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**EFFICACY AND PREDICTORS OF OUTCOME IN  
PARENT TRAINING INTERVENTIONS FOR CHILDREN  
WITH CONDUCT PROBLEMS**

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## ABSTRACT

Aggressive and disruptive behaviors in childhood are one of the most common reasons for referral to child psychiatric clinics and are predictive of a range of negative health outcomes later in life. The present thesis comprises four studies of parent training (PT) interventions targeting conduct problems (CP) in children aged 3 to 12. The main objectives were to evaluate issues pertaining to short- and long-term effects, dissemination modalities (Internet-based and face-to-face delivery) and predictors of change. Study I was a randomized controlled trial including parents of 104 children who were allocated to either an Internet-based PT program or a waitlist condition. At post-test, intervention families had improved significantly in parent-reported child CP and parenting practices, compared with waitlist families. Between-group effects sizes were in the moderate range for CP reductions, i.e., similar to effects commonly reported in meta-analyses of face-to-face PT programs. Study II concerned prediction of outcome for intervention families in the study-I sample. Results showed that children with elevated levels of callous-unemotional (CU) traits benefitted less from the Internet-based PT program, compared with low-CU children, despite the fact that parents of high-CU children reported increased use of positive/praiseful parenting, as well as decreased use of harsh parenting, following participation in the Internet-based PT program. Study III employed an 18-month follow-up of intervention families (from the study-I sample) showing further improvements of child CP and mostly maintenance of treatment gains in other domains (e.g., hyperactivity and prosocial behaviors). Within the same study, associations between homework compliance and outcomes were investigated. Results indicated that higher parental engagement in homework tasks related to conflict management (ignoring misbehavior and time out) was associated with greater reductions of child CP, compared to less engagement in homework assignments. Study IV compared the effectiveness of four group-based PT programs (Comet, Incredible years, Cope and Connect), including behavioral as well as non-behavioral interventions, at a 2-year follow-up. Participants were parents of 749 children who had been randomly allocated to one of the PT programs. At follow-up, children in all four conditions had improved to a similar extent with regard to child CP, hyperactivity and inattention problems, when controlling for baseline severity and age differences. A comparison of change rates, from baseline to the 2-year follow-up indicated that children in behavioral programs were reported to have more rapid reductions of problems during the course of the intervention, compared with children in the non-behavioral program. During the 2-year follow-up period, however, participants in behavioral programs were mostly characterized by maintenance of previous treatment gains, whereas participants in the non-behavioral program continued to improve. In conclusion, the current thesis provides support for the short- and long-term efficacy of an Internet-based PT program, suggesting that online dissemination of interventions targeting child CP could be an alternative to face-to-face PT. The findings also highlights the predictive role of child CU traits in PT programs, emphasizing the need for different treatment approaches, for the subgroup of children who present with a combination of CP and CU traits. The current thesis also provides support for the long-term effectiveness of four group-based PT programs, when employed in Swedish routine care settings. This finding should be important for future guidelines and recommendations of PT-program implementation.

## LIST OF PUBLICATIONS

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# TABLE OF CONTENTS

1	INTRODUCTION .....	1
1.1	EPIDEMIOLOGY OF CHILD CONDUCT PROBLEMS.....	2
1.1.1	DEFINITION .....	2
1.1.2	PREVALENCE .....	3
1.2	DEVELOPMENT AND PROGNOSIS .....	4
1.2.1	GENDER DIFFERENCES .....	6
1.3	GENETIC AND ENVIRONMENTAL CAUSES .....	6
1.3.1	CHILD BIOLOGICAL RISK FACTORS .....	7
1.3.2	CHILD FUNCTIONAL RISK FACTORS .....	8
1.3.3	PSYCHOSOCIAL RISK FACTORS.....	9
1.3.4	CONCLUSIONS ON GENETIC AND ENVIRONMENTAL CAUSES .....	12
1.3.5	THE RELEVANCE OF RISK FACTORS TO THE CURRENT THESIS. ....	14
1.4	DELINEATION OF PARENT TRAINING .....	14
1.4.1	DEFINITION AND COMMON FEATURES.....	14
1.4.2	ORIGIN AND DEVELOPMENT .....	15
1.4.3	FACE-TO-FACE PROGRAMS.....	16
1.4.4	SELF-DIRECTED PROGRAMS.....	17
1.5	EFFECTS OF PARENT TRAINING PROGRAMS .....	18
1.5.1	SHORT-TERM EFFECTS OF PARENT TRAINING PROGRAMS .....	18
1.5.2	COMPARING BEHAVIORAL AND NON-BEHAVIORAL PROGRAMS .....	19
1.5.3	SHORT-TERM EFFECTS OF SELF-DIRECTED PROGRAMS.....	20
1.5.4	LONG-TERM EFFECTS OF PARENT TRAINING PROGRAMS .....	21
1.5.5	SUMMARY OF THE EVIDENCE-BASE FOR PARENT TRAINING PROGRAMS .....	22
1.6	PREDICTORS OF PARENT TRAINING EFFICACY .....	22
1.7	LIMITATIONS TO PREVIOUS RESEARCH .....	23
1.8	AIMS OF THE THESIS.....	25
2	SUMMARY OF EMPIRICAL STUDIES .....	26
2.1	STUDY I.....	26
2.1.1	AIMS .....	26
2.1.2	PARTICIPANTS AND PROCEDURE .....	26
2.1.3	OUTCOME MEASURES .....	27
2.1.4	RESULTS.....	28
2.1.5	CONCLUSIONS .....	29
2.2	STUDY II.....	30
2.2.1	AIMS .....	30
2.2.2	PARTICIPANTS AND PROCEDURE .....	30
2.2.3	OUTCOME MEASURES .....	31
2.2.4	RESULTS.....	31

2.2.5	CONCLUSIONS.....	32
2.3	STUDY III.....	33
2.3.1	AIMS .....	33
2.3.2	PARTICIPANTS AND PROCEDURE .....	33
2.3.3	OUTCOME MEASURES .....	33
2.3.4	RESULTS.....	34
2.3.5	CONCLUSIONS.....	35
2.4	STUDY IV.....	37
2.4.1	AIMS .....	37
2.4.2	PARTICIPANTS AND PROCEDURE .....	37
2.4.3	OUTCOME MEASURES .....	38
2.4.4	RESULTS.....	39
2.4.5	CONCLUSIONS.....	41
2.5	ETHICAL ISSUES .....	41
3	GENERAL DISCUSSION .....	42
3.1	INTERPRETATION OF RESULTS.....	42
3.2	IMPLICATIONS OF THE FINDINGS AND FUTURE DIRECTIONS ....	46
3.3	LIMITATIONS .....	48
3.4	CONCLUSIONS .....	48
4	ACKNOWLEDGEMENTS.....	50
5	REFERENCES .....	52

## LIST OF ABBREVIATIONS

ADHD	Attention deficit hyperactivity disorder
APSD	Antisocial process screening devise
ASPD	Antisocial personality disorder
CP	Conduct problems
CD	Conduct disorder
DSM	Diagnostic and statistical manual of mental disorders
EARL	Early assessment risk list
ECBI	Eyberg child behavior inventory
ICC	Intraclass correlation
ICD	International classification of diseases
IYVMT	Incredible years videotape modeling treatment
K-SADS	Schedule for affective disorders and schizophrenia for school-age children
LGM	Latent growth model
MAO-A	Monoamine oxidase A
ODD	Oppositional defiant disorder
OR	Odds ratio
PDR	Parent daily report
PPI	Parenting practices interview
PT	Parent training
RCT	Randomized controlled trial
SDQ	Strength and difficulties questionnaire
SES	Socioeconomic status
SIL	Social interaction learning
SMD	Standardized mean difference
SNAP	Swanson, Nolan And Pelham questionnaire
TPSHP	Triple-P self-help program





# 1 INTRODUCTION

Conduct problems (CP) in childhood (including aggressive, hostile and disruptive behaviors) are one of the most common reasons for referral to child psychiatric clinics (Garland et al., 2001) and are predictive of a range of negative health outcomes later in life, including school-failure, alcohol and drug abuse, poor work outcomes and criminality (e.g., Campbell & Ewing, 1990; Champion, Goodall, & Rutter, 1995). Besides causing suffering to the individual child, their families and peers, CP also constitute a significant burden to society with an estimated ten-fold increase of public-service costs for individuals with these problems, when left untreated (Scott, Knapp, Henderson, & Maughan, 2001). The etiology of CP has been extensively studied and a number of risk factors have been shown to be involved in the development of persistent forms of these behaviors. Particularly, an early onset of severe CP increases the risk for development of long-term antisocial behaviors into adolescence and adulthood (Moffitt, 1993; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996) and adverse parenting seems to fuel this negative developmental trajectory (Dishion & Andrews, 1995; Haapasalo & Tremblay, 1994). The identification of poor parenting practices as a risk factor for childhood CP spurred the development of parent training (PT) programs that aim to provide parents with more positive child-rearing strategies. Most of these programs target parents of children aged 3 - 12, in accordance with the notion that early interventions increase the likelihood of positive outcomes (Webster-Stratton & Taylor, 2001). The majority of PT programs available today are founded on behavioral theory, including operant conditioning and the application of techniques derived from these principles on parent-child interaction (Kazdin, 2005). However, alternative forms of PT programs have also been developed, e.g., based on Adlerian psychotherapy and attachment theory (referred to as non-behavioral PT programs within the framework of the current thesis). While there is considerable empirical support for the effects of behavioral PT programs (e.g., Furlong et al., 2012), less is known about the outcomes of non-behavioral programs (Lundahl, Risser, & Lovejoy, 2006). The current thesis compares long-term treatment effects of behavioral and non-behavioral group-based PT programs.

Attending weekly PT group-sessions at social service centers or at child psychiatric clinics might not be convenient, or even possible, for a lot of parents. Travelling distances, working hours and day-care time limits are some of the barriers to treatment participation that seem to restrict the reach of currently employed face-to-face PT programs (Spoth, Redmond, Hockaday, & Shin, 1996). Self-directed PT interventions, administered online, could be viable and cost-effective alternatives to traditional PT programs. If shown to be effective, such programs could provide early-stage help, as part of stepped-care models, enabling parents of children with less severe CP to get quick access to an intervention. This thesis evaluates the long- and short-term efficacy of an Internet-based PT program, as well as explores predictors of treatment outcome. Across all four studies, the evaluated PT programs target children with CP, aged 3 - 12.

## 1.1 EPIDEMIOLOGY OF CHILD CONDUCT PROBLEMS

### 1.1.1 DEFINITION

CP in childhood relate to a wide array of behaviors including aggressive, hostile, defiant, dishonest and disruptive behaviors (Blissett et al., 2009). In more manifest terms, this could for instance involve hitting, biting, bullying, loosing temper, arguing, disturbing, lying, stealing and truancy. There are a number of overlapping synonyms to CP, in popular speech as well as in the research literature, describing to some extent the same constellation of behaviors, e.g., anti-social behavior (emphasizing acts that may cause damage to the society), externalizing behavior (implying an act directed towards the environment or others) and delinquent behavior (referring specifically to a criminal act). Within the framework of the current thesis, CP do not include the domains of inattention and hyperactivity. Although often co-occurring with CP (Biederman, Newcorn, & Sprich, 1991), they have been reported as correlated but distinct dimensions (e.g., Hinshaw, 1987; Waldman & Lilienfeld, 1991).

CP will in this thesis generally be conceptualized as a continuous, rather than as a dichotomous construct. Albeit, in clinical contexts, it is common to use the diagnostic categories of oppositional defiant disorder (ODD) and conduct disorder (CD). ODD refers to a set of criteria indicating a repetitive pattern (6 months or more) of child behavior that violates societal norms and the basic rights of others whereas CD is indicated by a persistent pattern (12 months or more) of hostile and defiant behavior, as described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013). To obtain a DSM-V diagnosis of ODD, a child needs to fulfill at least 4 out of 8 criteria, e.g., "Often loses temper", "Often deliberately annoys people" or "Is often spiteful or vindictive" to a degree that extends beyond what is considered age appropriate. The CD diagnosis comprise a list of 15 more severe criteria, e.g., "Often initiates physical fights", "Has deliberately engaged in fire setting with the intention of causing serious damage" or "Has broken into someone else's house, building or car", requiring presence of at least 3 criteria. A CD diagnosis in DSM-V is classified into two subtypes, with childhood or adolescent onset, referring to whether the symptoms appeared before or after age 10. As opposed to in the previous version of the Diagnostic and Statistical Manual of Mental Disorders (DSM IV; American Psychiatric Association, 1994), the recently published DSM-V (American Psychiatric Association, 2013) includes an additional specifier for individuals with limited prosocial emotions. This specification is intended for children who persistently lack remorse or empathy and who exhibit shallow affect (commonly summarized as callous-unemotional traits).

A categorical system such as the diagnostic one has several benefits, for instance by facilitating identification of patient groups who can be studied in research and treated in clinics, as well as by easing identification of prevalence rates and other public health factors (e.g., mortality) (American Psychiatric Association, 2013). However, dichotomizing individuals into separate entities (with or without a diagnosis) is associated with problems related to misclassification and a sometimes wide heterogeneity of symptoms among individuals with the same diagnosis (Costello, 1992). Studying CP as a continuum has the advantage of retaining the variation of

severity that would otherwise be lost when imposing a diagnostic cut-off point (Hinshaw, Lahey, & Hart, 1993) and, furthermore, it has been shown that a dimensional measure of CD symptoms is a better predictor of a future outcome, compared to a categorical classification into CD/no CD (Fergusson & Horwood, 1995). In the current thesis, CP will be mostly utilized and discussed as a continuous dimension and when ODD or CD diagnoses are described it will be explicitly stated.

### 1.1.2 PREVALENCE

Estimations of prevalence, or frequency of occurrence, of symptoms and disorders require specifications of the study population (e.g., healthy or clinical samples), time-frames investigated (e.g., point-, 6-month or life-time prevalence), geographical regions explored and methods of assessment (e.g., DSM-IV or ICD-10 criteria), as the findings tend to be influenced by these variables (Lahey, Miller, Gordon, & Riley, 1999). These prerequisites and conditions are more often met in prevalence studies of ODD and CD diagnoses, than in studies reporting on CP behaviors as continuous variables. However, studies of the latter type may provide relevant information regarding the normal course of child development.

#### 1.1.2.1 OCCURRENCE OF CONDUCT PROBLEMS

Some CP related behaviors are normative during child development. For instance, physical aggression has been described to reach its highest frequency somewhere between the ages 2 to 4 for most humans (Tremblay, 2010), given that toddlers commonly use physical aggression to fulfill needs that can not yet be verbalized (Björkqvist, Lagerspetz, & Kaukiainen, 1992). In a cross-sectional study including 19,850 children (aged 1.5 to 5 years), from 24 geographical regions across the world, parents responded to the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). In this normative sample, 7% of children were described as "often disobedient" and 57% as "sometimes disobedient"; 19% of children required that "demands must often be met immediately" and 50% required that "demands must sometimes be met immediately" (Rescorla et al., 2011). In the Dunedin Multidisciplinary Health and Developmental Study ( $N = 1037$ ), mother-reports showed that 4.9% of the assessed 3-year olds were rated as "a very difficult child to manage" (McGee, Partridge, Williams, & Silva, 1991). Furthermore, a study using data from the National Longitudinal Study of Children and Youth ( $N = 22,813$ ) in Canada reported 6-month prevalence rates of antisocial behavior in boys aged 4 to 7. Parent-reports indicated that 21.9% of the children "physically attacks people" and that 4.9% "steal at home" (Offord, Lipman, & Duku, 2001). The common denominator in these studies seems to be that there is a lower proportion of children (5 - 20%) who during childhood exhibit CP related behaviors to an extent that goes beyond what might be considered age appropriate, and who thereby places a heavy burden on the parents.

#### 1.1.2.2 OCCURRENCE OF ODD AND CD DIAGNOSES

A British national survey (Ford, Goodman, & Meltzer, 2003), investigating occurrence of ODD using DSM-IV diagnostic criteria, reported a point prevalence rate of 2.31% among a population of 10,438 children aged 5 to 15. Divided into gender groups, the

rates were 3.24% (boys) and 1.39% (girls). Divided into age groups, the rates were 2.65% (age 5 to 7), 2.80% (age 8 to 10), 2.31% (age 11 to 12) and 1.43% (age 13 to 15). The DSM-V (American Psychiatric Association, 2013) summarizes the prevalence rates of ODD found in different studies, describing a mean of 3.3% with a range from 1% to 11%. The disorder is described to be somewhat more common among boys than girls in childhood (ratio 1.4:1), but probably more evenly distributed in adolescence.

A systematic review exploring the global point prevalence of CD found rates of 3.6 % (boys) and 1.5 % (girls) for children aged 5 - 19, with no significant variation across different regions of the world (Erskine et al., 2013). This review included 25 studies investigating community, regional or national samples, all utilizing either DSM or ICD diagnostic criteria. The DSM-V (American Psychiatric Association, 2013) reports that the one-year population prevalence of CD has a median of 4%, ranging from 2% to more than 10% between studies, with higher rates among boys than girls, and with rising rates from childhood to adolescence.

## 1.2 DEVELOPMENT AND PROGNOSIS

Development of psychopathology, through the course of life, has been a topic of interest for a long time. Bengt Carl Rodhe, a Swedish teacher and textbook writer, provided an illustration (Figure 1) in his *The new reader for infant schools*, of two diverging developmental trajectories, from childhood to old age (Rodhe, 1886), fundamentally capturing the essence of developmental psychopathology. Namely, to study the mechanisms (involving genetic and various environmental factors) that cause developmental pathways to diverge toward typical or pathological outcomes.



Figure 1. Diverging developmental trajectories (from Rodhe, 1886)

1. "The child: What is to become of it?"
2. "The school / the street"
3. "Continued education / drunkenness"
4. "Successful career / vices and misery"
5. "Honorable aging / contempt and beggary"

During the very first infant years, disruptive behaviors (e.g., hitting and biting) would

best be described as universal, i.e., so common that they represent the norm for this age group. Eventually though, the vast majority of children learn more socially adaptive behaviors through interaction with the environment (Tremblay, 2010). Of particular interest is what happens during the following childhood years, when some children start to engage in more persistent patterns of CP that are not considered age appropriate, while most others remain on a path of mostly adaptive and benign functioning. One of the predominant theories on CP development, from childhood to adulthood, suggests that the chronology of onset has much impact on the later developmental trajectory. An early age of onset in childhood has been described to predict a life-course persistent pattern of CP and psychopathology, whereas a later onset point, during adolescence, has been found to predict a temporary period of CP with discontinuation after adolescence (Lahey et al., 1998; Moffitt, 1993; Moffitt, et al., 1996; Tolan & Thomas, 1995). The two groups are referred to as the *early onset - life-course persistent* group and the *adolescence-limited* group. Only a small proportion (5 - 10%) of the population is expected to follow the life-course persistent trajectory (Laub & Sampson, 2003; Moffitt & Caspi, 2001) but the advantage of being able to identify such a group and, possibly, to provide preventive interventions at an early stage would be of great importance. The generally broad support for this theory and taxonomy during the early 1990s spawned the incorporation of a subtype classification related to age of CP onset into the DSM-IV (American Psychiatric Association, 1994) CD diagnosis (Loeber, Burke, Lahey, Winters, & Zera, 2000).

Other studies have also reported temporal stability over time with childhood onset CP, for instance, Offord and colleagues (1992), using data from the Ontario Child Health Study ( $N = 1869$ ), showed that 45% of children (aged 4 to 12) diagnosed with CD upheld their diagnosis 4 years later. Cote and colleagues (2007) followed children ( $N = 1183$ ) initially aged 2, over a 6-year period, and found 15% of them to display high and stable trajectories of physical aggression. However, the taxonomy proposed by Moffitt (1993) has been the subject of some dispute. For instance, it has been shown that a group of children with early onset CP do not persist into adolescence (Odgers et al., 2007; Tremblay, 2003), sometimes referred to as the *childhood-limited* group. A possible explanation to why some children with an early onset persist with CP, while others do not, might have to do with symptom severity impacting the level of stability (Moffitt et al., 2008). Accordingly, Cohen, Cohen and Brook (1993) reported high stability for severe ODD and CD ( $OR = 8.3$  and  $13.9$ , respectively), lower stability for moderate ODD and CD ( $OR = 6.0$  and  $7.8$ , respectively) and the lowest stability for mild ODD and CD ( $OR = 3.2$  and  $3.1$ , respectively), between childhood and adolescence. Further critique against Moffitt's taxonomy has been related to findings showing that the adolescence-limited group, predicted to remit by the end of adolescence or early adulthood, seemed to actually have a continuation of CP when followed up at age 26, equal to the level of CP reported for the early onset - life-course persistent group (Odgers, et al., 2007). Another study, however, using a different outcome measure, reported that individuals with childhood-onset CD were more likely to be diagnosed with antisocial personality disorder (ASPD) in adulthood (54% of the group), compared to individuals who developed CD during adolescence (16% of the group) (Burt, Donnellan, Iacono, & McGue, 2011). All in all, despite extensive empirical support in favor of distinguishing between early-onset and adolescence-limited CP, the two groups of children seem to have slightly more similarities than previously assumed, and the differences have been suggested to be better thought of as quantitative rather than as qualitative (Fairchild, van Goozen, Calder, & Goodyer, 2013).

Apart from the impact that time of onset has on the development of CP, into more serious and persistent patterns of delinquency and criminality throughout the course of life, other predictive categorizations have been suggested to differentiate between those who will likely escalate into more severe problems and those who will outgrow these behaviors. Subtypes based on the use of *overt* (e.g., physical fighting) versus *covert* (e.g. lying and stealing) CP have been suggested to affect the developmental trajectory, however with contradictory findings showing both the former type (Le Corff & Toupin, 2013) and the latter type (Lahey, Loeber, Burke, & Applegate, 2005) to forecast adult ASPD, better than the other. Within the group of children displaying overt CP, those who use *proactive aggression* (calculated in advance) are more likely to show a continuation of problems, compared with those who mainly use *reactive aggression* (impulsive) (Dodge, Pepler, & Rubin, 1991). Another predictive subgrouping is *CP in combination with ADHD* versus *CP without ADHD* and it has been shown that the first mentioned (comorbid) group of children not only have a generally earlier onset of CP (Moffitt, 1990) but also an increased risk of becoming adult offenders (Satterfield & Schell, 1997).

### 1.2.1 GENDER DIFFERENCES

Males have been found to demonstrate higher levels of CP, from early on in life, compared to females (Keenan & Shaw, 1997) and these differences remain over the course of childhood, adolescence and adulthood (Moffitt & Caspi, 2001). Furthermore, males are more prone to use physical aggression, with more severity and persistency (Steffensmeier & Allan, 1996), compared to females, and therefore appear more costly to society. This might be one of the reasons why few of the earlier longitudinal studies on developmental trajectories included female, or even mixed-sex, samples. Nonetheless, it is less clear if developmental trajectories found for males, related to childhood- or adolescent-onset subtypes of CP, are similar for females (Brennan & Shaw, 2013). However, during the last decade, a growing number of prospective studies have included females (e.g., Lahey et al., 2006; Odgers et al., 2008) and there is now some evidence suggesting that the age-of-onset taxonomy proposed by Moffitt (1993) is applicable to females as well.

## 1.3 GENETIC AND ENVIRONMENTAL CAUSES

During the past 30 years, numerous studies have inquired into the many plausible mechanisms, or risk factors, thought to be involved in the development of CP. Genetic, temperamental and sociocultural causes, along with influence from parenting practices, attachment patterns, deviant peers and stressful life events are some of the variables suggested to affect the emergence of CP. Most of these risk factors have been examined independently of each other resulting in a somewhat scattered field of knowledge, with a number of diverse predictors of CP development, loosely, or not at all, connected to one another (Dodge & Pettit, 2003). In an attempt to overview the current state of knowledge, the primary domains of risk factors will be presented, followed by a discussion of the relevance these domains might have for the empirical studies in the thesis. It should be noted that the following review of the literature does not cover all possible aspects of risk factors, as the research field is too broad to be captured comprehensively within the framework of the current thesis.

### 1.3.1 CHILD BIOLOGICAL RISK FACTORS

#### 1.3.1.1 GENETICS

On a very fundamental level, child development begins with the genetic predisposition determined already at conception. This predisposition is probabilistically associated with later development during life, through direct, or indirect, paths. Behavioral genetic studies, using twin and adoptee designs, help us determine the extent to which variance in certain traits or behaviors are explained by our genetic disposition, relative to the proportion explained by environmental factors. They may also provide important information on how genetic and environmental factors interplay and jointly influence, for instance, the risk of developing CP. Straightforwardly, a review by Moffitt (2005) summarized a large number of studies and concluded that approximately 50% of the variance in antisocial behavior was attributed to genes, indicating a high heritability. Subsequently, 20% of the variation was accounted for by common environmental factors, shared within families (e.g., poverty or living in a violent neighborhood), and 20 - 30% by unique environmental factors experienced by individuals (e.g., being the victim of sexual abuse or contraction of a head injury). A corresponding meta-analysis by Rhee and Waldman (2002) reported a somewhat lower proportion, 41%, of the variance in antisocial behavior being explained by genes, whereas 16 and 43% of the variation was due to common and unique environmental factors, respectively. These figures provide a broad overview of the relative proportions of genetic and environmental causes of CP. A closer examination reveals that the influence of genes seems to be moderated by age. Studies targeting younger children generally report higher proportions of heritability, for instance 58% for 19-month olds (van den Oord, Verhulst, & Boomsma, 1996) and 69% among 3-year olds (van der Valk, Verhulst, Stroet, & Boomsma, 1998). In contrast, studies including adolescent samples have reported significantly lower rates of heritability (43%; Rhee & Waldman, 2002), which can be assumed to be a reflection of the notion that adolescents, compared to children, have experienced a longer period of exposure to environmental factors, in combination with being influenced by a broader range of environmental conditions (e.g., peers). These findings have been linked to the concept of early onset life-course persistent CP, suggesting that the small proportion of children who exhibit aggressive and pervasive CP from an early point in life, stand under relatively stronger genetic influence, compared with the adolescent-limited group (Moffitt, 2005).

Studying interaction between specific genes and environmental characteristics may provide an opportunity to better understand causal pathways leading to development of CP during childhood. Caspi and colleagues (2002) investigated individual differences in genotype conferring lower or higher levels of MAO-A (monoamine oxidase A) activity. Lower MAO-A activity was found to be associated with a higher vulnerability to maltreatment during childhood and the interaction between these genetic and environmental factors was shown to increase the risk of being diagnosed with a CD diagnosis during adolescence (OR = 2.8, 95% CI: 1.42 - 5.74), compared with individuals who were exposed to maltreatment but who had high MAO-A activity (OR = 1.54, 95% CI: 0.89 - 2.68). Similar findings were reported in a more recent study where high MAO-A activity was shown to have a protective effect on mild to moderate (but not high) levels of childhood exposure to trauma, in the development of aggressive

behaviors (Weder et al., 2009). Studies of this sort, examining interaction between a genotype and an environmental condition, are important, however, as pointed out by Tremblay (2010), there are probably thousands of genes and equally many environmental characteristics involved, through interaction, in the complex process of CP development, and the current understanding of this process must therefore be deemed as limited.

#### *1.3.1.2 PRE- AND PERINATAL FACTORS*

A number of prenatal risk factors for later development of CP have been reported including fetus exposure to methadone (Cubas & Field, 1993), nicotine (Wakschlag et al., 1997) and alcohol (Olson et al., 1997) through the mother. Complications during pregnancy and birth have been shown to be associated with violent behavior in adulthood (Raine, Brennan, & Mednick, 1997) and perinatal lead poisoning predicted antisocial and delinquent behavior in late childhood (Needleman, Riess, Tobin, Biesecker, & Greenhouse, 1996).

#### *1.3.1.3 FAMILY HISTORY OF CONDUCT PROBLEMS*

A vertical transmission of antisocial behavior and CP, between generations, has been shown to occur, resulting in aggregation of these problems within families (Blazei, Iacono, & Krueger, 2006; Farrington, Jolliffe, Loeber, Stouthamer-Loeber, & Kalb, 2001). It has for instance been reported that parents of boys with a CD diagnosis exhibited higher rates of ASPD compared with parents of no-CD boys (Frick et al., 1992), and this finding was later replicated for sons in a mixed-sex sample but, however, not for daughters (Foley et al., 2001). Fathers' history of CP seems to be more predictive of children's development of CD during childhood and adolescence, compared to mothers' history (Lahey, et al., 1998), although the general lack of studies including females (mothers as well as daughter) renders this conclusion uncertain. Furthermore, the familial transmissions described seem to hold true for a range of CP related outcomes (e.g., child aggressive behaviors, CD diagnosis and delinquency) (Blazei, et al., 2006).

### **1.3.2 CHILD FUNCTIONAL RISK FACTORS**

#### *1.3.2.1 TEMPERAMENT*

Difficult temperament, including aspects of negative emotionality, inflexibility and intense reactivity (Sanson, Hemphill, & Smart, 2004), has been described as an important aspect of child development that may be observed early on during infancy and that may evoke parenting that is less adaptive (Lytton & Romney, 1991). For instance, Hagekull (1994) reported that negative emotionality predicted externalizing behaviors at four years age, and a review by Sanson and Prior (1999) concluded that early signs of negative emotionality, intense reactivity and inflexibility predicted CP in later childhood. However, disagreement over the definition of temperament and over whether the construct is separable from early signs of ODD symptoms has limited the possible conclusions on the importance of temperament as a risk factor (Burke, Loeber, & Birmaher, 2002; Loeber, Burke, & Pardini, 2009). Nonetheless, a difficult infant temperament may constitute a mechanism connecting biological disposition to later development of CP.



### *1.3.2.2 BEHAVIORAL INHIBITION / IMPULSIVITY*

The high comorbidity between ADHD and CP has been established in numerous studies (e.g., Biederman, 2005; Biederman, et al., 1991) and the dimensions related to impulsivity and behavioral inhibition seem to be of particular importance for prospective development of CP (even at subthreshold levels, without being diagnosed with ADHD). A longitudinal study by White and colleagues (1994) showed how boys' impulsivity, measured at age 10, explained 16% of the variance in self-reported delinquency, two years later, when controlling for IQ and socioeconomic circumstances. The ability to inhibit responses, among 10 - 12 year old boys with varying degrees of disruptiveness, have also been shown to protect from development of delinquency in adolescence (Kerr, Tremblay, Pagani, & Vitaro, 1997).

### *1.3.2.3 CALLOUS-UNEMOTIONAL TRAITS*

Developmental precursors to psychopathy in adulthood have attracted a lot of attention during the last two decades. Particularly, the affective features of psychopathy, i.e., lack of remorse, absence of empathy and lack of emotionality, have been assumed to manifest early during childhood for some individuals. These features, often referred to as callous-unemotional (CU) traits, can be distinguished from behaviors included in ODD and CD (Frick, Bodin, & Barry, 2000), i.e., they do not seem to be captured by the conventional definition of CP. Children with a combination of CU traits and CP have been shown to be a subgroup at heightened risk for development of particularly severe and aggressive antisocial behavior (Christian, Frick, Hill, Tyler, & Frazer, 1997; Enebrink, Andershed, & Långstrom, 2005; Kimonis et al., 2006). Furthermore, CU traits show relatively high stability over time, during childhood ( $r = .60$  between 4th and 6th grade; Barry, Barry, Deming, & Lochman, 2008), from childhood to adolescence ( $r = .50$  between ages 8 and 16; Obradovic, Pardini, Long, & Loeber, 2007) and further during the transition from adolescence into early adulthood ( $ICC = .40$  between ages 16-18 and 22-24; Loney, Taylor, Butler, & Iacono, 2007). In cross-sectional studies, children with CU traits have been found to be less sensitive to cues of punishment (Fisher & Blair, 1998), more fearless (Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999) and more thrill-seeking (Frick, O'Brien, Wootton, & McBurnett, 1994), compared to low-CU children. CU traits in adolescence have been associated with less concerns about negative consequences of misbehavior (e.g., punishment) as well as with higher expectations of aggression leading to tangible rewards (Pardini, Lochman, & Frick, 2003). These findings are in line with research on adult psychopathy and it has been suggested that the development of CP in high-CU children has causal mechanisms that differ from those underlying CP in low-CU children. All in all, the dysfunctional expression of empathy and processing of emotions, characterizing children with elevated levels of CU traits, implicate an increased risk for developing persistent and severe forms of CP. The relevance of CU traits as a risk factor was recently emphasized when the latest revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013) added a specifier related to limited prosocial emotions into the criteria for CD.

## *1.3.3 PSYCHOSOCIAL RISK FACTORS*

### *1.3.3.1 PARENTING AND FAMILY ADVERSITY*

There is extensive empirical evidence linking poor parenting to the development of CP (e.g., Haapasalo & Tremblay, 1994) and different kinds of maladaptive parenting seem

to predict different child behaviors. Stormshak and colleagues (2000) examined five aspects of parenting practices: 1) punitive discipline (e.g., yelling and verbal threats), 2) inconsistency, 3) warmth and positive involvement, 4) spanking, and 5) physical aggression (beating), and their relation to different categories of child CP. Punitive discipline and spanking were found to be risk factors for a broad range of child disruptive behaviors, including oppositional, aggressive and hyperactive symptoms. Low parental warmth was mostly associated with children being oppositional and physical aggressiveness among parents was linked specifically to child aggression. In experimental studies, a reduction of harsh parenting has also been reported to mediate the effect of parent training interventions on child CP (e.g., DeGarmo, Patterson, & Forgatch, 2004). Other studies have described additional dimensions of parenting to be predictive of child CP development, for instance, monitoring/supervision, i.e., parents' ability to keep track of their children's whereabouts (Wasserman, Miller, Pinner, & Jaramillo, 1996) and teaching behaviors, i.e., parents' inclination to explain why certain things might be dangerous and how things can be done differently etc. (Pettit & Bates, 1989).

The abovementioned studies describe a one-direction relationship, from parents' behavior to children's CP development, but in fact, the process is evidently more dynamic and complex than that. Patterson's *coercion theory* (Patterson, Reid, & Dishion, 1992; Stoolmiller, Patterson, & Snyder, 1997) attempts to capture the reciprocal dimension of parent-child interaction over time, where negative reinforcement is thought to be a key component. A typical sequence that might illustrate the coercive process begins with the child exhibiting a minor deviant behavior, to which the parent responds by nagging or yelling, which in turn is followed by intensified child misbehavior and subsequent escalation of the parent's yelling or threatening behavior. Eventually, the parent gives in and negative reinforcement of the child's misbehavior has occurred, increasing the probability that the child will exhibit the same pattern of behaviors in a similar future situation. Parents' negative reinforcement (by giving in / capitulating) of child misbehavior has been shown empirically to predict later maladjustment, for instance by Snyder and Patterson (1995) who observed mother-son interactions for 1 hour on each of 10 nonconsecutive days. They found a significant correlation ( $r = .62$ ) between the relative rate of negative reinforcement of child misbehavior at an earlier time point, and the child's inclination to use the same misbehavior at a later time point. Interestingly, mothers' aversive behaviors during conflicts were also negatively reinforced by children's tendency to occasionally give in and cease misbehaving. The corresponding correlation ( $r = .58$ ), between children's negative reinforcement and mother's inclination to use aversive behaviors during later conflicts, was also significant. In fact, a more recent study suggested that child behavior might have more influence on parent behavior, than the other way around, in the coercive and reciprocal process (Burke, Pardini, & Loeber, 2008). Particularly, children's misbehavior seemed to coerce parents into discontinuation of appropriate disciplinary behaviors. In the same study, lack of appropriate discipline was also found to predict later development of CP, whereas other parenting variables, such as harsh punishment and poor monitoring, did not. Thus, the intricate interaction between parenting, and children's responses to parenting, impacts CP development and later adjustment, possibly through a chain of events where aversive (harsh and inconsistent) parenting precedes intensified child misbehavior, that in turn is followed by parental resignation and subsequent lack of disciplinary measures.

A number of other factors related to family functioning have been shown to increase

the risk for development of CP, e.g., parental divorce (Amato, 2001), teenage parenthood (Morash & Rucker, 1989), large family size (Farrington, 2000) and single parenthood (Ackerman, D'Eramo, Umylny, Schultz, & Izard, 2001). Some of these risk factors are, however, largely explained by confounding variables in the child's social context. For instance, the risk related to having divorced parents was mostly explained by circumstances that were present already before the separation, such as high levels of interparental conflicts and socioeconomic disadvantage (Fergusson, Horwood, & Lynskey, 1994). The effect of single parenthood on children's CP development was weak (explaining only 2% of the outcome) when e.g., family income and parent antisociality were accounted for in multivariate analyses (Ackerman, et al., 2001). Furthermore, a twin study by Meyer and colleagues (2000) described a significant association between marital discord and CP in childhood and adolescence, but when genetic influence from parent antisociality was entered into the model, this association vanished.

### *1.3.3.2 SOCIOECONOMIC FACTORS*

Family income, parental education and occupational status, summarized as socioeconomic status (SES), has been described as a strong predictor of CP development, from early childhood years into adolescence (Bradley & Corwyn, 2002). There seem to be mechanisms through which low SES results in more persistent patterns of CP, for instance, the link between SES and development of CP has been shown to be mediated by a number of contextual factors, such as the child's lack of cognitive stimulation, family life stressors and mothers' lack of social support (Dodge, Pettit, & Bates, 1994). It has also been reported that low-SES parents are less likely to purchase educational material and less likely to enforce limits on children's TV habits (Dodge, et al., 1994), leading to a higher risk for school failure and subsequent development of CP (Battin-Pearson et al., 2000).

### *1.3.3.3 CHILD ABUSE*

Physical abuse, defined as having been exposed to intentional violence by either/both parent/s, during the first 5 years of life was shown to be associated with a fourfold increase in risk for having CP in grades 3 and 4 (Dodge, Bates, Pettit, & Valente, 1995), and this effect remained intact when possible confounders such as family SES, single parenthood, family stressors and social support were accounted for. Similar findings were reported in a study where a broader construct of child victimization (including "substantiated child abuse and/or neglect") was found to predict significantly higher rates of ASPD 20 years later (Luntz & Widom, 1994). Among children who had been abused/neglected, 13.5% were diagnosed with ASPD at follow-up, compared with 7.1% of children in the control condition ( $\chi^2(1) = 7.1, p < .01$ ). Child sexual abuse has also been shown to increase the risk for later development of CD, even when controlling for a number of social background variables (Fergusson, Horwood, & Lynskey, 1996), and a dose-response relationship between severity of the sexual abuse and the increase in risk was also found. The latter finding suggests that the link between child abuse and later development of CP might be moderated by factors related to the severity and duration of the abuse, and perhaps to the relationship between perpetrator and victim, however only limited evidence of such interactions has been reported (Burke, et al., 2002).

#### 1.3.3.4 DEVIANT PEERS AND REJECTION

Already by early childhood, children spend more time interacting with peers than with adults (Ellis, Rogoff, & Cromer, 1981) and friends play a significant role in children's development, exerting positive as well as negative influence on their paths to adolescence and later adulthood. Associations with deviant peers have been examined as one such possible negative influence and risk factor for development of CP. Sinclair and colleagues (1994) investigated preschool children's exposure to aggressive peers in different social activities and found the degree of exposure to be highest in neighborhood settings, where play and interaction can be assumed to be less organized and less supervised, compared with for instance playgroup settings where adults are more present. Being exposed to deviant peers has also been reported to initiate CP (Elliott & Menard, 1996) and to further amplify already present CP (Coie & Miller-Johnson, 2001). The transfer of CP, from the peer group to the individual child, has been described to operate through "deviancy training", however, the process also involves a feedback loop from the individual over to the peer group, creating a reciprocal escalation of CP within the entire subgroup of peers (Coie & Miller-Johnson, 2001).

Peer rejection is another aspect of interchange between children that is related to CP. To begin with, children with CP are more likely to be rejected by peers (Coie & Dodge, 1998), compared to better adjusted children. Being rejected, in turn, predicts more aggressive behaviors (Dodge, Coie, Pettit, & Price, 1990) and it has been shown that longer periods of rejection from peers are associated with more aggression and less social skills in kindergarden and first grade children, compared with shorter periods of rejection (Pettit, Clawson, Dodge, & Bates, 1996), suggesting a dose-response effect. A longitudinal and prospective study investigating peer rejection in elementary school as well as interaction with deviant peers in early adolescence, as potential risk factors, reported that both variables predicted higher levels of CP in adolescence, but person-focused analyses indicated that they represented different pathways to CP (Laird, Jordan, Dodge, Pettit, & Bates, 2001).

#### 1.3.4 CONCLUSIONS ON GENETIC AND ENVIRONMENTAL CAUSES

Despite the numerous studies investigating into the various risk factors associated with CP development, there is still a lack of evidence for any causal mechanisms involved in the process. First, environmental risk factors have mostly been studied without controlling for genetic influences that has been shown to account for 50% of the variance in CP (Moffitt, 2005) and, additionally, sometimes without controlling for other potentially confounding environmental factors. Second, twin studies disentangling genetic from environmental influence often do not report on specific genes or environmental factors and, finally, studies examining the interaction between genetic and environmental factors have mostly done so by looking at *one* specific gene and *one* specific environmental condition at a time, resulting in a somewhat piecemeal current state of knowledge. Despite these shortcomings, the extensive amount of research conducted within the field has advanced our understanding of the different components involved in CP development immensely over the last decades. The difficulty lies, however, in putting the pieces together. Different overarching models

have been proposed in attempts to explain how risk factors relate to each other and how they affect CP development. *Additive models* assume that risk factors accumulate, i.e. that the number of present risk factors are linearly associated with the risk of developing CP (Rutter, Cox, Tupling, Berger, & Yule, 1975). The focus is thus more on the frequency of risk factors than on any particular kind of factor. *Interactive models* on the other hand suggests that some risk factors are only prone to exert influence on the outcome in the presence of another risk factor, or at least, have a varying degree of influence depending on the presence, or non-presence, of other risk factors. *Transactional or reciprocal models* describe an even more complex process of CP development where the environmental context constantly mediates the effect of predisposition (genetics and characteristics), but where also effects of the environmental context are mediated by predisposition, leading up to the outcome of CP. Tremblay (2010) describes one such transactional model (Figure 2) where environment and genotype factors are assumed to moderate and mediate each other through the course of life. In this model, emphasis is put on the important role that parents play during the early years by creating most of the young child's environment. This environment, in turn, impacts CP development through gene expressions and brain development. Later on in childhood and adolescence, peers and other environmental factors in the outside world become increasingly important as they exert more and more influence on the developmental trajectory of the individual.

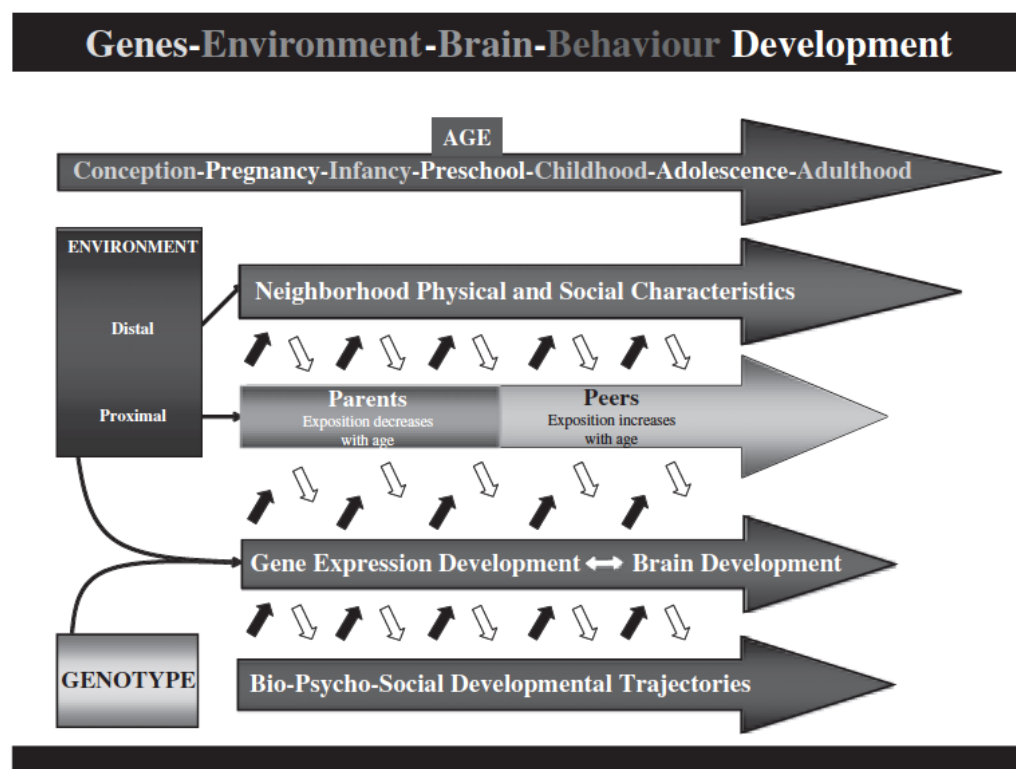


Figure 2. Transactional model of development over time (from Tremblay, 2010).  
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### 1.3.5 THE RELEVANCE OF RISK FACTORS TO THE CURRENT THESIS

The overview of the research literature concerning risk factors aims to set the stage for the main theme of the current thesis, i.e., parent training (PT) interventions. Some of the presented risk factors are obviously more suitable to be targeted by intervention, than others. A genetic predisposition entailing elevated risk of developing CP might be easily dismissed as an entry point for treatment, however, genes interact with environmental factors (e.g., Caspi, et al., 2002) and targeting the environmental part of this interaction might effectively reduce the overall risk of a maladjusted development. Parenting practices, particularly harsh and inconsistent forms, resulting in coercive patterns of negative reinforcement between children and parents, are targeted in all PT interventions described in study I - IV. An altering of these coercive processes, within families, has been shown to prevent children from developing more persistent forms of CP (Dishion & Andrews, 1995). Other risk-related aspects of parenting, such as insufficient monitoring and low level of warmth, might also be appropriate entry points for intervention. Improved monitoring has for instance been shown to affect children's amount of association with deviant peers (Laird, Criss, Pettit, Dodge, & Bates, 2008), another risk factor for CP development. Furthermore, physical abuse of children was described as a risk factor for later development of CP, and this is also an area where PT interventions have been shown to be effective. For instance, a meta-analysis by Lundahl and colleagues (2006) described how PT interventions produced significant reductions of parental physical and verbal abuse. Hence, a number of risk factors may be targeted, directly or indirectly, through PT, to alter the trajectories of children at risk for CP development. Other risk factors could be important to assess as they might produce differential effects of PT interventions, for instance CU traits (described in study II), socioeconomic status and family history of psychiatric disorders. Predictors of treatment outcome are of high clinical importance as they might implicate that an intervention is less effective, or not effective at all, for a particular subgroup. All in all, our growing understanding of childhood risk factors leading up to CP has had bearing on the development of PT programs and the different components implemented in these interventions. The next section provides an overview of PT programs and their empirical support in the research literature.

## 1.4 DELINEATION OF PARENT TRAINING

The scope of the thesis include several aspects related to PT, such as short- and long-term program efficacy/effectiveness (study I, III and IV), group-based (study IV) and self-directed (study I - III) interventions, programs with different theoretical underpinnings (study IV) as well as predictors/moderators of change (study II and III). The following sections aim to briefly detail these areas. To contextualize PT interventions somewhat, a short historical overview is also provided.

### 1.4.1 DEFINITION AND COMMON FEATURES

Parent training programs are interventions where parents are encouraged to change behaviors, perceptions and communication in order to effect desirable changes in child behavior (Lundahl, Risser, et al., 2006). PT is thus based on the assumption that parenting practices are involved in the emergence, progression and maintenance of CP

in childhood and adolescence. Following this conceptual view, a set of principles and techniques are commonly provided that parents are presented with and motivated to adopt and practice to some extent (Kazdin, 2005). Practicing of program components can occur through therapist modeling, role playing, feedback and homework assignments. PT programs are either administered in a group format or individually, typically in a clinic-based or community-based setting. Commonly, only parents participate in the intervention but some programs involve children in some, or all, of the sessions (in company with their parents). Most PT programs span between 10 - 20 sessions, each session lasting 1 - 3h.

To avoid confusion, it should first be pointed out that the description of parent training stated above is a broad definition aiming to capture the fundamental concepts of behavioral as well as non-behavioral programs. Second, within the context of this thesis, PT are interventions where the primary target is child CP, and not, e.g., anxiety or affective disorders. Lastly, in the research literature, a few different names are used to label these interventions, e.g., *parent management training*, *parent education programs* and *parent skills training programs*. Some of these names refer to a specific category of interventions (e.g., parent management training include behavioral programs only), but mostly these names are used interchangeably.

#### 1.4.2 ORIGIN AND DEVELOPMENT

During the first half of the 20th century, the most common approaches to dealing with child CP (if at all considering treatment) were through child therapy and, in more severe cases, institutionalization. A gradual trend shift started in the 1960s when interventions directed to parents emerged. The driving force behind this shift was the realization that parents were much involved in, and contributed to, children's development and maintenance of CP and that parents effectively could act as agents of child behavior change (Kaminski, Valle, Filene, & Boyle, 2008). Another springboard was the increased use of paraprofessionals, i.e., individuals who were not trained in therapy (e.g., teachers) but who could administer PT interventions in a relatively cost-effective manner (O'dell, 1974). Gerald Patterson's research on coercive family interactions was also critical for the development of PT programs. As described previously, Patterson provided empirical evidence of how reciprocal negative reinforcement of aversive behaviors, during conflicts between parents and children, increased the likelihood that more child aggression, and related CP, would occur in the future (Patterson, et al., 1992). The hypothesis derived from this line of research was that inept parenting practices, particularly those that had been shown to contribute to the development of CP, could be modified to possibly break the coercive process. The relevance of this hypothesis was later shown in intervention studies where the altering of parenting practices was reported to reduce child and adolescent CP (e.g., Dishion & Andrews, 1995; Dishion, Patterson, & Kavanagh, 1992). A theoretical framework, referred to as the social interaction learning (SIL) theory, was presented to describe how negatively reinforced interactions within families as well as interactions with the social environment (e.g., peers) needs to be changed to prevent further development of CP (Dishion & Patterson, 2006; Patterson, 2002). As of today, a great number of PT programs have been developed, and most of them are founded on the behavioral intervention procedures described by Gerald Patterson and his colleagues (Weisz,

Hawley, & Doss, 2004). Other forms of PT have originated from, e.g., Adlerian psychotherapy and attachment theory. Within the present thesis, these latter programs are referred to as non-behavioral PT programs. The characterizing features of behavioral and non-behavioral programs are detailed in the following paragraphs.

### 1.4.3 FACE-TO-FACE PROGRAMS

#### 1.4.3.1 BEHAVIORAL PROGRAMS

PT interventions derived from SIL theory are commonly referred to as behavioral programs (and in study I, II and III of the current thesis they are labeled *parent management training* programs). The overarching aims of these programs are to provide parents with skills that allow them to observe, identify and respond to CP in new ways. When more efficient skills are applied by parents, desirable child behaviors are predicted to increase and undesirable behaviors are assumed to decrease (Barlow & Stewart-Brown, 2000). Some of the most empirically well-supported programs belong to this category (Eyberg, Nelson, & Boggs, 2008), e.g., Parent Management Training Oregon Model (PMTO; Patterson, Reid, Jones, & Conger, 1975), the Incredible Years (IY; Webster-Stratton, 1984), Positive Parenting Program (Triple-P; Sanders, 1999) and Parent Child Interaction Therapy (PCIT; Brinkmeyer & Eyberg, 2003). A more recently developed behavioral PT intervention, central to the current thesis (study I - IV), is the Swedish Comet program (Kling, Forster, Sundell, & Melin, 2010; Kling, Sundell, Melin, & Forster, 2006). Core components in these programs involve teaching parents the concept and application of positive reinforcement, communication skills, problem solving, rule consistency, to ignore minor misbehavior and non-punitive limit setting strategies. Structurally, the behavioral PT programs contain two main parts. The first part aims to improve the quality of parent-child interaction (e.g., by practicing child-directed play and by instructing parents' to pay more attention to positive child behaviors). The second part of the programs aims to provide parents with strategies to respond to children's misbehavior (e.g., by ignoring these behaviors, by distracting the child, by removing privileges or by using time out). Skills are taught through role playing, modeling from group leaders and in some programs by showing illustrative video vignettes. This generic description holds for most of the behavioral PT programs, however, there are some differences as well. PCIT involves parents *and* children across all sessions whereas the other programs are mostly, or completely, directed to parents only. PMTO is administered to individual families and Triple-P may be administered either individually or in a group format, whereas the other programs are group-based. Triple-P and Comet include fewer sessions (10 and 11, respectively), IY 13 sessions, PCIT 12 - 16 sessions and PMTO adjusts the number of sessions depending on the needs of the particular family (an average of 17 sessions has been reported; Patterson, Chamberlain, & Reid, 1982).

Another PT program of importance to this thesis (study IV) is Cope (Cunningham, Bremner, & Boyle, 1995). Cope is commonly labeled a behavioral program, but has partly originated from family-system theory as well. Typical behavioral components such as positive reinforcement, rule consistency and problem solving are covered, but Cope differs slightly from the previously mentioned programs in that it allows parents to more freely reason their way to appropriate strategies, with guidance from group



leaders. This approach to training is assumed to entail a more profound learning experience, compared to more didactic approaches (Cunningham, Davis, Bremner, Dunn, & Rzasas, 1993).

#### *1.4.3.2 NON-BEHAVIORAL PROGRAMS*

Non-behavioral PT programs constitute a heterogeneous group of interventions that generally aim to improve the parent-child relationship. By means of encouraging parents to reflect on their own feelings and their expectations about their children, and by improving the parent-child relationship, changes in problematic child behavior are predicted to occur (Barlow & Stewart-Brown, 2000). Some of the PT programs belonging to the non-behavioral category are Parent Effectiveness Training (PET; Pinsky & Geoffroy, 1981), Systematic Training for Effective Parenting (STEP; Dinkmeyer & McKay, 1989) and Client-centered Parent Counseling (Bernal, Klennert, & Schultz, 1980). A non-behavioral PT program of importance to the current thesis (study IV) is Connect (Moretti & Obsuth, 2009; Obsuth, Moretti, Holland, Braber, & Cross, 2006) that will be used to exemplify this category of PT programs. Connect is theoretically derived from attachment theory (Bowlby, 1973) and was originally developed to target adolescents (but has recently been adapted to target children aged 9 to 12). The aim of Connect is to establish secure attachment between the parent and the child, through enhancement of parents' self-reflective capacity, by increased sensitivity to the child's needs and through improved parental affect regulation. The program covers 10 weekly one-hour sessions and each session focuses around one principle related to attachment, e.g., "all behavior has meaning", "conflict is part of attachment" and "attachment allows trusting the relationship even during turbulent times". These principles are operationalized during sessions through role playing and experiential exercises (Obsuth, et al., 2006). The goal of Connect, and non-behavioral PT programs in general, is to reduce child CP; however, this goal is less pronounced when compared to behavioral PT programs. The means to obtain the goal of CP reduction are also quite different between behavioral and non-behavioral programs, as illustrated in the delineations above. Within this thesis (study IV), the non-behavioral PT program Connect is evaluated and contrasted against three behavioral programs.

#### *1.4.4 SELF-DIRECTED PROGRAMS*

Self-directed PT has been defined as parent-directed interventions targeting CP, operating through the use of written material (bibliotherapy), or through TV, DVD, CD-ROM or Internet (multimedia) channels (O'Brien & Daley, 2011). If there is any involvement of trained therapists, it should be limited to monitoring of parents' progress or to prompting parents to, e.g., follow the protocol more closely or to progress to the next stage of the intervention (O'Brien & Daley, 2011). In response to a number of concerns regarding the utility of face-to-face PT interventions, the development of self-directed programs has flourished during recent years. One of the concerns with traditional face-to-face interventions is related to the rather high costs associated with therapist training, supervision and administration of the programs (Foster, Johnson-Shelton, & Taylor, 2007). Other concerns are that face-to-face programs are time-consuming for parents and that, logistically, it may be difficult for parents to attend sessions (Spath, et al., 1996), particularly so for families living in rural areas (Folio & Richey, 1991). Families who experience barriers to participation

have also been shown to be more likely to drop out of the intervention (Kazdin, Holland, & Crowley, 1997). Self-directed PT programs, with or without limited therapist support, may thus prove to be more cost-effective and more accessible alternatives to traditional face-to-face PT programs. They might also be viable channels for providing early-stage help, as part of stepped-care models, enabling parents of children with less severe CP to get quick access to an intervention.

The Triple-P self-help program (TPSHP; Sanders, 1992; Sanders, Lynch, & Markie-Dadds, 1994) is one of the most empirically supported self-directed PT interventions, and may be used to illustrate how these programs are structured. It is a 10-week program where parents are provided with a written material that they are instructed to read continuously and which contains a variety of tasks to be completed throughout the course of the intervention. Weekly telephone consultations from trained staff members are included to prompt parents' problem-solving skills (Connell, Sanders, & Markie-Dadds, 1997). The content of the written material resembles that of group-based behavioral PT programs, including positive reinforcement of desirable child behavior, communication skills, rule consistency, ignoring misbehavior and time out (Connell, et al., 1997). An online version of the Triple-P program was recently developed (Triple-P Online; Sanders, Baker, & Turner, 2012), involving no therapist support. This program is delivered via Internet and incorporates written instructions on how to use a number of parenting skills along with videos illustrating these skills. Parents interact with the program by, for instance, formulating personal treatment goals and by receiving automated messages intended to encourage active participation. In the current thesis (study I - III), another newly developed online PT program, the *iCOMET*, is evaluated.

## **1.5 EFFECTS OF PARENT TRAINING PROGRAMS**

Over the years, a number of meta-analyses and systematic reviews have contributed to our understanding of how efficiently PT programs can be expected to reduce child CP (e.g., Barlow & Stewart-Brown, 2000; Cedar & Levant, 1990; Dretzke et al., 2009; Furlong, et al., 2012; Lundahl, Risser, et al., 2006; Maughan, Christiansen, Jenson, Olympia, & Clark, 2005; Serketich & Dumas, 1996). Three of the more recent summary articles are detailed in the following section. First, short-term effects of PT programs are described, followed by a comparison of the empirical support for behavioral and non-behavioral interventions. Studies evaluating self-directed programs are then highlighted followed by an overview of studies investigating long-term effects. Lastly, the evidence-base for PT programs is summarized.

### **1.5.1 SHORT-TERM EFFECTS OF PARENT TRAINING PROGRAMS**

Lundahl and colleagues (2006) summarized 63 studies of PT programs targeting CP. Most of the studies (89%) included children, aged 0 - 12, and a few studies (11%) had adolescent samples. Only trials comparing a PT intervention to a control group were included and among the evaluated programs were behavioral and non-behavioral interventions, as well as programs with different modes of delivery (group-based, individual and self-directed). The overall short-term (at post-measurement) effect size of parent-reported measures of CP was  $d = 0.42$  (95% CI: 0.35 - 0.49) favoring PT interventions over controls conditions. No significant differences were found when comparing effects of behavioral and non-behavioral programs, and neither were there

any differences between face-to-face (group-based and individual) and self-directed PT programs. It should however be noted that the studies evaluating non-behavioral programs were few (13% of all included studies) and so were the studies evaluating self-directed programs (14% of all included studies). Dretzke and colleagues (2009) summarized finding from 57 randomized controlled trials (RCT) of PT programs targeting child and adolescent CP. In most studies (86%), the mean child age was below 12 years and in the other studies (14%) the mean age was above 12 years. Behavioral and non-behavioral PT programs were included, as well as programs with different modes of delivery (group-based, individual and self-directed). The overall short-term effect size with parent-reported measures of CP was  $SMD = 0.67$  (95% CI: 0.42 - 0.91), favoring intervention groups over controls. Behavioral and non-behavioral programs were not contrasted against each other, and neither were self-directed and face-to-face programs. A recent Cochrane review evaluated the effectiveness of group-based behavioral PT programs targeting children (aged 3 - 12) with CP (Furlong, et al., 2012). Thirteen randomized and quasi-randomized controlled trials were identified and the short-term effect size with parent-reported measures of CP was  $SMD = 0.53$  (95% CI: 0.34 - 0.72), favoring intervention over control groups. The mean effect sizes mentioned above (0.42, 0.67 and 0.53) were all based on parent-reports of child CP and indicate a moderate short-term effect of PT programs. When the outcome was measured through independent observations of CP, somewhat lower effect sizes were reported:  $SMD = 0.44$  (95% CI: 0.23 - 0.26) by Dretzke and colleagues (2009) and  $SMD = 0.44$  (95% CI: 0.11 - 0.77) by Furlong and colleagues (2012). Changes in secondary outcome measures (e.g., child emotional problems and peer problems) have been less frequently reported in meta-analyses and review articles. Furlong and colleagues (2012) included outcome measures related to child emotional problems and cognitive abilities but found no effects of PT programs on these domains.

PT programs have been repeatedly shown to affect parenting practices. Short-term changes in praiseful as well as harsh parenting (collapsed into a single construct) were described to occur with a mean effect size of  $d = 0.47$  (95% CI: 0.40 - 0.54) across studies in the Lundahl (2006) meta-analysis, with no significant differences between behavioral and non-behavioral programs. Furlong and colleagues (2012) reported separate effect sizes for short-term changes in negative parenting ( $SMD = 0.77$ ; 95% CI: 0.59 - 0.96) and positive parenting ( $SMD = 0.53$ ; 95% CI: 0.16 - 0.90) for behavioral PT programs. Parents' psychological adjustment (including measures of anxiety, depression and stress) has also been shown to improve significantly (mean Glass's  $\Delta = 0.44$ ) through participation in behavioral PT programs, as reported in a meta-analysis covering 26 studies by Serketich and Dumas (1996).

### 1.5.2 COMPARING BEHAVIORAL AND NON-BEHAVIORAL PROGRAMS

The evidence-base for non-behavioral PT programs is less certain, compared to that for behavioral programs. Cedar and Levant (1990) conducted a meta-analysis, including 26 studies, evaluating Parent Effectiveness Training. However, few of these studies reported child CP outcomes and those that did showed no significant change from pre to post-measurement. In their meta-analysis, Lundahl and colleagues (2006) found only 9 studies of non-behavioral PT programs (mean study  $N = 13$ ) that reported short-term CP outcomes. The mean effect size for these studies was  $d = 0.44$  (95% CI: 0.16 - 0.71)

with a large heterogeneity between studies. The same meta-analysis found 7 studies of non-behavioral programs (mean study  $N = 12$ ) reporting effects on (harsh and/or praiseful) parenting practices with a mean effect size of  $d = 0.66$  (95% CI: 0.40 - 0.93). Although no differences between non-behavioral and behavioral programs were reported, the authors conclude that due to few studies and generally low study rigor, non-behavioral programs could not be supported as interventions for clinically significant behavior problems (Lundahl, Risser, et al., 2006). Behavioral PT programs, on the other hand, were summarized as having substantial empirical support as interventions targeting child CP.

### 1.5.3 SHORT-TERM EFFECTS OF SELF-DIRECTED PROGRAMS

Self-directed PT programs have been shown to reduce child CP across a number of studies, most of them evaluating either the Triple-P self-help program (TPSHP; Sanders, 1992; Sanders, et al., 1994) or the Incredible years videotape modeling treatment (IYVMT; Webster-Stratton, Kolpacoff, & Hollinsworth, 1988). In an evaluation of TPSHP, with weekly telephone support, 67% of children showed clinically reliable improvement of CP at post-measurement, compared with 0% in the waitlist group (Connell, et al., 1997). Similar findings were reported in a later study comparing two treatment conditions, the TPSHP with and without telephone support, to a waitlist group (Markie-Dadds & Sanders, 2006). Children of parents in the PT groups showed clinically reliable improvement in 59% (with telephone support) and 60% (without telephone support) of the cases, respectively, compared to 0% in the waitlist group. The IYVMT (involves parents in watching approximately 4 hours of video-vignettes where different parental skills are modeled) has also been evaluated showing superior short-term effects on child CP, when compared with waitlist controls (Webster-Stratton, 1990; Webster-Stratton, et al., 1988) and equally effective when compared with the group-based Incredible years program (Lavigne et al., 2008). In addition to written and video material, used in the delivery of self-directed PT, the Internet provides an alternative channel through which interventions might be administered. The evaluation of one PT program delivered via Internet, the Triple-P Online, was recently conducted by Sanders, Baker and Turner (2012). Families with children aged 2 -9 were recruited through mass media, schools, online parenting forums and childcare facilities. Parents of 60 children with CP were randomized to receive the intervention, and were compared with an internet-use-as-usual control group ( $N = 56$ ). Children of parents in the Triple-P Online group had significant short-term reductions of CP, with moderate to large effect sizes (Cohen'  $d = 0.89 / 0.71$ , as measured by the intensity / problem subscales of the Eyberg Child Behavior Inventory, ECBI; Eyberg & Pincus, 1999) when compared with children in the control condition. The study thus showed that yet another medium, the Internet, is to be considered a promising platform for dissemination of PT interventions.

A Cochrane review (Montgomery, Bjornstad, & Dennis, 2006) summarized 11 studies where self-directed PT programs were compared with no-treatment controls. Moderate effects on child CP were reported and programs including therapist support were described to be more effective than completely self-directed programs. Another review, by O'Brien and Daley (2011), concluded that self-directed PT programs were slightly less efficacious in the short-term, compared with group-based programs, but that the potential cost-effectiveness of these programs and the ease with which they can be disseminated make them viable alternatives to traditional PT programs.

#### 1.5.4 LONG-TERM EFFECTS OF PARENT TRAINING PROGRAMS

In contrast to the general consensus of the moderate short-term efficacy of PT programs, the long-term effects of these interventions are debated. Lundahl and colleagues (2006) found 21 studies of behavioral PT programs where between-group effects (intervention vs. control condition) at follow-up time-points up to one year after program completion were reported. The mean long-term effect size was  $d = 0.21$  (95% CI: 0.08 - 0.33) for child CP outcomes, indicating some maintenance of pre to post treatment effects, but with attenuation over time. The Cochrane review by Furlong and colleagues (2012), employing more stringent inclusion criteria, found no follow-up study of behavioral PT comparing intervention and control groups beyond 3 months post-treatment. A number of evaluations of long-term effects of PT programs alone, without a control condition at follow-up, have been conducted. Lundahl and colleagues (2006) found 23 such studies of behavioral PT, with follow-ups up to one year, with a mean within-group effect size of  $d = 0.87$  (95% CI: 0.74 - 0.99) for child CP outcomes. A few recent studies of behavioral PT programs have also reported follow-ups longer than one year indicating retention, or further improvement, of treatment gains, at 18 months (Bywater et al., 2009), 4 -5 years (Losel & Stemmler, 2012), 5 - 6 years (Drugli, Larsson, Fossum, & Mørch, 2010) and up to 8 - 12 years (Webster-Stratton, Rinaldi, & Reid, 2011) after program completion. These studies were all conducted as efficacy trials, i.e., they evaluated PT programs employed within research settings. Only one previous study, by Gardner, Burton and Klimes (2010), has evaluated long-term effects (including an 18-month follow-up) of a behavioral PT program employed in a routine-care setting. This effectiveness trial showed moderate to large within-group effect sizes for baseline to follow-up reductions of child CP ( $d = 0.47$  and  $d = 0.96$ , with the intensity and problem subscales of the Eyberg Child Behavior Inventory, ECBI; Eyberg & Pincus, 1999).

Very few studies have investigated long-term effects of non-behavioral programs. The meta-analyses by Lundahl and colleagues (2006) included only 3 studies reporting long-term (up to 9 months) outcomes for child CP, with a mean effect size of 0.52 (Glass's  $\Delta$ ), when comparing intervention and control groups. Cedar and Levant (1990), in a meta-analysis of Parent Effectiveness Training, described significant effects on parents' attitudes and practices, as well as on children's self-esteem, up to 6 months after program completion, but no effect on child CP.

Studies evaluating long-term effects of self-directed PT programs have been partly limited by short follow-up periods. Maintenance of treatment gains for the Triple-P self-help program have been reported up to 4 (Connell, et al., 1997) and 6 months (Hahlweg, Heinrichs, Kuschel, & Feldmann, 2008; Markie-Dadds & Sanders, 2006) after treatment completion. One study conducted by Sanders, Bor and Morawska (2007) employed a more extensive follow-up of the TPSHP, reporting retention of treatment gains on child CP three years after treatment termination. The Incredible years videotape modeling treatment has also been reported to confer significant reductions of child CP, with retention up to 12 months post intervention (Lavigne, et al., 2008; Webster-Stratton, Hollinsworth, & Kolpacoff, 1989). Lastly, the previously described evaluation of Triple-P Online (Sanders, et al., 2012) included a 6-month follow-up where parents who had received the intervention reported significantly greater reductions of child CP (Cohen's  $d = 0.74 / 0.60$ , as measured by the intensity / problem subscales of the Eyberg Child Behavior Inventory, ECBI; Eyberg & Pincus, 1999), compared with parents in the internet-use-as-usual group. This finding was also replicated with an observational measure of child CP.

### 1.5.5 SUMMARY OF THE EVIDENCE-BASE FOR PARENT TRAINING PROGRAMS

The short-term efficacy of face-to-face behavioral PT programs is generally agreed upon and has been established in several reviews and meta-analyses over the last decades. The effects on child CP are moderate in size and parents who receive these interventions employ more positive and praiseful parenting, as well as less negative and harsh practices in relation to their children. There is also some evidence of behavioral PT programs improving parents' psychological adjustment. Non-behavioral PT programs have been evaluated to a lesser extent but the available studies indicate positive short-term effects on child CP and parenting practices. The quality of non-behavioral PT studies has, however, generally been low and evaluations have been conducted on mostly small and non-clinical samples. Self-directed PT programs, particularly programs involving some degree of therapist support, have been shown to reduce child CP in the short-term, albeit, the studies supporting this conclusion are few and point to somewhat smaller effects when compared with face-to-face PT programs. There is some evidence for the long-term efficacy of behavioral PT programs, up to one year after program participation, and a few studies have conducted even longer follow-ups, with promising indications of maintained treatment gains. The evidence for long-term effects of non-behavioral programs is very limited. A few studies of self-directed PT programs have reported long-term effects, with mostly retention of treatment gains up to one year after treatment termination and the evidence might be described as promising but limited. Lastly, it should be emphasized that the vast majority of studies conducted on PT programs have been efficacy trials, i.e., conducted in ideal research settings, as opposed to effectiveness trials conducted in "real world" clinical settings. This limits the generalizability of the described effects somewhat, although a recent meta-analysis suggested that short-term outcomes of PT programs might not differ significantly between efficacy and effectiveness trial (Michelson, Davenport, Dretzke, Barlow, & Day, 2013).

### 1.6 PREDICTORS OF PARENT TRAINING EFFICACY

Not all families benefit equally well from PT interventions and this observations has inspired several studies attempting to identify variables involved in the differentiation of treatment effects. Predictors of outcome could for instance be baseline measures of various parent or child characteristics, presence of risk factors or initial severity of child CP (commonly referred to as moderators, when assessed before the intervention). Reyno and McGrath (2006) conducted a meta-analysis where 19 studies were identified, examining all in all 11 predictor variables and their influence on child CP outcomes. Among family demographic variables, low family income was particularly associated with poor treatment outcomes. Concerning parental psychosocial factors, maternal symptoms of depressions as well as greater exposure to negative life events, were found to predict worse outcomes. Furthermore, a higher severity of child CP prior to the PT intervention did also predict less beneficial treatment effects.

Over the years, initial level of child CP severity has been the most commonly examined predictor of treatment outcome in PT studies. Another child characteristic that has more recently been investigated as a possible predictor of treatment response is callous-unemotional traits. It has been suggested that children with elevated levels of CU

traits may possess affective and motivational characteristics that are incongruent with socialization processes commonly involved in parenting practices (Frick & Marsee, 2006), and that this might have implications for the efficacy of PT programs when targeting these children. Hawes and Dadds (2005) reported that boys with higher levels of CU traits showed significantly less improvements from a PT program, compared with low-CU boys, and other studies evaluating child-directed interventions have reported similar findings (Haas et al., 2011; Waschbusch, Carrey, Willoughby, King, & Andrade, 2007). In the current thesis, child CU traits are evaluated as a potential predictor of outcome in a self-directed PT intervention (study II).

Over and above predictor variables present already prior to the intervention (moderators), parent behavior or other variables measured *during* the course of the PT intervention, may also be analyzed as predictors of outcome, including quantity and quality of attendance, homework compliance or parent-therapist alliance. In the Reyno and McGrath (2006) meta-analysis, various occurrences related to the progress of PT interventions were collapsed into one construct called "barriers to treatment", including practical obstacles to participation, perceived low treatment relevance and poor parent-therapist alliance. These factors were jointly found to predict inferior responses to treatment. A recent study showed how treatment fidelity (therapists' adherence to the PT protocol and use of clinical/teaching skills) predicted greater reductions of parent-reported externalizing behavior whereas parent-therapist working alliance actually predicted less improvement (Hukkelberg & Ogden, 2013). A few studies have examined treatment compliance as a predictor of change in child CP, showing that the quality of parents' participation in PT interventions is important for the outcome (Garvey, Julion, Fogg, Kratovil, & Gross, 2006; Nix, Bierman, & McMahon, 2009). Studies evaluating treatment compliance as a predictor of outcome has been conducted almost exclusively on face-to-face PT programs. Within the framework of this thesis, homework compliance is evaluated as a potential predictor of outcome in a self-directed PT intervention (study III).

## **1.7 LIMITATIONS TO PREVIOUS RESEARCH**

Although PT interventions have been extensively researched during the past half-century, there are still some limitations within the field. First, face-to-face programs are cost- and resource-intensive, as well as entailed with logistic problems for, particularly, rural families in need of help. These concerns have so far prevented a large-scale dissemination of evidence-based programs. Self-directed PT programs, administered via Internet, might be easily administered and cost-effective alternatives, or supplements, to traditional face-to-face programs but too few studies have evaluated the efficacy of these kinds of interventions. Second, previous research has provided little information about predictors of outcome in self-directed PT interventions. Given that these interventions are highly standardized, allowing little or no individual adjustment during the course of the program, pre-treatment knowledge of predictors of outcome could be crucial when families are assessed and matched to, e.g., an Internet-based PT program. Third, long-term follow-up studies of PT programs, extending beyond one year after program completion, are rare for behavioral face-to-face programs, non-existing for non-behavioral programs, and highly uncommon for self-directed PT interventions. This limits the conclusions on what reductions of child CP might be expected from PT in a longer perspective. Fourth, there is a general lack of

effectiveness trials evaluating PT programs implemented in routine care. This entails some uncertainty regarding program effects when these interventions are transported from research settings to clinics. Fifth, head-to-head comparisons of different PT programs (e.g., Incredible years vs. Cope) within the same study design have rarely been conducted, and the relative effectiveness of programs is commonly determined by comparison of effect sizes obtained from different studies. However, as studies may vary substantially with regard to study-population, settings, measures and data quality, that kind of comparison is less robust than contrasting of program effects within one and the same study. Sixth, most research on PT programs have been conducted in Anglo-Saxon countries and only a limited number of studies have evaluated these programs in a Swedish context. Given that program effects might be expected to vary when interventions are transferred from one cultural setting to another, relying on international research findings might not be sufficient, as recently pointed out by the Swedish Council on Health Technology Assessment (SBU, 2010).



## **1.8 AIMS OF THE THESIS**

The overall aims of the thesis were to evaluate a newly developed self-directed parent training program, administered via Internet, as well as to explore long-term effects of group-based PT programs, including behavioral and non-behavioral interventions.

The specific aims of the studies included in the thesis were to:

1. Evaluate the efficacy of an Internet-based PT program, with limited therapist support, targeting parents of children (aged 3 - 12) with conduct problems (study I).
2. Examine child callous-unemotional traits as a moderator of outcome in the Internet-based PT program (study II).
3. Study the long-term (18-month) efficacy of the Internet-based PT program, as well as to investigate homework compliance as a predictor of short- and long-term outcomes (study III).
4. Evaluate the long-term (2-year) effectiveness of four group-based PT programs, provided within the regular health care system, and to examine if children improve at different rates in behavioral and non-behavioral programs (study IV).

## 2 SUMMARY OF EMPIRICAL STUDIES

### 2.1 STUDY I

#### **Internet-based parent management training: A randomized controlled study**

##### 2.1.1 AIMS

Behavioral PT programs, administered in group or individual formats, are among the most extensively studied interventions for childhood onset CP and there is considerable empirical support for their efficacy (Dretzke, et al., 2009; Lundahl, Risser, et al., 2006; Serketich & Dumas, 1996) suggesting that PT leads to short-term reductions of CP, with moderate effects sizes. Unfortunately, a lot of families in need of these interventions do not have access to, or experience a variety of barriers to participate, in PT programs. This might be due to a lack of therapists trained in PT or due to practical obstacles, e.g., long travelling distances to clinics or social services, working hours and child-care time limits. To improve treatment availability, and possibly also cost-effectiveness, different levels of treatment intensity with various doses and formats of PT interventions are needed for children with CP and their families, i.e., through a stepped-care model. Self-directed PT programs, using written material or technical aids such as TV, DVD, CD-ROM or Internet as means to provide the interventions, have emerged as promising options to first steps in such models. Internet-based interventions have several advantages over face-to-face PT programs, e.g., they are more easily accessible for families and parents can get access to the information when they have time, the content is standardized (not dependent on a therapist) and can be updated with minimal effort. The aim of study I was to evaluate the efficacy of a newly developed Internet-based PT program (the Swedish *iComet*), for parents of children aged 3 to 12 years presenting with CP. Participants randomized to the intervention were compared to a waitlist control group. Short-term intervention effects on child CP, hyperactivity, emotional and peers problems, as well as on parenting practices (harsh and praiseful) were reported. A 6-month follow-up was also conducted. Issues related to clinically reliable changes, dose-response relationship and program costs were described as well.

##### 2.1.2 PARTICIPANTS AND PROCEDURE

The study was advertised in newspapers in mid-Sweden and information about the study was also distributed at university campus, at child psychiatric clinics and at schools. All in all, parents of 129 children reported interest and 109 were eventually eligible to participate in the study, after scoring above the cut-off on the Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999) used to indicate clinically relevant conduct problems, i.e., one *SD* above the mean in a Swedish norm group (Axberg, Hanse, & Broberg, 2008). Five participants failed to complete the rest of the pre-treatment assessment, due to technical complications with the website, and were hence excluded from all subsequent analyses. The analytic sample thus comprised parents of 104 children. No family was prevented to participate due to any of the study exclusion criteria (child psychosis, suicide risk, violence between family members and insufficient proficiency in the Swedish language). The mean age of included children was 6.8 years (*SD* = 2.3; range 3 - 12). Sixty children (57.7%) were boys and 44 (42.3%) girls. Most children, 101 (97.1%), were born in Sweden. Among

study parents, 77 (74.0%) had at least high school education. The pre-treatment assessment included responding to study-questionnaires online as well as participating in a 1.5h interview conducted by a research assistant/psychologist. The diagnostic interview Schedule for Affective Disorders and Schizophrenia for school-age children (K-SADS; Kaufman et al., 1997) and the risk-assessment interview Early Assessment Risk List-20B/21G (EARL-20B/EARL-21G; Augimeri, Koegl, Levene, & Webster, 2005) were used to determine diagnostic status of ODD/CD and presence of risk factors. Participants were randomized to either the Internet-based PT intervention ( $N = 58$ ) or the waitlist control condition ( $N = 46$ ). Parents allocated to the waitlist were offered the same PT program as the intervention group, after the 10-week waitlist period. Assessments were conducted at baseline and post-treatment (intervention and waitlist groups) as well as at a 6-month follow-up (intervention group only).

### ***iCOMET***

The Internet-based PT program (iComet) was developed from the Swedish group-based PT program Comet, a behavioral intervention that has shown promising results in recent evaluations (Kling, et al., 2010; Kling, et al., 2006). The transformation from a group to an online format included shortening the original Comet program, from 11 group sessions to 7 online sessions (distributed over approximately 10 weeks). The content of the program included teaching parents how to interact with their children in a flexible and positively reinforcing manner, to use distinct communication, to be consistent about rules, to ignore minor misbehavior and to use time out correctly. The online sessions were composed of written texts as well as short videos vignettes illustrating adaptive as well as non-adaptive parenting practices. During the 10-week intervention, parents were able to contact a research assistant for questions related to the program content or to technical issues concerning the website. The intervention might thus best be described as a self-directed PT program with limited therapist-support.

### **2.1.3 OUTCOME MEASURES**

The primary outcome was child CP as measured by the *Eyberg Child Behavior Checklist* (ECBI; Eyberg & Pincus, 1999). The ECBI is a well established parent-rated scale capturing child behavior problems and has been shown to correlate highly with independent measures of disruptive behaviors (Robinson, Eyberg, & Ross, 1980). The 36-item questionnaire is designed for use by parents of children aged 2 - 16 and has been validated in a Swedish normative population (Axberg, et al., 2008). On each item, parents report frequency of problems on a 7-point Likert scale ranging from 1 ("never") to 7 ("always"), enabling a total intensity score of 36 to 252. On the same set of items, parents then report whether they perceive each child behavior as difficult to handle, 0 ("no") or 1 ("yes"), resulting in a problem score of 0 to 36. To assess general child difficulties and prosocial behavior, the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 2001) was used. It is a well-validated 25-item questionnaire for parent-reports of conduct problems, hyperactivity, emotional problems, peer problems and prosocial behavior. The SDQ has shown good psychometric properties indicated by adequate internal consistency, test-retest stability and satisfying criterion validity when compared with other measures of psychopathology (Muris, Meesters, & van den Berg, 2003) and it has been validated in a Swedish normative population (Smedje, Broman, Hetta, & von Knorring, 1999).

Parenting practices were measured with the *Parenting Practices Interview* (PPI; Webster-Stratton, 1998; Webster-Stratton, Reid, & Hammond, 2001). The scale comprise 80 items measuring different aspects of parenting practices, e.g., what strategies parents apply when the child misbehaves, how often parents use positive reinforcement and to what extent parents use coercive child rearing. Moderate to high test-retest reliability has previously been reported with this measure (Baydar, Reid, & Webster-Stratton, 2003). In the current study, three summary scores were computed: harsh and inconsistent discipline (15 items), praise and positive incentives (11 items) and a total sum score (80 items).

#### 2.1.4 RESULTS

There were no significant ( $p < .05$ ) baseline differences between families allocated to the intervention and the waitlist groups, with regard to demographic characteristics, ODD/CD-diagnoses, EARL risk-factor scores or any of the outcome measures. In the entire sample ( $N = 104$ ), 55% of children met criteria for ODD and 7.6% for CD diagnoses at baseline. Pre-treatment scores on the ECBI intensity scale were above the 90<sup>th</sup> percentile for 97.1% of children in the sample, according to norms provided by Axberg, Hanse and Broberg (2008). The mean risk-factor score (EARL 20B/21G) was 7.3 for boys and 7.9 for girls indicating a generally low to medium risk for continuation of CP (Augimeri, et al., 2005).

All participants responded to the outcome measures at baseline and 83% at post-measurement. Of parents allocated to the intervention group, 15.5% completed fewer than 3 PT sessions and were subsequently defined as drop-outs. There were, however, no significant differences between drop-out families and those who remained longer in the treatment, with regard to demographic characteristics and baseline measures. In 69.2% of the cases, both parents participated in the intervention. In the other families, either the mother (27.9% of the cases) or the father (2.9% of the cases) participated. Two sets of analyses were conducted, 1) on treatment completers and waitlist families with full information (provided data at pre- and post-measurement), and 2) on all randomized participants notwithstanding status as treatment completer/drop-out or responder/non-responder at post-measurement (i.e., an intention to treat sample). Both analyses yielded similar results. Table 1 presents results for treatment completers, indicating that children of parents who received the Internet-based PT program had significant reductions of CP and hyperactivity, compared to the waitlist group. The intervention was also shown to improve child prosocial behavior, but not child emotional problems or peer problems. For parenting practices, there was an overall improvement among those who received the intervention. Particularly, harsh and inconsistent parenting decreased and praiseful/positive parenting increased for intervention parents, compared with those on the waitlist. Between-group effect sizes (Cohen's  $d$ ) at post-measurement, for the main outcome measures, were 0.66 (ECBI Intensity) and 1.08 (ECBI Problem) for treatment completers and somewhat smaller, .42 (ECBI Intensity) and .72 (ECBI Problem), in the intention to treat sample.

Based on criteria suggested by Jacobson and Truax (1991), estimations were made concerning clinically reliable changes. Using the ECBI Intensity scale, 76.1% of children in the intervention group were defined as recovered, 4.3% improved, 6.5%

unchanged and 13.3% deteriorated. The corresponding estimations for the control group were 35.0% recovered, 22.5% improved, 32.5% unchanged and 10% deteriorated.

Table 1

Pre- and post-measurement scores for treatment completers and statistical analyses of Time x Group interaction (repeated measures ANOVA).

Measures	Treatment condition				<i>F</i>	<i>pη<sup>2</sup></i>
	iComet ( <i>N</i> = 46)		Waitlist ( <i>N</i> = 40)			
	Pre <i>M</i> ( <i>SD</i> )	Post <i>M</i> ( <i>SD</i> )	Pre <i>M</i> ( <i>SD</i> )	Post <i>M</i> ( <i>SD</i> )		
ECBI						
Intensity	149.0 (16.9)	111.2 (40.2)	150.9 (18.0)	133.2 (24.1)	9.0**	.10
Problem	18.3 (5.4)	7.7 (6.0)	18.7 (5.4)	14.1 (6.0)	23.8**	.22
SDQ						
Sum score	11.0 (4.6)	8.0 (5.7)	11.6 (6.0)	12.1 (5.8)	17.0***	.17
Conduct	3.0 (1.4)	1.9 (1.6)	2.5 (1.3)	2.6 (1.4)	15.2***	.15
Hyperactive	4.0 (2.3)	3.2 (2.3)	4.8 (2.8)	5.2 (2.9)	11.6***	.12
Emotion	2.1 (1.8)	1.6 (2.0)	2.4 (2.1)	2.5 (2.4)	3.9	.05
Peers	1.9 (2.1)	1.3 (1.8)	2.0 (2.1)	1.9 (1.8)	2.7	.03
Prosocial	6.3 (2.1)	7.2 (1.9)	6.5 (2.3)	6.5 (2.1)	7.5**	.08
PPI						
Sum score	381.5 (24.4)	398.0 (22.7)	382.7 (20.7)	384.4 (25.0)	17.0***	.17
Harsh/incon.	49.5 (9.3)	43.7 (8.4)	51.9 (9.7)	50.3 (10.1)	5.0*	.06
Praise/positive	42.7 (6.8)	46.2 (6.9)	43.0 (6.7)	43.7 (6.1)	6.9*	.08

Note. ECBI = Eyberg Child Behavior Inventory; SDQ = Strength and Difficulties Questionnaire; PPI = Parenting Practices Interview; *pη*<sup>2</sup> = partial eta-squared

\* *p* < .05 \*\* *p* < .01 \*\*\* *p* < .001

Study I also included a 6-month follow-up of participants in the intervention group. The attrition was however high with only 27 out of 58 parents (46.6%) responding. Although the attrition group was not different from the responding group on any of the background variables, the results must be interpreted cautiously. Overall, pre to post improvements were maintained. A non-significant further decrease on the ECBI Intensity scale was noted, but an equally non-significant increase on the ECBI Problem scale was also detected. The SDQ sum score, as well as all subscales, remained unchanged from post-measurement.

## 2.1.5 CONCLUSIONS

The Internet-based PT program effectively reduced child CP with between-group effect sizes in the moderate range, which are comparable with those reported in previous meta-analyses of PT programs (e.g., Dretzke, et al., 2009; Furlong, et al., 2012). Reductions of child hyperactivity, as well as increases in prosocial behavior were also shown for children in the intervention families. Furthermore, parents allocated to the Internet-based PT program also reported less use of harsh parenting and increased use of praiseful parenting at post-treatment. These are all indications that this self-directed PT program, administered online with limited therapist support, could be a viable alternative to traditional group-based PT programs.

## 2.2 STUDY II

### **The moderating role of child callous-unemotional traits in an internet-based parent management training program**

#### 2.2.1 AIMS

Despite numerous empirical studies supporting the general efficacy of PT interventions, it has been acknowledged that a variety of child and family variables may be associated with an inferior treatment response. Maternal depression, low family income and more severe child CP are all pre-treatment characteristics that have been described to moderate the relationship between the intervention and subsequent changes in child CP, implicating worse treatment prognosis for particular families (Reyno & McGrath, 2006). Callous-unemotional (CU) traits in children, defined as lack of remorse, absence of empathy and lack of emotionality, have recently been attended to in the context of PT interventions, as a possibly important moderator of treatment outcome (Hawes & Dadds, 2005). Findings suggest that CP children with elevated levels of CU traits constitute a subgroup that has a particularly heightened risk for continuation of severe antisocial behavior (Frick, et al., 1999). If this subgroup benefits less from PT interventions it may have implications for how they should be matched to treatment. Particularly so prior to considering a self-directed PT program, where there is usually less room for therapeutic adjustment if the treatment does not seem to confer improvement. The first aim of study II was to investigate if "high-CU" children benefitted less from an Internet-based PT program (iComet), compared with "low-CU" children. A second aim was to evaluate the possible associations between child CU traits and treatment-related improvements in parenting practices.

#### 2.2.2 PARTICIPANTS AND PROCEDURE

Study II used the intervention group ( $N = 58$ ) from the sample in study I. One participant failed to complete the Antisocial Process Screening Devise (APSD; Frick & Hare, 2001), an important measure in study II, used to estimate level of child CU traits, and that child was therefore excluded from all subsequent analyses. The sample thus included 57 children, among whom 31 (54.4%) were boys and 26 (45.6%) were girls. The mean age was 6.7 years ( $SD = 2.3$ ; range 3 - 11) and all but one child were born in Sweden. For more details on participants, please see study I. Parents' baseline-ratings on the APSD CU-traits subscale determined if a child was clustered into a "high-CU traits" group or a "low-CU traits" group. A cut-off score of 5 was chosen due to the moderate problem severity level of the sample (APSD:  $M = 3.0$ ;  $SD = 1.8$ ; range 0 - 9) and this resulted in 8 children (14%) being defined as high on CU traits and 49 children (86%) as low on CU traits. The high-CU group and the low-CU group were first compared with regard to baseline differences on demographic characteristics, clinical features (presence of ODD/CD diagnoses and risk factors) and all outcome measures. The extent to which the two groups benefitted from the Internet-based PT program was then compared for all outcome measures.

### 2.2.3 OUTCOME MEASURES

Study II employed and reported mostly the same outcome measures as study I, ECBI (Eyberg & Pincus, 1999) as a primary measure of child CP, SDQ (Goodman, 2001) for general child difficulties and prosocial behavior, and PPI (Webster-Stratton, 1998; Webster-Stratton, et al., 2001) for parenting practices. Additionally, the CU traits subscale from the *Antisocial Process Screening Devise* (APSD; Frick & Hare, 2001) was used to categorize children into a high and a low CU-traits group. The APSD is a parent-rated measure of personality characteristics associated with severe antisocial behavior in children aged 6 – 13 and has also been validated for younger children (aged 4 - 6; Dadds, Fraser, Frost, & Hawes, 2005). A two-factor structure of the instrument (an impulsivity/conduct problems subscale and a CU traits subscale) has been demonstrated to fit data well in a Swedish clinical sample (Enebrink, Andershed, & Långström, 2005). Only the CU traits subscale was used in study II. This subscale contains 6 items: "Is concerned about how well he/she does at school", "Feels bad or guilty when he/she does something wrong" "Emotions seem shallow and not genuine" and "Does not show feelings or emotions" and "Is concerned about the feelings of others". Each APSD item is rated 0 ("not true"), 1 ("sometimes true"), or 2 ("definitely true").

### 2.2.4 RESULTS

At baseline, high-CU children were more likely to be diagnosed with CD ( $\chi^2(1) = 22.0$ ,  $p = .001$ ), had more severe CP ( $t(55) = 2.7$ ,  $p = .009$ , ECBI Intensity), were more hyperactive ( $t(55) = 2.8$ ,  $p = .008$ , SDQ), had more peer problems ( $t(55) = 2.8$ ,  $p = .006$ , SDQ) and less prosocial behavior ( $t(55) = 3.1$ ,  $p = .003$ ), compared with low-CU children. The groups did not differ on any of the other baseline measures (child emotional problems and parenting practices), clinical features (ODD symptoms/diagnoses and present risk factors) or demographic characteristics (e.g., child age, sex, number of siblings and family SES).

Intention to treat analyses were conducted (including all participants randomized to the intervention group) to investigate if high-CU and low-CU children benefitted differently from the Internet-based PT-program. Repeated measures ANOVAs were conducted using CU group (high/low) as between-group variable and time (pre/post measurement points with ECBI) as within-group variables, while controlling for baseline differences in hyperactivity, peer problems and prosocial behavior. There was a significant time X group interaction for ECBI Intensity ( $F(1,55) = 8.5$ ,  $p < .01$ ), indicating that high and low CU children changed differently over the course of the PT program. The low-CU group had a 25% decrease of CP whereas the high-CU group was mostly unaffected by the intervention. This pattern was, however, not found for the ECBI Problem subscale ( $F(1,55) = 1.0$ ,  $p = \text{n.s.}$ ) and nor were there differences between high- and low-CU children on child outcome measures of emotional problems, peer problems and prosocial behavior.

Furthermore, parenting practices measured by PPI (total sum score, harsh/inconsistent and praise/positive) were mostly affected by the Internet-based PT program to the same extent in both the high-CU group and the low-CU group. Effect sizes of pre-to-

post improvements for both CU-groups were in the moderate range for the PPI total sum and harsh and inconsistent discipline scales, and although improvements of praiseful and positive parenting seemed to differ (pre-to-post effect sizes were 0.04 and 0.48 for the high- and low-CU groups, respectively) between groups, there were actually no significant time X group interaction in the repeated measures ANOVA analyses ( $F(1,55) = 0.9$ ,  $p = \text{n.s.}$ ), when controlling for pretreatment differences between the groups.

#### 2.2.5 CONCLUSIONS

At baseline, high-CU children in this sample presented with more severe conduct problems and were more likely to obtain a CD diagnosis during the pre-treatment assessment, compared with low-CU children. This was in line with previous research linking elevated levels of CU traits to more severe forms of CP (Christian, et al., 1997). Further, the study showed that children with CP in combination with higher levels of CU traits had an inferior treatment response when their parents participated in the Internet-based PT program. This replicates findings reported previously in a study evaluating CU traits as a moderator of outcome in a face-to-face PT program (Hawes & Dadds, 2005). Interestingly, parents in both CU groups reported using the same levels of positive and negative parenting practices before the intervention and they improved equally well in these domains during the intervention. However, improved parenting skills did not seem to affect high-CU children, with regard to reductions of CP. This is in line with previous studies showing that CP in children with CU traits are less associated to poor parenting skills, compared to children without CU traits, where parenting practices are more closely linked to child CP (Wootton, Frick, Shelton, & Silverthorn, 1997). The results from this study, along with previous findings concerning children with CU traits, suggest that empathy and emotional development needs to be assessed prior to considering PT as an intervention for child CP.



## 2.3 STUDY III

### **Eighteen-month follow-up of Internet-based parent management training for children with conduct problems and the relation of homework compliance to outcome**

#### 2.3.1 AIMS

Short-term effects of self-directed PT programs have been demonstrated in several trials (Montgomery, et al., 2006; O'Brien & Daley, 2011) but few studies have included long-term follow-ups. More studies examining the duration of effects derived from these programs are thus needed prior to considering implementation in routine care. Furthermore, no previous PT trial has sought to evaluate if parents' compliance to different categories of homework tasks predict treatment outcome differently, i.e., if for instance completion of homework related to initial program components (intended to promote positive child behavior) predict the outcome more/less than homework tasks derived from components introduced later on in the intervention (conflict-management components). Such findings might have clinical implications for how certain homework assignments could be emphasized during the intervention, depending on their relative importance, which would hopefully help improve outcomes. The first aim of study III was to investigate if the post-treatment levels of child CP and parenting practices were retained 18 months after the end of an Internet-based PT program (iComet). The second aim was to evaluate if short- and long-term reductions of child CP were predicted by either total homework task completion, by subtypes of homework (tasks promoting positive behaviors and tasks intended to reduce negative behaviors) or by any specific kind of homework task.

#### 2.3.2 PARTICIPANTS AND PROCEDURE

Participants from the intervention group ( $N = 58$ ) in study I were all asked to take part in the 18-month follow-up. Families in the waitlist group ( $N = 46$ ) had by then been offered the intervention (and most of them had accepted the offer) and could thus not be included as a control condition at follow-up. Paired samples *t*-tests were used to investigate differences between post-measurement and 18-month follow-up means, as well as between baseline and follow-up means. Analyses of homework compliance as a predictor of short-term (pre to post) and long-term (pre to follow-up) changes were performed with bivariate linear regressions.

#### 2.3.3 OUTCOME MEASURES

Study III used mostly the same outcome measures as study I, ECBI (Eyberg & Pincus, 1999) as a primary measure of child CP, SDQ (Goodman, 2001) for general child difficulties and prosocial behavior, and PPI (Webster-Stratton, 1998; Webster-Stratton, et al., 2001) for parenting practices. The number of completed homework tasks was registered weekly by parents on the website. A research assistant monitored each family's progress, and made sure homework assignments were conducted and registered properly, at the end of every week, before giving access to the next session. All in all, six assignments were handed out, and registered by parents, during the 10-week program: Responsive playtime, prepare and prompt, tasks and rewards, ignoring misbehavior, problem solving and time-out. For each category of homework, a total

sum score was calculated indicating how many times during the entire program that a parent had practiced that particular assignment. All sum-score variables were normally distributed except for problem solving that showed extreme kurtosis. This variable was thus excluded from all analyses. Furthermore, two additional sum scores were calculated. One was the total number of completed homework tasks promoting positive behavior (i.e., the sum of responsive playtime, prepare and prompt and tasks and rewards). The other was the total number of completed homework tasks intended to reduce negative behavior (i.e., the sum of ignoring misbehavior and time out). Finally, a total sum score was calculated for all homework assignments completed during the program.

#### 2.3.4 RESULTS

All 58 participants provided baseline data, 46 (79.3%) families completed the post-measurement assessment and 37 (63.8%) the 18-month follow-up. There were no significant baseline differences in demographic characteristics, or on any of the outcome measures, between those who responded to the 18-month follow-up and those who did not. Analyses in study III (and the results presented below) were based on parents who had responded at all assessment point (baseline, post-test and follow-up ( $N = 32$ )). Thus, the analytic sample comprised 55.2% of participants in the intervention group. To verify the obtained results, all analyses were also conducted on a full dataset ( $N = 58$ ) where missing values were imputed using the Expectation Maximization (EM) method. The analyses based on these two datasets yielded similar results for seven out of eight outcome measures (the exception was praiseful parenting).

Table 2  
Means and standard deviations of outcome measures and post to 18-month follow-up effect sizes  
( $N = 32$ )

Measure	Pre		Post		Follow-up		T2 vs. T3	
	<i>M</i>	( <i>SD</i> )	<i>M</i>	( <i>SD</i> )	<i>M</i>	( <i>SD</i> )	<i>t</i> test	ES
ECBI								
Intensity	148.4	(15.7)	113.4	(45.9)	92.2	(22.5)	2.46*	0.43
Problem	18.2	(5.3)	6.8	(4.9)	4.9	(4.1)	1.97	0.35
SDQ								
Total sum	11.2	(4.6)	7.8	(5.2)	6.6	(3.0)	1.34	0.24
Hyperactive	3.8	(2.5)	2.7	(1.9)	2.8	(2.0)	-0.40	0.06
Peers	1.9	(1.9)	1.5	(1.9)	1.0	(1.3)	1.58	0.29
Prosocial	6.2	(2.0)	7.3	(1.6)	7.7	(1.5)	-1.35	0.09
PPI								
Harsh/incon.	50.0	(10.3)	42.9	(8.4)	42.7	(8.3)	0.10	0.03
Praise/positive	45.2	(8.8)	51.4	(6.9)	47.7	(7.1)	3.53**	0.65

Note. ECBI = Eyberg Child Behavior Inventory; SDQ = Strength and Difficulties Questionnaire; PPI = Parenting Practices Interview

\*  $p < .05$  \*\*  $p < .01$

### *Long-term program effects*

As displayed in table 2, child CP continued to decrease during the 18-month follow-up period, as measured by ECBI Intensity, with a small within-group effect size. The ECBI Problem subscale indicated retention of treatment effects, but no further improvement. Levels of general child difficulties, including hyperactivity and peer problems were unchanged between post and follow-up measurement, and so were prosocial behaviors. While the level of harsh and inconsistent parenting remained unchanged from post to follow-up, there was a significant deterioration of praiseful and positive parenting practices between post and follow-up, with a small within-group effect size (this deterioration was however not significant when analyses were conducted on the full sample,  $N = 58$ , with missing-data imputation). Changes in CP, from baseline to follow-up, were also analyzed and the results indicated large within-group effect sizes for the ECBI Intensity subscale ( $t(36) = 12.4$ ,  $p < .001$ , Cohen's  $d = 2.11$ ), as well as for the ECBI Problem subscale ( $t(36) = 12.3$ ,  $p < .001$ , Cohen's  $d = 2.32$ ).

### *Homework compliance as a predictor of outcome*

The total number of homework tasks completed by parents during the PT intervention predicted the short-term ( $\beta = .37$ ,  $t(28) = 2.10$ ,  $p = .045$ ) but not the long-term ( $\beta = -.27$ ,  $t(28) = 1.48$ ,  $p = .15$ ) changes in CP. Analyses of the two main categories of assignments showed that homework tasks intended to reduce negative behavior (ignoring misbehavior and time-out tasks combined) predicted short-term ( $\beta = .50$ ,  $t(28) = 3.02$ ,  $p = .01$ ,  $R^2 = 0.25$ ) but not long-term ( $\beta = -.13$ ,  $t(28) = .69$ ,  $p = .50$ ) changes in CP whereas the number of completed homework tasks promoting positive behavior (responsive playtime, prepare and prompt and tasks and rewards combined) did not predict short-term ( $\beta = .32$ ,  $t(28) = 1.77$ ,  $p = .09$ ) or long-term ( $\beta = -.29$ ,  $t(28) = 1.61$ ,  $p = .12$ ) outcomes. Analyses of each separate type of homework assignment yielded the following results. The number of times parents practiced ignoring misbehavior predicted the short-term outcome ( $\beta = .48$ ,  $t(28) = 2.88$ ,  $p = .01$ ), explaining 23 % of the variance in CP change, but not the long-term outcome ( $\beta = -.12$ ,  $t(28) = 0.65$ ,  $p = .52$ ). Similarly, parents' use of time out was a significant predictor of short-term changes in CP ( $\beta = .39$ ,  $t(28) = 2.23$ ,  $p = .03$ ), explaining 15% of the variance, but the number of practiced time outs did not predict long-term changes in conduct problems ( $\beta = -.12$ ,  $t(28) = 0.65$ ,  $p = .52$ ). Lastly, none of the homework tasks intended to promote positive behavior (responsive playtime, prepare and prompt and tasks and rewards) was a significant predictor of short-term or long-term changes in CP.

### 2.3.5 CONCLUSIONS

The long-term (18-month) efficacy of the Internet-based PT program was evaluated with findings indicating that child CP decreased further after the intervention and that post-measurement levels of hyperactivity, prosocial behavior and harsh parenting practices were unchanged to follow-up. Praiseful and positive parenting, on the other hand, deteriorated between post-measurement and the 18-month follow-up (although this finding was not supported in analyses on the full sample with imputation for missing data). Overall within-group effect sizes (pre to follow-up) for reductions of CP were large. Given that there was no control condition at follow-up to compare the effects with, the results should be interpreted with caution. However, the 18-month follow-up level of conduct problems (ECBI Intensity:  $M = 92.2$ ,  $SD = 22.5$ ) in the

current sample was within  $\frac{1}{5}$  standard deviation of the Swedish norm group level (ECBI Intensity:  $M = 88.2$ ,  $SD = 26.0$ ,  $N = 841$ ) as reported by Axberg and colleagues (2008), indicating that children whose parents had received the intervention were mostly comparable to the general population of children, with regard to CP severity. Furthermore, the category of homework assignments intended to reduce negative behavior, but not tasks promoting positive behavior, predicted short-term changes in conduct problems. This finding emphasizes the importance of conflict management strategies introduced during the later part of PT programs, as well as the relevance of parents' compliance to homework assignments related to these components.

## 2.4 STUDY IV

### **Two-year findings from a national effectiveness trial: Effectiveness of behavioral and non-behavioral parenting programs on children's externalizing behaviors**

#### 2.4.1 AIMS

There are few studies of PT programs including follow-ups extending beyond one year after treatment completion. This is particularly the case for effectiveness trials conducted within regular care settings. Recent reviews have highlighted the urgent need to conduct such studies (Furlong, et al., 2012; Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011; SBU, 2010). Furthermore, behavioral PT programs have been repeatedly shown to reduce child CP effectively but less is known about the effects of non-behavioral programs. Study IV evaluated the long-term (2-year) effectiveness of four group-based PT programs with different theoretical origins (behavioral and non-behavioral programs), as part of a larger randomized controlled trial. The programs included were Comet (behavioral), Incredible years (behavioral), Cope (derived from behavioral, family-system and group theory) as well as Connect (based on attachment theory). In the previously reported short-term (pre to post) evaluation of these four PT programs, a waitlist control group was included in the analyses (Stattin, Enebrink, Özdemir, & Giannotta, submitted). This study showed that all four programs produced significant reductions of child CP compared to the waitlist group, but Comet generated larger effects, as measured by the Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999), compared to the other three programs and children of parents in Connect showed the least improvement. Furthermore, Comet, Incredible years and Cope decreased inattention problems significantly compared to the waitlist group, as measured by the Swanson, Nolan, and Pelham questionnaire (SNAP-IV; Swanson, 1992), whereas Connect did not. Lastly, Cope and Incredible years generated significant improvements in hyperactivity symptoms, compared to the waitlist group, in contrast to both Comet and Connect. Overall, the short-term study showed that Comet was the most effective program, followed by Incredible years and Cope, while Connect was the least potent program.

The first aim of study IV was to evaluate the 2-year effects of these four PT programs. Specifically, levels of child CP as well as hyperactive and inattention problems, two years after treatment termination were compared between the four PT conditions. A second aim was to investigate if diverse trajectories of change could be identified across the programs, specifically, if programs with different theoretical underpinnings reduced problematic child behavior at different rates, during the course of the program (baseline to post-test) and during the follow-up period (post-test to the 2-year follow-up).

#### 2.4.2 PARTICIPANTS AND PROCEDURE

Study IV was part of a larger randomized controlled trial, The National Effectiveness Trial of Parenting Programs, where four PT programs (Comet, Incredible years, Cope and Connect), all targeting child CP, were evaluated and compared with a self-directed PT condition (reading a book about parent management strategies) and a waitlist condition. The current study included and reported results for the four PT conditions only. The study was conducted in four regions (Stockholm, Örebro, Göteborg and Lund) in the middle and southern parts of Sweden. Parents of 749 children were

recruited and randomized to either the Comet ( $N = 207$ ), the Incredible years ( $N = 122$ ), the Cope ( $N = 202$ ) or the Connect ( $N = 218$ ) program. As the programs were developed for, partly, different age groups, children in the age span 3 - 8 were all randomized to the programs developed for younger children (Comet, Incredible years and Cope), whereas children in the age span 9 - 12 were randomized to programs developed for older children (Comet, Cope and Connect). Hence, participants in the Incredible years condition were all aged 3 - 8; participants in the Connect condition were all aged 9 - 12; and participants in the Comet and Cope conditions were aged 3 - 12. The only exclusion criteria used in the study was the occurrence of an autism spectrum diagnosis. The overall mean age of included children was 8.0 ( $SD = 2.5$ , range: 3 - 12) and there were 470 (62.8%) boys and 279 (37.2%) girls in the sample. Among study families, 105 (14.0%) had an immigration background, 352 (47.0%) of parents had attended university and 204 (27.2%) were single parent households. The study was conducted as an effectiveness trial, meaning that the PT programs were provided at child psychiatric clinics, social services and schools with study participants being recruited the way these institutions usually recruited families. Parent-reports of child CP, hyperactivity and inattention problems, obtained at baseline, post-measurement and a 2-year follow-up, were analyzed for all participants randomized to one of the four PT programs.

### ***The group-based PT programs***

The four PT programs evaluated in the study, Comet (Kling, et al., 2010), Cope (Cunningham, et al., 1995), Incredible years (Webster-Stratton, 1984) and Connect (Moretti & Obsuth, 2009) were all employed as stand-alone PT interventions (i.e., no supplementary components involving child training, such as the Incredible years Dinosaur curriculum, was used). Before initiating the study, Connect (originally a program developed for parents of adolescents), was adapted to target 9 - 12 year old children, given the focus on children aged 3 - 12 in the current study. The four programs have some similarities (e.g., all programs provide a comprehensive group-leader manual giving structure and content to the weekly sessions) and some distinct differences. The behavioral PT programs, Comet and Incredible years, include similar components, e.g., both programs teach parents to use positive reinforcement, to be consistent about rules and to set limits in a non-punitive way. However, they differ with regard to origin as Comet is a Swedish program (developed to attune with Swedish norms and traditions regarding child rearing) whereas Incredible years is adopted from the USA. Cope include some behavioral components, such as positive reinforcement and rule consistency, however, it differs from Comet and Incredible years in that it uses a problem-solving approach where parents collectively reason their way to appropriate strategies, with guidance from group leaders. Connect is based on attachment theory and emphasizes the importance of strengthening the parent-child relationship through, e.g., parents' self-reflection and understanding of the child's need for autonomy. The Comet, Incredible years and Cope programs all use video vignettes and homework assignments, whereas Connect does not. The number and lengths of sessions vary across programs with Comet including 11x2.5h sessions, Incredible years 12x2h sessions, Cope 10x2h sessions and Connect 10x1h sessions.

### **2.4.3 OUTCOME MEASURES**

Study IV used the same primary outcome measure as study I - III, i.e., ECBI (Eyberg & Pincus, 1999), to assess child CP. Additionally, the *Parent Daily Report* (PDR; Chamberlain & Reid, 1987) checklist was employed as a secondary outcome measure

of child CP. The PDR is a parent-reported measure of problematic child behaviors, administered through a telephone interview. Parents are inquired about the occurrence/nonoccurrence, 0 ("has not occurred") and 1 ("has occurred"), of a number of child problem behaviors during the previous 24h period. The psychometric properties of the PDR checklist have been found adequate, including reports of high test-retest reliability ( $r < .82$ ) and concurrent criterion validity ( $r < .69$ ) when compared with direct observations of child problem behaviors (Chamberlain & Reid, 1987). Furthermore, study IV used the DSM-IV version of the *Swanson, Nolan and Pelham questionnaire* (SNAP-IV; Swanson, 1992), a parent-rated measure of ADHD and ODD symptoms. SNAP-IV includes three subscales: hyperactivity/impulsivity (9 items; e.g., "Often blurts out answers before questions have been completed"), inattention (9 items; e.g., "Often does not seem to listen when spoken to directly") and ODD (8 items; e.g., "Often loses temper"). Items are rated on a four-point scale, ranging from 0 ("not at all") to 3 ("very much"). The hyperactivity/impulsivity and inattention subscales have showed good agreement with clinicians' ratings of ADHD (Alda & Serrano-Troncoso, 2013).

#### 2.4.4 RESULTS

At baseline, there were no significant differences ( $p < .05$ ) between participants allocated to the four PT conditions with regard to child sex, family income, parents' educational level, number of siblings in the family, number of single parent households and immigration status. There were, however, differences in child age ( $F(3,739) = 68.2$ ,  $p < .001$ ) and parent age ( $F(3,734) = 6.4$ ,  $p < .001$ ) between the groups. Children and parents in the Connect group were the oldest ( $M = 9.7$  years,  $SD = 1.4$  and  $M = 39.9$  years  $SD = 5.4$ , respectively), whereas those in the Incredible years group were the youngest ( $M = 7.0$  years,  $SD = 2.2$  and  $M = 37.5$  years  $SD = 6.1$ , respectively). This was expected, given the randomization procedure described previously where 9 - 12 year old children were exclusively allocated to either the Comet, Cope or Connect programs (and not Incredible years), and where 3 - 8 year old children were allocated to Comet, Incredible years and Cope (and not Connect). Due to these differences, child age was controlled for in all subsequent analyses. All participants responded to the baseline questionnaires, 661 (88.3%) at post-test, and 543 (72.5%) at the 2-year follow-up. Response-status at the 2-year follow-up 1 ("responded") and 0 ("did not respond") was regressed on child age and gender, parent education and income, immigrant status as well as on all baseline measures, in a binary logistic regression. Only immigrant status and parent education were significant predictors of response-status at the 2-year follow-up. However, the Nagelkerke  $R^2$  was low (.068), indicating that responders and non-responders did not differ substantially and it is plausible to assume that the attrition bias was limited. Parents of 635 (84.8%) children attended at least one group session and the mean number of attended sessions was 6.8 ( $SD = 3.7$ ). Among those who started a program ( $N = 635$ ), the most common pattern was that only one parent participated in the PT program (496; 78.1%).

#### *Comparing outcomes at the 2-year follow-up*

To compare the levels of child problems across the four PT programs at the 2-year follow-up, ANCOVA analyses were conducted, controlling for child age and initial level of severity. The 543 (72.5%) participants who responded to the study questionnaires, as well as the 579 (77.3%) who responded to the PDR interviews, at follow-up, were included. As illustrated in table 3, there were no significant differences between the four PT groups in child CP (as measured by ECBI, SNAP-ODD and PDR)

at the 2-year follow-up. Neither were there any differences between the groups with regard to hyperactivity and inattention problems.

Table 3

Differences in clinical outcomes between PT programs at the 2-year follow-up (ANCOVA analyses).  $N = 543 / 579$  (questionnaires / PDRs).

Outcome measures	Comet <i>M (SD)</i>	Incr. Years <i>M (SD)</i>	Cope <i>M (SD)</i>	Connect <i>M (SD)</i>	$F^a$	$p\eta^2$
ECBI						
Intensity	2.73 (0.84)	2.92 (0.86)	2.70 (0.81)	2.60 (0.98)	0.76	.004
Problem	0.23 (0.20)	0.27 (0.23)	0.23 (0.21)	0.24 (0.25)	0.12	.000
SNAP-IV						
ODD	0.85 (0.64)	0.78 (0.65)	0.75 (0.63)	0.74 (0.72)	1.38	.008
Hyperactivity	0.69 (0.65)	0.81 (0.67)	0.78 (0.64)	0.58 (0.66)	0.76	.004
Inattention	0.90 (0.66)	1.01 (0.80)	0.97 (0.75)	0.91 (0.69)	1.29	.007
PDR	4.62 (2.88)	4.76 (2.85)	4.00 (2.94)	3.99 (2.74)	1.10	.006

Note. Item means are presented for ECBI and SNAP, whereas sum score means are presented for the PDR. Baseline level of severity and child age were included as covariates in ANCOVA analyses. ECBI = Eyberg Child Behavior Inventory; SNAP-IV = Swanson Nolan And Pelham questionnaire; PDR = Parent Daily Report;  $p\eta^2$  = Partial eta squared (ANCOVA effect sizes);

<sup>a</sup> None of the  $F$  statistics indicated significant differences ( $p < .05$ ) between groups

### ***Comparing change trajectories between programs***

To examine how (at what rate) children of parents in the four PT programs changed from baseline to the 2-year follow-up, a series of multi-group Latent Growth Models (LGM) were fitted using the baseline, post-test and 2-year follow-up measurement points. The slopes for all four programs were compared against each other to evaluate if changes in outcomes followed different trajectories. To more closely examine how change trajectories differed between programs, post-hoc analyses were conducted using latent change models. These post-hoc analyses were run to specifically compare the changes occurring from (1) baseline to post-test, and (2) post-test to the 2-year follow-up, between the four PT programs. Overall, analyses showed that Comet was more effective in reducing child CP in the short term (baseline to post-test), followed by Incredible years and Cope, while the non-behavioral program Connect was the least effective program. However, during the 2-year follow-up period, children of parents in Connect were reported to have a continued reduction of CP, whereas participants in Comet, Incredible years and Cope were mostly unchanged. Thus, all four PT programs had produced significant reductions of CP two years after treatment termination, with pre to follow-up (within-group) effect-sizes for ECBI scores ranging from  $d = 0.97$  to  $1.07$  (intensity) and from  $d = 0.76$  to  $d = 0.80$  (problems) across programs. Resembling results were found for changes in hyperactivity when LGM and post-hoc analyses were interpreted. Incredible years produced more rapid change in hyperactivity symptoms during the course of the intervention, compared with Connect, while Connect was the only program where parents reported continued reductions of child hyperactivity during the 2-year follow-up period. With regard to changes in inattention, analyses showed that participants in all four PT programs followed an overall similar trajectory.



### ***Program effectiveness for the most clinically severe***

To compare program effectiveness for the most clinically severe children, dichotomous variables were created using the 95<sup>th</sup> percentile cut-off values of the ECBI and SNAP subscales. At each measurement point (baseline, post-test and the 2-year follow-up), participants were thus separated into two groups, representing those children who scored above (coded 1) and below (coded 0) the 95<sup>th</sup> percentile cut-offs. LGM models were fitted using these dichotomous variables at each measurement point. These analyses estimated changes in the number of children who scored above and below the 95<sup>th</sup> percentile cut-off values, from baseline to the 2-year follow-up. The results showed that change trajectories for the most clinically severe children were similar (with four out of five ECBI and SNAP subscales) across all four programs. All in all, these results suggest that the Comet, Incredible years, Cope and Connect programs were equally effective for those children who presented with the most severe levels of CP.

### **2.4.5 CONCLUSIONS**

The long-term (2-year) effectiveness of four group-based PT programs (Comet, Incredible years, Cope and Connect) was evaluated and the findings showed that participants in all programs had levels of child CP, hyperactivity and inattention problems that did not differ significantly from each other at the 2-year follow-up. The behavioral programs, particularly Comet and Incredible years, were more potent in the short term, compared with the non-behavioral program Connect. On the other hand, parents in the Connect condition were the only ones who reported continued improvements in their children during the follow-up period. Furthermore, the four PT programs were shown to be equally effective for the most clinically severe children. Overall, the findings support further implementation of these PT programs in routine care.

### **2.5 ETHICAL ISSUES**

The study protocols included in the current thesis were approved by the regional ethical review board in Uppsala, Sweden (study I - III: 2008/142; study IV: 2009/254). All participants were informed, orally and in writing, about the objectives and procedures of the study they took part in. They were also informed that participation was voluntary and that they could leave the study at any point, without being asked about the reason. To secure confidentiality, all participants were assigned a coded identification number that was used during data entry and while conducting analyses. All data and information about participants were stored in locked file cabinets in premises with strict security regulations.

### 3 GENERAL DISCUSSION

In the current thesis, the short- and long-term effects of self-directed as well as group-based PT interventions have been evaluated. Predictors of outcome have been examined and PT programs with different theoretical origins have been contrasted. The results are discussed in the following section.

#### 3.1 INTERPRETATION OF RESULTS

Despite the substantial empirical support for PT programs as effective interventions for childhood onset CP (e.g., Dretzke, et al., 2009; Eyberg, et al., 2008; Lundahl, Risser, et al., 2006), there are still some remaining limitations within the field. One important issue relates to the fact that only a small segment of families in need are reached by evidence-based interventions (Dodge, 2009; Kazdin, 2013). Self-directed PT programs have some advantages over group-based programs in that they can be disseminated more widely and in a possibly cost-effective way (O'Brien & Daley, 2011) and might therefore help resolve this issue. Study I and III evaluated the short- and long-term efficacy of one such self-directed PT program (iComet), administered online, with limited therapist support. Findings showed that the intervention reduced child CP with short-term effect sizes  $d = 0.42$  (ECBI Intensity) and  $d = 0.72$  (ECBI Problem), in the moderate range. The magnitude of these effects were lower than those previously reported by Kling and colleagues (2010) for the face-to-face (group-based) version of the Comet program,  $d = 0.79$  (ECBI Intensity) and  $d = 0.91$  (ECBI Problem), but comparable to the mean effect sizes reported in meta-analyses,  $d = 0.42$  (Lundahl, Risser, et al., 2006),  $SMD = 0.53$  (Furlong, et al., 2012) and  $SMD = 0.67$  (Dretzke, et al., 2009). How do we explain the efficacy of this mostly self-directed PT program and the fact that it affected child CP to a similar extent as more resource-intensive face-to-face programs? One reason might be that both parents participated together in the intervention to a greater extent (in 69% of the cases) than commonly seen in PT contexts. Studies of group-based PT programs usually describe significantly lower rates of joint participation, e.g., 8% (Kling, et al., 2010), 16% (Webster-Stratton, 1998) and 22% across the four group-based PT programs evaluated in study IV. The common pattern is that only one parent attends group sessions and this parent is typically the mother (Budd & O'Brien, 1982). This is unfortunate given findings indicating that fathers involvement in PT programs results in more positive short-term outcomes (Lundahl, Tollefson, Risser, & Lovejoy, 2008) as well as in better maintenance of treatment gains after the interventions (Bagner & Eyberg, 2003). The high degree of joint participation in the Internet-based PT program might thus have contributed to the promising efficacy of the intervention. Not only effects on child CP were reported, but also a reduction of harsh and inconsistent parenting, as well as an increased use of praiseful and positive parenting. Reflecting back on Gerald Patterson's coercion theory (Patterson, et al., 1992), suggesting that coercive parenting is involved in children's development of CP, improvement in parenting domains should be of importance. Changes in positive parenting (Dishion et al., 2008; Gardner, et al., 2010) as well as negative parenting practices (Beauchaine, Webster-Stratton, & Reid, 2005; DeGarmo, et al., 2004; Ogden & Hagen, 2008) have accordingly been shown to mediate the effect of PT interventions on the outcome. Patterson and colleagues (2010) suggested that PT

interventions, operating through changes in parental behavior, reduces the level of coercion within families which in turn reduces child CP. This initial treatment effect is then followed by a chain of events (*cascading effects*) where several child and family domains are collaterally affected, i.e., improved family interactions are thought to spread to other areas, such as peer relations and social environments. Thus, with successful PT, these cascading effects may alter children's developmental trajectory in a profound way. The long-term follow-up in study III did in fact indicate that the Internet-based PT program produced changes in child CP that were maintained (ECBI problem subscale) or continued to grow (ECBI intensity subscale) during the 18-month post-treatment period. Furthermore, parent-reported reductions of general child difficulties (SDQ sum score: including conduct, hyperactive, emotional and peer problems) at post-test were retained to the 18-month follow-up. However, the experimental group could not be compared to an untreated control condition at follow-up, why the results need to be interpreted with caution. Yet, a comparison of the mean level of CP in the PT condition at follow-up, with the Swedish norm group mean (as measured by ECBI intensity subscale; Axberg, et al., 2008), revealed that participants in the Internet-based PT program were close to (within  $\frac{1}{5}$  SD) what could be considered a normative level of CP, providing some support for the long-term efficacy of the Internet-based PT program. The long-term effects of the iCOMET program ( $d = 2.11$ , pre to 18-month follow-up changes as measured by the ECBI intensity subscale) are comparable with effects reported in a previous 3-year follow-up of the Triple-P self-help program (TPSHP) where large within-group effect sizes were found ( $d = 1.70$  and  $d = 1.18$ , mother and father reports on the ECBI intensity subscale, respectively) when comparing pre-treatment and 3-year follow-up levels of child CP (Sanders, et al., 2007). Within the same study, TPSHP was also compared with the enhanced as well as the standard versions of the Triple-P program (both delivered face-to-face) and no between-group differences were found at the 3-year follow-up. Overall, these promising results provide support for the long-term efficacy of self-directed PT programs.

Study II and III investigated predictors of change in the Internet-based PT program. Predictors of outcome in self-directed interventions have been studied to a very limited extent, even though it might be even more crucial to be aware of variables that determine the outcome in treatments that are mostly self-directed, as there is usually less room for therapeutic adjustment in these interventions. In a face-to-face PT program, the group leader/therapist has the opportunity to individualize the intervention to a greater extent, particularly with families that do not seem to benefit from the treatment. This is less of an option within the standardized structure of self-directed PT programs. Study II showed how children with higher levels of CU traits, i.e., with low empathy and limited emotionality, benefitted less from the Internet-based PT program, when compared with low-CU children. High-CU children also presented with more severe CP, more hyperactivity and peer problems, as well as with less prosocial behavior at baseline. The generally high problem severity of children with CU traits did however not explain the inferior treatment response, as these variables were controlled for in the analyses. Furthermore, parents of high-CU children reported to use the same average amount of positive and negative parenting practices at baseline as parents of low-CU children during the intervention, and they improved within these domains to the same degree during the intervention. It is thus not plausible to assume that the

limited treatment response for high-CU children was associated with failure on behalf of their parents to utilize treatment components intended to change parenting practices. These findings replicate results from previous studies showing that CU traits in children with CP are associated with poorer treatment outcomes in PT programs (Hawes & Dadds, 2005) as well as in child-directed interventions (Haas, et al., 2011; Waschbusch, et al., 2007). Several characteristics of the CU + CP subgroup of children might explain why they seem to be more resistant to treatment. First, CP in children with CU traits are less associated with the quality of parenting these children are exposed to (Wootton, et al., 1997). As PT interventions aim to improve parenting practices, in order to change child behavior, this might not be a feasible approach with this group of children. Second, children with elevated levels of CU traits are less responsive to punishment (Fisher & Blair, 1998) and distress (Frick, et al., 1999) which has been proposed to interfere with moral development (Blair, 1995). These features might render limit setting and disciplinary strategies, taught in PT programs, less effective. All in all, these findings call for more attention on empathy and emotional development during clinical assessment of children with CP, prior to considering PT as an intervention. A quite different predictor of outcome was evaluated in study III. The association between number of completed homework assignments during the course of the Internet-based PT program and the outcome (short and long-term changes in child CP) was investigated. The main findings were that parents who completed more homework assignments intended to reduce negative behavior (ignoring misbehavior and time out) reported greater reductions of child CP, whereas the amount of completed homework assignments promoting positive behavior (responsive playtime, prepare/prompt and tasks/rewards) had no relation to the outcome. This was confirmed for short-term changes, but not for long-term changes where no homework variable predicted the outcome. The results were somewhat unexpected given the emphasis in most behavioral PT programs, including the iComet, on techniques that promote positive child behavior. These components are commonly introduced early on in the intervention, before any limit-setting strategies are presented, and parents are encouraged to practice positive components consistently throughout the intervention (even after limit-setting techniques are introduced). Still, the findings in study III point to the importance of practicing ignoring misbehavior and time out. A few studies have investigated parents' compliance to treatment as a possible predictor of outcome, generally showing that the quality of participation in PT has bearing on the outcome (Clarke et al., 2013; Nix, et al., 2009), but no such studies have been conducted on self-directed PT programs. Neither has any previous PT study (on self-directed or face-to-face programs) sought to evaluate if completion of different categories of homework tasks predict changes in child CP differently. The findings in study III are thus novel but the results should be interpreted cautiously as the study design restricts the comparability of the two main categories of homework tasks. Particularly because the different components/assignments were introduced to parents in a specific order (tasks promoting positive behavior first and then tasks intended to reduce negative behavior), it may thus be the case that the limit-setting techniques were effective *because* they had been preceded by techniques that intended to increase positive child behaviors. The traditional sequential ordering of components in behavioral PT programs is based on the assumption that limit setting is more effective when it occurs in the context of a positive parent-child relationship (Campbell, 1990). However, this assumption has rarely been tested. A study by Eisenstadt and colleagues (1993) investigated the impact

of the order in which the two main categories of components were introduced by randomizing participants to receive Parent-Child Interaction Therapy (PCIT) in either the traditional way (the relationship-strengthening part first and limit-setting part later) or in a reversed order (the limit-setting part first and the relationship-strengthening part later). At post-measurement, there were few differences in outcomes between the groups and those differences that were significant favored children of parents who had received the limit-setting part first. All in all, it might be the case that there are alternative ways to structure PT programs, with a more evenly distributed emphasis on relationship-building *and* limit-setting components, to possibly achieve better effects.

Study IV compared the effectiveness of group-based PT programs with different theoretical origin. Two behavioral programs, Comet and Incredible years, were shown to reduce child CP and ADHD symptoms at a generally more rapid rate during the course of the interventions (between pre and post measurements) compared with the attachment-based Connect program. During the 2-year follow-up period, however, children of parents who had participated in the behavioral programs were mostly unchanged (i.e., they maintained previous treatment gains), whereas participants in Connect continued to improve during this phase. When the means of all outcome measures were compared at the 2-year follow-up, while controlling for differences in child age and baseline problem severity, no significant differences between the programs were detected. The results thus indicate that the Comet, Incredible years, Cope and Connect programs were equally effective interventions, in the long run. Within-group effect sizes (baseline to the 2-year follow-up) for all programs were large with regard to parent-reported reductions of child CP, moderate for reductions of hyperactivity and small to moderate for reductions of inattention. Furthermore, all four PT programs appeared to be equally effective for children who had the most severe problems (scoring above the 95<sup>th</sup> percentile on the ECBI and SNAP subscales). The findings are in line with efficacy studies showing promising long-term (extending beyond one year) effects of PT programs with retention of treatment gains 18 months post intervention (the Incredible years program; Bywater, et al., 2009) and up to 8 - 12 years after treatment completion (the Incredible years program; Webster-Stratton, et al., 2011). One previous effectiveness study evaluated the long-term effects of the Incredible years program (Gardner, Burton, & Klimes, 2006). The study was conducted at community and family centers in the UK and included an 18-month follow-up of the experimental group ( $N = 44$ , child ages 2 - 9). The baseline to follow-up effect sizes, as measured by ECBI intensity and problem subscales, were moderate to large ( $d = 0.47$  and  $d = 0.96$ , respectively). This might be the study most close at hand to compare the results from study IV with, both showing that PT programs seem to remain effective when translated into community settings. One might also compare the mean level of CP across all four PT programs at the 2-year follow-up, with the Swedish norm group mean (as measured by ECBI intensity subscale; Axberg, et al., 2008). Children of parents in the four PT groups were on average within  $\frac{1}{2}$   $SD$  of the norm-group mean, suggesting that they still had some problems. However, having started off at a level more than  $1\frac{1}{2}$   $SD$  above the norm mean, at baseline, 27 months prior to the 2-year follow-up, is an indication that the PT programs were at least reasonably effective.

### 3.2 IMPLICATIONS OF THE FINDINGS AND FUTURE DIRECTIONS

The Internet-based PT program iComet was the first of its kind to be evaluated in a randomized and controlled trial, closely followed by a study evaluating the online version of the Triple-P program (Sanders, et al., 2012). The iComet (with limited therapist support) and Triple-P online (without therapist support) have now thus been shown to reduce child CP effectively when compared with waitlist controls. Brought together, the two RCTs evaluating these programs provide support for the transferability of PT to a medium (the Internet) that can potentially reach large number of clients. However, the iComet and the Triple-P online programs are different interventions, with resembling but not identical contents. Therefore, the iComet program, by itself, would not be classified as a "well established treatment", according to the definition provided by Silverman and Hinshaw (2008), requiring two or more well-conducted studies showing superiority to placebo, or equivalency to an already-established treatment. Even for the iComet to be considered a "probably efficacious treatment" would demand an additional study, conducted in an independent research setting (i.e., by another research group), proving the program to be superior to an untreated control group. This reasoning leads to the conclusion that the iComet program is not yet ready to be implemented in routine care. Currently, the iComet is being evaluated and compared with a brief parenting intervention (Family Check-Up, FCU; Dishion & Kavanagh, 2003) in a Swedish trial and the result are due to be presented soon. With more future studies of this sort, the self-directed PT intervention might prove to serve well as an initial step in a stepped-care model. The possible benefit of a treatment model with several levels of PT interventions, ranging from low to high treatment intensity, might be that resources (in terms of therapist time) would be better allocated to respond adequately to different families with different needs. Families of children with less severe CP could get quick access to Internet-based PT, requiring limited therapist effort, whereas families with more dire needs might be referred to group-based or individual PT programs.

Results from study III and IV provide support for the long-term efficacy/effectiveness of self-directed as well as group-based PT programs. These are encouraging findings that strengthen the overall evidence-base for the included programs (iComet, Comet, Incredible years, Cope and Connect). Additionally, all PT programs in study IV were delivered through child psychiatric clinics, social service centers and schools (i.e., not in research settings) and still showed good long-term effects. This provides support for the transportability of these interventions into routine practice. It should be noted that study III and IV reported follow-up effects without any comparison to untreated controls. In both studies, parents who had been on waitlists between baseline and post-measurement were offered a PT intervention immediately after the end of the waitlist period. This is common practice as it is generally viewed as unethical to withhold a possibly effective intervention from control groups. Findings from study IV showed that participants in behavioral PT programs reported more rapid reductions of child CP, compared with participants in the non-behavioral program. Yet, at the 2-year follow-up, there were no significant differences between behavioral and non-behavioral programs. What do we make of these findings? One might argue that it is preferable if an intervention produces quick improvements that are maintained to follow-up, compared with an intervention that generates more modest changes in the short term but continues

to improve participants during the follow-up period. The first kind of program would, all in all, entail a shorter period of time where participating families suffer from higher levels of child CP. However, the effectiveness of the Connect program, during the follow-up period, could also be an indication of how the development might continue, beyond the 2-year follow-up, with perhaps even further improvements for these families. Future studies comparing cost-effectiveness and acceptability between the Comet, Incredible years, Cope and Connect programs may also provide important information, perhaps showing that one of the programs is more suitable for implementation, compared to the others. As for now, if we bring in to the picture the substantial evidence-base for behavioral PT programs, and the limited empirical support for non-behavioral programs, the conclusion would be that the Comet, Incredible years and Cope programs are better supported interventions and should therefore be considered for implementation at first hand. The findings from study IV should also inspire future research to explore and compare mechanisms of change in behavioral and non-behavioral PT programs. The apparent differences in program contents might suggest that, e.g., the Comet and Connect programs operate through different mediating variables. However, it should not be ruled out that there could be common mechanisms of change across programs with different theoretical origin. One such plausible mechanism might be the quality of the parent-child relationship that has previously been shown to mediate the effect of *Multidimensional Treatment Foster Care* (MTFC) on antisocial behavior in youths (Eddy & Chamberlain, 2000). Although relationship improvement is more emphasized in non-behavioral PT programs (and is theoretically assumed to account for the effects on child CP), it is not unlikely that changes in this domain could affect the outcome of behavioral programs as well.

The results from study II showed how higher levels of CU traits in children predicted an inferior treatment response, with the Internet-based PT program. This finding, along with similar previous reports (e.g., Hawes & Dadds, 2005), suggest that children with a combination of CP and CU traits may require other treatment approaches. One recent study found significant improvements in affective empathy and CP in high-CU children and adolescents (aged 6 - 16), following emotion recognition training (Dadds, Cauchi, Wimalaweera, Hawes, & Brennan, 2012). The computerized training (4 x 90-minute sessions) involved teaching children/adolescents to accurately perceive and interpret human emotions and the promising effects were reported at a 6-month follow-up. Adaptations to traditional PT programs have also been suggested for CP + CU children, involving, e.g., teaching parents to perform perspective taking exercises and to foster greater emotional awareness in their children (Kimonis, Bagner, Linares, Blake, & Rodriguez, 2014). Future studies should evaluate such supplementary components, in combination with PT interventions, to achieve better outcomes for this group of children. Furthermore, the use of standardized scales, such as the Antisocial Process Screening Device, or by focusing more on aspects of empathy and emotional development during assessment of children with CP, would help clinicians detect presence of CU traits, which might improve treatment planning for this subgroup. Findings from study III, regarding how completion of homework assignments intended to reduce negative child behavior predicted changes in CP, were interesting but should be considered preliminary. Given the emphasis in behavioral interventions on the importance of acquisition and use of skills, the general lack of studies investigating the association between training and outcome is noteworthy (Hundt,

Mignogna, Underhill, & Cully, 2013). Future studies should include measures of quantity as well as quality of homework compliance to better respond to the question of their importance.

### **3.3 LIMITATIONS**

A number of methodological constraints limit the generalizability of the previously described findings. First, all four studies relied on a single source of information, namely parent-ratings of child behavior and parenting practices. It would have been preferable to include direct observations of parent-child interactions as well as teacher-ratings of these constructs to further validate the findings. This was however not possible due to limited resources within both studies. Second, the sample that formed the basis for study I, II and III was self-referred, possibly reducing the severity of child behavior problems, compared with levels that would have been found in a clinical sample. However, only families who scored more than 1 *SD* above the Swedish norm group mean (Axberg, et al., 2008) on the ECBI were eligible to enter the study, ensuring that the participating families had relevant problems to some extent. Third, participants in study I, II and III were well-educated (the majority had attended university) and almost all children were born in Sweden. This was possibly a consequence of the fact that the evaluated intervention required computer and Internet access, as well as proficiency in the Swedish language. This homogeneity of the sample, nonetheless, limits the generalizability of the findings to other samples of children with CP. Fourth, the long-term follow-up effects reported in study III and IV could not be compared with untreated control conditions. Thus, it was not possible to distinguish long-term program effects from spontaneous remission that possibly would have occurred in children and parents if they had not participated in a PT program. Fifth, the substantial attrition in study I (at the 6-month follow-up) and study III (at the 18-month follow-up) entails uncertainty regarding the reported follow-up effects of the Internet-based PT program. Baseline characteristics and problem severity, as well as pre to post changes in all outcome measures, were compared between responders and non-responders (study III), showing that these two groups were mostly similar with regard to how they presented at the initial assessment and how they changed during the course of the intervention. These analyses suggest that the bias derived from attrition might have been limited, yet the follow-up results should be interpreted cautiously. Lastly, two of the group-based PT programs in study IV were compared even though children in these programs did not overlap with regard to age. The Incredible years group included children aged 3 - 8 whereas the Connect group included those aged 9 - 12. The fact that child age was included as a covariate in all analyses does not adequately compensate for this, and the comparison of program effects, between these particular programs, should be interpreted in light of this limitation.

### **3.4 CONCLUSIONS**

Today, more than one hundred programs aiming to prevent mental illness in children have been estimated to be implemented in Sweden and most of them target child CP. Very few of these interventions have been evaluated in Sweden and none in randomized trials with follow-ups extending beyond 6 months (SBU, 2010). As such, families with CP children who seek help at social service centers and child psychiatric clinics are far from guaranteed to be offered an evidence-based PT program. The current thesis provides support for the long-term effectiveness of four group-based PT



programs (Comet, Incredible years, Cope and Connect), when employed in Swedish routine care settings and when administered by regular personnel. This information should be important for future guidelines and recommendations of PT-program implementation. The finding that an attachment-based intervention, the Connect program, produced outcomes similar to those reported for the more established behavioral programs, was particularly interesting and should inspire future studies to compare mechanisms of change, cost-effectiveness and parents' acceptability between programs with different theoretical underpinnings. The present thesis also provides support for the short- and long-term efficacy of an Internet-based PT program, the iComet, and future replications of these results could prove this intervention to be a fitting part in a stepped-care treatment model. Such a model might entail a more efficient allocation of resources, by allowing therapists to focus more on families with severe and complex problems. An Internet-based PT program might also reach families who currently do not have access to care, who experience different barriers to treatment or who would not consider taking part in a face-to-face program. Results reported in the thesis also showed that CP children who presented with elevated levels of CU traits did not benefit sufficiently from the Internet-based PT program. This finding highlights the importance of assessing empathy and emotional development prior to considering PT as an intervention for child CP and it also emphasizes the need for alternative treatment approaches that may help this subgroup of children better. Lastly, it was shown that parents who completed more homework assignments related to limit-setting program components had more positive outcomes, in the Internet-based PT program. This finding does not prove these tasks to be more important than other assignments, but merely that parents should be encouraged to engage in all kinds of homework assignments, even those presented at the very end of the program.

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