level of aggression. Preschool children with a high level of aggressive behavior showed lower SCL and SCR and children with ODD/CD showed lower SCL. In contrast, we did not find lower HR and HRR in preschool children with a high level of aggressive behavior or ODD/CD. Thus, results suggest that decreased SCL, but not HR, is a characteristic of preschool children with aggressive behavior or ODD/CD.

**Keywords:** preschoolers, aggression, ODD, CD, HR, SCL

## INTRODUCTION

Autonomic underarousal is one of the neurobiological correlates of aggressive behavior (Raine, 2002), i.e., behavior deliberately aimed at harming people (Parke & Slaby, 1983). Heart rate (HR) and skin conductance level (SCL) have been studied as indicators of underarousal in relation to aggressive behavior, both during baseline and in reaction to stimuli. However, as pointed out by Lorber (2004), in empirical studies in this field, children have been defined not only in terms of aggressive behavior, but also in terms of antisocial behavior, delinquent behavior, psychopathic traits and conduct problems.

Results of meta-analyses conducted by Raine (1996) and Ortiz and Raine (2004) indicate that low resting HR is one of the best replicated biological markers of antisocial and aggressive behavior in children and adolescents. Effect sizes in the meta-analyses were calculated using Cohen's *d*: .20 indicates a small effect, .50 a medium effect and .80 a large effect size (Cohen, 1992). Effect sizes were medium ( $d = -.56$ ) for HR during rest in children and adolescents with antisocial behavior in the first meta-analysis and in the meta-analysis of 2004 ( $d = -.44$ ). For heart rate reactivity (HRR), Ortiz and Raine reported a large effect size ( $d = -.76$ ). In another recent meta-analysis in which children, adolescents and adults were analyzed separately, Lorber (2004) found that conduct problems in children were associated with low resting HR ( $d = -.34$ ), but greater HRR ( $d = .20$ ). In this meta-analysis, it was also found that children with conduct problems had lower SCL ( $d = -.30$ ) and skin conductance reactivity (SCR;  $d = -.46$ ) (Lorber, 2004). In conclusion, these meta-analyses provide evidence that low resting HR and SCL, as well as SCR, are robust correlates of antisocial behavior in children, but there is less agreement regarding HRR.

As it appears from a large number of studies, there is evidence for autonomic underarousal in elementary school children and adolescents with aggressive or antisocial behavior. Yet, few studies regarding autonomic nervous system (ANS) functioning have been conducted in preschoolers and results are inconsistent. Some longitudinal studies starting in early childhood have been conducted to assess HR and SC as predictors of aggressive or antisocial behavior. In the Mauritius study, it was found that nine-year-old boys, who had been characterized by their teachers as indulging in fighting, had significantly lower SCR at age 3 than their non-fighting peers (Venables, 1989). Furthermore, aggression at age 11 was predicted by low resting HR at age 3 (Raine, Venables & Mednick, 1997). However, results from another study revealed that low HR in infancy and toddlerhood (measured at 14, 20, 24 and 36 months) did not predict externalizing behavior problems at age 7 (Van Hulle, Corley, Zahn-Waxler, Kagan & Hewitt, 2000). From these studies, it remains unclear at what age underarousal in children with aggressive behavior arises. Besides these longitudinal studies,

some cross-sectional studies have investigated HR and SC as correlates of aggressive or antisocial behavior. A recent study demonstrated that preschool children with Oppositional Defiant Disorder (ODD) showed less spontaneous skin conductance fluctuations and lengthened cardiac pre-ejection periods (Crowell et al., 2006). In a study in two-year-old children with externalizing behavior, no differences were found on HR (Calkins & Dedmon, 2000). Assuming that aggression and fearlessness are associated (Raine, 1993), the study conducted by Fowles, Kochanska and Murray (2000) should be mentioned; fearless four-year-old children showed lower SCR than children who were fearful.

Few studies in preschoolers have been conducted and most studies included only one indicator of underarousal. On top of that, as mentioned earlier, children have been defined from different behavioral perspectives. Therefore, aims of the present study were to assess four indicators of underarousal (HR, SCL, HRR and SCR) in a sample of preschool children defined both from the perspective of aggressive behavior and from the perspective of syndromes of disruptive behaviors, i.e., the DSM-IV-TR categories ODD and Conduct Disorder (CD) (APA, 2000). ODD and CD are clusters of disruptive behavior or clinical syndromes consisting of a large variety of inappropriate behaviors, whereas aggressive behavior is more homogeneous. ODD and CD are being increasingly used to define children in ANS studies (e.g., Beauchaine et al., 2008; Crowell et al., 2006). Moreover, since aggressive behavior is frequently observed in children with ADHD (Connor, Glatt, Lopez, Jackson & Melloni, 2002), we also included children diagnosed with ADHD. To our knowledge, no studies have been conducted regarding ANS functioning in an ADHD-only group. Therefore, we did not formulate specific hypotheses regarding ADHD. Finally, because of a high comorbidity of ODD/CD and ADHD (Angold, Costello & Erkanli, 1999), a comorbid group was also included. Based on the literature about ANS functioning in school aged children, we hypothesized that 1) children with a high level of aggressive behavior and 2) children with ODD/CD with or without ADHD, show lower basal levels of HR and SC, and decreased HR and SC responses when compared to children with a low level of aggressive behavior.

## METHOD

### Participants

Children were selected from a population-based sample (N = 16.002) from the province of Utrecht, The Netherlands. The sample used in this study was derived from a larger study into the effect of an indicated preventive intervention. Here, we report on the psychophysiological assessment that took place prior to the intervention. Addresses of children born in 2000 and 2001 were acquired by the Office for Screening and Vaccination. Parents of

the four-year-old children were asked to fill out the Child Behavior Checklist 1½-5. (CBCL for ages 1½-5; Achenbach & Rescorla, 2000; Dutch version by Verhulst & Van den Ende). Parents of 8632 children returned the CBCL. The CBCL Aggressive Behavior scale, which consists of 19 items, e.g., 'often had temper tantrums', 'fights and attacks people', was used to select the children. Children (N = 452) with a score at or above the 80<sup>th</sup> percentile on the Aggressive Behavior scale of the CBCL were considered children with aggressive behavior and were invited to participate in the preventive study. In the present study, 140 children who scored at or above the 80<sup>th</sup> percentile of the CBCL Aggressive Behavior scale both at selection and at pre-intervention assessment were included (64% boys). In sixteen children (8 boys, 8 girls) assessment of HR and SC was not possible because of excessive noncompliant behavior. Thus, the final group of children with aggressive behavior consisted of 79 boys and 45 girls. The CBCL was also used to select 101 normal control children (64% boys) from the population-based sample. These children were required to score below the 50<sup>th</sup> percentile of the CBCL Aggressive Behavior scale. Exclusion criteria were an IQ below 80 and for normal control children the presence of ODD, CD or ADHD. Of both groups of children, 3.2% was non-Caucasian (mainly Antillean). All children were medication naïve.

### Definition of groups

In order to compare the children with high and low levels of aggressive behavior, children were divided in two groups: a group of children with a low level of aggression (LOW AGGR;  $\leq$  50<sup>th</sup> percentile) and a group of children with a high level of aggression (HIGH AGGR;  $\geq$  80<sup>th</sup> percentile). The children were also divided into four diagnostic subgroups: an ODD/CD only group, an ADHD group, a comorbid ODD/CD + ADHD group and the LOW AGGR group without an ODD/CD/ADHD diagnosis. Characteristics of all groups of children are summarized in Table 1.

Independent sample *t*-tests showed that some groups differed significantly from LOW AGGR children on these demographic characteristics. HIGH AGGR children and children with ADHD had a lower IQ than the LOW AGGR group. The children with ODD/CD + ADHD had a lower IQ and were younger than the LOW AGGR group. Furthermore, the difference between inside and outside temperature was significantly smaller in the group of children with comorbid ODD/CD + ADHD. Educational level of the parent was measured with a 5 point scale (1: primary education, 2: secondary education, 3: intermediate vocational education, 4: higher vocational education and 5: university).

The mean percentage of educational level in the groups was: 0.9% of the parents followed primary education, 4.9% received secondary education, 30.9% followed intermediate vocational education, 33.1% received higher vocational education and 30.2% went to university.

**Table 1.** Participant characteristics

	LOW AGGR	HIGH AGGR	ODD/CD	ODD/CD + ADHD	ADHD
N	101	124	43	45	21
Gender in % boys	64.4%	63.7%	62.8%	68.9%	57.1%
Age in years (M, SD)	4.3 (0.2)	4.3 (0.3)	4.3 (0.3)	4.2 (0.3) <sup>a</sup>	4.3 (0.3)
WPPSI estimated IQ (M, SD)	110.5 (8.4)	107.6 (10.5) <sup>*</sup>	109.1 (10.9)	105.1 (9.4) <sup>**</sup>	106.1 (9.0) <sup>*</sup>
Temperature in Celsius					
<i>Inside</i>	21.2 (2.0)	20.7 (1.9)	20.7 (1.3)	21.3 (1.8)	20.8 (2.0)
<i>Outside</i>	10.7 (6.2)	11.8 (7.1)	11.3 (7.1)	13.7 (7.0) <sup>a</sup>	10.04 (6.1)
Humidity level in % (M, SD)	41.4 (8.5)	41.9 (8.7)	41.1 (8.7)	43.0 (8.9)	39.14 (6.3)
CBCL					
Aggressive behavior (M, SD)	3.5 (2.4)	22.2 (5.1)	21.0 (4.2)	25.0 (5.8)	20.5 (4.0)
DISC IV					
No diagnosis		15			
ODD/CD		43			
ODD/CD + ADHD		45			
ADHD		21			

\*\* p < .01

\* p < .05

<sup>a</sup> inside-outside difference smaller than in LOW AGGR

Chi<sup>2</sup> tests showed that educational level of the parents did not differ between the LOW AGGR group and the HIGH AGGR group;  $\chi^2 (4, N = 223) = 1.899, p = .754$  and between the LOW AGGR group and the ADHD, ODD/CD and ODD/CD + ADHD groups;  $\chi^2 (12, N = 210) = 10.376, p = .583$ .

### Apparatus

The Vrije Universiteit Ambulatory Monitoring System 36 (VU-AMS; Klaver, De Geus and De Vries, 1994) was used to measure HR and SCL. The electrocardiogram (ECG) was amplified and filtered at 17 Hz. The R-top in the analogue signal triggered a level detector with automatic level adjustment. This level detector stopped and reset a timer with millisecond resolution. For each R-top the output of this timer was stored in memory and later exported as a raw series of Inter Beat Intervals (IBI). SCL was measured with 0.5 V constant voltage method, as recommended by Fowles et al. (1981). To record skin conductance two Ag-AgCl electrodes (65 mm diameter) were used, filled with Biopac isotonic paste. Sample rate for SC measurement was set at 10 samples per second (10 Hz). ECG was recorded with disposable electrodes on the chest (sternum- V6 lead; bandwidth 5-30 Hz). ECG electrodes were attached above the jugular notch of the sternum between the collar bones, 4 cm under the left nipple, between two ribs and at the right lateral side, between the lower two ribs. Usually, SCL electrodes are attached to the nondominant hand. Since hand dominance is not crystallized by the age of 4, the skin conductance electrodes were attached to the volar surfaces of the medial phalanges of the middle and index finger of the left hand. Humidity level and the difference between inside and outside temperature are possible confounders of HR and SC (D.C. Fowles, personal communication, August 31, 2005). Therefore, inside temperature and humidity level were measured with a weather station. Outside temperature data were acquired by the archives of the Royal Netherlands Meteorological Institute in De Bilt.

### Procedure

All children were individually assessed twice in their home environment, in order to reduce their fear. During the first home visit, children were neuropsychologically assessed for 45 minutes. After a short break, the assessment of HR and SC took place. The children sat at a table facing the monitor at approximately 60 cm. They were asked to sit still and to lay down their hands on the table, because motor activity is expected to elicit increases of SCL and HR. Before the electrodes were attached, the skin was cleaned and firmly rubbed with alcohol. During the second home visit, the CBCL and the Diagnostic Interview Schedule for Children IV - Parent version (DISC IV-P), (Shaffer et al., 2000) was administered to parents of all children in both groups, to assess symptoms of ODD, CD and ADHD. Intelligence of the child was assessed with the Wechsler Preschool and Primary Scales of Intelligence-Revised (WPPSI-R; Wechsler, 1997; Dutch version by Vander Steene and Bos, 1997).

Subtests Vocabulary, Similarities, Picture Completion and Block Design were used to estimate full scale IQ (correlation subtests with full scale IQ = .92), following the guidelines of Sattler (1992). On each home visit, two trained experimenters were present.

Written informed consent was obtained from the parents prior to participation and all families received a financial reimbursement for participation. Children received a small gift for their participation. The study was approved by the Medical Ethical Review Committee of the University Medical Center Utrecht.

### Assessment of HR and SCL

Given the age of the children in this study, a stimulus such as a movie was necessary in order to keep the child seated at the table and to limit movement artefacts in HR and SC data. The children were asked to relax and enjoy the Bob the Builder movie<sup>1</sup>, "Dizzies crazy garden path", which lasted for 9:28 min. The Event Button of the VU-AMS was used to provide synchronization between the start of the film and the physiological signals. Baseline HR and SCL were defined as its average level from minutes 2-5 of the Bob the Builder film. A small pilot study ( $N = 25$ ) confirmed that assessment of HR and SCL during video-watching did not differ from that during unfilled rest. After 6:20 minutes, an exciting moment occurred in the film. This moment was used to measure HR and SC responses. SCR was defined as the maximum response in the one minute time window following the exciting moment, relative to the local minimum preceding the maximum<sup>2</sup>. For HRR, the average HR from 6:05 to 6:20 minutes served as a baseline. Next, the average HR was calculated for 7 intervals of 10-s duration, with 5 s overlap (from 6:20 to 6:55). The baseline value was subtracted from the averages to arrive at HRR values for each interval (see also: Perez, Fernandez, Vila & Turpin, 2000; Sanchez-Navarro, Martinez-Selva & Roma, 2006). The time series of these values showed a 10-s deceleration and recovery after 25 s in all groups. Due to missing markers SCR and HRR were missing in 9 normal controls and 12 children with aggressive behavior.

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<sup>1</sup> Story line Bob the Builder: Bob, his co-worker Wendy and the machines (who have human qualities) are creating a new garden path in the garden of a very respectable lady. While Bob and Wendy are absent, one of the machines is carrying the tiles for the garden path. The tiles are too heavy and the machine has to let them go. The tiles fall and break into pieces. What would the lady say and what should they do now? As usual, they come up with a solution (to make a mosaic path with the broken tiles) and the lady likes her new garden path.

<sup>2</sup> Note that when skin conductance is measured by the constant-voltage method, as it was in the present study, the SC signal decreases very gradually but monotonously over time in the absence of skin responses. Therefore, identifying the local minimum which precedes the response is a valid heuristic to derive the level at the start of the response.

### Statistical analyses

Since IQ differed between the HIGH and LOW AGGR group, IQ was used as a covariate in this comparison. In the omnibus ANCOVA, all variables on which diagnostic subgroups differed from the LOW AGGR children, were used as covariates (age, IQ and the difference between inside and outside temperature). SPSS 15.0 (2006) was used to conduct statistical analyses. In all analyses, an  $\alpha$  of .05 was used. Skewness was  $<1$ , therefore log transformation was not necessary. Effect sizes were calculated using Cohen's  $d$ : 0.2 indicates a small effect, 0.5 a medium effect and 0.8 a large effect size (Cohen, 1992). Three outliers, defined as individual values more than 3 SD's above the mean group value, were removed from the final analyses.

## RESULTS

All analyses were run separately for boys and girls but no differences were obtained, nor were there any group by gender interactions (all  $F$ 's were smaller than 3.190). Therefore, the results from analyses without the factor gender will be presented below.

### Children with aggressive behavior problems

Results of the comparisons between children with a high level of aggressive behavior and children with a low level of aggressive behavior are presented in Table 2. According to expectations, children with a high level of aggression had significantly lower SCL ( $d = .33$ ) and SCR ( $d = .36$ ) than children with a low level of aggression. We expected to find that children with a high level of aggressive behavior had lower resting HR and HRR, but we observed no significant differences between the groups of children with high and low levels of aggression (HR:  $d = .10$ ; HRR:  $d = .20$ ).

### Children with a DSM-IV-TR diagnosis

Results of the comparisons between children with a DSM-IV-TR diagnosis and children with a low level of aggressive behavior are presented in Table 3. Only SCL did show group differences. Post hoc analyses showed that, according to expectations, children with ODD/CD had significantly lower SCL than children with a low level of aggression ( $d = -.45$ ,  $p < .05$ ). We expected to find that children with ODD/CD would also have lower HR, HRR and SCR than children with a low level of aggressive behavior, but we observed no significant differences (HR:  $d = -.10$ ; HRR:  $d = -.12$ ; SCR:  $d = -.35$ ). There were no significant differences neither between children with comorbid ODD/CD + ADHD and children with a low level of aggressive behavior (all  $d$ 's  $\leq -.27$ ) nor between children with ADHD only and children with a low level of aggression on any of the autonomic measures (all  $d$ 's  $\leq -.54$ ).

**Table 2.** HR and SC results from one-way ANCOVAs in children with low and high aggression levels

	LOW AGGR		HIGH AGGR		F	df	p
	N	M (SD)	N	M (SD)			
HR in bpm	101	97.05 (10.46)	123	94.87 (12.66)	0.20	1	ns
SCL in $\mu$ S	101	13.26 (7.50)	120	11.09 (5.94)	5.50	1	.020
HRR <sup>a</sup>	92	-0.60 (4.66)	111	-1.46 (3.99)	1.77	1	ns
SCR	93	2.28 (2.24)	111	1.61 (1.55)	5.97	1	.015

LOW AGGR: children with a low level of aggression (< 50th percentile CBCL); HIGH AGGR: children with a high level of aggression (>80<sup>th</sup> percentile CBCL)

<sup>a</sup> Because the time series of HRR intervals did not interact with the between subjects factor the table shows the average value over time

**Table 3.** HR and SC results from omnibus ANCOVA in children with ODD/CD and/or ADHD and LOW AGGR children

	LOW AGGR		ODD/CD		ODD/CD + ADHD		ADHD		F	df	p
	N	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)			
HR in bpm	101	97.05 (10.46)	43	95.99 (12.54)	44	95.24 (12.47)	21	90.59 (13.69)	1.73	3	ns
SCL in $\mu$ S	101	13.26 (7.50)	42	9.77 (5.30)	44	12.65 (5.99)	19	11.06 (6.29)	2.85	3	.04
HRR <sup>a</sup>	92	-0.60 (4.66)	39	-1.10 (3.91)	43	-1.06 (4.04)	18	-2.62 (4.11)	2.85	3	.09
SCR	93	2.23 (2.24)	39	1.64 (1.78)	43	1.796 (1.41)	17	1.46 (1.61)	1.54	3	ns

<sup>a</sup> Since the time series of HRR intervals did not interact with the between subjects factor the table shows the average value over time

## DISCUSSION

In the present study, various measures of autonomic arousal were investigated in groups of preschool children, defined from the perspective of aggressive behavior and from the perspective of clinical syndromes of disruptive behaviors. The main finding was that four-year-old children with a high level of aggressive behavior showed lower SCL and SCR than children with a low level of aggressive behavior, and that four year old children with ODD/CD showed lower SCL, relative to children with a low level of aggressive behavior. Our results are in line with findings in older children with conduct problems (Lorber, 2004). This suggests that decreased SCL and SCR are correlates of aggressive behavior from the preschool years onwards. Yet, the meaning of these results is unclear, but if we assume that low SCL and SCR are markers of punishment sensitivity (Fowles, 1980), young children with reduced SCL and SCR would be at risk for problems in socialization because of their reduced responsiveness to negative feedback on their misbehavior.

Contrary to expectations, we did not find lower HR in preschool children with aggressive behavior or in children with a DSM-IV-TR ODD or CD diagnosis. This is in line with findings in both younger children (14-36 months) (Van Hulle et al., 2000; Calkins and Dedmon, 2000), as well as in somewhat older children (five-year-old) (Calkins, Graziano and Keane, 2007) with aggressive behavior, who also did not display lower HR. In contrast, numerous studies in school-aged children with clinical syndromes of disruptive behavior did show lower HR (e.g., Van Goozen et al., 1998) and lower SCL during rest (e.g., Van Goozen, Matthys, Cohen-Kettenis, Buitelaar & Van Engeland, 2000). Moreover, results from meta-analyses show that low resting HR is a correlate of school aged children with aggressive behavior (Ortiz & Raine, 2004; Raine, 1996). Results of these studies suggest that differences on HR between children with aggressive behavior and normal controls arise during elementary school. It is possible that the group of children with a high level of aggressive behavior at the age of four consists of a subgroup of children who will show a decrease in aggression over time (Shaw, Lacourse & Nagin 2005; Hill, Degnan, Calkins & Keane, 2006) and in which lower HR is not a characteristic. This leads to the working hypothesis that lower HR is a characteristic only in the group of school aged children with persistent aggressive behavior or a DSM diagnosis of ODD/CD.

Although we expected children with aggressive behavior or a DSM-IV-TR diagnosis of ODD/CD with or without ADHD to have decreased HRR, we did not find significant results. Results of meta-analyses are contradictory with respect to HRR in children with aggressive behavior; Lorber (2004) found that greater HRR was associated with conduct problems, whereas Ortiz and Raine (2004) found children with aggressive behavior to have decreased HRR.

Thus, our results suggest that electrodermal activity is a more sensitive correlate of aggression than HR in preschool boys and girls, which is also reflected by the effect sizes. However, in contrast to Beauchaine et al. (2008), who found reduced respiratory sinus arrhythmia and cardiac pre-ejection periods in 8-12 year old boys with conduct problems and greater SCR in girls with conduct problems, we did not find sex differences on any of the autonomic measures. Since we used different indicators of underarousal than Beauchaine et al. (2008), further research should decide whether this is a real developmental gender difference.

From the analyses with the comorbid ODD/CD + ADHD group, it appeared that these children do show neither lower HR and SCL, nor decreased HRR and SCR. To date, it is unclear whether children with ODD/CD + ADHD should be considered as a subgroup of children with ODD/CD, as a subgroup of children with ADHD, or as a distinct diagnostic category. There is evidence that the ODD/CD + ADHD group cannot be distinguished as an independent disorder (Rhee, Willcutt, Hartman, Pennington & DeFries, 2008). If the ODD/CD + ADHD group in the present study would have been a subgroup of the ODD/CD group, decreased SCL should have been a characteristic. The meaning of the absence of differences between children with comorbid ODD/CD + ADHD and children with a low level of aggressive behavior is unclear. Furthermore, children with ADHD do not differ from children with a low level of aggressive behavior on any of the autonomic measures in the present study. It is difficult to compare these results with other research regarding autonomic measures in children with ADHD, because most studies did not include an ADHD-only group (but instead, used children with comorbid ADHD + ODD/CD).

The results of the study should be interpreted in the context of some limitations. First, the educational level of the parents participating in this study is rather high. Comparing the distribution of educational level in our sample to the distribution of educational level in the entire Dutch population (CBS, 2007) indicates that the parents in our sample received higher education. Thus, our findings have limited generalizability to children from less educated parents. Second, it would have been interesting to measure psychopathic traits in this group in relation to autonomic measures, as Lorber (2004) showed in his meta-analysis that adult psychopaths are characterized by low SCL, but not low HR. In an early review by Hare (1978) it was shown that psychopaths had decreased SCR, but normal or even larger cardiac responses. Unfortunately, there are no reliable measures to assess psychopathy in preschoolers. Finally, the DSM-IV-TR subgroup comparisons had less power than the analyses using continuous aggression scores due to a relatively small number of children in the DSM-IV-TR subgroups.

Regarding methodological issues, there are two particular strengths in this study. First, we controlled for inside and outside temperature and humidity level as possible confounding factors in the analyses. Second, by assessing these young children at home, the influence of fear and excitement on autonomic measures was minimized.

In conclusion, the present study showed low SCL and SCR to be characteristics of four-year-old children with aggressive behavior. This finding is similar to the results of four-year-old children with ODD/CD; those children showed lower SCL. In contrast, we did not find lower HR in preschool children with aggressive behavior or a DSM-IV-TR ODD/CD diagnosis. Lower HR seems to be a correlate of aggression in children at a later age.

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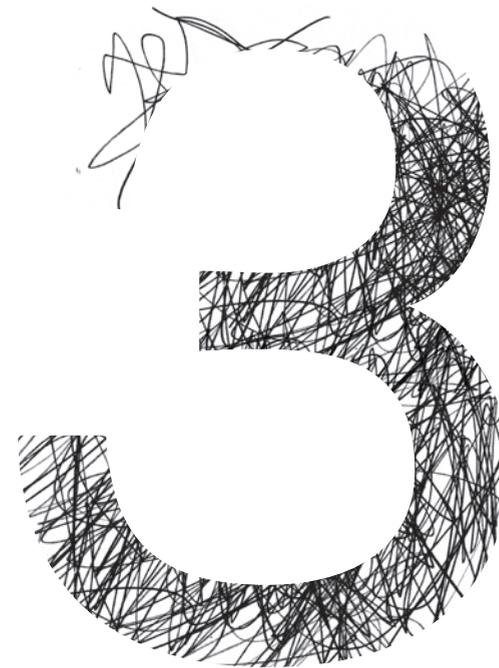
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**Accidental and  
hostile intent  
attribution and  
inhibition in  
preschool children  
with and without  
aggressive behavior  
problems**



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## ABSTRACT

Intent attribution skills, part of the social information processing (SIP) model, are considered an important developmental task in the preschool years. Yet, little is known about accidental intent attribution in preschool children with aggressive behavior problems, especially in relation to inhibitory control. We compared 67 four-year-old children with aggressive behavior problems with 49 nonaggressive peers on hostile and accidental intent attribution, response generation, and inhibition. We tested the individual and joint contributions of SIP and inhibition to explain individual differences in aggressive behavior. When compared with their nonaggressive peers, children with aggressive behavior problems attributed significantly less accidental intent and had a significantly lower inhibition score. Groups did not differ on any of the response generation variables. From structural equation modeling analyses it became clear that deficient inhibition and accidental intent attribution each explain unique variance in preschoolers' aggressive behavior.

**Keywords:** preschoolers, aggression, SIP, inhibition

## INTRODUCTION

*David is four years old. His parents describe him as extremely noncompliant and aggressive to other children. David just entered Kindergarten. At this particular morning, David's class is painting. One of his classmates wants to have a look at David's work of art. As he bows over, he touches the arm with which David holds his pencil, causing a scratch on David's painting. David starts screaming: "You stupid!" and he hits the other boy.*

This case is illustrative of the difficulties children with aggressive behavior problems encounter in social interactions. Possibly, David's aggressive behavior is caused by a hostile attribution style. Within the field of developmental psychopathology, the social information processing (SIP) model (Crick & Dodge, 1994; Dodge, 1986; Lemerise & Arsenio, 2000) has been the main theoretical framework to address the question which proximal factors give rise to aggression in particular situations. This model proposes that social cognitive processes are key factors in explaining aggressive behavior. Socially competent behavior is proposed to require adequate processing in the following steps: encoding, representation, goal selection, response generation, response evaluation and enactment. Specific deviations in each of these steps are believed to lead to aggressive behavior. Deviations in all steps have indeed been shown to be related to aggressive behavior problems in numerous studies with children in middle childhood and adolescence (see De Castro, Veerman, Koops, Bosch & Monshouwer, 2002; Dodge, 2006).

Theoretically, important individual differences in social information processing are believed to emerge in the preschool years, as children are believed to develop social-cognitive skills to interact with their social environment during that period (Dodge, 2006). Aggression during toddlerhood is common, but usually aggression rates decrease over time (Hill, Degnan, Calkins & Keane, 2006). When children first enter school, their repertoire of social strategies is limited, because they did not have exposure to many challenging peer situations. An important task in this age period is to learn to behave nonaggressively (Tremblay et al., 2004). In case of ambiguous provocation children have to learn to inhibit their initial aggressive response tendency, and then carefully interpret others' intentions as hostile, accidental, or benign, in order to respond appropriately. Given the importance of the preschool years for SIP, surprisingly little is known empirically about SIP patterns in preschoolers and their relations with aggressive behavior problems.

The present study aims to clarify relations between SIP and aggressive behavior in preschoolers. We focus on the steps representation and response generation of the SIP model, because these steps play a pivotal role in theoretical accounts of early SIP development.

Representation involves, among others, inferring the motives behind other people's behavior and its significance to one's own concerns. Children with aggressive behavior problems more often believe other's behaviors toward them to be motivated by hostile intent; the so called hostile intent attribution (for a meta-analysis, see De Castro et al., 2002). Generating responses refers to the availability of multiple possible responses to the represented situation. Studies in population based samples revealed that the number of responses children are able to generate to social dilemmas increases with age (Feldman & Dodge, 1987) and the generation of prosocial and aggressive solutions appeared to be stable over time (Mayeux & Cillessen, 2003). According to Shure and Spivack (1980) children behave violently because they lack interpersonal cognitive problem-solving skills, such as how to brainstorm a variety of solutions, how to predict consequences of one's own actions and how to link the causes to effects in interpersonal interactions. Without these skills children are more likely to have frustrating social interactions. These frustrations, in turn, may lead to misbehavior of the children. Results of empirical studies are in line with these ideas. Middle childhood and adolescent boys with aggressive behavior have been found to generate fewer responses (Matthys, Cuperus & Van Engeland, 1999) and more aggressive responses than non-aggressive boys (Waldman, 1996).

Since hostile intent attribution has a relatively low impact in explaining aggressive behavior in children (De Castro et al, 2002), there is reason to consider other characteristics of the representation stage that may help to explain aggressive behavior. Recently, it has been argued that the ability to infer accidental intent may be an important developmental milestone in early childhood (Dodge, 2006), but virtually no research has been conducted on the relations between accidental intent attribution and behavior problems, nor on the discriminant validity of accidental intent attribution versus hostile intent attribution in early childhood. Several authors (Crick & Dodge, 1994; De Castro, 2004; Dodge, 2006; Kempes, Matthys, De Vries & Van Engeland, 2008) have suggested that the ability to consider an event with a negative outcome to be accidental may be an even more important aspect of representation than hostile intent attribution. Yet, empirically, little attention has been given to the ability to attribute accidental intent to others. While the capacity to attribute intent develops in the third or fourth years of life (Schult, 2002), it is unclear when the understanding of someone causing frustration or harm without the clear intention to do so develops (Björqvist & Osterman, 2001). Dodge and Newman (1981) found that the tendency to attribute hostile intent decreases with age. However, it is unclear whether a decrease in hostile intent attribution is necessarily paralleled by increases in attribution of accidental intent and by an actual decrease in aggressive response generation. Crick and Dodge (1994) suggested that accidental intent attribution develops more slowly in children with aggressive behavior problems than in their peers. Probably, some children fail to develop the ability to make

accidental attributions and to consequently moderate the aggressiveness of their responses to frustration. In these children, the hostile attributional style, then, becomes a trait that is persistent over time and guides behavior. Thus, acquisition of the ability to attribute accidental intent and to moderate one's responses accordingly seems to be an important developmental task in the preschool years (Dodge, 2006).

In the theoretical and empirical literature (Dodge, 2006; Runions & Keating, 2007), benign and accidental intent attribution have generally been considered identical. We, however, believe it is important to differentiate between benign and accidental intent, because they are in fact quite different. For example, Tom spoils milk on David's trousers. In our view, it is hard to imagine that Tom spoiled the milk with benign intent. Clearly, if David saw that Tom's cup was too full and would have said: "It doesn't matter, it was an accident", he would be quite right, because Tom's intention was neither benign nor hostile, but instead, it was an accident. Many ambiguous provocation situations used in SIP research and in daily social situations, do not require children to be able to infer benign intent, but the ability to see something was an accident. In fact, in most of the vignettes presented in the literature, inferring benign intent is very unlikely (as in the milk example above), and accidental intent is more appropriate.

If accidental intent attribution is indeed an important developmental task, the question is what determines individual differences in the development of accidental intent attribution. According to the SIP model, both environmental factors and information processing capacities influence the development of the ability to attribute accidental intent (Dodge, 2006). Concerning environmental influences, evidence is emerging for social learning of SIP styles through parental conditioning and modeling. Harsh discipline predicts deviations in SIP that, in turn, predict behavior problems later in childhood (Weiss, Dodge, Bates & Pettit, 1992). If children experience physical abuse in their first years of life, they become hypersensitive to cues of threat. It was shown that physically abused children focused selectively on hostile cues in social situations (Pollak & Tolley-Schell, 2003). There also is consistency in SIP patterns between parents and children (McDowell & Parke, 2002; Nelson, Mitchell & Yang, 2008). In addition, mother's hostile intent attribution predicted their harsh discipline strategies, which in turn predicted their child's increase in externalizing behavior (Nix et al., 1999).

Concerning cognitive capacities inhibition problems may be an important factor complicating the development of accidental intent attribution. Impairments in inhibitory processes have been linked to the regulation of aggressive behavior (Sequin, Pihl, Harden, Tremblay & Boulerice, 1995). It has been shown that deficits in inhibition were related to aggressive behavior problems in school aged children (Oosterlaan, Logan & Sergeant, 1998) and in preschool children (Hughes, Dunn & White, 1998; Raaijmakers et al., 2008). Inhibition

problems may make it difficult for children to develop accidental intent attributions. If it is hard to inhibit immediate responses to frustration, there is no time to carefully appraise other's intentions, i.e., to consider the possibility of accidental intent and to moderate one's initial impulsive aggressive response tendency (Dodge, 2006). In order to respond nonaggressively, children have to learn to inhibit their initial aggressive response to ambiguous provocations, thereby creating time to represent social information more in depth and to detect accidental intent cues. Thus, inhibition problems may serve as a moderator in the development of accidental intent attribution.

There is surprisingly little research concerning the development of SIP in the preschool years and its relation with inhibition. Empirical studies regarding the social information processing model have mostly been performed in school aged children. To understand the development of hostile and accidental intent attribution, it is crucial to learn more about the preschool age, when understanding of other's intent is presumably learned and when individual differences emerge. As far as we know, there is no empirical information about the potential role of inhibitory processes in the development of individual differences in intent attribution outlined above.

To date, few studies have investigated SIP in preschoolers. In a study with over 500 Kindergarten children, significant main effects for early step (e.g., making attributions) and later step (e.g., generating responses) SIP problems on concurrent teacher and mother reported externalizing behavior were found (Lansford et al., 2006). Besides this study in typically developing children, hostile intent attribution has been investigated in preschool children with aggressive behavior problems. Webster-Stratton and Lindsay (1999) tested a clinic referred group of children with Oppositional Defiant disorder (ODD) or conduct problems and typically developing children. Their mean age was 5.7 years old. Children with ODD and conduct problems were more likely to make hostile attributions of the other's intent, they generated significantly fewer positive solutions, and had a lower ratio of positive to negative problem solving strategies than did comparison group children. Moreover, children with conduct problems showed more aggressive conflict management in social interactions. In another study, preschool boys with aggressive behavior problems generated more aggressive solutions to hypothetical peer conflict situations than their less aggressive peers (Gouze, 1987). Katsurada and Sugawara (1998) used videotaped interactions of children in order to measure intent attribution in preschool children (mean age 4.8 years). Results indicated that children with aggressive behavior attributed more hostile intent than their non-aggressive peers. Interestingly, a subgroup of children (22%) attributed solely accidental intent. The authors concluded that this result was due to the age of these children (the 22% was significantly younger than the rest of the sample).

Furthermore, some prospective studies have been conducted. In a longitudinal study in four-year-old boys who were assessed again one and two years later, it was shown that boys with ODD, at all three time points, were twice as likely as comparison boys to generate aggressive solutions to hypothetical, peer-oriented social dilemmas (Coy, Speltz, DeKleyn & Jones, 2001). Furthermore, social cognitive processes had little prognostic significance to later diagnostic status or severity of behavior problems; boys distinguished by the presence or absence of aggressive problem solving or hostile attributions showed equivalent levels of externalizing behavior after two years. Lansford et al. (2006) conducted a longitudinal study from which it became clear that patterns of social information processing problems (e.g., hostile intent attribution and generating aggressive responses) during Kindergarten did not predict externalizing behavior in Grade 11. A recent study in a large sample of preschool children (Runions & Keating, 2007) revealed that hostile intent was predictive of externalizing behavior in Grade 1. As in Katsurada and Sugawara's study (1998), almost a quarter of the preschoolers attributed solely benign intent. Mothers and teachers of these children reported fewer externalizing behavior and these children scored higher on cognitive tasks. The authors stated that the preschoolers who attributed solely benign intent, were capable of understanding the questions and the concept of intentional behavior. An explanation the authors gave for these results was social desirability towards the adult tester. In this study, as in the study of Katsurada and Sugawara (1998), benign and accidental intent are not considered to be distinct categories and are not scored separately. It is intriguing that the researchers did not seem to consider the possibility that these preschoolers already lost their predisposition to attributing hostile intent, and were able to understand that some situations with negative consequences could be accidents.

In sum, compared to school aged children and adolescents, little is known about SIP in preschool children. There is preliminary evidence that preschool children are capable of attributing accidental intent (e.g., Flavell, Miller & Miller, 1993), but we do not know how accidental intent attribution is related to aggressive behavior, yet. Aims of the present study were to assess a preschool sample of children with aggressive behavior problems on both hostile and accidental intent attribution, response generation and inhibition at age four. Regarding intent attribution, we hypothesized that hostile intent attribution and accidental intent attribution would be clearly distinct phenomena, i.e., that accidental intent attribution would have discriminant validity. Furthermore, we hypothesized that children with aggressive behavior problems when compared with nonaggressive children would 1) attribute more hostile intent and 2) attribute less accidental intent. Regarding response generation, we hypothesized that children with aggressive behavior problems when compared with nonaggressive children 1) would generate fewer responses to hypothetical problems, 2) would generate more aggressive solutions and 3) would generate fewer prosocial solutions. Regarding inhibition,

we hypothesized that children with aggressive behavior problems would have more inhibition problems. Furthermore, we aimed to test the relative contributions of SIP and inhibition in explaining individual differences in aggressive behavior. We used structural equation modeling to explore whether SIP and inhibition were independent contributors to aggressive behavior or whether there was an interaction between SIP and inhibition in predicting aggressive behavior.

## METHOD

### Participants

Children were selected from a population-based sample of Dutch children in the province of Utrecht. The sample used in this study was derived from a larger study into the effect of an indicated preventive intervention. Data used in this study were collected at pre-assessment (see Raaijmakers et al., 2008). Addresses of all children born in the region in 2001 were acquired by the Office for Screening and Vaccination. Parents of the four-year-old children were asked to fill out the Child Behavior Checklist (CBCL) 1½-5 (Achenbach & Rescorla, 2000; Dutch version by Verhulst & Van Den Ende). Children were selected to participate in the group of children with aggressive behavior problems if they scored at or above the 90th percentile of the CBCL Aggressive Behavior Scale. The group of children with aggressive behavior, referred to as AGGR, consisted of 67 children. The CBCL was also used to select 49 children without aggressive behavior, referred to as NONAGGR. These children were required to score below the 50th percentile of the CBCL Aggressive Behavior scale. Children with an estimated full scale IQ below 80 were excluded from the study. All children were medication naïve.

Characteristics of the AGGR and NONAGGR group are presented in table 1. Parents of the children in both groups were highly educated. Educational level was measured with a 5-point Likertscale. Percentages of completed education in the AGGR and NONAGGR group were as follows: 3.0% versus none of the parents in the NONAGGR group completed primary education; 7.5% versus 6.1% completed secondary education; 31.3% versus 16.3% completed intermediate vocational education; 32.8% versus 30.6% completed higher vocational education and 25.4% versus 46.9% completed university. Chi<sup>2</sup> tests showed that educational level did not differ between the groups.

**Table 1.** Participant characteristics

	AGGR	NONAGGR
N	67	49
Gender in % boys	61.20%	71.40%
Age in months (M, SD)	53 (0,3)	53 (0,2)
CBCL		
<i>Aggressive behavior</i> (M, SD)	23.48 (5.44)	3.12 (2.66)**
<i>Attention problems</i> (M, SD)	6.14 (2.25)	0.55 (0.74)**

\*  $p < .05$

\*\*  $p < .01$

### Procedure

All children were individually assessed twice in their home environment. Both assessments lasted for approximately one hour. During the first home visit, children completed neuropsychological tests. Tests were administered by trained experimenters using standardized instructions. Testing began when instructions were fully understood by the child. Children were asked to be accurate and as fast as possible and they were not informed of their errors. The child looked at a Philips 15" LCD-monitor and had to push two large buttons which were converted emergency stop switches with an external diameter of 94 mm (MOELLER Safety Products; FAK-R/V/KC11/1Y). See Measures for a detailed description of the tasks. During the second home visit participants completed the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-R; Wechsler, 1997; Dutch version by Vander Steene & Bos, 1997) and the social information processing (SIP) task. Regarding the SIP task, children were told they would listen to stories about events they could experience every day and they were asked to imagine that they experienced the stories themselves. It was emphasized that no wrong answers could be given. On each home visit, two experimenters were present: one assessed the child and the other observed the child.

Written informed consent was obtained from the parents prior to participation and all families received a financial reimbursement for participation. Children received a small gift for their participation. The study was approved by the Medical Ethical Review Committee of the University Medical Center Utrecht.

## Measures

### SIP

In order to measure SIP in young children, we designed an age appropriate task based on two SIP tasks that have been found to have adequate psychometric qualities with middle childhood participants (Crick & Dodge, 1996; De Castro, Merk, Kooops, Veerman & Bosch, 2005) and a semi-structured SIP task previously used with young children (Webster-Stratton & Lindsay, 1999). The resulting SIP task consisted of 14 vignettes. All vignettes concerned being hindered by a peer whose intent was ambiguous. An example of a vignette is:

*Imagine: you are eating cake. One of your classmates wants to sit next to you. (S)he is holding a glass of milk. As (s)he sits down, he spoils the milk all over your pants.*

Intent attribution and response generation questions were posed about different vignettes, to prevent interdependence between answers. Six vignettes were used to assess attribution of others' intent and eight vignettes were used to assess response generation. Intent attribution was assessed with an open ended question and a 5-point rating scale. Answers to the open ended question "why did (s)he [behavior in vignette]?" were coded as benign, accidental or hostile. On rare occasions, when multiple answers were given, the children were prompted to provide one definite answer. Variables for open-answer benign, hostile accidental intent attribution were created by summing the number of vignettes with benign, hostile or accidental intent responses, respectively. Thus, scores on these variables could range from 0 (never attributed this intent) to 6 (attributed this intent to every vignette). After each open ended question, intent attribution was also assessed using a multiple choice format by asking the child whether the other conducted the provocative behavior on purpose or by accident. Overall, hostile and accidental intent attribution variables were then created by adding up the open-ended and multiple choice variables. This resulted in a total score between 0 and 12 with respect to both hostile and accidental intent attribution. Cronbach's  $\alpha$  for intent attribution was .71. Interrater agreement and kappa of intent attribution were 94% and .92.

To assess response generation, children were presented eight provocation vignettes similar to the six intent attribution vignettes, and were asked to tell how they would respond if they would actually experience this particular situation. When the child had given one answer, this question was asked again, until the child said he or she did not know more answers. Each response was coded as physical or destructive aggression (i.e., punch him in the face), verbal aggression or coercion (i.e., if you don't fix it, I'll beat you up), or as a prosocial solution (i.e., let's build a new one together). These codes were then given respective weights of two, one, and zero points, in accordance with the severity assigned to

each of these categories of aggressive behavior by children from the same region (see De Castro, 2000) and averaged over vignettes. Furthermore, we calculated a total generated responses score, by counting the number of responses a child generated. Cronbach's  $\alpha$  for response generation was .85. Answers of both response generation and intent attribution were coded by three trained coders and 20% was double checked. Interrater agreement and kappa of response generation were 92% and .90.

### Aggression

Aggressive behavior of the child was measured with the CBCL Aggressive Behavior Scale. The Aggressive Behavior Scale consists of 19 items, e.g., "often has temper tantrums" and "is disobedient". Parent circle the answer 0 (never), 1 (sometimes) or 2 (all the time) which fits the behavior of their child best. Cronbach's  $\alpha$  of the Aggressive Behavior Scale was .95. The CBCL was completed by the primary caregiver, who was in all cases the mother, except for one child in the AGGR group.

### Inhibition

A factor analysis, performed on data of several neuropsychological tasks (see Raaijmakers et al., 2008), revealed that a single disinhibition factor can be constructed from the three tasks: the Shape School conditions 'Inhibition' and 'Both' and the Go/NoGo. Standardised scores on these three tasks were therefore summed to assess disinhibition. Cronbach's  $\alpha$  for disinhibition was .70. Correlations between the four inhibition scores ranged from .30 to .49 and were all significant at the .01 level.

### Go/Nogo

In the present study an adaptation of the original Go/No go paradigm was used, adjusted to four-year-old children (Smidts, 2003). The Go stimulus (an elephant) and the Nogo stimulus (a dog) appeared in random order for 1.5 ms on a monitor, but disappeared when the child pressed the button within that period. In 50% of the randomly presented 48 trials, the child had to inhibit his response. Disinhibition reflects the number of presses when the dog appeared.

### Shape School

Originally, the Shape School aims to measure working memory, inhibition and switching processes. In this study, a computerized version (Smidts, 2003) of the original Shape School storybook (Espy, 1997) was used. The task consisted of four conditions. In the first condition, the 'Control' condition, children had to push the button of the color of the figure that appeared on the screen (red or yellow). In the second condition, the 'Inhibition' condition, children had to respond by pushing the button of the correct color only when the figure

on the screen looked happy, and to suppress this response when the figure looked sad. In the following two conditions, 'Switching' and 'Both', the child had to retain and switch between rules. In the 'Switching' condition, the child had to respond to the color of the figure, but when the figure wore a hat, children had to push the button of the contrasting color. In the 'Both' condition one rule was added; only push a button when the figure looks happy. In this last condition, children had to inhibit a response when a sad figure appeared on the screen and had to switch between rules from earlier conditions. In this study, we only used the 'Inhibition' and the 'Both' condition of the Shape School. Disinhibition was measured by the number of incorrect inhibition responses during the 'Inhibition' condition and the 'Both' condition, and during the number of incorrect responses during the 'Inhibition' condition.

### Data analysis

Two group ANOVAs were conducted to analyze differences between the AGGR and NONAGGR group on attribution of intent and response generation. In all analyses, an  $\alpha$  of .05 was used. A number of hostile attribution studies in children have controlled for group differences in intelligence. No group by gender interactions were present; therefore, data of boys and girls were analyzed together. Effect sizes were calculated using Cohen's  $d$ : 0.2 indicates a small effect, 0.5 a medium effect and 0.8 a large effect size (Cohen, 1992). Structural equation modeling analyses were conducted in Amos (Arbuckle, 2006). The models used in the present study only included observed variables, no latent variables were present.

## RESULTS

### Group differences

Group differences are displayed in table 2. No significant group difference on hostile attribution of intent was obtained; ( $F(1, 115) = 3.34, p = .070, d = .35$ ). Percentage of hostile intent attribution in the AGGR group was 39%, whereas children of the NONAGGR inferred hostile intent attribution in 32% of the situations. According to expectations, there was a significant group difference on accidental attribution of intent. Children with aggressive behavior problems attributed less accidental intent ( $F(1, 115) = 5.47, p = .021, d = .45$ ). Children in the AGGR group inferred accidental intent in 31% of the situations, whereas children in the NONAGGR group inferred accidental intent in 40% of the situations. In addition, there were no significant differences between children in the AGGR group and children in the NONAGGR group with respect to percentages of benign intent attribution, "don't know" and answers that were uncodable (benign; AGGR: 0.13% versus NONAGGR: 0.69%; 'don't know': AGGR: 24% versus NONAGGR: 22% and uncodable: AGGR: 5.87% versus NONAGGR: 5.31%)

Contrary to expectations, there were no significant group differences on total number of generated responses and prosocial responses. Children with aggressive behavior problems did not generate fewer responses in general and did not generate less prosocial responses, relative to children without aggressive behavior problems. Furthermore, there was no significant difference on aggressive responses between children with and without aggressive behavior problems. As expected, children in the AGGR group had a significant higher score on the disinhibition factor than children in the NONAGGR group ( $F(1, 115) = 6.24, p = .014, d = .49$ ).

**Table 2.** Intent attribution, response generation and disinhibition

	AGGR	NONAGGR			
	M (SD)	M (SD)	F	p	d
<b>Intent attribution</b>					
hostile attribution	4.69 (2.35)	3.88 (2.32)	3.34	.070	.35
accidental attribution	3.78 (2.36)	4.73 (1.82)	5.47	.021	.45
<b>Response generation</b>					
total generated responses	12.06 (3.95)	12.06 (4.32)	0.00	ns	.00
aggressive responses	2.31 (3.61)	2.33 (2.52)	0.00	ns	.01
prosocial responses	2.22 (2.50)	2.31 (2.42)	0.03	ns	.04
<b>Disinhibition</b>	0.14 (0.83)	-0.20 (0.51)	6.24	.014	.49

### Correlations and moderation

Bivariate correlations are presented in Table 3. Aggression was correlated with accidental intent attribution ( $r = -.21$ ) and disinhibition ( $r = .29$ ), but not with hostile intent attribution. Hostile intent attribution and accidental intent attribution were negatively correlated ( $r = -.58$ ) indicating that these variables share only 34% of their variance. The intent attribution variables were not correlated with disinhibition.

**Table 3.** Correlations of aggression, disinhibition and SIP measures

	Disinhibition	Accidental	Hostile	Aggression
Disinhibition				
Accidental intent	-.14			
Hostile intent	.18	-.58**		
Aggression	.29 **	-.21*	.17	

Next, we tested the relations between attribution and inhibition variables in the explanation of aggressive behavior. Since the direction of significant group effects of disinhibition and accidental intent attribution were established, it was allowed to use one-tailed tests (Cohen, 1992). We investigated the fit of a model in which both disinhibition and intent attribution served as independent contributors to aggressive behavior. First, we used accidental intent and disinhibition as independent contributors in the model. The standardized regression weight of the relation between accidental intent and aggressive behavior was  $-.17$ ,  $p$  (one sided) =  $.029$ , while the standardized regression weight of the relation between disinhibition and aggressive behavior was  $.27$ ,  $p$  (one sided) =  $.002$ . Fit statistics of the model were modest (CFI =  $.822$ ; RMSEA =  $.120$ ). Thus, accidental intent attribution and disinhibition each explained unique variance in aggressive behavior. Second, we used hostile intent and disinhibition as independent contributors in the model. The standardized regression weight of the relation between hostile intent and aggressive behavior was  $.12$ ,  $p$  (two sided) =  $.181$ . Fit statistics of this model were not satisfactory (CFI =  $.669$ ; RMSEA =  $.160$ ). Third, we tested the interaction effect of accidental intent and inhibition by adding the multiplicative interaction between accidental intent attribution and inhibition to the first model. The contribution of the interaction between accidental intent and inhibition to aggressive behavior was not significant, with a standardized regression weight of  $-.23$ ,  $p$  =  $.364$ . Including the interaction term in the model did not improve model fit (CFI =  $.993$ ; RMSEA =  $.110$ ). Thus, the best fit was obtained with a model including independent contributions of accidental (not hostile) intent attribution and disinhibition on aggressive behavior.

## DISCUSSION

The main aim of this study was to test whether preschool children with aggressive behavior problems differed from their nonaggressive peers in accidental and hostile intent attribution and response generation. Furthermore, we wanted to investigate the relations between

inhibition and SIP in the explanation of aggressive behavior.

With respect to the attribution of intent, preschool children with aggressive behavior attributed less accidental intent than their nonaggressive peers. It may be that nonaggressive children at age four start to overcome a predisposition to attribute hostile intent following negative events and are able to understand that some situations with negative consequences could be accidents, whereas preschoolers with aggressive behavior problems have difficulties using this 'protective mechanism' that enables successful management of ambiguous provocation situations. Thus, preschool children with aggressive behavior problems apparently still think that the negative effect of someone else's behavior was done on purpose, instead of considering it was an accident. Moreover, less accidental intent attribution appeared to be a more important correlate of aggressive behavior than hostile intent attribution in preschoolers.

Although the groups did not differ significantly on hostile intent attribution, the effect size of hostile intent attribution was medium ( $d = .35$ ) and was comparable to effect sizes found in previous SIP studies with similar –albeit older– samples (De Castro et al., 2002). This suggests we may have had slightly too little power to demonstrate group differences on hostile intent attribution, given the relatively low variance on this variable.

The group of children with aggressive behavior problems did not differ from their nonaggressive peers on any of the response generation variables. Children with aggressive behavior problems showed equal total generated responses, aggressive responses and prosocial responses. This is contrary to the findings of Webster-Stratton and Lindsay (1999), who found that in response to a less standardized but perhaps more engaging task, young children with conduct problems generated less prosocial solutions than their peers without conduct problems, and to the study of Coy et al. (2001) in which it was shown that children with aggressive behavior were twice as likely as normal controls to generate aggressive solutions to hypothetical problems. The null-finding of response generation in the present study may be due to the level of aggression of the children. As children in the studies of Webster-Stratton and Lindsay (1999) and Coy et al. (2001) had diagnoses of disruptive behavior disorders, the larger group differences in aggressive behavior in those studies may have led to clearer effects on SIP measures. Another explanation for the null finding on response generation is the response format used in this study. Despite that studies in which open answer questions are used showed larger effects, relative to studies in which closed-response formats are used (Milich & Dodge, 1984; De Castro et al., 2005), we assume that it may have been too difficult for some of the four-year-old children to verbalize what they would do in a particular situation. This may also explain why the less verbal puppet interview

method used by Webster-Stratton and Lindsay (1999) yielded clearer findings on response generation.

The structural equation modeling analyses revealed that inhibition explains more variance of aggressive behavior than intent attribution, suggesting that inhibition is a more important factor than intent attribution in explaining aggressive behavior during the preschool years. However, in comparing the magnitude of these associations, note that they have large confidence intervals, so apparent differences between the strength of associations are not significant. Our findings regarding the independent contributions of intent attribution and inhibition seem in contrast to findings by Waldman (1996) with older children. Although there are important differences in group composition and measures between the studies, Waldman showed that hostile attributions by school aged boys were related with impulsivity and that relations with aggressive behavior remained after statistically controlling for impulsivity. It might be that inhibition is a more important factor in explaining preschool aggressive behavior problems than intent attribution. In the preschool years, inhibition plays a key role in the regulation of behavior. Perhaps inhibition is of primary importance in the preschool years, when the foundations for SIP are laid, whereas individual differences in accidental intent attribution become larger at later ages, when the gap between children who continue to develop these skills and children who lag behind becomes increasingly large. This is supported by research showing that associations between SIP and aggression are larger in middle childhood than during the preschool years. (De Castro, 2002). Future longitudinal studies regarding SIP and inhibition in children with aggressive behavior problems are required to investigate whether this hypothesis holds true.

The results of this study should be interpreted in the light of some limitations. First, the educational level of the parents participating in this study was rather high. Comparing the distribution of educational level in our sample to the distribution of educational level in the entire Dutch population (CBS, 2007) indicates that the parents in our sample received higher education. Thus, our findings have limited generalizability to children from less educated parents. Second, it has been found that the emotional involvement in a situation is crucial when it comes to inferring intent (De Castro, Slot, Bosch, Koops & Veerman, 2003; Dodge & Somberg, 1987). Children are more likely to display hostile intent when they are affectively aroused. In the present study, children may not have felt truly angry or threatened. When replicating this study, inducing a negative emotional state in children with aggressive behavior problems might generate clearer group differences on hostile intent attribution. Third, we used parent report to measure aggression. Considering that parent ratings of child behavior are often susceptible to systematic biases (Gardner, 2000), an objective observation of aggressive behavior of the child would be a more adequate measure of aggressive behavior

of the child. Fourth, as relational aggression is not measured with the CBCL (Achenbach & Rescorla, 2000), we were only able to measure overt aggression.

The results of this study show that the impaired ability to attribute accidental intent in others, an underestimated phenomenon in SIP research, is probably a discriminative factor between preschool children with and without aggressive behavior. Future research should study the development of accidental intent longitudinally to gain insight in factors that promote or hinder its development. Besides, inhibition seems to be an important factor in explaining aggressive behavior in preschool children. This gives rise to the idea that an inhibition measure should be included in future SIP studies in order to further understand the interrelatedness between SIP and inhibition.

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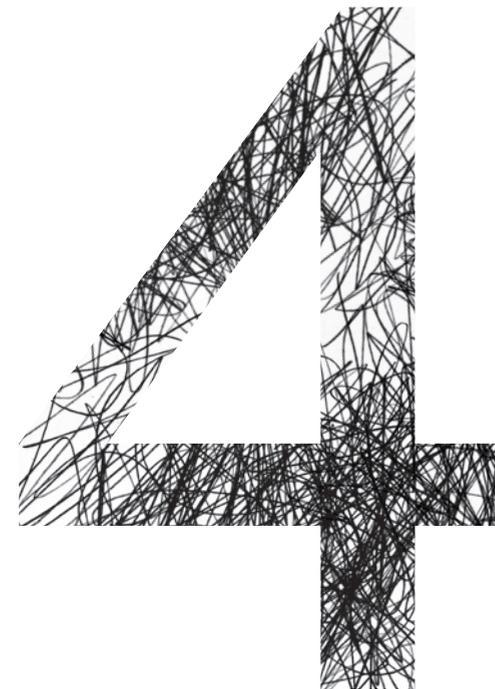
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**Explanations for  
non-participation in  
the Incredible Years  
parent program**



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## ABSTRACT

**Objective:** As drop out rates during interventions are high, it is important to identify barriers parents might experience when they start an intervention. In the present study, parents of children at risk of a chronic pattern of conduct problems were invited to participate in the Incredible Years (IY) parent program. The main purpose of the present study was to examine reasons of parents who refused to participate in the IY parent program. **Method:** Reasons for non participation were scored according to Kazdin's (1997) barriers to treatment model. Moreover, families who refused and agreed to participate in the intervention were compared on child mental health problems and stress levels of the primary caregiver. **Results:** The main reason for non participation was that parents found the intervention not relevant. Other reasons for non participation were that the intervention was too demanding or parents indicated practical reasons to refuse participation. Parents who agreed to participate appeared to have higher levels of stress than parents who refused to participate, while the aggression level of the child did not differ between families who agreed and refused to participate. **Conclusion:** High levels of stress may strain the capacity of parents to interact with their children in a positive manner, which may result in negative and controlling behavior and may therefore have been an important motivation for parents to participate in the IY parent program.

## INTRODUCTION

Aggressive behavior in children represents a significant public health problem. Up to 60% of clinical referrals are for evaluation and treatment of children and adolescents with aggressive behavior problems. The majority of children and adolescents in mental health services are referred because of severe conduct problems (Kazdin & Weisz, 2003). On top of that, children with persistent aggressive behavior problems incur high costs to society (Scott, Knapp, Henderson & Maughan, 2001). Early detection and the prevention of conduct problems have become important and popular goals for authorities in child development and those who provide community mental health services. Hence, intervention programs specifically designed to prevent the development of conduct problems in at risk children have been developed. Despite these actions, only one third of children in need of mental health services actually receive an intervention (Leaf et al., 1996; Offord & Bennett, 1994).

Since preschool children with aggressive behavior problems are at risk for the development of a chronic pattern of conduct problems (Shaw, Lacourse & Nagin, 2005), we provided an indicated preventive intervention to parents of preschool children with high scores on an aggression scale. As motivation to participate is a recurrent problem in intervention studies, especially when families of children with conduct problems are involved (Luk, Staiger, Mathai, Wong, Birlleson & Adler, 2001), we wanted to lower the threshold for families to participate. It has been shown that offering a preventive intervention for preschool children with conduct problems in a hospital leads to a low attendance rate; less than half of the participants attended at least 50% of the sessions (Barkley et al., 2000). To avoid this, we have chosen to deliver the IY program at four different easy accessible sites, such as community centres. These sites were within a 15 km radius from the consenting families' homes. Furthermore, it appears to be difficult to keep families in treatment and to motivate them to complete the full treatment program. Indeed, among children and families who begin outpatient treatment services, 40 to 60% drop out of treatment prematurely (Kazdin, 1996a; Staudt, 2003). Therefore, it is important to identify barriers parents experience when they start an intervention.

A growing body of literature paid attention to the investigation of barriers to attend intervention sessions (for a review see: Nock & Ferriter, 2005). Kazdin, Holland and Crowley (1997) and Kazdin, Holland, Crowley and Breton (1997) have outlined and evaluated a model of barriers to treatment that classifies reasons why parents fail to attend treatment sessions into four domains: 1) the experience of stressors and obstacles, 2) a poor relationship with the therapist, 3) the belief that treatment is not relevant, and 4) the idea that treatment is

too demanding. These barriers interfere with remaining in, adhering to and benefiting from treatment; families who scored high on perceived barriers were more likely to drop out of treatment, were in treatment for significantly fewer weeks, and had higher rates of cancelling and not showing up for appointments prior to dropping out (Kazdin, Holland, Crowley & Breton, 1997).

Next to studies into perceived barriers to treatment, also studies concerning the relation between treatment drop out and characteristics of the family have been carried out. Salient predictors of dropping out of treatment include socioeconomic disadvantage (e.g., educational level, income), difficult living circumstances for parents and children (e.g., single parent families, adverse parenting practices), family stress, and life events (Kazdin & Wassell, 2000; Nock & Kazdin, 2001). It is proposed that these factors may not themselves contribute directly to premature termination of treatment, but that these variables influence the barriers to treatment that parents experience. Indeed, it was shown that high parental stress and child dysfunction were specifically associated with low expectations of child improvement (Nock & Kazdin, 2001), which makes parents more vulnerable for drop out. Moreover, higher levels of parent psychopathology, stress, and lower levels of quality of life predicted the subsequent emergence of perceived barriers to participation in treatment in the parents and therapeutic changes among the children (Kazdin & Wassell, 2000).

In the present study, the Incredible Years parent program was offered as an indicated preventive intervention in order to reduce aggressive child behavior. Parents of the child were proposed to participate in an eighteen-week intervention program. However, a number of parents refused to participate. The main purpose of the present study was to examine reasons of parents who refused to participate in the intervention program. We registered the reasons for refusal and scored these reasons according to the barriers to treatment model of Kazdin et al. (1997). For the families who refused to participate, we explored what the largest barriers for participation in the intervention program were. Furthermore, we had the disposal of mental health problem scores of the child and we collected stress scores of the primary caregiver of families who agreed and refused to participate in the intervention program. Thus, we were able to compare families who refused and agreed to participate in the intervention on the stress level of the primary caregiver and the child's mental health problems. By doing so, we may provide insight in reasons for non participation. More information on refusal to participate could enhance our knowledge of how to engage families in interventions and might shed a light on the prerequisites of parental compliance to an intervention. This might be a valuable starting point to tailor the way of addressing families with a child at risk for a chronic pattern of conduct problems. With respect to the reasons for non participation, we did not formulate specific hypotheses. Based on the findings of Kazdin

and Nock (2001), we expected that parents who refused to participate in the intervention program would have higher stress scores or would have children with higher aggression scores, relative to parents who agreed to participate in the intervention. Furthermore, we expected that children of parents who indicated that the intervention was not relevant had lower aggression scores than children of parents who agreed to participate in the intervention program.

## METHOD

### Participants

Children were selected from a population-based sample ( $N = 16.002$ ) from the province of Utrecht, The Netherlands. Addresses of children born in 2000 and 2001 were acquired by the Office for Screening and Vaccination. Parents of the four-year-old children were asked to fill out the CBCL 1½-5. (Achenbach & Rescorla, 2000; Dutch version by Verhulst and Van den Ende). Parents of 8632 children returned the CBCL. The CBCL Aggressive Behavior scale, which consists of 19 items, e.g., "often had temper tantrums", "fights and attacks people", was used to select the children. If children had a score at or above the 80<sup>th</sup> percentile of the CBCL Aggressive Behavior scale, they were invited to participate. Of these 8632 children, 503 children had a score at or above the 80<sup>th</sup> percentile and were considered to show aggressive behavior problems. Of these 503 families, 277 families were invited to participate in the intervention program (226 families were selected for the control group). Exclusion criteria were: not being able to speak and understand the Dutch language or the child's IQ was below 80. (Intelligence was measured at pre-intervention, children with an IQ below 80 were excluded from the analyses, but parents were allowed to participate in the intervention).

### Procedure

Parents who returned the CBCL were asked to provide their address and telephone number. In case parents did not provide their telephone number, they were sent a letter and asked if they were willing to provide their telephone number on a form they could return. The parents who were selected to participate in the intervention group, received a letter in which we offered them participation in a parent management training because their child showed behavior such as "is often noncompliant", "has temper tantrums" and "fights a lot". After approximately one week, the parents were called by one of the trainers of the intervention group. During the call, trainers explained to the parents that they had been selected to participate in a research study and that they were offered participation in an intervention. Trainers asked if the parents were willing to make an appointment for a home visit, in order

to receive more information. If the parents agreed, two trainers (presumably the ones who would deliver the training in that area) visited the parents. The trainers provided information regarding the measurements and the intervention (e.g., time commitment involved, subjects covered in the intervention) and parents were invited to ask questions. The home visits lasted 90 minutes on average. It is important to note that we attempted to lower the barriers to come to the intervention. We provided transportation if needed, asked all the parents who wanted to participate what day and time was most suitable for them, and chose the day and time most parents of that group had indicated. Furthermore, the intervention was offered in a site which was easy accessible (within a 15 km radius from the parents homes), such as a community centre. Parents who refused to participate in the intervention program were sent a letter in which we asked to fill out a questionnaire about their current levels of stress.

## Measures

### Barriers to treatment model

Reasons for non participation were registered and scored according to the barriers to treatment model of Kazdin et al. (1997). Since there had not been any contact with the therapist yet, we could not take into account reason number two of the barriers to treatment model: a poor relationship with the therapist. During the phone call the trainers made, they wrote down the comments parents made. If a parent said the family was not willing to participate, trainers asked for a reason. Reasons were categorized in 1) *no reason*; this category was scored if parents refused to participate and were not willing to provide a reason, 2) *other stressors*, 3) *treatment is not relevant*, 4) *treatment is too demanding*, and 5) *practical reasons*; this category was scored e.g. if parents did want to participate but were not able to come to the intervention on the particular day and time the intervention was offered. If a parent reported more than one reason, the first reason was scored. All reasons were scored by two researchers into one of the five above mentioned categories. Kappa was .95.

### Child Behavior Checklist 1½-5 (CBCL)

The CBCL 1½-5 (Achenbach & Rescorla, 2000) is a parent report questionnaire, consisting of 99 items, on which the child is rated on various behavioral and emotional problems. The CBCL 1½-5 consists of 7 subscales in which the items can be clustered, i.e., Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems and Aggressive Behavior. By cumulating all items, a Total Problems score can be computed. Parents circle the answer that fits the behavior of their child; "never", "sometimes" or "always". The CBCL is widely used in clinical and research settings because of its demonstrated reliability and validity, ease of administration and applicability to clinical and nonclinical groups (Dutra, Campbell & Westen, 2004).

### Parental Stress Index (PSI)

The PSI (Abidin, 1990; Dutch version (NOSI) by De Brock, Vermulst, Gerris & Abidin, 1992) was designed to measure stress of parents or caregivers in a pedagogical context. In this study, stress of parents was assessed by four subscales of the PSI: Role Restriction (the extent to which the parent considers the parental role as a restriction of his/her freedom; 7 items), Health (somatic or physical problems of the parent; 6 items), Isolation (feelings of loneliness and lack of social support; 6 items) and Spouse (satisfaction of the marital relation; 7 items). Parents' responses to the statements of this questionnaire were rated on a six-point Likertscale, ranging from "totally disagree" to "totally agree". The Dutch version of the PSI has shown adequate reliability and validity (De Brock et al., 1992). Reliability of the four scales used in this study was acceptable; Role Restriction:  $\alpha = .80$ , Health:  $\alpha = .80$ , Isolation:  $\alpha = .69$ , and Spouse:  $\alpha = .78$ . The scores of the four subscales were added up in order to calculate a Total Stress Score:  $\alpha = .83$ .

### Urbanization

Address density was used as a measure of urbanization, and is defined as the mean number of addresses within the radius of one kilometre (CBS, 2004). A five-point scale was used, ranging from a very rural area (1; less than 500 addresses in the radius of 1 km) to a very urban area (5; 2500 addresses or more in the 1 km radius).

## The Incredible Years parent program

Program goals are to improve positive parenting skills such as praise, and to reduce negative parenting skills such as harsh and inconsistent discipline, in order to reduce aggressive child behavior. Subjects covered in the IY parent program are play, praise and rewards, limit setting and handling misbehavior (BASIC program: 11 sessions), how to cope with upsetting thoughts and depression, and how to communicate and problem-solve with adults and children (ADVANCE program: 7 sessions). Teaching methods such as group discussion, role playing, watching video vignettes and modelling are used within a collaborative setting, in which group leaders established themselves as part of the group, rather than as experts (Webster-Stratton, 2001, 2002). In this study, the IY parent program was delivered in 18 two-hour sessions. Eight groups of parents received the intervention in different towns and cities spread over the province of Utrecht. The parent groups were led by two certified group leaders with parents of 6-11 children per group. Couples were encouraged to attend the group together. After termination of the IY program, two booster sessions were offered; the first session three months and the second booster session six months after termination of the intervention.

## Flow

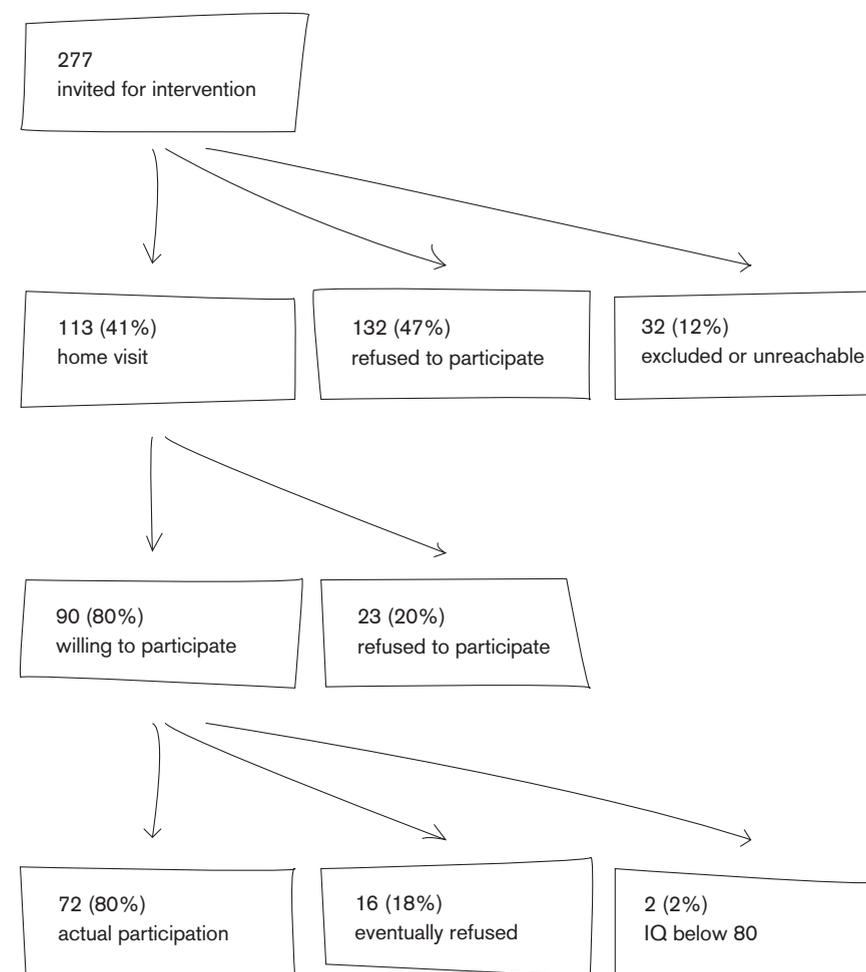
In figure 1, the flow diagram of this study is presented. In total, 277 families with a child who was supposed to be at risk of a chronic pattern of conduct problems were invited to participate in the intervention. Five families (2%) did not speak and understand Dutch and were therefore excluded from the study. We were not able to reach 27 families (10%), because e.g. a telephone number was not provided, or because the telephone number did not exist anymore. During the phone call, 132 parents (47%) indicated they did not want to participate in the intervention. We visited 113 families (41%). During the home visits, 23 families (20%) indicated they did not want to participate in the intervention. Consequently, 90 families (80% of all parents who received a home visit) indicated they wanted to participate in the parent group. Two families (2%) had a child with an IQ below 80 and were therefore excluded from the study. Sixteen families (18%) who initially indicated they were willing to participate eventually refused. We chose to consider the parents who indicated they could not participate in this stage of the study, also as “refusers”. Three parents indicated they wanted to participate, but were about to move to another city or country, which made it impossible to come to the intervention (scored as practical reasons). In two other cases, the mother agreed to participate, but we were called by the father who said he would not allow participation in the intervention (scored as stressors). After the home visits, we asked all parents which day and time were most suitable for them to participate in the parent group. We chose the day and time most suitable for the majority of the parents. However, 11 parents could not make it to the group that particular day or time because they had other commitments; e.g. a course or work. This resulted in 72 families who actually participated, which is 80% of all families who had indicated they wanted to participate, 64% of the families we visited at home, and 26% of all families who were invited to participate.

## RESULTS

### Reasons for non participation

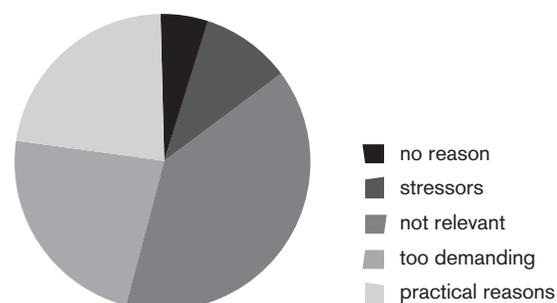
In figure 2, the percentages of categories for non participation are presented. Five percent was scored in the category no reason: these parents did not provide a reason for their refusal. Nearly 10% of the parents indicated that they were experiencing stressors as a reason for their non participation. These stressors were e.g., a chronic illness of a family member or a family conflict (mother did want to participate, father did not). The treatment not relevant category, in which 39% of the reasons were scored, consisted of reasons such as: “my child only displays mild problem behavior”; “my child shows aggressive behavior but I am capable of handling it” or “the problem behavior of my child has been decreased since (s)he went to school”. The category treatment too demanding, in which 23% of the reasons

Figure 1. Flow chart of participation



parents gave were scored, consisted of reasons that had to do with the time involved in the intervention. Parents indicated for instance they found 18 sessions too much. The category practical reasons, in which 23% of the reasons parents gave were scored, contained reasons such as: “the day or time of the intervention is not suitable”; “my child is diagnosed with another disorder” (4 PDD NOS, 1 Prader Willi) or “we already are in other treatment”.

**Figure 2.** Reasons for non participation



### Comparisons of families who agreed and refused to participate

The group of families that refused to participate ( $n = 171$ ) consists of families who refused during the phone call ( $n = 132$ ), of families who refused during the home visit ( $n = 23$ ) and of families who initially agreed to participate, but who eventually refused ( $n = 16$ ). In table 1, the demographic characteristics (gender and urbanization), CBCL scores of the children and stress scores of the primary caregiver are presented. Chi<sup>2</sup> tests revealed no differences between the children who refused and the children who agreed to participate on gender and urbanization.

### CBCL profiles

No significant differences between the children whose parents agreed and refused to participate on total problems score or any of the CBCL small band categories were found. All  $t$ 's were smaller than 1.01.

### Stress scores

Parents who were unable to reach ( $n = 27$ ), parents who did not meet inclusion criteria ( $n = 7$ ), and parents who initially indicated they wanted to participate, but who eventually refused ( $n = 16$ ), were not sent a stress questionnaire. We sent 155 questionnaires and received 105 back, which is 68%. Significant differences on Total Stress, Role Restriction and Spouse were obtained; parents who agreed to participate experienced more stress than parents who refused to participate in the intervention (Total Stress:  $t = -2.21$ ,  $p = .029$ ; Role Restriction:  $t = -2.03$ ,  $p = .044$ ; Spouse,  $t = 2.73$ ,  $p = .007$ ).

**Table 1.** Characteristics of families who agreed and refused to participate

	AGREED	REFUSED
	M (SD)	M (SD)
<b>N</b>	72	171
<b>Gender in %</b>		
boy	70%	66%
girl	30%	34%
<b>Urbanization in %</b>		
very rural	4.2%	5.3%
rural	13.9%	18.1%
sub urban	25.0%	17.0%
urban	41.7%	46.2%
very urban	15.3%	13.5%
<b>CBCL</b>		
withdrawn	2.36 (1.78)	2.36 (2.44)
emotionally reactive	5.86 (3.39)	5.58 (2.89)
anxious/depressed	3.15 (2.82)	3.03 (2.68)
somatic complaints	2.94 (1.92)	3.04 (2.26)
sleep problems	4.22 (3.21)	3.91 (2.96)
attention problems	4.24 (2.19)	4.55 (2.35)
aggressive behavior	21.96 (4.37)	21.71 (4.22)
total problems	59.47 (18.43)	58.95 (18.34)
<b>Stress</b>		
<b>N</b>	72	105
total stress	71.54 (19.42)	64.57 (22.28)
role restriction	23.39 (6.98)	21.15 (7.53)
spouse	20.01 (7.52)	17.07 (6.82)
isolation	13.82 (4.64)	12.84 (5.39)
health	13.57 (5.75)	13.62 (5.98)

Comparisons of families who indicated treatment was not relevant and families who agreed to participate

We compared families who refused to participate in the intervention because they found treatment not relevant (NOT RELEVANT;  $n = 66$ ) to families who agreed to participate (AGREED;  $n = 72$ ). The CBCL *aggressive behavior* score and *total problems* score appeared to be significantly different between the two groups. Children of families who indicated treatment was not relevant had significantly lower *aggressive behavior* and *total problems* scores than children whose parents agreed to participate (*aggressive behavior*; NOT RELEVANT:  $M = 20.06$ ;  $SD = 3.64$ ; AGREED:  $M = 21.96$ ;  $SD = 4.37$ ;  $t_{aggression} = 2.76$ ,  $p < .01$ ; *total problems*; NOT RELEVANT:  $M = 53.33$ ;  $SD = 14.90$ ; AGREED:  $M = 59.47$ ;  $SD = 18.43$ ;  $t_{total} = 2.14$ ,  $p < .04$ ). Moreover, significant differences on *Total Stress*, *Role Restriction*, *Isolation* and *Spouse* were found. Parents who indicated treatment was not relevant had significantly lower levels of *Total Stress*, *Role Restriction*, *Isolation* and *Spouse*, relative to parents who agreed to participate in the intervention. (*Total Stress*; NOT RELEVANT:  $M = 60.22$ ;  $SD = 17.87$ ; AGREED:  $M = 71.54$ ;  $SD = 19.42$ ;  $t_{total\ stress} = 3.12$ ,  $p < .01$ ; *Role Restriction*; NOT RELEVANT:  $M = 19.84$ ;  $SD = 6.92$ ; AGREED:  $M = 23.39$ ;  $SD = 6.98$ ;  $t_{role\ restriction} = 2.77$ ,  $p < .01$ ; *Isolation*; NOT RELEVANT:  $M = 11.56$ ;  $SD = 3.84$ ; AGREED:  $M = 13.82$ ;  $SD = 4.65$ ;  $t_{isolation} = 2.81$ ,  $p < .01$ ; *Spouse*; NOT RELEVANT:  $M = 16.36$ ;  $SD = 6.11$ ; AGREED:  $M = 20.01$ ;  $SD = 7.52$ ;  $t_{spouse} = 2.72$ ,  $p < .01$ ).

Comparisons of families who indicated treatment was too demanding and families who agreed to participate

We compared families who refused to participate in the intervention because they found treatment too demanding (TOO DEMANDING;  $n = 39$ ) to families who agreed to participate (AGREED;  $n = 72$ ). No differences between families who indicated treatment was too demanding and families who agreed to participate on any of the CBCL categories or Stress variables were obtained (all  $t$ 's smaller than 1.48).

Comparisons of families who did and did not send back the stress questionnaire

Families who did and did not send back the stress questionnaire were compared on gender, urbanization and CBCL profiles of the children. Chi<sup>2</sup> tests revealed no differences between families who did and did send back the stress questionnaire on gender and urbanization. Furthermore, no significant differences were obtained with respect to the CBCL categories of the children (all  $t$ 's smaller than 1.47).

## DISCUSSION

In the present study, we examined reasons of parents who refused to participate in the IY parent program, offered as an indicated preventive intervention. In total, 72 families actually participated in the IY parent program, which is 80% of all families who indicated they wanted to participate, 64% of the families who received a home visit in order to get more information about the intervention and the research project, and 26% of all families who were invited to participate. The main reason for non participation appeared to be that parents found the intervention not relevant. Other reasons for non participation were that the intervention was too demanding or parents indicated they could not participate in the IY parent program because of practical reasons. With respect to differences between parents who agreed and parents who refused to participate in the IY parent program, the current study revealed that aggressive behavior of the child did not differ. Interestingly, a significant difference between parents who agreed and parents who refused to participate was obtained on stress, in particular stress regarding role restriction and spouse. Parents who agreed to participate in the IY parent program indicated they experienced more stress, felt they were more restricted in their role as a parent and indicated they were less content with their partner than parents who refused to participate. Families who indicated treatment was not relevant had children with significantly lower aggressive behavior scores and parents with significantly lower stress levels than families who agreed to participate in the intervention.

Only 26% of the families who received an invitation to participate in the IY parent program actually did participate. Although this percentage is low, this is a well-known phenomenon in the field (Briggs-Gowan, Horwitz, Schwab-Stone, Leventhal & Leaf, 2000; Hacker et al., 2006; Rushton, Bruckman & Kelleher, 2002). This result raises some questions with respect to the method of recruitment. Using another method of recruitment might have increased the number of participants, but would have been more time consuming and more costly.

Parents who refused to participate because they indicated that treatment was not relevant to them, might not have felt the same need for this parent program given that their children were less problematic in their aggressive behavior problems than were the children of those parents who agreed to participate. These parents were probably right by indicating the intervention was not relevant for them, since both their children displayed fewer aggressive behavior problems and their own stress levels were lower than aggression scores and stress levels of families who agreed to participate in the intervention.

Another reason for non participation was that treatment was too demanding. Families who indicated treatment was too demanding did not differ from families who agreed to

participate. We chose to deliver both the BASIC and ADVANCE curriculum of the IY parent program in 18 sessions. Since a high number of parents who refused to participate clearly indicated 18 sessions were too demanding, we suggest to consider delivering the additional ADVANCE program to parents who after termination of the BASIC program indicate they need it and who are willing to participate in another eight sessions, when implementing the IY parent program.

The third reason for non participation consisted of practical reasons, e.g. parents initially indicated they were willing to participate but the day and time of the IY parent program were not suitable for them, children were diagnosed with another disorder or families were involved in other treatment. Although we attempted to meet parents' demands with respect to the day and time of the parent groups, it could not be prevented that part of the parents could not participate at that particular day and time. We chose to deliver the parent groups in the evenings, because we wanted to stimulate couples to attend the groups together. However, some parents preferred to attend the parent group during day time. We therefore suggest offering parent groups both during day time and in the evenings and to let parents choose which group they prefer.

An important finding of the present study is that parents who agreed to participate in the IY parent program had higher levels of stress than parents who refused to participate. Since higher levels of stress predicted dropping out of treatment in previous studies (Kazdin & Wassell, 2000; Nock & Kazdin, 2001), this finding seems contradictory. However, high levels of stress may strain the capacity of parents to interact with their children in a positive manner, which may result in negative and controlling parenting behavior (Wahler & Dumas, 1986) and may therefore have been an important motivation for parents to participate in the intervention. A parent who is perfectly capable of handling the child with a substantial level of aggression behavior problems, may not feel the same need to participate in an intervention program as a parent with increased stress levels (Angold, Costello, Burns, Erkanli & Farmer, 2000).

We provided insight in reasons for non participation when offering the IY parent program as an indicated preventive intervention. As mentioned in the Introduction, more knowledge about reasons for non participation might be a valuable starting point to tailor the way of addressing families with a child at risk for a chronic pattern of conduct problems. Results of the present study suggest that a higher threshold of aggressive behavior problems should be established for the screening instrument in selecting families to be offered such an intervention. Besides, in the selection of families, the amount of stress of the parents might be included.

The findings of the present study should be viewed in the context of a number of limitations. The most important limitation is that only 68% of the parents who refused to participate returned the stress questionnaire. Results may therefore have been biased. Furthermore, reasons for non participation have been categorised retrospectively, and were distilled from parents' answers on an open question. We did not ask parents to choose between one of the five categories. The educational level of the parents participating in this study is rather high. Comparing the distribution of educational level in our sample to the distribution of educational level in the entire Dutch population (CBS, 2009) indicates that the parents in our sample received higher education. Thus, our findings have limited generalizability to less educated parents.

In a future study, it might be interesting to conduct follow up assessments in families who refused to participate, in order to investigate levels of aggressive behavior of the children and whether these families went to other mental health services later on.

In sum, the present study showed that the level of stress of the primary caregiver seems an important factor in the decision whether or not to participate in the IY parent program offered as an indicated preventive intervention. It is therefore suggested to also assess stress levels of the parents when screening aggressive behavior problems in children.

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**Two-year follow up  
of Incredible Years  
as a preventive  
intervention;  
sustained effects,  
moderation and  
mediation**



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## ABSTRACT

**Objective:** The present study aimed to evaluate the sustained effects of the Incredible Years (IY) parent program for parents of preschool children who were at risk for a chronic pattern of conduct problems. **Method:** A population based sample of 144 preschool children with a high level of aggressive behavior was divided into an intervention group and a matched control group. A direct observation and parent and teacher questionnaires were used to measure parenting skills and child behavior at pre-intervention and two years after termination of the intervention. **Results:** Results revealed significant improvements in observed and parent rated parenting skills. Observed child behavior showed sustained intervention effects. The change in observed critical parenting from pre to post-intervention mediated the change in negative child behavior from pre-intervention to two-year follow up, and from the model in which bidirectional influences of parenting skills and child behavior over time were investigated, it became clear that parental influence increased over time. The intervention was most beneficial to children with a high level of initial aggressive behavior. **Conclusion:** This population based study highlights the potential of the IY parent program as a preventive intervention for preschool children at risk for a chronic pattern of conduct problems.

## INTRODUCTION

A high level of aggression in children is stable and persistent over time (e.g., Broidy et al., 2003; Marakovitz & Campbell, 1998; Nagin & Tremblay, 1999). Moreover, it has been shown that the earlier children display antisocial behavior, the more likely antisocial behavior will be shown in the future (e.g., Caspi, Henry, McGee, Moffitt & Silva, 1995). Thus, children who show a high level of aggressive behavior problems during the preschool years are at risk for developing a chronic pattern of conduct problems (Shaw, Lacourse & Nagin, 2005; Tremblay et al., 2004). In addition, aggressive behavior in children represents a significant public health problem. The majority of children and adolescents in mental health services are referred because of severe conduct problems (Kazdin & Weisz, 2003). On top of that, childhood Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) often precede a wide spectrum of adult adjustment problems, such as depression, addiction, and other psychiatric disorders (Kim-Cohen et al., 2003), there is a strong relationship between aggression and crime (Farrington, 2005), and children with CD incur high costs to society (Scott, Knapp, Henderson & Maughan, 2001).

Early detection and prevention of the development of a chronic pattern of conduct problems have become important goals for authorities in child development and those who provide community mental health services. Hence, intervention programs specifically designed to prevent the development of a chronic pattern of conduct problems in at risk children have been developed. Two distinct approaches to preventing conduct problems in childhood can be distinguished (Mrazek & Haggerty, 1994). The universal approach is directed at the entire population with the aim of reducing the incidence of conduct problems. An example of a universal preventive intervention program is violence prevention in schools (for a review, see Mytton, DiGiuseppi, Gough, Taylor & Logan, 2002). The second major prevention strategy is targeted prevention, i.e. selective and indicated prevention. Selective preventive interventions are targeted at individuals at risk for a disorder due to the presence of biological, psychological and social risk factors associated with the onset of that particular disorder. Indicated prevention is targeted at children who are at high risk because of a predisposition for more serious conduct problems or at children who already show some symptoms of the disorder (Mrazek & Haggerty, 1994). Although results suggest effectiveness of some programs (Boisjoli, Vitaro, Lacourse, Barker & Tremblay, 2007; Foster, Jones & the Conduct Problems Prevention Research Group, 2006), the establishment of prevention effects is hampered. In prevention programs a high number of children receive an intervention that do not actually need it. Despite the screening of at risk children in targeted prevention programs, results show only small effect sizes, which is most probably due to a substantial number of 'false positives' (children inaccurately identified as being at risk) (Bennett,

Lipman, Racine & Offord, 1998). Moreover, this causes unnecessary high societal costs.

Behavioral Parent Training (BPT), which uses the parent as the primary agent for change, is proven to be the most effective method in reducing aggressive behavior problems, particularly in young children (McCart et al., 2006). One of the BPT's, the Incredible Years parent program (IY parent program), has been proven effective in improving parenting skills and reducing aggressive behavior in children by the program developer (e.g., Webster-Stratton, 1984, 1994; Webster-Stratton, Reid & Hammond, 2004). These findings have been replicated by independent investigators (e.g., Gardner, Burton & Klimes, 2006; Scott, Spender, Doolan, Jacobs & Aspland, 2001; Taylor, Schmidt, Pepler & Hodgins, 1998). In these studies, the Incredible Years parent program was used as treatment for referred families with a child displaying a substantial level of conduct disorder symptoms. Moreover, the IY parent program has been evaluated as an effective prevention program in disadvantaged and high risk populations in the US (Webster-Stratton, Reid & Hammond, 2001) and the UK (Hutchings et al., 2007). An example of a selective preventive intervention study is the evaluation of preventive effects of the IY program in children who were considered to be at risk because they had an adjudicated older sibling (Brotman et al., 2008). Observed physical aggression of the child was reduced after parents participated in the IY program in that study, but this positive effect was not corroborated by parent rated measures of aggression. It was shown that improvements in harsh parenting, responsive parenting and stimulating parenting partially mediated the effect on the child's physical aggression (Brotman et al., 2009).

In an earlier study we investigated the effects of the IY parent program as an indicated preventive intervention, one year after termination of the intervention (FU1; one-year follow up; Raaijmakers et al., 2009). We focused on several issues with respect to the evaluation of effectiveness. First, with respect to the measurement of child behavior, we used parent and teacher rated questionnaires and a direct observation because in order to assess changes in intervention studies, multimethod assessments with multi-informants have been recommended (Chambless & Hollon, 1998). However, parent ratings are often easily influenced by systematic biases in the parents' mood or expectations about the intervention (Eddy, Dishion & Stoolmiller, 1998). Instead, observational measures have shown to be particularly sensitive to change in parent and child behavior (Aspland & Gardner, 2003; Gardner, 2000). Therefore, we chose to carry out a well-established observation with adequate psychometric properties during a home visit (i.e., the Dyadic Parent-child Interaction Coding System-Revised (DPICS-R); Robinson & Eyberg, 1981), as such provides a close approximation of the environment the parent and child normally interact in (Jacob, Tennenbaum, Bargiel & Seilhamer, 1995). We expected to find reductions in negative child behavior and improvements in

parenting skills more clearly on the observation than on the parent rated measures. At FU1, results showed significant improvements in both parent rated and observed parenting skills in the intervention group compared to the control group (Raaijmakers et al., 2009). The observation of parenting behavior revealed a sustained decrease in critical statements (effect size: .44) at FU1. Parents reported increases in the use of appropriate discipline and praise, and a decrease in harsh and inconsistent parenting (effect sizes ranged from .43 to .55). Observed child behavior showed positive intervention effects at FU1; children became more compliant (effect size: .48) and showed less negative behavior (effect size: .37).

Second, we carried out mediation analyses. Our objective was to study mediating mechanisms, i.e. to investigate whether the improvement in parenting skills precede and cause the decrease of aggressive behavior problems. At FU1, evidence for parenting skills as a mediating mechanism of child behavior was demonstrated. Mediation analyses revealed that a decrease in observed critical parenting from pre to post-intervention led to a decrease in observed negative child behavior at FU1.

Third, we investigated moderation. Typically, not all children may equally benefit from an intervention. Measuring moderating variables helps to identify specific subgroups of children and parents that benefit most from the intervention. Results with respect to moderating effects are equivocal. Evidence suggests severity of child problems and parental psychopathology to be negatively correlated with intervention responsiveness (Scott, 2005). However, severity of child problems has also been shown to positively influence intervention responsiveness (Reid, Webster-Stratton & Baydar, 2004). In addition, it has been shown that low IQ, poor inhibitory control, a low level of autonomic arousal, critical parenting, maternal psychopathology, paternal substance abuse, low family income and low parental education are associated with poor intervention effect (Beauchaine, Webster-Stratton & Reid, 2005; Reyno & McGrath, 2006). On the other hand, in a study in which parents of 3 to 6-year-old children were offered parent training, parental stress and internalizing problems, functional impairment and difficult temperament of the child were identified as moderators of the intervention effect; higher scores on these variables were associated with more improvement in child behavior (Lavigne et al., 2008). At FU1, the intervention effect was moderated by parental stress and psychopathology, and the child's IQ and inhibitory control. Children with a low IQ or poor inhibitory control, and parents with a high level of stress and psychopathology were most likely to benefit from the intervention.

Fourth, most evaluations of the IY parent program have investigated the effectiveness of the BASIC program. The additional program, ADVANCE, has been shown to enhance the effects of the BASIC program by promoting children's and parents' conflict management

skills and self-control techniques (Webster-Stratton, 1994). In the present study, both the Basic and ADVANCE curriculum were delivered.

Fifth, In order to establish solid preventive effects, it is necessary to conduct long term follow up assessments. Therefore, we have conducted relatively long follow up assessments in order to evaluate effects of the IY parent program.

In the present study, we report on results of assessments conducted two years after termination of the IY parent program (FU2; two-year follow up) in non-disadvantaged parents of four-year-old children at risk for the development of a chronic pattern of conduct problems in the Netherlands. The primary aim of the present study was to extend the former study by investigating whether the effects found at FU1 are sustained at FU2 and whether results corroborate FU1 findings, thereby decreasing the probability that FU1 results were fortuitous. Based on findings at FU1, we expected that the parenting skills of parents who received the IY parent program measured at FU2, would be improved relative to the parenting skills of parents from the control group. In addition, we expected a sustained decrease in observed negative behavior and an increase in observed positive behavior in children whose parents received the IY parent program when compared to children from the control group. At FU1, we did not find effects on parent rated child behavior. In the present study, we examined whether parent rated negative child behavior was decreased, since 'sleeper effects' may emerge later on (Boisjoli, Vitaro, Lacourse, Barker & Tremblay, 2007). As in the study regarding the effects at FU1, mediational processes and moderation of the intervention effect were investigated in the present study. In order to investigate whether improvements in parenting skills caused the changes in child behavior, we studied mediation effects. More specifically, we expected that the negative behavior of the child would be reduced as a consequence of improvement in parenting skills, since FU1 results indicated a mediation effect of critical parenting on negative child behavior. In addition, we assessed bidirectional influences of parenting skills and child behavior over time. We explored whether bidirectional influences of parenting skills and child behavior over time were present by means of a cross select longitudinal panel design with four distinct moments of assessment. In the present study, we investigated moderation of the sustained intervention effect. Based on the FU1 findings, a low IQ and impairments in inhibition of the child, and high levels of parental stress and psychopathology were expected to positively influence the sustained intervention effect. Based on literature, we expected that low levels of autonomic arousal would negatively influence the sustained intervention effect. Since the literature is inconsistent about the direction of the moderating effect of the initial severity of aggressive behavior, we explored the moderating effect of the initial severity of aggressive behavior on the intervention effect.

## METHOD

### Design

In this study, a case control design was used. Participants were invited to participate in a research study. Whether they were enrolled in the intervention group (IG) or the control group (CG) depended on their place of residence. Randomization of participants was not feasible because of geographical and motivational reasons. According to the Standards of Evidence given by the Society for Prevention Research (2005), use of a case control design is permitted "as long as assignment was not by self-selection, but instead by some other factor (for instance geography)". The families to be recruited lived in different towns and cities in the province of Utrecht, The Netherlands. Since motivation to participate is a recurrent problem in intervention studies, especially when families of children with conduct problems are involved (Luk, Staiger, Mathai, Wong, Birlleson & Adler, 2001), we wanted to lower the threshold for families to participate. It has been shown that offering a preventive intervention for preschool children with conduct problems in a hospital leads to a low attendance rate; less than half of the participants attended at least 50 % of the sessions (e.g., Barkley et al., 2000). To avoid this, we have chosen to deliver the IY program at four different sites which were easy accessible, such as community centers. These sites were within a 15 km radius from the consenting families' homes. Further, the IY program requires at least six parents to participate in a parent group to optimize group discussion and to foster support (Webster-Stratton, 2001). Consequently, the location of the sites had to be close to the homes of the parents and a sufficient number of parents had to live in the same area in order to form a group. In addition, parents of the CG had to be blind to their condition; they were not informed on the fact that another group which received an intervention also participated in the study. The CG was told that the study was aimed at investigating aggressive behavior in young children longitudinally. CG and IG parents were allowed to use regular services for their child's behavior, i.e., care as usual, and they will be informed about the design of the study retrospectively. Hence, to prevent the two groups from running into each other, control participants had to live at a considerable distance from the participants of the intervention group, preferably in another town or city (Raaijmakers et al., 2008). Therefore, a case control design was used in which families were matched on the child's gender, level of aggression, IQ, the parents' educational level, stress level and address density of the place of residence of the family.

## PARTICIPANTS

Addresses of families were acquired by the Office of Screening and Vaccination in the province of Utrecht, the Netherlands. Parents of 16.002 four-year-old children born in 2000 or 2001 were asked to fill out a Child Behavior Checklist 1½-5 (CBCL; Achenbach & Rescorla, 2000; Dutch version by Verhulst & Van der Ende). More than half (54%) of the parents returned the questionnaire. Children were selected to participate if they scored at or above the 80<sup>th</sup> percentile of the CBCL Aggressive Behavior scale. In total, 503 children scored at or above the 80th percentile and were considered to show aggressive behavior problems. Based on the place of residence, 277 families were selected for the IG and 226 families were selected for the CG. Parents were invited to participate by letter. After approximately one week the researchers called them to ask for their response. If parents were interested in participation, two members of the research team visited the family to explain the procedure of the research project. Families who were invited to participate in the intervention received additional information on the IY program during the home visit. Children with an estimated full scale IQ below 80 were excluded from the study. This resulted in 72 families in the IG and 110 families in the CG. Reasons for non participation were that parents did not think of their child as showing a high level of aggressive behavior, parents were already involved in other interventions, parents felt a pressure from their partner to decline, or we were unable to reach the family. For a more detailed description of reasons for non participation see chapter 4 of this dissertation. The aggressive behavior score of children whose parents agreed or refused to participate in the study were not significantly different, neither in the IG, nor in the CG.

**Table 1.** Sample characteristics by group

Measure	IG	CG
	(n = 72)	(n = 72)
	<i>M (SD)</i>	<i>M (SD)</i>
<b>Child</b>		
Gender in % boys	70.80	70.80
Age in months	50.29 (3.11)	51.27 (2.53)
IQ	107.31 (9.87)	107.49 (11.57)
CBCL 1½-5 (raw scores at selection)		
<i>Aggressive Behavior</i>	21.99 (4.37)	22.49 (4.69)
<b>Parent</b>		
Age in years		
<i>Primary caregiver</i>	35.50 (4.84)	34.14 (5.49)
<i>Secondary caregiver</i>	37.87 (5.12)	36.84 (4.83)
Education in %		
<i>Primary</i>	-	2.80
<i>Secondary</i>	4.20	5.64
<i>Intermediate vocational</i>	29.24	31.00
<i>Higher vocational</i>	38.76	31.00
<i>University</i>	27.80	29.56

Note. Relation to child and civil status of the primary caregiver are reported; Education denotes the highest educational level of both parents.

Person-to-person matching was performed after pre-intervention (PRE) on 72 IG families and 72 CG families. An independent administrator who was not involved in this study carried out the matching procedure. Families lost from post-intervention (POST; directly after termination of the intervention) to FU2 (3 CG and 2 IG children) did not differ in their initial level of aggression from those retained. A flow chart of this study is presented in figure 1. Attrition of these families was due to, e.g. personal circumstances of the parent, medical condition of the child or participation was a too heavy burden for the family. Characteristics of the IG and the CG are presented in table 1. Groups did not significantly differ on any

of the descriptive characteristics, except for age of the child ( $t(71) = 2.41, p = .018$ ). All primary caregivers were biological parents, except for one mother from the IG, who was an adoptive parent. Only 4.2% of the children were non-Caucasian, 5 children in the IG and 1 child in the CG. At pre-intervention, all children were medication naïve. Children from the CG were allowed to use care as usual, i.e., to consult mental health services, a clinical child psychologist or the child psychiatry department of the University Medical Center. In addition, the researchers offered their help in finding adequate mental health services when needed.

Eleven families in the CG (15.3%) and 12 IG families (16.7%) received other professional help because of their child's behavior during the intervention phase. These children were psychiatrically or psychologically assessed and then received psycho-education and parental counseling. Between POST and FU2, two CG children and one IG child received special education, three CG children and two IG children received medication, and 22 CG children versus 21 IG children consulted a clinical child psychologist, youth care center or received parental counseling.

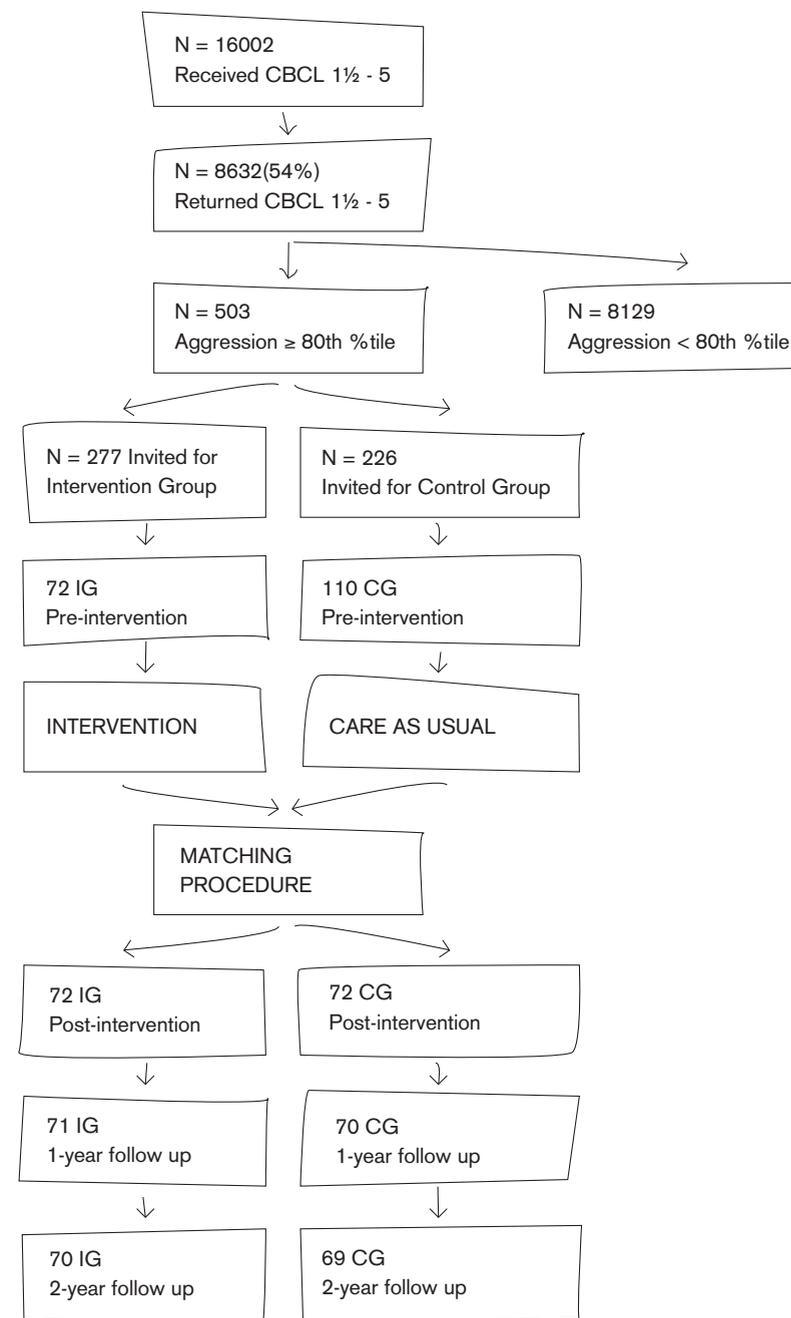
### Procedure

Prior to PRE, written informed consent was obtained from the participating families. Every assessment consisted of a set of questionnaires, which was mailed to the parents, and a home visit. Home visits consisted of an observation of the primary caregiver and the child playing together. At PRE, IQ, heart rate and skin conductance level of the child were measured and children were neuropsychologically assessed. Children received a small gift for their participation and parents received a financial reimbursement (€ 25 for each assessment). The study was approved by the Medical Ethical Review Committee of the University Medical Center Utrecht.

### The Incredible Years parent program

In this study, the BASIC and ADVANCE curriculum were delivered in 18 two-hour sessions; 11 BASIC sessions and 7 ADVANCE sessions. Eight groups of parents received the intervention in different towns and cities spread over the province of Utrecht. The parent groups were led by two certified group leaders with parents of 6 to 11 children per group. Couples were encouraged to attend the group together. After termination of the IY program, two booster sessions were offered; three months and six months after termination of the intervention. Subjects covered in the BASIC program are play, praise and rewards, limit setting and handling misbehavior. Parents are taught to use child-directed play skills, to use less critical statements and harsh discipline and to increase the use of positive and consistent strategies. The ADVANCE program (Webster-Stratton, 2002) elaborates on the BASIC

Figure 1. Flow chart of selection and assessments



program and covers topics such as how to cope with upsetting thoughts and depression, how to give and get support and how to communicate and problem solve with adults and children. In the weekly sessions, parents watched approximately 225 brief vignettes of parents and children interacting. After each vignette, the group leader asked questions to stimulate discussion about what parents found particularly (in) effective and to practice alternative responses. Group leaders encouraged parents to role play new skills and to practice these skills at home in order to establish new habits. In addition, parents read the Dutch translation of the book: *The Incredible Years*, a troubleshooting guide for parents (Webster-Stratton, 1992).

Teaching methods are used within a collaborative setting, in which group leaders established themselves as part of the group, rather than as experts. In the IY program, group leaders are effective coaches, sometimes educating, encouraging parents to stick with it and sometimes exploring resistance, all with a high level of sensitivity, compassion, and understanding of child development principles (Webster-Stratton & Herbert, 1994). Group leaders are supportive and caring and create an optimistic, safe atmosphere in which parents' self-confidence increases. Group leaders encourage parents to problem solve in order to ensure that the progress made during the intervention is maintained after program completion. The group based format offers the advantage over individual therapy of providing social support that helps parents feel less lonely and stigmatized. Moreover, parents are empowered due to the group process and the collaborative attitude of the therapist.

#### Treatment fidelity and integrity

It has been demonstrated that treatment fidelity is a predictor of positive change (Bellg et al., 2004; Miller & Binder, 2002). Therefore, it is crucial to ensure the intervention program is delivered as originally intended. We ensured treatment fidelity and integrity by training six members of the team, with a background in clinical child psychology or child psychiatry, by the program developer during a three-day workshop. The members of the research team all ran two pilot groups at child psychiatry settings to become familiar with the materials and specific techniques, and they became certified group leaders prior to delivering the groups investigated in this study. Furthermore, group leaders received supervision from accredited IY trainers to become certified. Intervention sessions were videotaped and reviewed during weekly meetings of group leaders to ensure that the program was delivered with fidelity. In addition, the manual of the IY program was used and both parental evaluations as well as checklists for group leaders were filled out after every session.

#### Measures

##### Child Behavior Checklist (CBCL 1½-5)

In order to recruit the children, the level of aggression was measured by the CBCL 1½-5 *Aggressive Behavior scale* (Achenbach & Rescorla, 2000). This scale contains 19 items such as "hits others", "does not feel guilty" and "often has temper tantrums". Parents circle the answer that fits the behavior of their child; "never", "sometimes" or "always".

##### Eyberg Child Behavior Inventory (ECBI)

The ECBI (Eyberg & Pincus, 1999) is used to assess the occurrence of disruptive behavior problems in children aged 2 to 16 years. The ECBI consists of 36 behavioral items which are rated on two scales; an *Intensity Scale*, which measures the frequency of the behaviors on a 7-point scale (ranging from "never" to "always") and a *Problem Scale*, which asks parents to report whether the behavior is perceived to be a problem (yes or no). Several studies have demonstrated acceptable reliability and validity of both scales (e.g., Boggs, Eyberg & Reynolds, 1990; Eyberg & Pincus, 1999; Rich & Eyberg, 2001). In this study, Cronbach's  $\alpha$ 's were .91 and .88 for the *Intensity* and *Problem Scale*, respectively.

##### Dyadic Parent-child Interaction Coding System-Revised (DPICS-R)

The DPICS-R (Eyberg & Robinson, 1981) is an observational measure used to assess the quality of parent-child interactions. In this study, parent and child were observed at home for 20 minutes while playing with a standard set of toys. The observation was videotaped and coded later on. The observation consisted of four five-minute periods; in the first period parent and child played as they would usually do to get used to being videotaped, in the second period the child choose a toy and decided what happened during the play session (child directed play, CDI), in the third period the parent picked a toy and decided what happened (parent directed play, PDI), in the last period the parent had to make the child to clean up the toys (clean up, CU). For each period, parenting skills and child behavior were coded separately into 47 categories; 24 for parent behavior (e.g., statements, positive affect) and 23 for child behavior (e.g., physical warmth, smart talk). In this study, parental behavior categories *Critical Statements* and *Labeled Praise* were used. With respect to child behavior, a composite score of categories Smart Talk, Cry/Wine/Yell, and Physical Negative was used. This composite score was labeled *Negative Child Behavior* ( $\alpha = .51$ ). In addition, the category *Comply* was used as a measure of child behavior. The number of complies of the child was divided by the number of parental commands, which yielded a proportional compliance score. Trained master students and trained staff had to achieve an interrater reliability of 70% before coding independently. The quality of scoring was monitored continuously by having 20% of the observations checked by a second rater. Double checking the observations revealed an interrater reliability of 79%.

### Parent Practices Interview (PPI)

This parent rated questionnaire was designed to measure parenting skills or discipline styles of parents of young children (Webster-Stratton, 2001). The PPI consists of 15 questions. Parents are required to give their responses to misbehavior, appropriate behavior and several statements. The answers are rated on a seven-point Likertscale, ranging from "not (likely) at all" to "always/very likely". Seven summary scales are extracted from this questionnaire; *Appropriate Discipline* (e.g., actually disciplining the child when it misbehaves, 12 items,  $\alpha = .74$ ), *Harsh & Inconsistent Discipline* (threatening, but not punishing, 15 items,  $\alpha = .81$ ), *Positive Verbal Discipline* (e.g., discussing the problem with the child, 9 items,  $\alpha = .67$ ), *Monitoring* (e.g., supervision of the child's activities, 5 items,  $\alpha = .35$ ), *Physical Punishment* (e.g., slapping or hitting the child when misbehavior occurs, 6 items,  $\alpha = .87$ ), *Praise & Incentives* (e.g., giving a hug or a compliment, 11 items,  $\alpha = .73$ ) and *Clear Expectations* (e.g., clear rules about bedtime, 6 items,  $\alpha = .65$ ). All scales demonstrated acceptable reliabilities, except for *Monitoring*. Therefore, this scale was excluded from the analyses.

### Parental Stress Index (PSI)

The PSI (Abidin, 1990; Dutch version (NOSI) by De Brock, Vermulst, Gerris & Abidin, 1992) was designed to measure stress of parents or caregivers in a pedagogical context. In this study, stress of parents was assessed by four subscales of the PSI: *Role Restriction* (the extent to which the parent considers the parental role as a restriction of his/her freedom; 7 items), *Health* (somatic or physical problems of the parent; 6 items), *Isolation* (feelings of loneliness and lack of social support; 6 items) and *Spouse* (satisfaction of the marital relation; 7 items). Parents' responses to the statements of this questionnaire were rated on a six-point Likertscale, ranging from "totally disagree" to "totally agree". The Dutch version of the PSI has shown adequate reliability and validity (De Brock et al., 1992). Reliability of the four scales used in this study was acceptable; *Role Restriction*:  $\alpha = .80$ , *Health*:  $\alpha = .80$ , *Isolation*:  $\alpha = .69$ , and *Spouse*:  $\alpha = .78$ . The scores of the four subscales were added up in order to calculate a *Total Stress Score*. This *Total Stress Score* was used as a putative moderating variable of the sustained intervention effect.

### Symptom Checklist (SCL-90)

The SCL-90 (Arrindell & Ettema, 2003) is a multidimensional checklist based on self-report with adequate psychometric properties. In this study, parents filled out three subscales of the SCL-90: *Fear* (10 items,  $\alpha = .86$ ), *Depression*, (16 items,  $\alpha = .92$ ), and *Somatic Complaints* (12 items,  $\alpha = .85$ ). Parents were asked to report to what extent (from "not at all" to "very much" on a five-point Likertscale) they experienced fear, depression and somatic complaints in the past week. The subscales *Fear*, *Depression* and *Somatic Complaints*

were used as putative moderating variables of the sustained intervention effect.

### Teacher's Report Form (TRF)

Teachers of the participating children were asked to fill out the TRF (Achenbach & Rescorla, 2000). This widely used checklist consists of 118 items to assess behavior problems of the child as experienced by the teacher in the classroom. Teachers circle the answer ("never", "sometimes" or "always") that fits the behavior of the child in the preceding two months. Two symptom scales were used in this study; *Attention Problems* and *Aggressive Behavior*. Both scales showed adequate reliability (*Attention Problems*:  $\alpha = .86$ ; *Aggressive Behavior*:  $\alpha = .94$ ).

### Wechsler Preschool and Primary Scales of Intelligence - Revised (WPPSI-R)

Intelligence of the child was assessed at PRE with the WPPSI-R (Wechsler, 1997; Dutch – Flemish version by Vander Steene & Bos). Subtests Picture Completion, Vocabulary, Block Design and Similarities were used to estimate full scale IQ (correlation subtests with full scale IQ = .92), following the guidelines of Sattler (1992).

### Neuropsychological assessment

At PRE, the child had to complete a set of neuropsychological tasks measuring working memory, set shifting, inhibition and verbal fluency. Factor scores were computed and children with aggressive behavior problems showed impaired inhibitory control when compared to a group of typically developing children. For a more detailed description of the neuropsychological assessment see Raaijmakers et al. (2008). In this study, the factor score *Inhibition Problems* was used as a putative moderating variable of the sustained intervention effect. The factor score consisted of four variables measuring impairments in inhibition from the computerized Shape School and Go/No go task ( $\alpha = .69$ ) (Espy, 1997; Smidts, 2003).

### Psychophysiological assessment

Children's heart rate and skin conductance level were measured at PRE. Skin conductance level and reactivity were decreased in the group of children with aggressive behavior problems when compared to a group of typically developing children (Posthumus, Böcker, Raaijmakers, Van Engeland & Matthys, 2009). For a more detailed description of the psychophysiological assessment see chapter 2 of this dissertation. Heart rate and skin conductance were measured with the Vrije Universiteit-Ambulatory Monitoring System 36 (VU-AMS; Klaver, de Geus & De Vries, 1994) while the children watched a videotape. Both resting *Heart Rate* and *Skin Conductance Level* were used as putative moderating variables of the sustained intervention effect.

## Parent Satisfaction Questionnaire (PSQ)

The PSQ was designed by Webster-Stratton (1989) and adapted from the work of Forehand and McMahon (1981) to assess the level of satisfaction of parents who participated in the IY parent program. After termination of the BASIC component (after 11 sessions) and after termination of the entire IY program (including the ADVANCE component), parents filled out a comprehensive satisfaction questionnaire. Parents rated the usefulness and difficulty of the overall content, teaching methods, group dynamics, videotape vignettes, and specific parenting skills. Questions were rated on seven-point Likert scales, ranging from extremely difficult/ useless (1) to extremely easy/ useful (7). Five summary scale scores were calculated for the BASIC and ADVANCE program together: *Overall Program Satisfaction* (11 items,  $\alpha = .76$ ), *Teaching Format – Usefulness* (13 items,  $\alpha = .70$ ), *Specific Parenting Techniques – Difficulty* (16 items,  $\alpha = .64$ ), *Specific Parenting Techniques – Usefulness* (15 items,  $\alpha = .82$ ), and *Leader Satisfaction* (10 items,  $\alpha = .89$ ).

## Data analysis

Assessments took place at four time points: at PRE, POST, FU1 and at FU2. Intervention effects were evaluated based on an intention-to-treat approach; data from all participants who completed the assessment at PRE were included in analyses on each moment of assessment, irrespective of the level of participation in the intervention. Since there was a low level of attrition, missing data were not imputed. If a scale score was missing for a family, that scale score of the matched family was removed from the analyses as well. Scale scores were excluded from the analyses if 25% or more of the data was missing.

## RESULTS

### Comparisons at PRE

Paired samples *t*-tests revealed no significant differences between IG and CG on the parent reported measures at PRE. However, on observed behavior of both parents and children several significant differences between IG and CG were found. Parents differed on *Critical Statements*, with IG parents being more critical than CG parents ( $t(63) = 2.08$ ,  $p = .04$ ). Children differed significantly on *Comply* ( $t(65) = -7.02$ ,  $p = .00$ ) and *Negative Child Behavior* ( $t(65) = -2.86$ ,  $p = .01$ ). IG children were significantly less compliant and showed more negative child behavior than CG children.

### Attendance

The attendance rate was 78%; an average of 14 (out of 18) sessions was attended by at least one of the parents, 92% of the parents attended at least 9 sessions. If a parent was

unable to participate, group leaders called and tried to meet up with this parent prior to the subsequent session in order to discuss the missed content. None of the families dropped out of the intervention. The level of attendance did neither affect parent nor child outcomes significantly.

### Parental Satisfaction with the Incredible Years parent training

Parents were very positive about the IY parent training and no differences in satisfaction rates between the eight parent groups were obtained. The five summary scales of the PSQ were rated from 1 to 7, with a high score indicating a high level of satisfaction, difficulty or usefulness. *Overall Program Satisfaction* was high ( $M = 5.60$ ,  $SD = 0.51$ ) and the *Teaching Format* was on average perceived as useful ( $M = 5.10$ ,  $SD = 1.00$ ). The *Difficulty of Specific Parenting Techniques* was rated on average as neither difficult, nor easy ( $M = 4.40$ ,  $SD = 1.01$ ). The *Usefulness of Specific Parenting Techniques* was rated as high ( $M = 5.70$ ,  $SD = 0.75$ ) and parents were highly satisfied with their groups leaders. (*Leader Satisfaction*:  $M = 6.50$ ,  $SD = 0.37$ ). Overall, parents would recommend the IY program to friends or relatives and felt supported by the group. At POST, parents felt they were more capable of handling their child's misbehavior effectively and they felt more confident about parenting and themselves.

### PRE to FU2 comparisons

Overall interventions effects were evaluated. To account for the person-to-person matching performed in this study, paired samples *t*-tests were used. Analyses were conducted on difference scores of the primary caregiver from PRE to FU2. We used difference scores in order to control for different baseline levels of parenting skills and child behavior in the analyses. These difference scores were calculated by subtracting the PRE scores from FU2 scores, such that a higher difference score represented a larger change over time in parenting skills or child behavior. To compare the IG and the CG, the differences between the mean difference scores over time were examined. Subsequently, group means were explored to investigate the direction of the effects. Effect sizes were calculated based on Cohen's *d* (0.2 represents a small effect, 0.5 a medium effect and 0.8 represents a large effect; Cohen, 1992); the difference in mean difference score over time between the IG and the CG was divided by the standard deviation of the mean difference score over time of the entire sample. Sample sizes, means and standard deviations for IG and CG, and the results of the paired samples *t*-tests with effect sizes of the PRE to FU2 comparisons are presented in table 2. For the sake of clarity results are presented such that positive *t*-values and positive effect sizes (*d*) indicate beneficial effects for the IG, whereas negative values represented beneficial effects for the CG. Two-tailed tests and a criterion of  $p < .05$  were used in the analyses, as negative intervention effects cannot be excluded. Besides the evident

importance of *p*-values, we highly valued the effect sizes in the present study, because the assumption of independence of parents participating in the same parent group is obviously violated. Analyses were performed with SPSS 15.0 (2006). Due to technical problems in the video registration of the observations of parent-child interactions, less DPICS data were gathered at PRE than at FU2. Moreover, five families were lost from POST to FU2 (3 CG and 2 IG children). As a consequence, 59 pairs of children in the PRE to FU2 DPICS comparisons were used.

#### DPICS: Observed Parenting

PRE to FU2 comparisons demonstrated significant group effect on *Critical Statements*. The decrease in *Critical Statements* in the IG was significantly larger than in the CG. The effect size of *Critical Statements* indicated a medium effect. The IG and CG did not significantly differ on *Labeled Praise*.

#### DPICS: Observed Child Behavior

PRE to FU2 comparisons showed a significant effect in favor of the IG on *Negative Child Behavior*. The effect size of *Negative Child Behavior* was in the medium range. The IG and CG did not significantly differ on *Comply*.

#### PPI: Parent-rated parenting skills

PRE to FU2 comparisons showed significant differences on *Appropriate Discipline*, *Harsh and Inconsistent Discipline* and *Praise and Incentives*. All effects pointed in the expected direction, with the IG showing larger improvements in parenting than the CG. Effect sizes were in the medium to large range.

#### ECBI: Parent-rated child behavior

No significant differences between the IG and CG were found over time.

#### TRF: Teacher-rated child behavior

No significant differences between the IG and CG on teacher reported child behavior between PRE and FU2 were obtained.

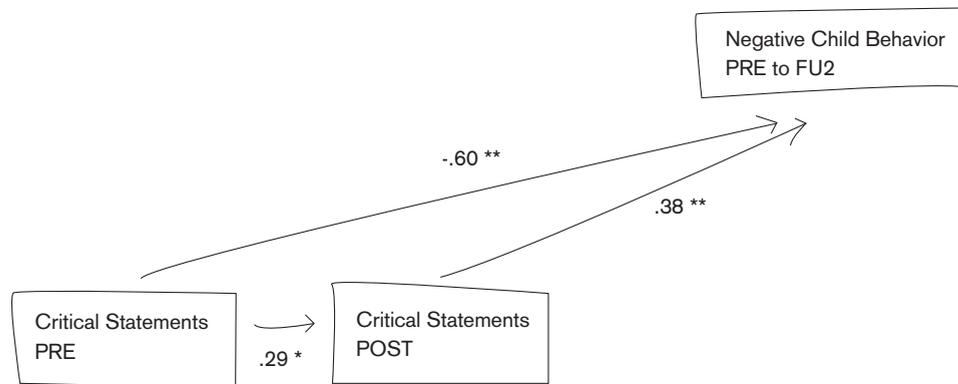
**Table 2.** Differences between IG and CG from PRE to FU2

	PRE		FU2		PRE FU2			
	N	M (SD)	IG	CG	M (SD)	t	p	d
<b>Observed</b>								
<b>Parenting: DPICS</b>								
<i>Critical statements</i>	59	8.92 (8.21)	6.08 (4.71)	2.98 (3.47)	3.47 (3.95)	2.66	.010	.46
<i>Labeled praise</i>	59	0.49 (0.84)	0.44 (0.77)	0.47 (0.90)	0.41 (0.72)	-0.09	.925	-.01
<b>Child Behavior: DPICS</b>								
<i>Comply</i>	59	40.59 (15.41)	45.04 (13.95)	48.61 (13.94)	49.11 (14.87)	1.24	.222	.19
<i>Negative child behavior</i>	59	8.92 (13.35)	3.73 (5.49)	1.22 (2.15)	0.76 (1.59)	2.53	.014	.46
<b>Parent or teacher rated</b>								
<b>Parenting: PPI</b>								
<i>Appropriate discipline</i>	61	49.84 (10.64)	49.93 (8.60)	53.90 (9.16)	48.44 (8.22)	3.24	.002	.57
<i>Harsh and inconsistent discipline</i>	61	46.57 (9.97)	44.39 (10.24)	39.59 (9.16)	42.05 (10.03)	2.97	.004	.52
<i>Positive verbal discipline</i>	60	50.25 (5.84)	48.68 (5.90)	50.70 (5.04)	49.28 (6.19)	-0.11	.914	-.03
<i>Physical punishment</i>	60	9.92 (4.96)	10.55 (4.78)	7.40 (1.73)	8.53 (3.26)	0.54	.591	.12
<i>Praise and incentives</i>	60	46.92 (8.35)	45.20 (7.00)	50.93 (6.06)	43.37 (7.76)	4.09	.000	.70
<i>Clear expectations</i>	60	21.96 (3.93)	21.33 (3.76)	24.07 (4.70)	22.85 (4.16)	0.93	.357	.12
<b>Child behavior: ECBI</b>								
<i>Intensity</i>	65	126.34 (24.20)	127.31 (27.38)	117.17 (34.37)	115.54 (25.77)	-0.67	.502	-.11
<i>Problem</i>	55	11.94 (7.03)	11.93 (7.37)	9.87 (7.31)	10.02 (8.18)	0.07	.945	.02
<b>Child Behavior: TRF</b>								
<i>Aggression</i>	47	55.40 (6.20)	56.26 (7.50)	56.38 (5.77)	57.23 (8.22)	-0.17	.986	.00
<i>Attention problems</i>	47	56.02 (6.07)	57.85 (8.38)	53.47 (4.42)	54.79 (5.52)	-0.40	.690	-.07

## Mediation

We investigated whether the mediation effect found at FU1, which indicated that the decrease in *Critical Parenting* led to a decrease in *Negative Child Behavior*, was sustained at FU2, by means of a path model. We expected that the change in *Critical Parenting* from PRE to POST would significantly predict the change in *Negative Child Behavior* from PRE to FU2. Because of the matching of the IG with the CG, it was not possible to conduct traditional mediation analyses according to the guidelines of Baron and Kenny (1986). In order to include the matching in the mediation analyses, IG-CG difference scores were calculated for each moment of assessment by subtracting the scores of the CG from the scores of the IG for each matched pair. The model used to investigate mediational mechanisms is presented in figure 2. The coefficient from *Critical Parenting* at PRE to the difference from PRE to FU2 on *Negative Child Behavior* is negative ( $B = -.60, p < .000$ ). This means that the difference between IG and CG on *Critical Statements* at PRE (which was in favor of the CG) is negatively associated with the difference between IG and CG on *Negative Child Behavior* from PRE to FU2 (which was in favor of the IG). The coefficient from *Critical Parenting* at POST to the difference from PRE to FU2 on *Negative Child Behavior* is positive ( $B = .38, p < .000$ ). This means that the difference between IG and CG on *Critical Statements* at PRE (which was in favor of the IG) was positively associated with the difference between IG and CG on *Negative Child Behavior* from PRE to FU2. These results indicate that the decrease in *Critical Parenting* due to the IY parent program led to a decrease in *Negative Child Behavior* two years after termination of the intervention.

**Figure 2.** Mediation of critical parenting on negative child behavior

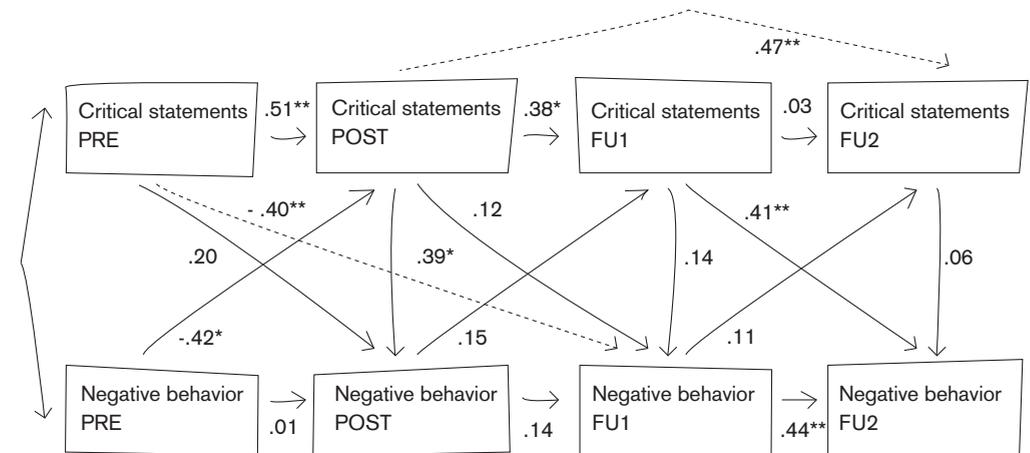


\*  $p < .05$

\*\*  $p < .001$

In addition to the consolidation of the FU1 mediation effect, we conducted longitudinal analyses in order to test the bidirectional influences of parenting skills and child behavior over time. Therefore, we constructed a cross select longitudinal panel with parenting skills and child behavior measured at four distinct moments in time. Since observed *Child Negative Behavior* was the only child behavior outcome that improved at FU2 and *Critical Statements* was the only observed parenting skill that improved at FU2, a model with observed *Critical Statements* and *Negative Child Behavior* from PRE to FU2 was constructed. Note that the IG showed a significantly larger decrease on *Negative Child Behavior* and *Critical Statements* over time. We hypothesized that *Critical Statements* and *Negative Child Behavior* would be relatively stable over time. Further, we predicted that both parents and children would influence each others behavior, both cross-sectionally and longitudinally. The bidirectional influences could not be assessed cross-sectionally because such a model did not result in a convergent solution. Since we expected parental influence on child behavior to be larger than influence of child behavior on parenting skills, we hypothesized that parents would influence their children's behavior cross-sectionally. As a result of the IY parent program, we predicted the child's influence to be decreased and the parents' influence to be increased over time. After considering the modification indices, a fitting model emerged (CFI = .958; RMSEA = .057;  $\chi^2 = 14.66$ ;  $df = 10$ ), which is depicted in figure 3.

**Figure 3.** Bidirectional influences of critical statements and negative child behavior



\*  $p < .05$

\*\*  $p < .001$

In this model, the added relations, relative to the hypothesized relations, are represented as dotted lines. Standardized Direct, Indirect and Total Effects are presented in table 3. Since, against expectations, the paired samples *t*-tests revealed that the IG and CG significantly differed on *Critical Statements* and *Negative Child Behavior* at PRE, the influences of PRE to subsequent moments in time were not interpreted. The difference between IG and CG on *Critical Statements* is relatively stable over time (from POST to FU2), and the difference between IG and CG on *Negative Child Behavior* appears to be stable between FU1 and FU2. The cross-sectional influence of the difference between IG and CG on *Critical Statements* on the difference between IG and CG on *Negative Child Behavior* is moderate at POST, and very weak at FU1 and FU2. The influence of the difference between IG and CG on *Critical Statements* at POST on the difference between IG and CG on *Negative Child Behavior* at FU1 is weak, while the influence of the difference between IG and CG on *Critical Statements* at FU1 on the difference between IG and CG on *Negative Child Behavior* at FU2 is moderate. This model indicates that the influence of critical parenting on negative child behavior increases over time, while the influence of the child's negative behavior on critical parenting remains relatively small.

**Table 3.** Standardized direct, indirect and total effects of differences between IG and CG on *Critical Statements* and *Negative Child Behavior*

	Critical Statements								
	POST			FU1			FU2		
	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT
<b>Negative Child Behavior</b>									
POST	.315	.000	.315	.000	.000	.000	.000	.000	.000
FU1	.114	.099	.213	.140	.000	.140	.000	.000	.000
FU2	.000	.269	.269	.408	.063	.471	.055	.000	.055
<b>Negative Child Behavior</b>									
<b>Critical Statements</b>									
POST	.000	.000	.000	.000	.000	.000			
FU1	.153	.000	.153	.000	.000	.000			
FU2	.000	.019	.019	.106	.000	.106			

DIR: direct effect; IND: indirect effect; TOT: total effect

## Moderation

The moderating influence of several parent and child characteristics at PRE on sustained intervention effect was explored. Putative moderating variables were parental *Stress* and psychopathology (*Fear*, *Depression* and *Somatic Complaints*) and the child's *IQ*, *Heart Rate Skin Conductance Level*, *Initial Level of Aggression* and *Inhibition Problems*. At PRE, groups did not differ on any of these variables. To investigate moderation, the interaction term, as a product of group score (IG = 1; CG = -1) and the putative moderating variable score, was calculated (Baron & Kenny, 1986). The PRE to FU2 difference scores of either observed or parent rated child behavior were entered separately as the dependent variable in the regression analyses. Group status, one of the putative moderating variables, and the interaction term were entered in the regression analysis as independent variables to investigate which variables moderated the sustained intervention effect.

### Moderation of observed intervention effects

In order to investigate moderation of the observed child behavior sustained intervention effect, the PRE to FU2 difference score of observed child behavior *Comply* was entered as dependent variable in the regression analyses. No significant moderation effects were obtained. Next, the PRE to FU2 difference score of observed *Negative Child Behavior* was entered in the regression analyses. No significant moderation effects were found.

### Moderation of parent reported intervention effects

In order to investigate moderation of the parent rated child behavior sustained intervention effect, the *ECBI Intensity* PRE to FU2 difference score was entered as dependent variable in the regression analysis. The *Initial Level of Aggression* of the child appeared to be a significant moderator of the sustained intervention effect ( $B_{aggression} = -.08$ ,  $B_{interaction} = -.93$ ,  $F(1, 131) = 1.64$ ,  $p = .04$ ), implicating that there was a different pattern of the sustained intervention effect for children with a high or low level of initial aggression. Inspection of the regression equations of the IG and the CG revealed that a higher *Initial Level of Aggression* in the IG was associated with more positive change in the *ECBI Intensity* difference score, whereas a lower *Initial Level of Aggression* in the CG implies more negative change in the *ECBI Intensity* score. This suggests that the intervention was most effective for children with a high level of initial aggression. Next, the *ECBI Problem* score PRE to FU2 difference score was entered as dependent variable in the regression analysis. No significant moderation effects were found.

## DISCUSSION

In the present study, we addressed the question whether results found at the FU1 evaluation of the IY parent training were maintained one year later. PRE to FU2 comparisons demonstrated that the effect on observed critical parenting was maintained over time. The effect size of critical parenting was in the medium range and similar to the PRE to FU1 effect size. Furthermore, the increase in parent reported appropriate discipline, the use of praise and incentives, and the decrease of harsh and inconsistent discipline were maintained over time. Effect sizes of parent reported parenting skills were in the medium range at FU1, and became larger over time (in the medium to large range at FU2). With respect to child behavior, it appeared that FU1 results on observed negative child behavior were maintained over time. The effect size of negative child behavior was in the small to medium range at FU1, and was in the medium range at FU2. In contrast, the effect on compliance did not remain significant over time. In line with results found at FU1, parents did not report improvements in child behavior. The mediation effect found at FU1 was sustained at FU2, indicating that the decrease in critical parenting due to the IY parent program leads to a decrease in negative child behavior two years after termination of the intervention. Additional analyses in which the bidirectional influences of parenting skills and child behavior were investigated revealed that the influence of parenting skills on child behavior increases over time, while the influence of the child's behavior on parenting skills remains weak over time. In addition, the initial level of aggression of the child moderated the sustained intervention effect.

Despite the fact that parents were highly satisfied with the program at POST as became clear from the parental evaluations, no difference between IG and CG children on parent reported aggressive behavior were obtained. The absence of a parent reported decrease of the child's aggressive behavior might be due to a difference in willingness to report conduct problems. Indeed, when compared with parents who did not participate in the intervention, parents in the IY parent program learn to observe their child's behavior and to identify their child's problems as goals in the IY parent program (Webster-Stratton, 1998). If families do not receive help, they might be reluctant to acknowledge the child's aggressive behavior, whereas if families do receive help, parents might be more inclined to report on their child's misbehavior at assessments after termination of the intervention. It is of interest to investigate whether effects on parent rated child behavior will emerge later. In order to investigate these 'sleeping effects', long-term follow up assessments are required.

Similar to parents, teachers reported no effects of the intervention on child behavior. The base rates of aggression in the classroom may have been too low to detect a change. A complicating matter in the interpretation of the teacher rated results is that at the start of this

study not all participating children went to school, and most children attended school for a relatively short period of time.

In line with FU1 findings, we found evidence for a mediating effect of the decrease of critical parenting on the decrease of negative child behavior. These results are in line with the coercive theory of Patterson (1982), which states that a sequence of interactions based on negative reinforcement maintains aggressive behavior problems in children. This sequence starts with a parent acting aversively towards the child. The child reacts aversively to the parent, and the parent gives in. The child's behavior is thus reinforced and is likely to increase in the future. Although, in contrast to Patterson (1982), the direct influence of the parents' critical statements on the child's negative behavior was not assessed during the observation, the association of the decrease of parental critical remarks from PRE to POST with the decrease of negative child behavior from PRE to FU2 suggests a causal relation between critical parenting and negative child behavior. From the model in which bidirectional influences of parent and child behavior were investigated, it became clear that parents gain influence over time; the association of using less critical statements by parents with the decrease of child's negative behavior increases over time, while the influence of child behavior on the parental use of criticism remains weak over time. This supports the effect of the IY parent program, as parents learn to take over the lead.

With respect to moderation, it appeared that sustained intervention effects were largest for children who showed a high level of initial aggression. These results are in contrast with our previous study, in which we found that a low IQ, poor inhibitory control and a high level of parental stress and psychopathology, but not a high initial level of aggression, moderated the intervention effect. Apparently, parents who did experience high levels of stress and psychopathology benefited most from the parent program directly after the intervention program, maybe because the parents used the social support from the group and the specific skills to adequately cope with stress taught in the ADVANCE program. Apparently, it is difficult for parents to keep up these skills, but maybe more time is needed. The finding that children with a high initial aggression score benefited most from the intervention is in line with the studies of Reid, Webster-Stratton and Baydar (2004) and Scott (2005), in which it was shown that children with a high initial level of conduct problems benefited most from the intervention relative to children with a lower initial level of conduct problems. This highlights the need to focus recruitment efforts on the group of children with most elevated aggressive behavior scores.

The results of this study have to be considered in the light of a number of limitations. First, this study was not a randomized controlled trial. Although matching can be a viable

alternative when randomization cannot be performed, it still lacks the opportunity to control for the unobserved variables that might have influenced the results. Specifically, motivation to participate in this study might have influenced the results. Participation was voluntary, which might have resulted in a highly motivated sample and the unintentional exclusion of families who experienced more severe problems. Moreover, in our study, the shortcoming of matching became visible in the PRE scores on critical parenting and negative child behavior. Second, a relatively low inclusion criterion (the 80<sup>th</sup> percentile on the CBCL aggressive behavior scale) was used in this study. Therefore, it might be possible that we included a large proportion of false positives (Offord & Bennett, 2002), resulting in rather small intervention effects. Accurate identification of children at risk for the development of a chronic pattern of conduct problems is essential for effective prevention interventions, but extremely difficult to obtain (Hill, Lochman, Coie, Greenberg & Conduct Problems Prevention Research Group, 2004). Third, it should be noted that children from the intervention group had significantly higher negative child behavior scores at PRE than children from the control group, and parents from the intervention group scored significantly higher on the use of critical statements. Therefore, there might have been a larger probability of improvement in the intervention group. However, we corrected for this difference by using difference scores, but our findings must be interpreted with caution. Fourth, our results may have been biased by the high educational level of the parents who participated in the present study. Therefore, these findings have limited generalizability.

The present study is a corroboration of the FU1 study. We proved sustained improvements in parenting skills and observed child behavior of the IY parent program used as an indicated preventive intervention. We found evidence for the mediating effect of critical parenting on negative child behavior and it appeared that parental influence on child negative behavior increased over time. Moreover, the initial level of aggression appeared to be a moderator of the sustained intervention effect. Although families participating in this study were followed for two years and we had the possession of data of four distinct moments in time, we cannot draw conclusions with respect to the long term effects of the Incredible Years parent program as a preventive intervention, yet. Since the present study showed sustained effects on observed negative child behavior at two year follow up and a mediation effect of parenting skills on the child's misbehavior, we regard the IY parent program as a promising preventive intervention. However, follow up assessments in middle childhood and adolescence are needed.

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## Cost-effectiveness analysis of the Incredible Years parent program as a preventive intervention

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## ABSTRACT

**Objective:** Aggressive behavior in early childhood affects daily life of both children and their surroundings, resulting in serious economic implications to society. The Incredible Years (IY) parent program is a manualized behavioral parent training aiming at the improvement of parenting skills in order to reduce child aggressive behavior. The aim of the present study was to conduct a cost-effectiveness analysis of the IY parent program, compared to care as usual (CAU) in preschoolers at risk of a chronic pattern of conduct problems. **Method:** In a case control design, cost data were collected including intervention costs, use of public services such as health care and special education, damage, travel costs and parental productivity losses. Follow up period was two years. Observed negative child behavior (measured with the DPICS-R) was used as effect measure. Different perspectives were taken for the cost-effectiveness analysis, i.e. public authorities, parents and the societal perspective. **Results:** Children from the IY condition, relative to CAU, showed a significant improvement of negative child behavior. Cost-effectiveness differed from the perspective taken. The intervention appeared to be dominant over CAU (better effects and cost saving), taking the societal perspective and the parents' perspective respectively. However, from the public authorities' perspective, the net costs per child to reduce the negative child behavior score by one point were € 124. Sensitivity analyses, performed to assess the robustness of the base case estimate, revealed that the IY parent program was always cost saving from the parents' and the societal perspective. From the public authorities perspective, the sensitivity analyses revealed that net costs to reduce negative child behavior by one point, ranged from € 40 to € 178. However, IY was also dominant over CAU in a subgroup of children with the most severe aggressive behavior problems at baseline. **Conclusion:** The IY parent program used as an indicated preventive intervention is unambiguously dominant, i.e. both cost saving and effective in reducing negative behavior, seen from a comprehensive societal perspective.

## INTRODUCTION

Aggressive behavior in early childhood can lead to scholastic failure, poor peer relations and delinquency in adolescence (Maughan & Rutter, 2001). Moreover, the quality of life of both the children and their families is affected and childhood aggression has serious economic implications to society (Scott, Knapp, Henderson & Maughan, 2001), even from the preschool years onwards (Knapp, Scott & Davies, 1999; Raaijmakers, Posthumus, Van Hout, Van Engeland & Matthys, 2009). Long term utilization of mental health and social services, special educational services and also the judicial and penal systems for children and adolescents with aggressive behavior problems have found to be high (Foster, Jones & the Conduct Problems Prevention Research Group, 2005; Vostanis, Meltzer, Goodman & Ford, 2003; Scott et al, 2001), resulting in increased costs for public authorities and health insurance companies.

It has been calculated that the prevention of a developmental trajectory of chronic aggressive behavior and associated criminality in adolescence and adulthood would result in life-long savings up to 1.7 to 2.3 million dollar per person (Cohen, 1998). Recently, evidence based interventions and prevention programs have proven to be effective in reducing aggressive behavior problems in children (e.g., McCart, Priester, Davies & Azen, 2006; LeMarquand, Tremblay & Vitaro, 2001). Hence, the prevention of aggressive behavior at an early age may lead to a decrease in costs for the child, their families and society at large. The investment in delivering these mental health programs is believed to lead to large savings in the long term in mental health service use and in other sectors of the society. However, there is a need to determine the economic impact of interventions because health insurers and other decision makers want to know which intervention gives best value for their money (Romeo, Byford & Knapp, 2005).

Foster, Jones and the Conduct Problems Prevention Research Group (2006) conducted a cost-effectiveness analysis of the Fast Track program, a multicomponent intervention designed to reduce violence among at risk children. From the public perspective, the program was not cost-effective when the total sample of children was examined. However, subsequent analyses of the children with most severe conduct problems showed that the intervention was cost-effective in this group. A Dutch study, in which costs of the Utrecht Coping Power Program (UCPP), aiming at reducing aggressive behavior problems, were compared with costs of children with aggressive behavior problems who received care as usual (Van de Wiel, Matthys, Cohen-Kettenis & Van Engeland, 2003), revealed that the UCPP condition was 42% cheaper in attaining the same improvement as the care as usual condition. However, this study only took into account direct costs related to the actual treatment (staff

costs), but other costs such as supervision hours of the therapists, costs involved in parental loss of productivity and loss of leisure time were not taken into account.

In the present study, the cost-effectiveness of parent program Incredible Years (IY) compared to care as usual (CAU) in preschoolers at risk of a chronic pattern of conduct problems was assessed. The IY parent program is a manualized behavioral parent training aiming at the improvement of parenting skills in order to reduce child aggressive behavior (Webster-Stratton, 2001). We are aware of one other published cost-effectiveness analysis of the IY parent program as a preventive intervention; the cost-effectiveness analysis of Sure Start in Wales (UK) (Edwards, C elleachair, Bywater, Hughes & Hutchings, 2007). This cost-effectiveness analysis (in this study reflected in program costs divided by the effectiveness of the program), in which the IY parent program was used to prevent the development of conduct disorder, revealed that it would cost   1,344 to bring the average child in the intervention group within the normal range. As in the Fast Track prevention study, the IY parent program in Sure Start appeared to be more cost-effective in those with more intense conduct problems (Edwards et al., 2007). This might be due to the inclusion of a high number of 'false positives' in the total sample; children inaccurately identified as being at risk (Bennett, Lipman, Racine & Offord, 1998). Foster, Johnson-Shelton and Taylor (2007), who conducted a study into the costs of the IY program in the UK, stressed that the value of time participants spend in intervention activities should be taken into account, as time costs accounted for 31% of total costs. These time costs are indirect costs borne by the parents, and generally do not appear on program budgets, but as stressed by these authors, participation may be lower and dropout may be higher in a time intensive intervention.

In the present study, an economic evaluation was carried out alongside an evaluation of the IY parent program as an indicated preventive intervention, whereby data on direct and indirect costs were collected. Parents in the current study received both the BASIC and the ADVANCE curriculum of the IY parent program. The BASIC program, which consists of 12 sessions, also proved to be effective in decreasing aggressive behavior problems (Webster-Stratton, Reid & Hammond, 2001; Hutchings, et al., 2007). In order to measure child behavior, multimethod assessments with multi-informants have been recommended (Chambless & Hollon, 1998). Since parent ratings are often easily influenced by systematic biases to the parents' mood or expectations about intervention effects (Eddy, Dishion & Stoolmiller, 1998) and observational measures have shown to be particularly sensitive to change in parent and child behavior (Aspland & Gardner, 2003; Gardner, 2000), we chose to carry out a well-established observation with adequate psychometric properties during a home visit (i.e., the Dyadic Parent-child Interaction Coding System-Revised (DPICS-R); Robinson & Eyberg, 1981). In addition, observed child behavior is a commonly used

outcome measure in clinical trials of child behavior interventions (e.g., Brotman et al., 2009; Gardner, 2000; Webster-Stratton, Reid & Hammond, 2004).

In most economic evaluations of mental health programs, only intervention costs are monitored. However, the greatest cost burden is mostly borne by the family, as became apparent from an economic evaluation into who pays the costs incurred by children with antisocial behavior (Romeo, Knapp & Scott, 2006). Therefore, in the present study the assessment of costs and the cost-effectiveness analysis were conducted using different perspectives. First, the perspective of public authorities was taken, in which all costs by public authorities such as health insurance, education and community work are included. Second, the parents' perspective was taken, in which all costs paid by parents (i.e., damage caused by the child and travel costs) are included. Third, the societal perspective was taken, in which all costs of any stakeholder are considered, including all above mentioned costs and parental productivity losses.

In this paper we present the child behavior outcomes of the IY parent program, the IY parent program costs per child, the costs generated by the IY and CAU children and a cost-effectiveness analysis with sensitivity analyses. Sensitivity analyses were performed to assess the robustness of the base case estimate.

## METHOD

### Participants

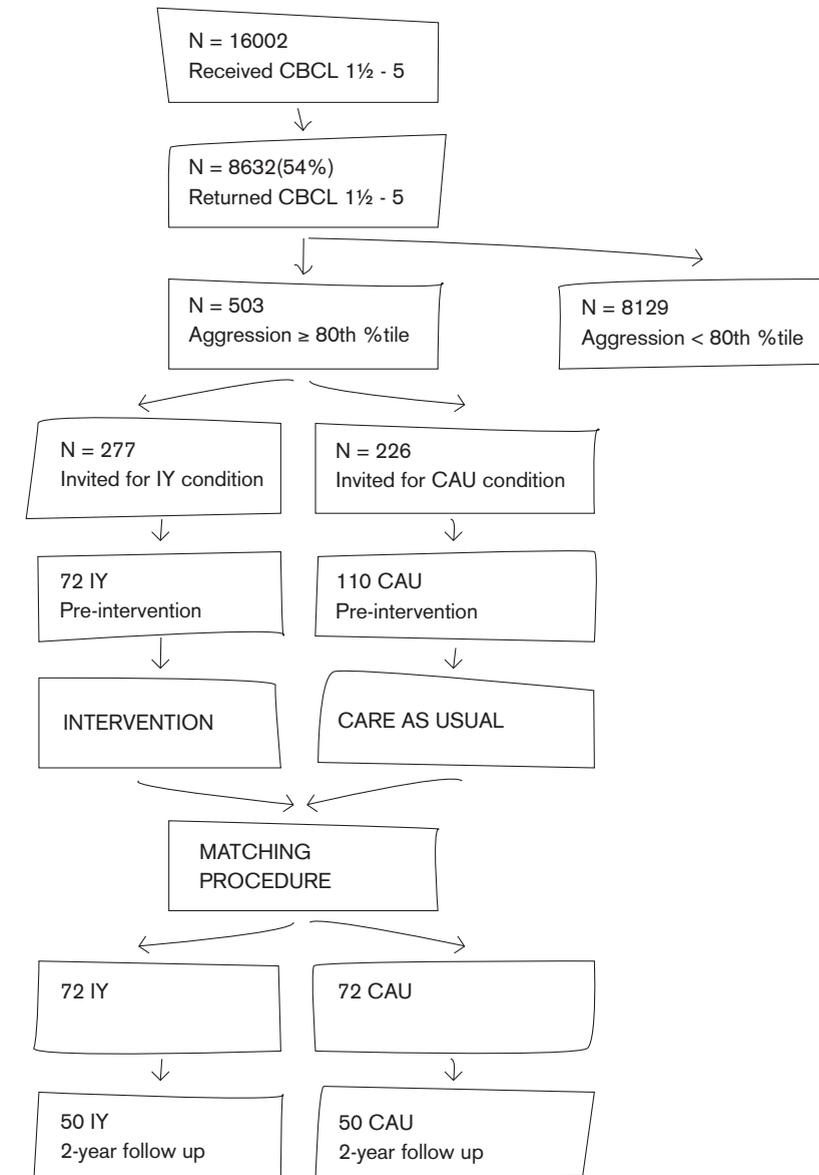
Addresses of families in the general population were acquired by the Office of Screening and Vaccination in the province of Utrecht, the Netherlands. Parents of 16,002 4-year-old children born in 2000 or 2001 were asked to fill out a Child Behavior Checklist 1 1/2-5 (CBCL; Achenbach & Rescorla, 2000; Dutch version by Verhulst & Van der Ende). More than half of the parents returned the questionnaire (54%). Children were selected to participate if they scored at or above the 80<sup>th</sup> percentile of the CBCL Aggressive Behavior scale. In total, 503 children scored at or above the 80<sup>th</sup> percentile and were considered to show aggressive behavior problems. In order to avoid exchange of information between parents participating in the IY program and the CAU condition, the IY parent program could only be executed in a limited amount of villages and cities (Raaijmakers et al., 2008). Families were therefore selected based on their place of residence. For the IY condition, 277 families were selected and 226 families were selected for the CAU condition. Parents were invited to participate by letter and were called after approximately one week to ask for their response. If parents were interested in participation, two members of the research team

visited the family to explain the procedure of the research project. Families who were invited to participate in the IY condition received additional information on the intervention during this home visit (N = 113). Children with an estimated full scale IQ below 80 were excluded from the study. This resulted in 72 families in the IY condition and 110 families in the CAU condition. A flow chart of this study is presented in figure 1.

Randomization of participants was not feasible because of geographical and motivational reasons (Raaijmakers et al., 2008). Therefore, person-to-person matching was performed after pre-intervention on 72 IY families and 72 CAU families. An independent administrator who was not involved in this study carried out the matching procedure. Families were matched on the child's gender, level of aggression, IQ, the parents educational level, stress level and address density of the place of residence of the family. The mother was the primary caregiver in all but 2 cases in the IY condition and in all cases in the CAU condition. Mean estimates of costs and mean difference scores of negative child behavior were used to investigate whether changes differed between the two conditions over time. Analyses for the intervention effect were conducted on difference scores of the primary caregiver from pre-intervention (PRE) to follow up two (FU2; two years after termination of the intervention). Using difference scores over time ensures that different baseline levels of child negative behavior are controlled for in the analyses. These difference scores of the intervention effect were calculated by subtracting scores from the first moment of assessment from the scores from the later moment of assessment (i.e., FU2 scores minus PRE scores), such that a higher difference score represents a larger change over time in negative child behavior. For costs, all costs generated directly after the intervention (POST), one year (FU1) and two years (FU2) after termination of the intervention, were added up for each child. To compare the IY and the CAU condition, the differences between the mean difference scores of the intervention effect over time and total generated costs were examined. Paired samples *t*-tests were used to account for the person-to-person matching performed in this study.

Due to technical problems in assessing negative child behavior (by means of a video registration; n = 8), attrition (n = 5), and parents who did not fill out the questionnaire on service use (n = 9), final analyses were performed on 50 instead of 72 matched pairs (see figure 1). In table 1, characteristics of both the 72 and the 50 matched pairs are presented. No significant differences on any of the sample characteristics between the IY and CAU condition were obtained, nor were there any differences between the 72 and 50 matched pairs.

**Figure 1.** Flow chart of selection and assessments



**Table 1.** Sample characteristics

Measure	IY condition		CAU condition	
	(n = 72)	(n = 50)	(n = 72)	(n = 50)
	M (SD)	M (SD)	M (SD)	M (SD)
<b>Child</b>				
Gender (% boys)	70.8	72	70.8	72
Age (months)	50.3 (3.1)	50.2 (3.1)	51.3 (2.5)	51.3 (2.8)
IQ	107.3 (9.9)	107.6 (9.5)	107.5 (11.6)	107.4 (11.9)
CBCL 1½-5 (at selection)				
<i>Aggressive Behavior</i>	21.99 (4.4)	22.5 (4.5)	22.49 (4.7)	22.9 (4.6)
<b>Parent</b>				
Age (years)				
<i>Primary caregiver</i>	35.5 (4.8)	35.7 (4.6)	34.1 (5.5)	34.7 (3.8)
<i>Secondary caregiver</i>	37.9 (5.1)	38.2 (5.0)	36.8 (4.8)	36.8 (5.0)
Education (%)				
<i>Primary</i>	-	-	2.8	4.0
<i>Secondary</i>	4.2	4.0	5.6	4.0
<i>Intermediate vocational</i>	29.2	26.0	31.0	30.0
<i>Higher vocational</i>	38.9	36.0	31.0	26.0
<i>University</i>	27.8	34.0	29.6	36.0
<b>Paid job (%)</b>				
<i>Primary caregiver</i>	72	68	66	62
<i>Secondary caregiver</i>	96	98	96	98
<b>Employment (hours per week)</b>				
<i>Primary caregiver</i>	21.9 (9.7)	22.00 (8.9)	19.3 (9.4)	20.27 (9.4)
<i>Secondary caregiver</i>	40.2 (8.5)	39.55 (8.2)	41.4 (7.9)	41.09 (8.2)

Note. Education denotes the highest educational level of the parents

## Procedure

Parents of the IY parent group followed the intervention for eighteen two-hour weekly sessions. Families in both conditions were allowed to seek help at any time. Written informed consent was obtained from the participating families. A home visit was conducted at PRE and FU2 in order to carry out an observation of parent child interactions using video registration. In addition, a set of questionnaires was mailed to the parents every year. Parents received a financial reimbursement (€ 25 for every assessment) for their participation. The study was approved by the Medical Ethics Review Committee of the Utrecht University Medical Center.

## Incredible Years parent program

The IY parent program consists of two programs: BASIC (12 sessions) and ADVANCE (6 sessions). Program goals are to increase positive parenting skills such as child-directed play and praise, and to decrease the use of critical statements and harsh discipline in order to reduce the risk of developing a chronic pattern of conduct problems (Webster-Stratton, 2001, 2002). Eight groups of parents received the intervention in different towns and cities spread over the province of Utrecht. Trainers were six professionals with a background in clinical child psychology or child psychiatry.

## Data collection on effects and costs

### Intervention effect

The Dyadic Parent-child Interaction Coding System-Revised (DPICS-R) (Eyberg & Robinson, 1981; revised 2000) is an observational measure used to assess the quality of parent child interactions. At PRE and FU2, parent and child were observed for 20 minutes during a home visit while playing with a standard set of toys. The observation was videotaped and coded later on. With respect to child behavior, a composite score of categories Smart Talk, Cry/Wine/Yell, and Physical Negative was used. This composite score was labeled *Negative Child Behavior* and ranged from 0 to 35. Effectiveness of the IY program was measured by means of reductions in observed *Negative Child Behavior*.

### Intervention costs

The costs of the IY parent program are presented in table 2, and consist of non-recurrent costs, and recurrent costs. Non-recurrent costs were only start up costs such as a license fee and program materials for the IY parent program, education of the group leaders and supervision during at least the first year. These costs are made once and only when introducing such a preventive program and are independent of the number of courses given thereafter. We assumed that the maximum of courses per institute given simultaneously would be four per semester by on average two courses per trainer per semester. Assuming that the license and program materials could be used for 10 years, that trainers would use

their workshop knowledge for 10 years, and including the supervision, the non-recurrent costs per participating child in any course, -applying standard accounting theory-, would be € 15. The non-recurrent start-up costs were calculated by using information of the Incredible Years website ([www.incredibleyears.com](http://www.incredibleyears.com)) regarding workshop fees and program costs, based on 2008 prices (see table 2).

**Table 2.** Intervention Costs (in 2008 €) and underlying parameters

		source
<b>Start-up costs (non-recurrent costs) when implementing the program</b>		
Materials (€/program)	1000	<a href="http://www.incredibleyears.com">www.incredibleyears.com</a>
Initial group leader training (€/group leader) (including workshop, travelling and accommodation)	1000	<a href="http://www.incredibleyears.com">www.incredibleyears.com</a>
Supervision in first year (€/group leader) assuming 1 hour per week (= 2 x 18 weeks)	2785	Oostenbrink et al 2004
<b>Recurrent costs per course and underlying parameters</b>		
Number of sessions per course (baseline)	18	
Assumed number of hours per session		
For trainer (hours/ session) (running session, preparation, and administration)	5*	group leader diaries
For parent (hours/session) (participation in group, travelling and preparation)	3.5	
For babysitter (paid and unpaid) (hours/session)	3	
Average distance to travel – one way (km)	7	
Group materials pack per group (€/group)	200	
Space rental and refreshments (€/session)	29.5	group leader diaries
Book (€/book)	30	
Psychologist (€/hour)	77	Oostenbrink et al 2004
Social worker (sensitivity analysis) (€/hour)	64	Oostenbrink et al 2004
Paid babysitting (€/hour)	9.30	Oostenbrink et al 2004
Informal help (unpaid babysitting) (€/hour)	9.30	Oostenbrink et al 2004
Loss of leisure time parents (sensitivity analysis)	9.30	Oostenbrink et al 2004
Travel costs (public transport or car) (€/km)	0.20	Oostenbrink et al 2004

\* estimation based on collected data in weekly group leader diaries

Recurrent costs are directly related to the daily implementation of the intervention and included costs of running the IY parent group sessions as well as expenses of the parents such as travel costs, paid babysitting and other expenses made during the participation. The costs of running the IY parent group sessions were measured by means of weekly diaries of all six IY group leaders. They reported how much time they spent on delivering the groups, preparation, additional phone calls to the families, preparing the materials, and travel time. Additionally, costs for space rental, materials and refreshments offered during the parent groups were collected as well. Group leaders spent 5 hours per week on delivering the IY parent program on average, and were assumed to be a psychologist (€ 77 per hour; Oostenbrink et al., 2004). The costs of the parents in the intervention costs were based on the actual situation in the eight parent groups in the research project. Parents lived on average 7 kilometers from the location where the intervention was delivered; travel costs were estimated to be € 0.20 per km, independent of using a car or public transport (Oostenbrink et al., 2004). Parking fees were not required. In the eight parent groups, 23% of the parents required a paid babysitter, 35% had (unpaid) family members who babysitted, and in 42% of the cases, parents took turns in participation, or only one of the parents participated in the group while the other parent stayed at home. In order to calculate the paid babysitter, costs of € 9.30 per hour (Oostenbrink et al., 2004) were used and babysitting by family members was calculated by using the costs of informal care (€ 9.30 per hour; Oostenbrink et al., 2004).

#### Questionnaire on work, service use and damage

To collect information on work and impairment in daily functioning of the parents, a questionnaire based on the Health and Labour Questionnaire (HLQ; Hakkaart-Van Roijen & Essink-Bot, 1999; Van Roijen, Essink-Bot, Koopmanschap, Bonsel & Rutten, 1996) was used. Employment status, absenteeism at work in order to take care of their child, extra time and help needed for housekeeping and reduced productivity were assessed. Both parents filled out this questionnaire, which consisted of twelve questions. In additional questionnaires information regarding the child's service use (filled out by the primary caregiver) and parental service use of both the primary and secondary caregiver were acquired. Four questions focused on potential damage and related costs caused by children due to their aggressive behavior. The recall period was always 3 months. Data were collected directly after the intervention (POST), and at FU1 and FU2. Unit prices were obtained by using published Dutch guideline prices (Oostenbrink et al., 2004), and where not available other sources had to be accessed (see table 3). Medication prices were obtained from the Medication and Aid Information Project database (Health Care Insurance Board, 2009) and were based on the daily defined dosage. All costs were expressed in 2008 euros by using the Consumer Price Index (CPI: Statistics Netherlands, 2009). As recommended by developers of the HLG

questionnaire, frequencies of assessments in service use and work absence were multiplied by four in order to get data on service use and work absence per year. Annual costs were estimated by multiplying the frequencies of assessments in service use and work absence by their unit prices (see table 3). Damage related costs were equally multiplied by four to obtain annual costs. The extrapolation may for some families have led to an overestimation of their service use and work absence, whereas for other families these costs may have been underestimated. Since the mean annual costs are based on data of costs for service use, productivity losses and damage related costs of all families, we expect the average annual costs to be balanced. Data of the three years (POST, FU1 and FU2) were added up in order to present longitudinal service use and other costs.

## Resources used

### Public authorities perspective

Twenty-two types of service use of the child were categorized into the following domains: *medical care* (general practitioner (GP), specialist services, physiotherapist, speech therapist, language center, alternative medicine, medication (pharmacist fee included) and home help), *mental health care* (clinical child psychologist, psychologist, psychiatrist, day treatment and outpatient treatment), *youth care* (regional child care, social work, social pedagogical services and child care & protection board), and *educational care* (special education, service for the learning disabled, preventive ambulant services and additional budget to support a child in a regular school). For parents, the use of *medical care* (GP, specialist services, company doctor, physiotherapist and alternative medicine), *mental health care* (clinical child psychologist, psychologist, psychiatrist and outpatient treatment) and *community care* (social work and community social work) were also assessed. The unit prices are presented in table 3.

### Costs paid by parents

Parents were asked to write down what damage their child had caused and to estimate the monetary value thereof. Since no information was available on which transport services were used by the families while using health and other services, we made several assumptions with respect to the travel costs. As all families participating in this study had small children, we assumed that a very small number of families would use public transport, whereas the majority would use their own car, or in close proximity walk or bike. We assumed that when parents went to the GP, physiotherapist or other services in close proximity to their home, they would use their car in about 50% of the cases. For longer travel distance such as a hospital, we assumed that parents would use their car in 95% of the cases, and public transport in 5% of the cases. Parking fees were estimated at € 2.70 per visit.

**Table 3. Services and Unit Costs**

Service	Unit Cost in 2008 €	Source	Travel Cost
<b>Medical Care</b>			
General Practitioner	21.80	Oostenbrink et al. 2004	1.60
Specialist services	67.00	Oostenbrink et al. 2004	5.00
Alternative medicine	83.00	Health Insurance Company	1.90
Physiotherapist	25.00	Oostenbrink et al. 2004	1.60
Speech therapist	27.00	Oostenbrink et al. 2004	5.00
Health visitor in school	46.00	PC GG&GD	
Language Centre	79.00	NZA 2008	14.70
Company doctor	89.00	PC director ARBO dienst	*
<b>Medication</b>			
<i>Ritalin (1 mg)</i>	0.01		
<i>Concerta (1 mg)</i>	0.15	Medication and Aid	
<i>Pharmacy fee</i>	7.00	Information Project	
<i>Annual Costs</i>	27.90		
<b>Mental Health Care</b>			
Psychologist	90.00	pilot of 10 private practices <sup>a</sup>	5.00
Child psychologist	80.00	pilot of 10 private practices	5.00
Psychiatrist	82.00	Oostenbrink et al. 2004	5.00
'subscription fee' childpsychiatry	146.00 **	NZA 2008 b	
Outpatient treatment University Hospital	77.00	Oostenbrink et al. 2004	14.70
Outpatient treatment Fornhese	77.00	Oostenbrink et al. 2004	9.50
Outpatient treatment Zonnehuize	77.00	Oostenbrink et al. 2004	9.50
<b>Youth Care</b>			
Regional Child Care	53.00	PC Regional Child Care	7.40
Social Work	64.00	PC KWIZ	5.00
Social Pedagogical Service	64.00	PC KWIZ	5.00
Child Care & Protection Board	85.00	PC CC & PB	9.50
<b>Educational Care</b>			
Educational Services	52.00	PC director Cluster IV school	*
Preventive ambulant services	52.00	PC director Cluster IV School	
Individual educational support (year)	12067.00 ***	Ministry of Education, 2008	
Special education (year)	4500.00 ***	Ministry of Education, 2008	
Cluster IV education (year)	7850.00 ***	Ministry of Education, 2008	
<b>Community Care</b>			
Social work	64.00	Oostenbrink et al. 2004	5.00
Community social work	129.00	Oostenbrink et al. 2004	9.50

Note. All unit costs are prices per consult, unless indicated otherwise

<sup>a</sup> Available on request by the first author

\* No additional travelling required as assuming that a visit to the company doctor would be during working hours at the working place. No additional costs for travelling to educational services were considered.

\*\* In the Netherlands, apart from a consultation fee and medical services, specialist charge their patients a so-called 'subscription fee'. This could either be a 'short subscription fee' or a 'yearly subscription fee'. These subscription fees vary from specialist to specialist. We assumed a yearly subscription for a psychiatrist for children and parents when consulting.

\*\*\* Costs per child per year, expressed as the difference with regular education. (NZA: Nederlandse Zorgautoriteit; KWIZ: Kenniscentrum Werk, Inkomen en Zorg)

### Productivity losses related to the child's misbehavior

Parents were asked to write down (using the HLO questionnaire as described above) how many days of work they had missed in the preceding three months due to their child's misbehavior or because they had to visit a service with their child (e.g., center for youth care, child psychiatrist or psychologist). Costs of productivity losses of the parents due to absence of work in order to take care of the child were calculated by means of the friction cost method (Koopmanschap, Rutten, Van Ineveld & Van Roijen, 1995), based on the mean productivity of the Dutch working population in the age range of 35 and 44 years, multiplied by a correction factor of 0.8 to account for compensation mechanisms (Oostenbrink et al., 2004).

### Cost-effectiveness analysis

A method for comparing the cost and effects of two different interventions is to calculate an incremental cost-effectiveness ratio (ICER), which is defined as:  $NC / \Delta Q$ , where net costs (NC) are monetary benefits (costs IY – costs CAU) subtracted from the intervention costs,  $\Delta Q$  equals the difference in effect between the two conditions. Costs were considered both discounted and undiscounted, whereas effects remained undiscounted. The applied discount rate for costs was 4% according to the Dutch guidelines (Oostenbrink et al., 2004).

### Sensitivity analyses

The main cost-effectiveness analysis of the present study relied on several key assumptions. Therefore, sensitivity analyses were performed to study the relative influence of these assumptions on study results.

### *Children with severe aggressive behavior problems*

We present a sensitivity analysis in which only children with a score above the 93<sup>rd</sup> percentile of the CBCL Aggressive Behavior scale (borderline range), instead of the 80<sup>th</sup> percentile used in the baseline, were taken into account.

### *IY parent program*

In the present study (our baseline), the IY parent program was delivered by psychologists in eighteen sessions (BASIC and ADVANCE). There are studies however, in which it was shown that the BASIC curriculum (12 sessions) also was effective in decreasing aggressive behavior problems (Hutchings et al., 2007; Webster-Stratton, Reid & Hammond, 2001). For sensitivity analyses we therefore calculated intervention costs assuming only twelve sessions but assuming the same effect on negative child behavior as in the baseline. Additionally, the program can also be delivered by community social workers or nurses who are experienced in working with groups and who are familiar with child developmental principles (Webster-Stratton, 2001). Therefore, we present sensitivity analyses with a social worker instead of a psychologist delivering the group sessions in twelve sessions (only BASIC) and eighteen sessions (BASIC and ADVANCE), respectively, assuming that the effect on negative child behavior would be the same.

### *Recruitment of families*

Recruitment of families in a prevention trial is time intensive. As in a lot of mental health care services, families will register themselves, and no time will be spent on recruitment itself, but some time explaining the program and deciding on inclusion in the IY parent program will remain. Therefore, we did not take into account time involved in recruiting the families in the baseline, but present the required time and their related costs in a sensitivity analysis. Based on the data collected during the current study we hereby assumed that per included child 1.57 child would have to be contacted, and required time per contacted child would be 2 hours, including travel time.

### *Parking fees*

Although parents did not have to pay parking fees in the present study, once the IY parent program would be implemented nationwide, the chosen locations for the IY parent program might be no longer in parking fee free areas. Therefore, sensitivity analysis was applied assuming parking fees of € 2.7 per session (Oostenbrink et al., 2004).

### *Informal care*

Costs for informal care (time that family members spent on baby sitting during parents' participation in the IY parent program) were taken into account in the baseline. However, since no actual payments take place, we analyzed the impact of the costs for informal care on intervention costs and CEA by excluding these costs in a sensitivity analysis.

### *Loss of leisure time*

It has been shown that time costs involved in the Incredible Years parent program represent

a substantial proportion of total costs (Foster, Johnson-Shelton & Taylor, 2007). Therefore, the time costs (time that could have been spent on other uses) that arise when parents participate in parent groups, were also taken into account in a sensitivity analysis. The prices of loss of leisure time were based on a 'shadow' price following Dutch costing guidelines of Oostenbrink et al. (2004), valued as the minimal hourly wages for paid work in the Netherlands.

### Statistical Analysis

Distributions of costs were highly skewed, as in most studies on human health. Although the assumptions of the normal distribution of the data were violated, traditional parametric statistical tests in the analyses of cost data were used, mainly because nonparametric statistical methods and transformation of the data are supposed to be inappropriate to measure differences in mean costs between groups (Doshi, Glick & Polsky, 2006; Thompson & Barber, 2000). We followed a complete case analysis, meaning that missing data were not imputed. Instead, we excluded families from the final analyses of which we did not have data at all time points (see above). Effect sizes were calculated based on Cohen's *d* (0.2 represents a small effect, 0.5 a medium effect and 0.8 represents a large effect; Cohen, 1992); the difference in mean difference score over time between the IY and CAU condition was divided by the standard deviation of the mean difference score over time of the entire sample.

## RESULTS

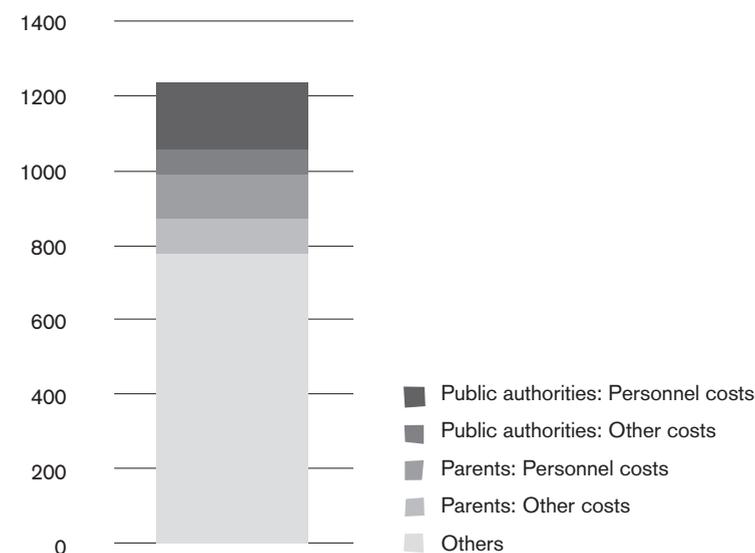
### Effectiveness of the IY parent program

The IY and CAU condition significantly differed at PRE on *Negative Child Behavior* (IY:  $M = 9.20$ ,  $SD = 14.28$ ; CAU:  $M = 4.14$ ,  $SD = 2.28$ ;  $t(49) = 2.35$ ,  $p = .023$ ). At FU2, children from the IY condition had a mean score on *Negative Child Behavior* of 1.42 ( $SD = 2.28$ ) and children from the CAU condition had a mean score on *Negative Child Behavior* of 0.88 ( $SD = 1.70$ ). The mean difference between the PRE-FU2 differences scores on *Negative Child Behavior* between the IY and CAU condition was 4.52 ( $SD = 15.43$ ). Over time (from PRE to FU2) children from the IY condition significantly differed from children from the CAU condition with respect to their observed negative behavior score ( $t(49) = -2.07$ ,  $p < .05$ ,  $d = .30$ ); children of the IY condition showed a larger decrease on *Negative Child Behavior* than CAU children. If considering only children with severe aggressive behavior problems ( $n = 34$ ), as presented in the sensitivity analysis, the mean difference between the PRE (IY:  $M = 10.32$ ,  $SD = 16.26$ ; CAU:  $M = 4.47$ ,  $SD = 6.53$ ) to FU2 (IY:  $M = 1.53$ ,  $SD = 2.54$ ; CAU:  $M = 1.09$ ,  $SD = 1.96$ ) difference scores on *Negative Child Behavior* was 5.4 ( $SD = 17.24$ ) ( $t(33) = -1.83$ ,  $p = .07$ ,  $d = .31$ ).

### Intervention costs

Cost estimates of the IY parent program were used to calculate per-child costs, and include all the fees and expenses for which the agency adopting the IY parent program is responsible. Since we delivered groups with a mean of parents of nine children, we calculated the costs per group divided by nine in order to estimate the total intervention costs per child. The intervention costs per child were estimated to be € 1.235. The majority of costs (about 70%) would be borne by public authorities and were € 870 per child. The majority of these costs would consist of personnel fees; additional costs borne by public authorities were costs for space rental, refreshments, and materials. Parents' costs would be equal to € 189 per child and consisted of costs for babysitting, travel costs and the book, and other stakeholders costs, i.e. the average indirect costs for unpaid babysitting by family members would be equal to € 176 per child. The intervention costs are presented in Figure 2.

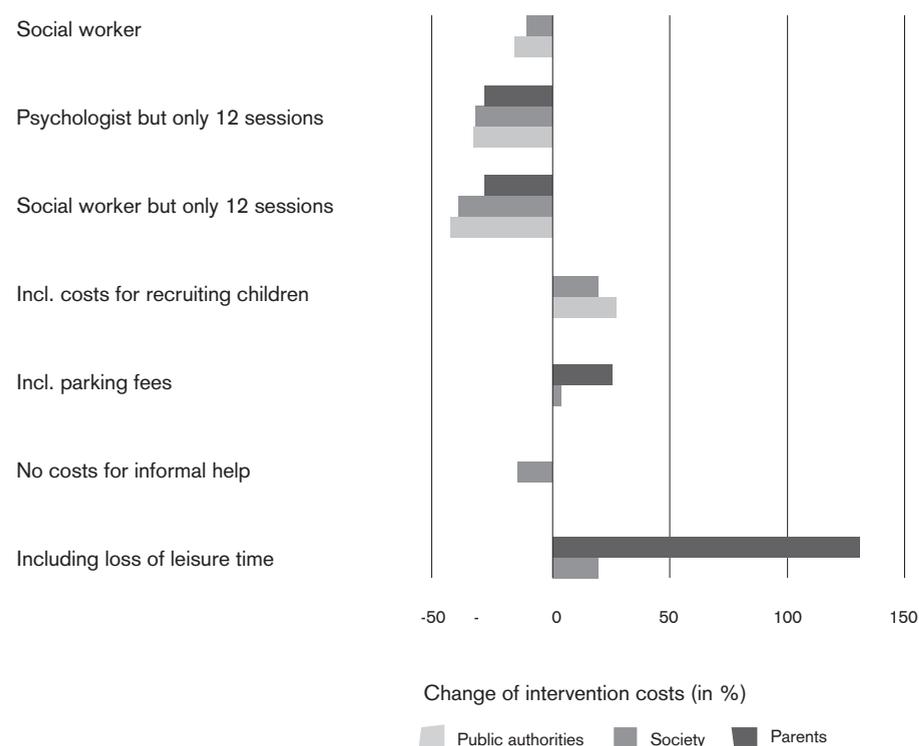
Figure 2. Intervention costs per perspective



The sensitivity analyses with respect to the intervention costs are presented as a percentage deviated from baseline intervention costs in figure 3 for all three perspectives used. From the societal perspective, -the most complete perspective-, intervention costs would be reduced by 11% if using a social worker instead of a psychologist. If the IY parent program would be delivered in 12 instead of 18 sessions delivered by a psychologist, the intervention would be 32% cheaper. Taking into account extra time for recruiting the families would raise

the intervention costs by 20%, including parking fees would increase intervention costs with 4% and including loss of leisure time of the parents would add 20% to the intervention costs. If we would exclude costs for informal help (babysitting by another unpaid family member), the intervention would be 14% cheaper. From the public authorities perspective similar results were obtained for the sensitivity analyses: using a social worker instead of a psychologist; assuming only twelve sessions for both the psychologist and a social worker; and considering time costs for recruitment of families, whereas all other sensitivity analyses had no impact on the baseline. From the parents perspective, the intervention costs would increase by more than 130% if costs for their loss of leisure time would be considered. Including parking fees would raise the part of the intervention costs paid by parents by 26%, whereas twelve sessions instead of eighteen sessions would result in a decrease of the part of the intervention costs paid by the parents, mainly due to lower costs for babysitting.

**Figure 3.** Sensitivity analyses of the intervention costs



## Costs

In table 4, the baseline differences in discounted costs between the IY and CAU condition are presented taking the perspective of the public authorities, the parents and the society, respectively. Given that the IY parent program was only evaluated for a three-year period, the undiscounted costs did hardly differ from the discounted costs and were therefore not presented here. Independent of the perspective taken, the IY and CAU condition did not significantly differ in total costs.

**Table 4.** Results of cost differences between IY and CAU condition for baseline, with costs discounted at 4%

	Children	Parents	Total
	M (SD)	M (SD)	M (SD)
Medical care	-137 (1906)	-106 (2241)	-245 (2831)
Mental health care	174 (1919)	-77 (1407)	97 (2543)
Educational care	257 (5211)		257 (5211)
Youth care	193 (787)		193 (787)
Community care	13 (1135)		13 (1135)
<b>Costs paid by publ. authorities</b>	<b>488 (7160)</b>	<b>-170 (3047)</b>	<b>319 (8050)</b>
25 <sup>th</sup> percentile	-1228	-1511	-2386
75 <sup>th</sup> percentile	1136	1682	2362
Damage	446 (2145)		446 (2145)
Travel costs	28 (311)	6 (232)	34 (431)
<b>Costs paid by parents</b>	<b>474 (2351)</b>	<b>6 (232)</b>	<b>480 (2443)</b>
25 <sup>th</sup> percentile	-174	-84	-266
75 <sup>th</sup> percentile	213	128	354
<b>Productivity losses</b>	<b>1488 (8997)</b>		<b>1488 (8997)</b>
25 <sup>th</sup> percentile	-1976		-1976
75 <sup>th</sup> percentile	2607		2607
<b>Total Costs</b>	<b>2450 (14404)</b>	<b>-164 (3264)</b>	<b>2287 (15020)</b>
25 <sup>th</sup> percentile	-3448	-1587	-3183
75 <sup>th</sup> percentile	4792	1789	4980

Note. Positive cost differences represent beneficial effects for the IY over the CAU condition (lower costs for IY); negative cost differences denote cost advantages for the CAU over the IY condition

### Cost-effectiveness analysis

The monetary benefits (costs IY minus costs CAU) are subtracted from the intervention costs in order to present net costs. Net costs are divided by the difference in effect in order to present the ICER. The cost-effectiveness analyses are presented in table 5 for discounted costs. First, from the public authorities perspective, we calculated an ICER of € 124 per 1 point change on observed negative child behavior. Second, from the parents' perspective, the IY condition is dominant over the CAU condition, implying that the intervention is both cost-saving and generating better effects. Third, from the societal perspective, the IY condition is also dominant over the CAU condition. Similar results were found for undiscounted costs, see figure 4.

**Table 5.** Cost-effectiveness analyses

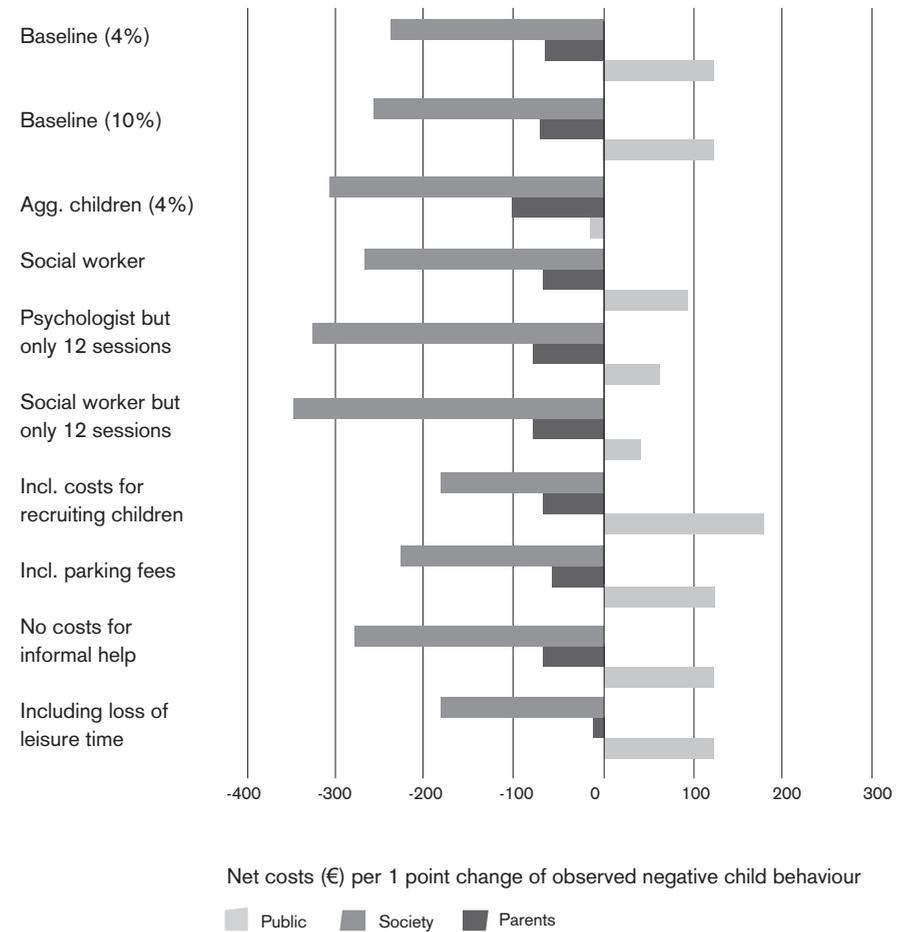
	IC	MN	NC	Δ Q	ICER
<b>Baseline</b>					
Public authorities perspective	870	319	551	4.5	124
Parents perspective	189	468	-291	4.5	*
Societal perspective	1235	2287	-1051	4.5	*

IC: Intervention Costs, MN: Monetary Benefits, NC: Net Costs, Δ Q: difference in effect, ICER: NC / Δ Q  
 \* Negative Net Costs reflect that IY is cost saving; no CEA was performed

### Sensitivity analyses

The sensitivity analyses are presented in figure 4 as net costs per point change of observed negative child behavior. The sensitivity analysis with children with most severe aggressive behavior problems resulted in better results than the baseline and revealed that the IY parent program is cost-saving from all perspectives under consideration. All other sensitivity analyses revealed that the IY parent program remained cost-saving taking the societal or parents perspective, but not from the public authorities perspective. Sensitivity analyses from the public authorities perspective revealed an ICER range of € 40 for a social worker conducting the IY parent program to € 178 for including the costs for recruitment of families per one point change on *Negative Child Behavior*, in comparison to € 124 at baseline.

**Figure 4.** Net costs per point change of observed negative child behavior for baseline, discounted (4%) and undiscounted and sensitivity analyses



## DISCUSSION

The aim of the present study was to conduct a cost-effectiveness analysis of the IY parent program as an indicated preventive intervention in the Netherlands. Comparisons of differences between pre-intervention and two-year follow up demonstrated that negative child behavior was on average significantly more decreased in the IY condition than in the

CAU condition, which indicates that the IY parent program is effective in reducing negative behavior in children. The observed average costs generated by children and their parents were lower in the IY condition than in the CAU condition, although this observed difference was, when tested statistically, not significantly different. Cost-effectiveness analyses were conducted using three different perspectives. Seen from the societal and the parents' perspective, the intervention is unambiguously dominant over the alternative: care as usual. However, when taking the public authorities perspective, the cost-effectiveness analysis revealed that the net costs per child to reduce the negative child behavior score by one point were € 124.

A major part of the costs in our study can be attributed to the parental loss of productivity due to their child's misbehavior. This is in line with findings of Knapp et al. (1999) who showed that the productivity losses of families with a conduct disordered child encompassed 30% of total costs generated by parents and children. Another substantial part of the costs generated by children in the present study consists of costs of damage caused by the children with aggressive behavior problems. Taken together, both productivity losses and damage caused by the child seem very important and should be considered in future studies into the costs of children with aggressive behavior problems and their parents. The fact that the larger part of the total costs was generated outside the health care sector demonstrates the importance of using a comprehensive societal viewpoint in economic evaluations of interventions for aggressive behavior problems.

Sensitivity analyses, performed to assess the robustness of the base case estimate, revealed that the IY parent program was always cost-saving from the parents' and the societal perspective. From the public authorities perspective, the sensitivity analyses revealed that net costs to reduce negative child behavior by one point, ranged from € 40 to € 178 and showed that the IY parent program was even cost-saving when taking into account children with the most severe aggressive behavior problems. A better effect and larger monetary savings for the group of children with the most severe aggressive behavior problems compared to the total study population, suggests that it is this group that would profit most from interventions such as the IY parent program. The IY parent program in this group was far more cost-effective than for the total study population. This result is in line with findings of previous studies, in which interventions were only cost-effective in children with most severe conduct problems (Foster et al., 2006; Edwards et al., 2007). This highlights the need for prevention programs targeted at children with most severe aggressive behavior problems, and for screening procedures tailored in such a way that the inclusion of a high number of false positives can be avoided.

We regard it as important from the families' perspective to take into account time costs. Such costs may affect participation negatively, as families may be more likely to drop out of programs that require a lot of their leisure time. Given the effectiveness of the BASIC curriculum in preventive settings (Hutchings et al., 2007), we suggest to only use the BASIC curriculum. If the effect on negative child behavior after twelve sessions is indeed the same as after eighteen sessions, the intervention would cost less and would therefore be more cost-effective when offering only the BASIC curriculum and this applies to all three perspectives under study. In addition, the hours spent on the IY parent program by parents would be reduced.

The results should be interpreted in the light of some limitations. First, it should be noted that, although the IY and CAU condition were matched, the groups significantly differed on negative child behavior at pre-intervention. Therefore, there might have been a larger probability of improvement in children from the IY condition. Second, the results are based on cost averages across individuals. As is typical in research on service use, expenditures are generated by a minority of children and their parents receiving intensive services. Conditional averages (the average expenditures among those children and their parents, identified as using the service) would probably better reflect the costs for children with aggressive behavior problems, as was shown by the sensitivity analysis focusing on the most aggressive children. Third, we chose not to take into account the work involved prior to running the parent groups (i.e., phone calls to parents and home visits to recruit the families), because in many mental health agencies families do not have to be recruited. However, it is important to note that in prevention trials, time of recruitment of families should be taken into account. As was shown in the sensitivity analysis, taking into account time involved in recruitment of families resulted in slightly higher costs, but still cost savings from the societal perspective. Fourth, in the original questionnaire, we did not assess productivity losses of parents who were absent from work due to own illness, and had consequently no data on this issue. Productivity losses may therefore be underestimated. Fifth, by following the complete case analysis, we applied a naïve method to deal with missing data, a decision taken because of the highly skewed costs. Our decision not to impute missing data caused a loss of information. There is a genuine lack of consensus among methodologists with respect to the correct methods to impute missing values (Collins, 2006). In the present study, missing data were not imputed. As a consequence, differences between the two groups could be related to attrition of subjects. Sixth, we assumed that the costs of damage would always be paid by the parents themselves. Depending on the damage, parents might claim at least some of the costs from their insurance companies. Then, costs of damage would only be partly for parents, and the other part would have to be borne by other stakeholders in the society, leaving us still with cost savings when taking the societal perspective.

In sum, the IY parent program used as an indicated preventive intervention is both cost-saving and effective in reducing observed negative behavior, seen from a comprehensive societal perspective. If policy makers in mental health care are willing to invest € 870 per child to improve parenting skills in families with children at risk of a chronic pattern of conduct problems, both the child's negative behavior will be reduced and substantial costs in the public domain (i.e., fewer services used), and outside the public domain (i.e., lower productivity losses, lower costs of damage and lower travel costs) will be saved in the two years following the intervention. Although the IY and CAU condition did not significantly differ on mean costs of service use, when tested statistically, the future need of mental health, youth, community and educational care of the children and their parents may be reduced or even prevented by providing the IY parent program by age four. With only two-year follow up, the impact of the IY parent program may have been underestimated. Lower needs of medication, mental health, youth, community and educational care of the children and their parents in future years, as well as lower future societal costs associated with the long term effects of aggressive behavior, such as costs of the juvenile justice sector, the loss of employment income, higher rates of substance abuse and the loss of quality of life, e.g. caused by higher divorce rates, may be prevented in children whose parents received the IY parent program. However, these are speculations and a follow up study in adolescence and adulthood is highly needed, in order to be able to demonstrate and quantify the above described effects. By reducing the child's negative behavior, the child's own quality of life and the quality of life of their caregivers and others surrounding them is more than probably affected. These effects were not considered in the present study. We recommend measuring these quality of life effects in future similar studies.

To our knowledge, this is the first cost-effectiveness study regarding the IY parent program as an indicated intervention, which yielded both positive effects and cost-savings. Policy makers and mental health services should balance the extra costs involved with providing the IY parent program with the beneficial effects, i.e. the decrease in negative child behavior and cost-savings at two year follow up in deciding whether or not to roll out this intervention.

## ACKNOWLEDGEMENTS

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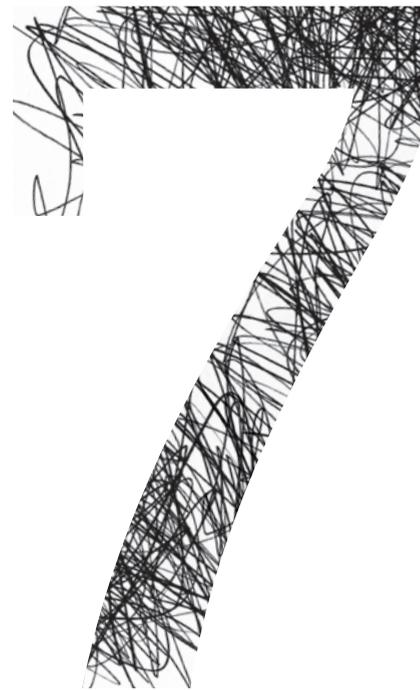
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## General discussion



A high level of aggressive behavior in early childhood is stable and persistent over time (e.g., Broidy et al., 2003; Tremblay et al., 2004; Shaw, Lacourse & Nagin, 2005), and both individuals and society pay a high price (Scott, Knapp, Henderson & Maughan, 2001). Preschool aggression is explained best by a combination of child characteristics and characteristics of the child's environment, such as inadequate parenting skills (Patterson, Reid & Dishion, 1992; Stormshak, Bierman, McMahon, Lengua, & the Conduct Problems Prevention Research Group, 2000). It is important to provide insight in putative correlates of the aggressive behavior in young children. We therefore conducted studies into the psychophysiology (chapter 2) and social information processing skills (chapter 3) of four-year-old children with aggressive behavior.

A critical developmental period for diminishing aggressive behavior is concentrated in the transition from preschool to the elementary school years (Loeber & Hay, 1997). Thus, by intervening during the preschool years, the trajectory of early aggressive behavior problems may be corrected. In many countries, early detection and the prevention of aggressive behavior problems have become important goals for authorities in child development and those who provide community mental health services. Hence, interventions specifically designed to prevent the development of aggressive behavior problems in at risk children have been developed. To date, there are a large number of interventions aiming at the reduction of child aggressive behavior problems. Therefore, there is a need to investigate which interventions work and which interventions are cost-effective. The primary aim of the present thesis was to evaluate the two-year follow-up effects (chapter 5) and cost-effectiveness (chapter 6) of the IY parent program used as an indicated preventive intervention in a population based sample of preschool children at risk for a chronic pattern of conduct problems. Furthermore, a study into reasons for non participation in the IY parent program was conducted (chapter 4).

### **Autonomic arousal in preschoolers with aggressive behavior**

Autonomic underarousal is one of the neurobiological correlates of aggressive behavior (Raine, 2002). As appears from a large number of studies, there is evidence for autonomic underarousal in elementary school children and adolescents with aggressive or antisocial behavior. Yet, few studies regarding autonomic nervous system (ANS) functioning in preschoolers have been conducted and most studies included only one indicator of underarousal.

In **chapter 2**, various measures of autonomic arousal were investigated in groups of preschool children, defined from the perspective of aggressive behavior and from the perspective of clinical syndromes of disruptive behaviors. The main finding was that four-year-old

children with a high level of aggressive behavior showed lower SCL and SCR than children with a low level of aggressive behavior, and that four-year-old children with ODD/CD showed lower SCL, relative to children with a low level of aggressive behavior. Our results are in line with findings in older children with conduct problems (Lorber, 2004). This suggests that decreased SCL and SCR are correlates of aggressive behavior already at preschool age. Yet, the meaning of these results is unclear, but if we assume that low SCL and SCR are markers of punishment insensitivity (Fowles, 1980), young children with reduced SCL and SCR would be at risk for problems in socialization because of their reduced responsiveness to negative feedback on their misbehavior (Matthys, Van Goozen, Snoek & Van Engeland, 2004). Contrary to expectations, we did not find lower HR in preschool children with aggressive behavior or in children with a DSM-IV-TR ODD or CD diagnosis. Thus, our results suggest that electrodermal activity is a more sensitive correlate of aggression than HR in preschool boys and girls.

Furthermore, since social conditioning plays a key role in the IY parent program, we investigated whether HR and SCL would serve as moderators of the intervention effect. Based on an earlier study, in which the outcome of DBD in adolescence among children treated at school age was associated with SCL (Van Bokhoven, Matthys, Van Goozen & Van Engeland, 2006), we hypothesized that a relatively low SCL would influence the intervention effect negatively, i.e. the IY parent program would be less beneficial for children with low HR or SCL. Results reported in chapter 5 show that HR and SCL did not moderate the sustained intervention effect. This may be due to the age and the level of aggression of the children. Moderation of SCL on treatment outcome may have been present in the study of Van Bokhoven et al. (2006) because these children were older and had diagnoses of disruptive behavior disorders. Moreover, with respect to the relation between SCL and punishment sensitivity, the assessment of electrodermal activity in anticipation of and in response to aversive stimuli probably is more informative than the assessment of basal SCL (Matthys & Lochman, 2009).

### **Intent attribution and inhibition in preschoolers with aggressive behavior**

Children with aggressive behavior problems more often believe behavior of others toward them to be motivated by hostile intent (Crick & Dodge, 1994). Since hostile intent attribution has a relatively low impact in explaining aggressive behavior in children (De Castro, Veerman, Koops, Bosch & Monshouwer, 2002), there is reason to consider other characteristics of the representation stage of the social information processing (SIP) model that may help to explain aggressive behavior.

The main aim of **chapter 3** was to test whether preschool children with aggressive behavior problems differed from their nonaggressive peers in accidental and hostile intent attribution, response generation and inhibitory control. Moreover, we aimed to test the relative contributions of SIP and inhibition to explaining individual differences in aggressive behavior. Results showed that preschool children with aggressive behavior attributed less accidental intent than their nonaggressive peers. It may be that nonaggressive children at age four start to overcome a predisposition to attribute hostile intent following negative events and are able to understand that some situations with negative consequences could be accidents, whereas preschoolers with aggressive behavior problems have difficulties using this 'protective mechanism' that enables successful management of ambiguous provocation situations. Thus, preschool children with aggressive behavior problems apparently still think that the negative effect of someone else's behavior was done on purpose, instead of considering it was an accident. Moreover, less accidental intent attribution appeared to be a more important correlate of aggressive behavior than hostile intent attribution in preschoolers.

From the structural equation modelling analyses, it became clear that inhibition explains more variance of aggressive behavior than intent attribution, suggesting that inhibition is a more important factor than intent attribution in explaining aggressive behavior during the preschool years. Important questions that evolve from this study are whether we should investigate SIP in preschoolers and whether we should try to influence SIP patterns at this young age. In our opinion, skills such as basal turn taking and perspective taking are primarily learned during the preschool age. These skills, that are part of the interpretation stage, may be particularly difficult for children with aggressive behavior problems to become part of their repertoire and are therefore an important focus of further research.

### **Explanations for non participation in the IY parent program**

As drop out rates during interventions are high, it is important to identify barriers parents might experience when they start an intervention. The main purpose of **chapter 4** was to examine reasons of parents who refused to participate in the IY parent program and we compared families who refused and agreed to participate on child mental health problems and stress level of the primary caregiver. Reasons were scored according to the barriers to treatment model (Kazdin, Holland, Crowley & Breton, 1997). Results showed that the main reason for non participation was that parents found the intervention not relevant. Other reasons for non participation were that the intervention was too demanding or parents indicated practical reasons to refuse participation. Parents who agreed to participate appeared to have higher levels of stress than parents who refused to participate, while the aggression level of the child did not differ between families who agreed and refused to participate.

Parents who refused to participate because they indicated treatment was not relevant to them, might not have felt the same need for this parent program given that their children were less problematic in their aggressive behavior problems than were the children of those parents who agreed to participate. These parents were probably right by indicating the intervention was not relevant for them, since both their children displayed less aggressive behavior and their own stress levels were lower than aggression scores and stress levels of families who agreed to participate in the intervention.

Another reason for non participation was that treatment was too demanding. Families who indicated treatment was too demanding did not differ from families who agreed to participate. We chose to deliver both the BASIC and ADVANCE curriculum of the IY parent program in 18 sessions. Since a high number of parents who refused to participate clearly indicated 18 sessions were too demanding, we suggest to consider delivering the additional ADVANCE program to parents who after termination of the BASIC program indicate they need it and who are willing to participate in another eight sessions, when implementing the IY parent program.

The third reason for non participation consisted of practical reasons, e.g. parents initially indicated they were willing to participate but the day and time of the IY parent program was not suitable for them, children were diagnosed with another disorder, or families were involved in other treatment. We chose to deliver the parent groups in the evenings, because we wanted to stimulate couples to attend the groups together. However, some parents preferred to attend the parent group during day time. We therefore suggest offering parent groups both during day time and in the evenings and to let parents choose which group they prefer.

Parents who agreed to participate appeared to have higher levels of stress than parents who refused to participate in the IY parent program. Since higher levels of stress predicted dropping out of treatment (Kazdin & Wassell, 2000; Nock & Kazdin, 2001), this finding seems contradictory. However, high levels of stress may strain the capacity of parents to interact with their children in a positive manner, which may result in negative and controlling parenting behavior (Wahler & Dumas, 1989) and may therefore have been an important motivation for parents to participate in the intervention. Results of the present study suggest that a higher threshold of aggressive behavior problems should be established for the screening instrument in selecting families to be offered such an intervention. Besides, in the selection of families, the amount of stress of the parents might be included.

### **Sustained preventive effects of the IY parent program**

In **chapter 5**, we addressed the question whether results found at the one-year follow-up (FU1) evaluation of IY parent training were maintained one year later. Results at two-year follow-up (FU2) demonstrated sustained intervention effects on observed critical parenting. The effect size of observed critical parenting was in the medium range. Furthermore, sustained intervention effects were found on parent reported appropriate discipline, the use of praise and incentives, and on harsh and inconsistent discipline. Effect sizes of parent reported parenting skills were in the medium range at FU1 (Raaijmakers, Posthumus, Maassen, Van Hout, Van Engeland & Matthys, 2009), and became larger over time (in the medium-large range at FU2). With respect to child behavior, sustained intervention effects were found on observed negative child behavior and the effect size was in the medium range. Parents, however, did not report improvements in child behavior. Results of the path model revealed that the decrease in critical parenting at post-intervention due to the IY parent program led to a decrease in negative child behavior two years after termination of the intervention. Additional analyses in which the bidirectional influences of parenting skills and child behavior were investigated revealed that the influence of parenting skills on child behavior increased over time, while the influence of the child's behavior on parenting skills remained weak over time. In addition, the initial level of aggression of the child moderated the sustained intervention effect.

Despite the fact that parents were highly satisfied with the program directly after the intervention as became clear from the parental evaluations, no difference between IG and CG children on parent reported aggressive behavior were obtained. The absence of a parent reported decrease of the child's aggressive behavior might be due to a difference in willingness to report conduct problems. Indeed, when compared with parents who do not participate in the intervention, parents in the IY parent program learn to observe their child's behavior and to identify their child's problems as goals in the IY parent program (Webster-Stratton, 1998). If families do not receive help, they might be reluctant to acknowledge the child's aggressive behavior, whereas if families do receive help, parents might be more inclined to report on their child's misbehavior at assessments after termination of the intervention. It is of interest to investigate whether effects on parent rated child behavior will emerge later. In order to investigate these 'sleeper effects', long term follow up assessments are required.

The results of the mediation effect, i.e. the association of the decrease of critical statements and the decrease of negative child behavior, are in line with the coercive theory of Patterson (1982), which states that a sequence of interactions based on negative reinforcement maintains aggressive behavior problems in children. Moreover, the path model in which bidirectional influences of parent and child behavior were investigated, showed that parents

gain influence over time; the association of using less critical statements by parents with the decrease of child's negative behavior increases over time, while the influence of child behavior on the parental use of criticism remains weak over time. This supports the effect of the IY parent program, as parents seem to have learned to take over the lead.

Given the strong association between the decrease of critical parenting and the decrease of negative child behavior, a greater emphasis on intervention strategies to decrease the use of critical parenting during early childhood is warranted. Greater reductions in critical parenting could potentially be accomplished by for instance, focusing on anger management of the parents or helping parents to develop a better understanding of the detrimental role of criticism.

The results of the present study are both promising and sobering. They are promising in demonstrating that the IY parent program as an indicated preventive intervention with preschool children with aggressive behavior results in significant improvement in observed negative child behavior two years after termination of the intervention. Next to improvements in child behavior, we found evidence for a causal relationship between parenting skills (i.e., critical statements) and negative child behavior. In addition, the bidirectional model suggests that interactions between parents and children can be changed as a result of the IY parent program. These results highlight the need to address the parents in order to reduce preschool aggressive behavior. The soberness of these results, however, lies in the finding that parents did not report improvements in child behavior.

Whereas it seems important to find the same results on parent reported aggressive behavior as on the observed measure of aggressive behavior, parent ratings are known to be easily influenced by systematic biases to the parents' mood or expectations about intervention effects (Eddy, Dishion & Stoolmiller, 1998). Therefore, direct observational measures are recommended specifically when the parents are the targets of intervention. Moreover, direct observational measures have been shown to be particularly sensitive to change in parent and child behavior (Aspland & Gardner, 2003; Gardner, 2000). Our results are in line with other studies (Brotman et al., 2008; Webster-Stratton, 1998), in which the effectiveness of the intervention was also shown on the direct observation, but not on parent reported measures of aggressive behavior.

### **Cost-effectiveness of the IY parent program**

Since there is a need to determine the economic impact of interventions, we conducted in **chapter 6** a cost-effectiveness analysis of the IY parent program (IY) compared to care as usual (CAU) in preschoolers at risk of a chronic pattern of conduct problems. As became clear from chapter 5, children who received the IY parent program showed significantly

less observed negative child behavior, relative to CAU. Cost-effectiveness analyses were conducted using three different perspectives. Seen from the societal and the parents perspective, the intervention is unambiguously dominant (better effects and cost-saving) over CAU. However, when taking the public authorities perspective, the cost-effectiveness analysis revealed that the net costs per child to reduce the negative child behavior score by one point were € 124.

Sensitivity analyses, performed to assess the robustness of the baseline estimate, revealed that the IY parent program was always dominant from the parents' and the societal perspective. From the public authorities perspective, the sensitivity analyses revealed that net costs to reduce negative child behavior by one point, ranged from € 40 to € 178 and showed that the IY parent program was even cost saving when taking into account children with the most severe aggressive behavior problems. A better effect and larger monetary savings for the group of children with the most severe aggressive behavior problems compared to the total study population, suggests that it is this group that would benefit most from interventions such as the IY parent program. The IY parent program for this group was far more cost-effective than for the total study population. This result is in line with findings of previous studies, in which interventions were only cost-effective in children with most severe conduct problems (Foster, Jones & the Conduct Problems Prevention Research Group, 2006; Edwards, C elleachair, Bywater, Hughes & Hutchings, 2007). This highlights the need for prevention programs targeted at children with most severe aggressive behavior problems and for screening procedures tailored in such a way that the inclusion of a high number of false positives can be avoided.

A major part of the costs in our study can be attributed to the parental loss of productivity due to their child's misbehavior and the damage caused by the child. Both productivity losses and damage caused by the child seem very important and should be considered in future studies into the costs of children with aggressive behavior problems and their parents. The fact that the larger part of the total costs was generated outside the health care sector demonstrates the importance of using a comprehensive societal viewpoint in economic evaluations of interventions for aggressive behavior problems.

In sum, the IY parent program used as an indicated preventive intervention is both cost saving and effective in reducing observed negative behavior, seen from a comprehensive societal perspective. If policy makers in mental health care are willing to invest € 870 per child to improve parenting skills in families with children at risk of a chronic pattern of conduct problems, both the child's negative behavior will be reduced and substantial costs with respect to productivity losses, service use and costs of damage will be saved in the two

years following the intervention. Although the IY and CAU condition did not significantly differ on mean costs of service use, when tested statistically, the future need of mental health, youth, community and educational care of the children and their parents may be reduced or even prevented by providing the IY parent program by age four. With only two-year follow up, the impact of the IY parent program may have been underestimated. Lower needs of medication, mental health, youth, community and educational care of the children and their parents in future years, as well as lower future societal costs associated with the long term effects of aggressive behavior, such as costs of the juvenile justice sector, the loss of employment income, higher rates of substance abuse and the loss of quality of life, e.g. caused by higher divorce rates, may be prevented in children whose parents received the IY parent program. However, these are speculations and a follow up study in adolescence and adulthood is highly needed, in order to be able to demonstrate and quantify the above described effects.

Policy makers and mental health services should balance the extra costs involved with providing the IY parent program with the beneficial effects, i.e. the decrease in negative child behavior and cost-savings at two year follow up in deciding whether or not to roll out this intervention and should bear in mind that the ultimate outcome may be cheaper in the long run.

### **Study characteristics**

The findings of chapters 3, 4 and 5 should be interpreted in the light of some strengths and limitations. None of the parents in the IG dropped out during the intervention, and the attendance rate was remarkably high. This might be due to the recruitment of a highly motivated sample as is also reflected by the low percentage of overall recruited families. All parents who participated in the present studies were relatively highly educated and most families were of Caucasian ethnicity. This might have introduced bias to our results, since children with most severe aggressive behavior problems often come from less educated parents (Côté, Vaillancourt, LeBlanc, Nagin & Tremblay, 2006). On the other hand, this is the first study that proved effectiveness of the IY parent program as an indicated preventive intervention in a relatively highly educated sample. In future interventions studies, efforts should be made to include parents with low educational levels and with non-Caucasian backgrounds, in order to enhance the generalizability of intervention effects. The use of a direct observation in order to measure changes in parent and child behavior is a particular strength of the study, as observations are not distorted by parental perceptions of child behavior (Gardner, 2000) and have proven to be sensitive to changes as a result of the intervention (Brotman et al., 2008; Webster-Stratton, 1998, chapter 5). Another strength of the study is that we conducted relatively long-term assessments, which is necessary to establish solid preventive effects. In order to investigate long-term child aggressive behavior problems, generated

costs and parenting skills, future research should examine the 72 families who received the IY parent program and the 72 families who received care as usual and served as control group again at middle childhood and during adolescence. A limitation is that, although the IY and CAU conditions were matched, the groups significantly differed at pre-intervention on observed negative child behavior. Therefore, there might have been a larger probability of improvement in children from the IY condition. Another limitation is that the observational measure lacks normative data on a comparable sample of typically developing children. As a result, we cannot draw a firm conclusion with respect to the clinical relevance of the effects found on the direct observation.

### **When to intervene?**

Young children are still heavily dependent on their parents for guidance and support (McCart, Priester, Davies & Azen, 2006), and therefore parental behavior has a large impact on child development. For children in the preschool age, deviant peer groups, academic failure and negative reputations have not stabilized, whereas for school aged children, these factors play a key role in maintaining conduct problems. Patterns of parenting skills are more malleable for parents of preschoolers than for parents who have spent years of coping unsuccessfully with a child with conduct problems and oppositionality. We therefore suggest intervening as early as possible.

### **Issues related to screening of at risk children**

In the present study, a relatively low inclusion criterion, i.e., the 80<sup>th</sup> percentile on the Aggressive Behavior Scale of the CBCL) was employed. We used this questionnaire for screening at only one moment in time, filled out by only one informant. It might be that the screening procedure used in this study, led to substantial misclassification and a high number of false positives (Bennett, Lipman, Racine & Offord, 1998). chapter 4 revealed that parents who refused to participate because they indicated that the intervention was not relevant to them, might not have felt the same need for this parent program as parents who agreed to participate, since their children showed less aggressive behavior. Moreover, initial level of aggression appeared to be a moderator of the sustained intervention effect, with children with more severe aggressive behavior problems benefiting most from the intervention. In addition, the cost-effectiveness analysis revealed that the IY parent program was cost-effective from all three perspectives (i.e., society, public authorities and the parents) for children who scored above the 93<sup>rd</sup> percentile of the CBCL aggressive behavior scale. These results suggest that a higher threshold of aggressive behavior problems would have been more appropriate. By using a higher aggression score on the CBCL, e.g. the 93<sup>rd</sup> percentile, the probability of including false positives would have diminished. Moreover, it is questionable whether it is desirable to label children as "at risk", as this can

result in unnecessary feelings of uncertainty among the parents of these children. However, a study by Hill, Lochman, Coie, Greenberg & Conduct Problems Prevention Research Group (2004), describing the screening procedure of the Fast Track study, showed that retrospectively using other screening measures (parent instead of teacher ratings) or using more screening moments, did not improve the positive predictive power. This study clearly demonstrates that accurate screening is, despite the use of multiple raters at multiple moments in time, extremely difficult.

Thus, a key issue for the field is to identify the particular subgroup of children with early signs of externalizing behavior that are at strongest risk for persistent antisocial behavior later in life. More effective and accurate screening of children with aggressive behavior problems can be accomplished by increasing the number of screening moments, as children who show aggressive behavior at subsequent moments in time, are most at risk of developing a chronic pattern of conduct problems (Shaw et al., 2005). Thus, monitoring of at risk children over one or two years might help identifying which children actually belong to the group of children who are at risk of a chronic pattern of conduct problems. Part of the monitoring might be the inclusion of parental stress, as chapter 4 showed that parents who agreed to participate in the IY parent program had high levels of stress and were therefore probably in greater need of an intervention.

### **Is the IY parent program feasible for implementation as a preventive intervention?**

Since the present study suggests sustained intervention effects and cost-effectiveness of the IY parent program in a population based sample of preschool children assumed to be at risk of the development of aggressive behavior, we regard the IY parent program as a promising indicated preventive intervention. We suggest implementation of the IY parent program in easy accessible locations, in order to lower the threshold to seeking help. Well-Baby clinics, community centers, Centers for Youth and Family, and schools may serve as convenient locations to effectively reach the young children and their parents most in need of the intervention (Atkins, Graczyk, Frazier & Abdul-Adil, 2003; Weist, Evans & Lever, 2003). Specifically, we suggest implementing the BASIC curriculum of the IY parent program, and to apply the ADVANCE curriculum of another eight sessions only to parents who indicate they need it. This might lower the threshold for parents who find 18 sessions too demanding and might enhance cost-effectiveness of the IY parent program.

Since research into the effectiveness of interventions in disadvantaged families is needed, a future study into the effectiveness of the IY parent program in those who need help most is planned.

### **Key issues related to the implementation of preventive interventions**

An important question for the future is how to get evidence based programs delivered successfully in real life settings. In such environments attempts to replicate positive results often fail because a program has been adapted or diluted, due to a lack of resources or skills in ways that prevent it from achieving the same outcomes (Mihalic, 2002). Interventions must be implemented with fidelity to the original model to preserve the behavior change mechanisms that made the original model effective (Arthur & Blitz, 2000). The intervention should be offered with all the core components being delivered utilizing the recommended protocols, video vignettes, program dosage and clinical methods for the prescribed number of sessions. Offering fewer than the recommend number of sessions for prevention and treatment populations will result in reduced effectiveness of the IY parent program (Webster-Stratton, 2004).

Implementation of an intervention is enhanced when staff members are sensitive, competent and receive sufficient (time for) training, support and supervision (Lewis, Battistich & Schaps, 1990). Even when group leaders are sufficiently competent, their effectiveness in delivering the IY program with fidelity can be limited by a high case load or limited time for supervision due to limited budgets. We therefore recommend agencies that wish to implement the IY parent program to schedule enough time outside the sessions for group leaders. Group leaders running the groups need adequate time to study the materials, prepare for their sessions, make phone calls to the parents, arrange logistics (food, transportation and day care, if needed) and weekly supervision (Webster-Stratton, 2004). Ideally, agencies who implement the IY parent program should collect baseline and follow up data in order to measure changes in child behavior and parenting skills.

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## Achtergrond en doelstellingen van het onderzoek

Veel mensen maken zich zorgen over de hoeveelheid agressie in onze maatschappij, waarschijnlijk omdat agressie ons een gevoel van onveiligheid geeft. Hoewel agressie beschouwd kan worden als een intrinsiek onderdeel van elke maatschappij, is het niet vreemd dat er veel aan gedaan wordt om agressie te verminderen. Fysieke agressie die zich al bij jonge kinderen openbaart en een persistent hoog niveau kent, heeft namelijk veel nadelige gevolgen. Zo lopen deze kinderen bijvoorbeeld een groter risico op het ontwikkelen van een verslaving, delinquent gedrag, depressie, werkloosheid en relatieproblemen. Daarnaast zorgen kinderen die al vroeg gedragsproblemen vertonen, voor hoge maatschappelijke kosten. Die kosten worden gemaakt in de geestelijke gezondheidszorg, vanwege extra hulp op school, en ook doordat er materiële schade wordt toegebracht (aan bijvoorbeeld meubels of speelgoed) of bijvoorbeeld omdat ouders vanwege de gedragsproblemen van hun kind minder op hun werk aanwezig kunnen zijn, wat leidt tot productiviteitsverlies. In veel landen is de vroege signalering en het voorkomen van gedragsproblemen bij kinderen momenteel een 'hot item'. In Nederland wordt dit zichtbaar in het beleid van het programmaministerie voor Jeugd en Gezin. Er is bepaald dat alle ouders en kinderen voor hulp en met opvoedvragen terecht moeten kunnen bij een herkenbaar en laagdrempelig punt in de buurt, een Centrum voor Jeugd en Gezin.

Gedragsproblemen ontstaan vanuit een wisselwerking tussen de (biologische) kwetsbaarheid van het kind en omgevingsfactoren. Over het algemeen willen kinderen in de peuterpuberteit (tussen het tweede en derde levensjaar; ook wel de nee-fase) graag hun zin doordrijven. Als ouders grenzen stellen worden peuters boos en kan een driftbui het gevolg zijn. Bij een kind met een moeilijk temperament komen driftbuien vaker voor en duren ze langer. Sommige ouders geven dan eerder toe, om een conflict te vermijden. Gebeurt dit steeds, dan leert een kind dat ongewenst gedrag, zoals drammen, schreeuwen, schelden en slaan helpt om zijn zin te krijgen en kan dit gedrag een persistent beloop krijgen. Zowel individuele factoren van het kind zelf als de opvoeding spelen dus een rol bij het ontstaan en in stand houden van agressief gedrag. Uit eerder onderzoek is gebleken dat oudercursussen in opvoedingsvaardigheden het meest effectief zijn om agressief gedrag bij jonge kinderen te verminderen. De Incredible Years oudercursus is een programma waarnaar, door zowel de ontwikkelaar van het programma als door onafhankelijke onderzoeksgroepen, veel onderzoek gedaan is. Uit deze studies bleek deze oudercursus een effectieve behandeling te zijn voor kinderen met ernstige gedragsproblemen. Het staat echter nog niet vast of de Incredible Years oudercursus ook een preventief effect heeft, dat wil zeggen of de interventie ook werkt bij kinderen met mildere gedragsproblemen voordat ouders zelf hulp hebben ingeschakeld, opdat ernstige gedragsproblemen in de toekomst kunnen worden voorkomen.

Tijdens de Incredible Years oudercursus leren ouders het gedrag van hun kind te beïnvloeden. De onderwerpen die tijdens de cursus aan de orde komen zijn prijzen, grenzen stellen, duidelijke opdrachten geven, negeren en het geven van een time-out. Deze onderwerpen worden besproken aan de hand van videofragmenten, rollenspellen en een cursusboek met theorie. Belangrijk is dat ouders leren dat zij door hun eigen gedrag te veranderen, zelf invloed kunnen uitoefenen op het gedrag van hun kind.

Gezien de nadelige gevolgen van agressief gedrag bij jonge kinderen en de hoge kosten die dit met zich meebrengt voor de maatschappij, is er behoefte aan onderzoek naar factoren die een rol spelen bij het ontstaan en in stand houden van agressief gedrag bij jonge kinderen. Omdat er een groot aantal interventies voorhanden is die allemaal het doel hebben gedragsproblemen van kinderen te verminderen, is het belangrijk de effectiviteit van de verschillende interventies en of ze ook zorgen voor kostenbesparingen, te onderzoeken. Doelstellingen van de studies die zijn beschreven in dit proefschrift waren het onderzoeken van twee factoren die samenhangen met agressief gedrag (autonome arousal en sociale informatie verwerking) en het onderzoeken van het preventieve effect en de kosteneffectiviteit van oudercursus Incredible Years twee jaar na afloop van de interventie bij kinderen die het risico lopen op het ontwikkelen van gedragsproblemen.

### Belangrijkste bevindingen

In **hoofdstuk 2** beschrijven we de studie naar de autonome arousal van kleuters met agressief gedrag. Uit eerder onderzoek is naar voren gekomen dat een lage autonome arousal vaak voorkomt bij kinderen en adolescenten met agressief gedrag, maar ook bij personen met psychopathische kenmerken. In onze studie hebben we de autonome arousal van vierjarige kinderen met agressief gedrag of met een oppositioneel opstandige gedragsstoornis (ODD) of gedragsstoornis (CD) vergeleken met de autonome arousal van kinderen zonder agressief gedrag. Als indicatoren van autonome arousal zijn zowel de hartslag en huidgeleiding in rust als de hartslag en huidgeleiding in reactie op stimuli gemeten, terwijl de kinderen keken naar een filmpje van Bob de Bouwer. We verwachtten dat de kinderen met agressief gedrag en met ODD/CD een lagere hartslag en huidgeleiding in rust en in reactie op stimuli zouden hebben dan kinderen zonder agressief gedrag. De belangrijkste bevinding van deze studie was dat vierjarige kinderen met agressief gedrag een lagere huidgeleiding in rust en in reactie op stimuli hadden dan de kinderen zonder agressief gedrag. Ook bleek dat de kinderen met een ODD/CD diagnose een lagere huidgeleiding in rust hadden dan de kinderen zonder agressief gedrag. Kinderen met agressief gedrag en de kinderen met een ODD/CD diagnose verschilden niet van kinderen zonder agressief gedrag op hartslag in rust en in reactie op stimuli. Dit onderzoek laat zien dat een verlaagde huidgeleiding in rust en in reactie op stimuli al samenhangt met agressief gedrag op jonge leeftijd. Hoewel

de betekenis van dit resultaat nog onduidelijk is, valt hierover wel te speculeren. Als we aannemen dat een verlaagde huidgeleiding in rust en in reactie op stimuli samenhangt met ongevoeligheid voor straf, zoals in eerder onderzoek gesuggereerd is, dan lopen kinderen met een verlaagde huidgeleiding het risico op problemen in hun socialisatie, onder andere doordat zij ongevoeliger zijn voor negatieve feedback.

In **hoofdstuk 3** beschrijven we de studie naar de intentie toekenning (het inschatten van de bedoeling van iemand anders) van vierjarige kinderen met agressief gedrag in vergelijking met vierjarige kinderen zonder agressief gedrag. Kinderen met agressief gedrag blijken de bedoeling van anderen vaak als vijandig te interpreteren. Dit wordt ook wel vijandige intentietoekenning genoemd. Omdat uit onderzoek is gebleken dat vijandige intentietoekenning maar een klein deel van agressief gedrag bij kinderen verklaart, is het belangrijk ook onderzoek te verrichten naar andere factoren, zoals het vermogen van kinderen om bedoelingen van anderen in te schatten als 'per ongeluk'. Het vermogen om een situatie en gedrag van anderen goed in te schatten wordt mogelijk beïnvloed door het vermogen impulsen te kunnen inhiberen. Daarom hebben wij onderzocht of kinderen met agressief gedrag de bedoelingen van een ander anders inschatten dan kinderen zonder agressief gedrag. Dit is onderzocht door de kinderen verhaaltjes voor te lezen waarbij ze zich moesten voorstellen dat zij de hoofdpersoon in het verhaal waren. De verhaaltjes waren allemaal zo opgesteld dat het mogelijk was de bedoeling van de ander zowel als 'vijandig' als als 'per ongeluk' te interpreteren. Het vermogen om impulsen te kunnen inhiberen (inhibitie) werd gemeten met een aantal neuropsychologische computertaken. Om te onderzoeken of inhibitie en intentie toekenning onafhankelijke factoren zijn die beide een deel van agressie op jonge leeftijd verklaren, of dat er sprake is van een interactie tussen beide factoren, werd een padmodel gemaakt. Uit de resultaten bleek dat de kinderen met agressief gedrag minder goed in staat waren hun impulsen te inhiberen dan kinderen zonder agressief gedrag. Ook bleek dat de kinderen met agressief gedrag de bedoelingen van anderen minder vaak als per ongeluk interpreteerden. Een verklaring hiervoor kan zijn dat vierjarige kinderen die zich normaal ontwikkelen al begrijpen dat bepaalde dingen met negatieve gevolgen per ongeluk gebeuren, terwijl de kleuters met agressief gedrag het nog lastig vinden om situaties waarin de bedoeling van een ander niet direct duidelijk is, goed te interpreteren. Het is mogelijk dat kleuters met agressief gedrag nog niet in staat zijn te begrijpen dat anderen iets per ongeluk kunnen doen. Uit de analyses met het padmodel bleek dat inhibitie een grotere rol speelt in de verklaring van agressie dan intentietoekenning bij kinderen op deze jonge leeftijd.

Vragen die opkomen naar aanleiding van de resultaten van deze studie zijn of het mogelijk is om deze vaardigheden bij kleuters goed te meten en, misschien wel belangrijker, of deze vaardigheden te beïnvloeden zijn. Naar ons idee zijn juist vaardigheden als

'perspectiefname' en 'beurt verdelen' vaardigheden die aangeleerd (dienen te) worden tijdens de kleuterleeftijd. Die vaardigheden, die ook vereisen dat kinderen de bedoeling van de ander goed kan inschatten, zouden juist voor kinderen met agressief gedrag erg moeilijk kunnen zijn en vormen daarom een belangrijk onderwerp voor toekomstig onderzoek.

In de studies beschreven in dit proefschrift, werden ouders van kinderen die hoog scoorden op agressie, uitgenodigd om deel te nemen aan de preventieve interventie, met als doel het agressieve gedrag te verminderen. De interventie betrof de oudercursus Incredible Years, die bestond uit een BASIC gedeelte (12 sessies) en een ADVANCE gedeelte (6 sessies). Uiteraard stond het ouders vrij om deelname te weigeren. In **hoofdstuk 4** rapporteren we over de redenen van weigering die ouders opgaven om niet mee te doen aan de Incredible Years oudercursus. De redenen die ouders voor hun weigering, zijn geregistreerd en gescoord aan de hand van het *barriers-to-treatment* model. Vervolgens zijn de families die wel wilden meedoen aan de interventie, vergeleken met de families die niet mee wilden doen aan de interventie aan de hand van de stress scores van de primaire opvoeder en de emotionele en gedragsproblemen van het kind. Het doel van deze studie was om meer zicht te krijgen in redenen van ouders om een interventie te weigeren. Dit zou er mogelijk voor kunnen zorgen dat gezinnen met een kind met gedragsproblemen in de toekomst op een passende manier kunnen worden benaderd om mee te doen aan een dergelijke interventie.

Uit dit onderzoek kwam een aantal interessante bevindingen naar voren. Zo bleek dat de belangrijkste reden van ouders om deelname aan de interventie te weigeren was dat ze de interventie *niet relevant* achtten. Ouders gaven bijvoorbeeld aan dat het wel meeviel met de gedragsproblemen van hun kind. Deze ouders hebben deelname aan de oudercursus waarschijnlijk terecht geweigerd, gezien het feit dat de kinderen van deze ouders significant lager op agressie scoorden dan kinderen van de ouders die wel wilden deelnemen aan de interventie. Een andere reden voor weigering was dat ouders de interventie te *intensief* vonden. Ouders gaven bijvoorbeeld aan dat ze de duur van de interventie (18 sessies) te lang vonden. Verder bleek dat ouders ook praktische redenen hadden om deelname te weigeren. Een aantal ouders wilde bijvoorbeeld aanvankelijk wel deelnemen aan de interventie, maar de dag en/of tijd kwam niet uit. Aanbevelingen die volgen uit de resultaten van deze studie zijn het optioneel maken van de verlenging van de BASIC cursus met 6 sessies voor die ouders die zelf aangeven er behoefte aan te hebben, en het op verschillende dagen en tijden (dus zowel overdag als 's avonds) aanbieden van de oudercursus.

Ouders die aangeven wel deel te willen nemen aan de interventie bleken een hoger stressniveau te hebben dan ouders die deelname hadden geweigerd. Hun hogere stressniveau en de daarmee mogelijk samenhangende verminderde draagkracht, zouden een belangrijke

motivatie kunnen zijn geweest om deel te willen nemen aan de interventie. De resultaten van deze studie geven aanleiding om te pleiten voor een hogere drempelwaarde van agressief gedrag bij screening van kinderen die het risico lopen op het ontwikkelen van chronische gedragsproblemen. Daarnaast lijkt het ook nuttig het stressniveau van de primaire opvoeder op te nemen als screeningsvariabele.

Het verbeteren van opvoedingsvaardigheden van ouders blijkt de effectiefste methode om agressieve gedragsproblemen van kinderen te verminderen, vooral als de kinderen nog jong zijn. Uit studies naar de effectiviteit van behandelingen voor kinderen met ernstige gedragsproblemen komt de Incredible Years oudercursus als één van de effectiefste programma's naar voren. Of de oudercursus ook werkt bij kinderen met milde gedragsproblemen wanneer ouders nog geen hulp hebben ingeschakeld, is echter nog niet goed onderzocht. In **hoofdstuk 5** wordt de preventieve effectiviteit van de Incredible Years oudercursus onderzocht bij kleuters die het risico lopen gedragsproblemen te ontwikkelen. De 72 kleuters van wie de ouders deelnamen aan de oudercursus, vormden de interventiegroep. Deze kinderen werden, op basis van 6 karakteristieken, individueel gematcht aan 72 kleuters uit de controlegroep, die overigens te allen tijde zelf hulp mocht zoeken (*care as usual*). Om de effecten van de interventie te bepalen werden er voorafgaand aan, direct na, en twee jaar na afloop van de oudercursus, metingen verricht. Ouder-kind interacties werden geobserveerd volgens een gestandaardiseerde methode, om zowel opvoedingsvaardigheden als gedrag van het kind te scoren. Ook vulden ouders vragenlijsten in over hun psychisch welbevinden, het gedrag van hun kind en hun eigen opvoedingsvaardigheden. De resultaten lieten zien dat de opvoedingsvaardigheden van ouders (zowel geobserveerd als door zichzelf gerapporteerd) verbeterd waren. Ook bleek twee jaar na afloop van de interventie dat het geobserveerde negatieve gedrag van de kinderen verminderd was. Ouders en leerkrachten gaven echter aan geen verbeteringen te zien in het gedrag van de kinderen. Bovendien werd een mediatie-effect (oorzakelijk verband) aangetoond; als ouders minder kritiek gaven op hun kind, vermindert dat het negatieve gedrag van hun kind later in de tijd. Uit het model waarin de wederzijdse beïnvloeding van opvoedingsvaardigheden van de ouders en gedrag van het kind werd onderzocht, bleek dat de invloed van ouders op het gedrag van hun kind groter werd naarmate de tijd verstreek. Uit het onderzoek naar welke factoren het effect van de interventie modereren, bleek dat het effect het grootst was voor kinderen met een hoog initieel niveau van agressie.

Dat ouders geen verbeteringen zien in het gedrag van hun kind kan liggen aan het feit dat ouders door deelname aan de interventie geleerd hebben om heel goed en bewust te kijken naar het gedrag van hun kind, waardoor mild agressief gedrag meer kan opvallen. Ook is het mogelijk dat ouderlijke waarneming minder snel verandert dan kindgedrag als gevolg

van de vaststaande cognities die ouders hebben over hun kind. Om te onderzoeken of ouders later wel verbeteringen in het gedrag van hun kind rapporteren, is het van belang om deze kinderen longitudinaal te volgen.

Het lijkt belangrijk om het resultaat dat gevonden wordt op de observatie, ook te vinden op de ouderrapportage. Daar valt echter een kanttekening bij te plaatsen. Wanneer ouders zelf moeten rapporteren over hun kind of hun eigen opvoedingsvaardigheden, bestaat het risico dat zij beïnvloed worden door hun eigen gevoel en verwachtingen over bijvoorbeeld de voortgang van het gedrag van hun kind, nadat zij veel tijd geïnvesteerd hebben in de oudercursus. Daarom wordt aangeraden veranderingen die men door interventies wil bewerkstelligen, 'objectief' te meten met directe observaties.

Samengevat kan gesteld worden dat de resultaten van deze studie naar de preventieve effectiviteit van oudercursus Incredible Years veelbelovend zijn. Twee jaar na afloop van de interventie blijkt geobserveerd negatief gedrag van kinderen die het risico lopen ernstige gedragsproblemen te ontwikkelen, te zijn verminderd. Ook blijkt dat ouders als gevolg van de interventie minder kritiek geven op hun kinderen, wat weer tot gevolg heeft dat de kinderen minder negatief gedrag laten zien. Ook blijkt dat ouders naarmate de tijd vordert, meer invloed krijgen op het gedrag van hun kind. Deze resultaten geven aanleiding om te verwachten dat het inderdaad de ouders zijn tot wie we ons moeten richten als we probleemgedrag bij jonge kinderen willen verminderen.

In **hoofdstuk 6** rapporteren we over de kosteneffectiviteit van oudercursus Incredible Years, een studie die tegelijk met de effectstudie werd uitgevoerd. Voor beleidsmakers, maar bijvoorbeeld ook voor verzekeraars is het belangrijk om te weten welke interventies waar voor het te investeren geld geven. In veel economische evaluaties worden alleen interventiekosten geregistreerd. Omdat is gebleken uit eerder onderzoek dat bijvoorbeeld ook de ouders zelf en de werkgever veel kosten dragen die door kinderen met agressief gedrag gemaakt worden, vonden wij het belangrijk om ook die kosten te laten registreren. Ouders werd direct na afloop van, een jaar en twee jaar na afloop van de interventie gevraagd om een uitgebreide vragenlijst in te vullen over hulpverleningsconsumptie (van zichzelf en hun kind), de materiële schade die het kind had toegebracht, en over de hoeveelheid dagen die van werk gemist werden als gevolg van gedragsproblemen van het kind. Uit de resultaten bleek dat oudercursus Incredible Years niet alleen betere effecten heeft dan de 'care as usual' die de controlegroep ontving, maar ook kostenbesparingen met zich meebrengt. Die kostenbesparingen waren relatief groter in de subgroep van kinderen met het meest agressieve gedrag. Verder bleek het merendeel van de kosten die de families maakten, gegenereerd te worden door productiviteitsverliezen van ouders en de materiële schade veroorzaakt door

de kinderen. Een aanbeveling voor toekomstige economische evaluaties is dan ook om juist die kosten te registreren.

Ook zou het zo kunnen zijn dat verdere kosten met betrekking tot de nadelige lange termijn gevolgen zoals delinquentie, werkloosheid, verslaving en een vermindering van kwaliteit van leven, te voorkomen zijn door het inzetten van de Incredible Years oudercursus op deze jonge leeftijd. Om te onderzoeken of dat daadwerkelijk zo is, dienen er lange termijn follow up studies te worden verricht.

Beleidsmakers en instellingen voor de geestelijke gezondheidszorg zullen moeten bepalen of de investering in de aanschaf van de interventie opweegt tegen de vermindering in negatief gedrag en de kostenbesparingen die optreden twee jaar na afloop van de interventie.

In **hoofdstuk 7** zijn de belangrijkste bevindingen van de studies samengevat. Ook zijn de resultaten in het licht van de beperkingen van het onderzoek bediscussieerd en wordt een aantal aanbevelingen gedaan voor toekomstig onderzoek. Daarnaast zijn de klinische implicaties met betrekking tot de screening van kinderen die het risico lopen op het ontwikkelen van ernstige gedragsproblemen en de implementatie van de Incredible Years oudercursus besproken.

### **Sterkten en beperkingen van het onderzoek**

In de verschillende hoofdstukken van dit proefschrift worden de beperkingen van de studies en de consequenties daarvan voor de interpretatie van de resultaten besproken. Een sterkte van de studie is dat geen van de ouders is uitgevallen tijdens de interventie. De grote motivatie om mee te doen zou hiervoor een verklaring kunnen zijn. Andere sterke kanten van het onderzoek zijn het gebruik van een directe observatie en het verrichten van relatief lange termijn metingen. Een beperking van de studie is het feit dat ouders hoog opgeleid waren, wat generalisatie van de bevindingen naar lager opgeleide families bemoeilijkt. Een andere beperking is dat de interventie en de controlegroep significant van elkaar verschilden op geobserveerd negatief kindgedrag op de voormeting. De interventiegroep scoorde hoger dan de controlegroep en had daarom een grotere kans om te dalen. Verder bestaan er geen normeringsdata over de directe observatie, wat het lastig maakt om een uitspraak te doen over de klinische relevantie van de gevonden daling in geobserveerd negatief kindgedrag.

### **Klinische implicaties**

Screening van 'at risk' kinderen

Om de kinderen voor deelname aan dit onderzoek te selecteren werd een relatief laag inclusie criterium gebruikt, namelijk het 80<sup>e</sup> percentiel op de agressieschaal van de CBCL

(gedragsvragenlijst). Uit hoofdstuk 4 bleek dat ouders die niet mee wilden doen aan de interventie, kinderen hebben met een lagere agressiescore en dat zij zelf een minder hoog stressniveau hadden. Uit hoofdstuk 5 bleek dat juist de kinderen die een hoge agressiescore hadden bij aanvang van het onderzoek het meest profiteerden van de aangeboden interventie, en uit hoofdstuk 6 bleek dat bij de groep kinderen die boven het 93<sup>e</sup> percentiel op de CBCL agressieschaal scoorde, een grotere kostenbesparing kon worden bereikt. Deze bevindingen geven het belang aan om juist de kinderen die hoog scoren op agressie uit te nodigen voor deze interventie.

Wel moeten we ons afvragen of het wenselijk is om kinderen aan te merken als 'at risk', omdat dit tot gevoelens van onzekerheid bij ouders kan leiden (omdat hun kind een 'sticker opgeplakt' krijgt). Uit eerder onderzoek is echter gebleken dat het ontwerpen van een screeningsprocedure die over voldoende positieve voorspellende waarde beschikt, zelfs als er meer informanten op verschillende meetmomenten worden ingezet, moeilijk is.

Het is belangrijk om juist die kinderen 'te pakken te krijgen' die al vroeg probleemgedrag vertonen, maar die ook het grootste risico lopen op het ontwikkelen van persistent antisociaal gedrag. Een effectievere en accurate manier van screenen zou bewerkstelligd kunnen worden door kinderen die op een aantal opeenvolgende momenten hoog scoren op agressie, te monitoren. Ook factoren als ouderlijke stress en draagkracht zouden als screeningsfactoren kunnen worden opgenomen.

Is Incredible Years een geschikte interventie om te implementeren?

Omdat uit de studies die zijn beschreven in dit proefschrift is gebleken dat kinderen als gevolg van de interventie een afname van geobserveerd negatief gedrag laten zien, en omdat de kosteneffectiviteit van het programma is aangetoond, beschouwen wij oudercursus Incredible Years als een veelbelovende interventie. Wij raden aan om de interventie te implementeren op gemakkelijk bereikbare locaties, zoals consultatiebureaus, buurtcentra, het Centrum voor Jeugd en Gezin of scholen. Gezien het feit dat een aantal ouders duidelijk aangaf niet deel te willen nemen aan de interventie omdat 18 sessies te veel was, raden wij aan het tweede deel van de cursus, het ADVANCE gedeelte, voor ouders optioneel te maken. Het standaard Incredible Years ouderprogramma bestaat dan uit 12 sessies. De effectiviteit van het aanbieden van deze 12 sessies (het BASIC gedeelte van de cursus) alleen is overigens veelvuldig bewezen. Dit zal wellicht meer ouders over de streep trekken om deel te nemen, en ook een gunstig effect hebben op de kosteneffectiviteit.

Het is een uitdaging om evidence based programma's ook op een goede manier in de klinische praktijk te implementeren. Uit onderzoek is gebleken dat het lastig is om dezelfde

positieve resultaten te behalen die eerder in onderzoeksettings werden aangetoond. Het is belangrijk dat interventies uitgevoerd worden op de manier zoals ze bedoeld zijn. Dat betekent dat er volgens de handleiding gewerkt dient te worden, dat alle videofragmenten getoond moeten worden, in het aantal sessies dat ervoor staat en dat de groepstrainers voldoende tijd krijgen voor voorbereiding en supervisie.

Het is wenselijk dat praktijkinstellingen die oudercursus Incredible Years implementeren, een meting voorafgaand aan en tenminste één meting na de interventie verrichten, opdat veranderingen in opvoedingsvaardigheden en kindgedrag kunnen worden gemeten.

## Publications

De Wied, M., Van Boxtel, A., **Posthumus, J.A.**, Goudena, P.P. & Matthys, W. (2009). Facial EMG and heart rate responses to emotion-inducing film clips in boys with disruptive behavior disorders. *Psychophysiology*, 46, 996-1004.

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**Posthumus, J.A.**, Orobio de Castro, B., Raaijmakers, M.A.J. & Matthys, W. Accidental and hostile intent attribution and inhibition in preschool children with and without aggressive behavior problems. Submitted.

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Raaijmakers, M.A.J., **Posthumus, J.A.**, Van Hout, B., Van Engeland, H. & Matthys, W. Cross-sectional study into the costs and impact on family functioning of 4-year-old children with aggressive behavior. Submitted.

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**Dankwoord**

A single thread can't make a cord,

nor a single tree a forest

Hoe af het op dit moment ook lijkt, een proefschrift zou in zekere zin als onvoltooid kunnen worden beschouwd. Want waar eindigt de tocht van de onderzoeker? Het voelt alsof er nog een heleboel te onderzoeken, te analyseren en te beschrijven valt. Voor nu echter, zijn 5 jaar onderzoek samengevat in 5 artikelen. Die waren er alleen niet gekomen zonder toegewijde promotoren, enthousiaste mede-auteurs, alle kinderen en hun ouders en zeker ook zij die zorgden voor de balans; vrienden en familie. Daarom ook **dank, dank, duizend maal dank**, aan al diegenen die hebben bijgedragen aan het tot stand komen van mijn proefschrift.

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## Jocelyne



## Curriculum Vitae

Jocelyne Posthumus werd geboren op 2 december 1979 in Asperen. In 1998 deed zij eindexamen VWO op het Sint Gregorius College in Utrecht. Daarna begon zij met de studie Orthopedagogiek aan de Universiteit Utrecht. Haar afstudeerstage liep zij op buitenkliniek Vosseveld, een kinderpsychiatrische behandelsetting voor kinderen met gedragsstoornissen, waar zij psychodiagnostisch onderzoek verrichtte. Haar afstudeeronderzoek verrichtte Jocelyne ook op Vosseveld, dit betrof een onderzoek naar empathie bij kinderen met gedragsstoornissen. Na haar afstuderen in 2003 werkte zij in een weeshuis en gaf zij les op een kleuterschool in Ghana. In juni 2004 startte zij met het promotieonderzoek op de afdeling kinder- en jeugdpsychiatrie van het UMC Utrecht, waarvan de resultaten in dit proefschrift zijn beschreven. Tijdens dit promotietraject behaalde Jocelyne haar certificatie als groepstrainer in het Incredible Years ouderprogramma. In mei 2007 was zij in Ghana om een kleuterschool te bouwen. Vanaf de zomer van 2007 is zij voor een dag in de week werkzaam bij het project Betere Start van de sectie Ontwikkelingspsychologie van de Universiteit Utrecht. In het kader van dit project geeft zij de Incredible Years oudercursus aan (ex-) gedetineerde moeders en geeft zij hen individuele thuisbegeleiding. Voorts werkt Jocelyne als secretaris bij Kind en Adolescent, tijdschrift voor pedagogiek, psychiatrie en psychologie. Na de verdediging van dit proefschrift zal zij gaan werken bij De Waag, centrum voor ambulante forensische psychiatrie, en in 2010 start zij met de opleiding tot gezondheidszorgpsycholoog.



Opvoedingsvaardigheden van ouders spelen een rol in het ontstaan en in stand houden van agressief en opstandig gedrag bij jonge kinderen. Deze opvoedingsvaardigheden kunnen worden verbeterd door oudercursussen. Onderzocht is of oudercursus Incredible Years ook werkt bij kinderen met milde gedragsproblemen voordat ouders hiervoor zelf hulp hebben ingeschakeld. Uit eerder onderzoek bleek dat deze oudercursus een effectieve behandeling is voor kinderen met ernstige gedragsproblemen. Ook is bekeken of het inzetten van de interventie leidt tot een vermindering van kosten voor de maatschappij.

Twee jaar na afloop van de oudercursus blijken de kinderen minder agressief gedrag te laten zien. Bovendien toont de studie een mediatie-effect aan; agressief gedrag vermindert als ouders minder kritiek geven op hun kind. Daarnaast leidt het inzetten van oudercursus Incredible Years op jonge leeftijd tot kostenbesparingen voor de maatschappij.

Omdat de oudercursus het meest effectief is en de kostenbesparingen het grootst zijn bij die kinderen die het meest agressieve gedrag lieten zien, wordt aangeraden om kinderen goed te screenen alvorens gezinnen uit te nodigen voor deelname aan deze preventieve interventie.