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PREVENTION AND PREDICTION OF ADOLESCENT PROBLEM BEHAVIOR

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Prevention and prediction of adolescent problem behavior

THESIS FOR DOCTORAL DEGREE (Ph.D.)

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ABSTRACT

Background: The adolescent period is characterized by a huge leap in social, emotional, and cognitive development. For most people, it passes without major disruptions, but for a substantial number of adolescents, it does not. There is a range of social and psychological theories that aim to explain the development of problem behaviors, where some have a holistic approach and some focuses on individual features. Several strategies for preventing or decreasing problem behaviors have been developed, often by addressing identified risk factors that increase the likelihood of a negative development. Such prevention include for instance parent training programs, and a change in parenting skills has been shown to be a strong predictor for child problem behavior. Two parent training programs; ParentSteps (FöräldraStegen) and Comet for parents of adolescents aged 12-18 (ungdomsKomet) that address parents of adolescents with problem behaviors have been run since year 2004 within the regular preventive work of Swedish social services. Within this thesis, the two programs are evaluated for the first time. The aims of the three studies' within the present thesis were to 1) study the effectiveness of the two parent training programs that address parents of adolescents with at-risk behaviors with regard to the programs' ability to decrease the adolescents' parent- and self-rated antisocial behavior, delinquency, substance use, and psychosocial distress; 2) explore both self-rated and parent-rated short-term predictors of hazardous alcohol use (externalizing behavior, delinquency, internalizing behavior, psychosocial distress, perception of peers' deviancy, perception of peers' drinking) among alcohol using adolescents; 3) explore the ability of self-rated psychological risk factors to predict externalizing behavior or delinquency among female adolescents, and if perception of peers' deviancy moderated any such effect.

Methods: A naturalistic inclusion sample comprised parents and adolescents aged 12-18 years, who were assessed in a randomized controlled trial, at baseline and at a 6-month follow-up. Study 1 consisted of 243 parents and 237 adolescents, who were randomized to ParentSteps, Comet or to a wait-list control group. The parent group training was carried out in real-world settings within the regular preventive work of social services. Study 2 comprised 167 alcohol-using adolescents and their parents, and Study 3 comprised 112 female adolescents. Initially, prior to study inclusion, parents were briefly screened for eligibility with questions about their adolescent's behaviors, and participation required informed and written consent from both parent and adolescent. Participants also had to live in on of the five collaborating municipalities in Stockholm county. Data collection was carried out between fall 2008 and spring 2010.

Results: We found no significant effects from the programs over time with regard to reduction of parent- and adolescent-rated antisocial behaviors, delinquency, substance use or psychosocial distress. Of the tested predictors only perception of peers' drinking had an effect on both females' and males' heavy episodic drinking and risk use of alcohol, and externalizing behaviors predicted females' risk use. There were no significant differences in predictor slopes between females and males. Parent-rated externalizing behavior predicted

males' risk use. Among the psychological risk factors, cognitive problems emerged as a significant predictor for the females' externalizing behaviors and delinquency. Perception of peers' deviancy did not moderate the effect.

Conclusion: With a focus on clinical applicability, it can be concluded that ParentSteps and Comet were not suitable for this population of at-risk adolescents. The included adolescents were found to have elevated, sometimes clinical, levels of several co-existing problem behaviors, suggesting that adolescents who together with their parent seek parent training should be thoroughly examined for co-existing problems so they can be assigned to proper intervention or treatment. Future research should explore both females' and males' ADHD symptoms as risk factors for externalizing behaviors, delinquency, illicit drug use, and hazardous alcohol use in longitudinal studies with longer follow-up periods than 6 months, preferably in larger samples.

LIST OF SCIENTIFIC PAPERS

- I. **Jalling, C.**, Bodin, M., Romelsjö, A., Källmén, H., Durbeej, N., & Tengström, A. (2016). Parent programs for reducing adolescent's antisocial behavior and substance use: A randomized controlled trial. *Journal of Child and Family Studies*, 25(3).
- II. **Jalling, C.**, Elgán, T. H., Tengström, A., & Birgegård, A. (2017a). Gender-specific predictors of at-risk adolescents' hazardous alcohol use - a cohort study. *Substance Abuse Treatment, Prevention, and Policy*, 12(1), 23. doi:10.1186/s13011-017-0105-6.
- III. **Jalling, C.**, Elgán, T. H., Tengström, A., & Birgegård, A. (2017b). Psychological risk factors for female adolescents' externalizing behavior and delinquency, testing the perception of peers' deviancy as moderator. Submitted.

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LIST OF ABBREVIATIONS

ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactive Disorder
BPT	Behavioral Parent Training
CD	Conduct Disorder
CBCL	Child Behavior Check List
CI	Confidence Interval
Comet	Comet for parents and adolescents aged 12-18
DSM-5	The Diagnostic and Statistical Manual for Mental Disorders, 5 th edition
ESPAD	The European School Survey Project on Alcohol and Other Drugs
HED	Heavy Episodic Drinking
MDFT	Multidimensional Family Therapy
MST	Multisystemic Therapy
OR	Odds Ratio
PBT	Problem-Behavior Theory
PMT	Parent Management Program
PS	ParentSteps
RCT	Randomized Controlled Trial
RTM	Regression to the Mean
SD	Standard Deviation
SES	Socioeconomic Status
SFP 10-14	Strengthening Families Program for parents and youth aged 10-14
SRD	Self-Reported Delinquency scale
STAD	Stockholm förebygger alkohol- och drogproblem
TAU	Treatment as Usual
YSR	Youth Self-Report
Y-OQ®	Youth Outcome Questionnaire
ÖPP	Örebro Prevention Programme

1 INTRODUCTION

1.1 ABOUT THIS THESIS

In 2007, planning began for an evaluation of a prevention program, the *ParentSteps* program for parents of adolescents aged 13-17 years. *ParentSteps* program was theoretically derived from the prevention program *Step-by-Step*, a Swedish adapted *Strengthening Families Program: For Parents and Youth 10-14*. At that time, the Prevention Centre within the social services in the City of Stockholm suggested that a parent program within their regular service could be included in the same evaluation study, which targeted a similar group of adolescents and their parents. That prevention program, *Comet for Parents and Adolescents aged 12-18 years*, had been developed as a part of a set of Swedish programs that were all based on the *Parent Management Training* program. A three-armed randomized controlled trial was designed, with two intervention groups, receiving either the *ParentSteps* or the *Comet for parents and adolescents aged 12 – 18*, and one wait-list control group. Subsequently, a doctoral thesis project was shaped, with the overall purpose to study different aspects of how adolescents and their parents respond to the interventions. Studies 1, 2, and 3 are all based on data stemming from this evaluation study. The first research plan was based on the assumption that the interventions would show positive effects on the adolescents' problem behaviors. Since this did not occur, the plan was updated to encompass explorations of possible factors that influenced the adolescents' problem behaviors and that the interventions did not address – with the purpose to provide support for social services or clinicians in investigating adolescents with problem behaviors.

Throughout this thesis, I will refer to the following programs by their abbreviations: PS (*ParentSteps*, in Swedish *FöräldraStegen*) and Comet (*Comet for parent and adolescents aged 12-18*, in Swedish *ungdomsKomet*), as well as PS's and Comet's original programs SFP 10-14 (*Strengthening Families Program: For Parents and Youth 10-14*), and lastly PMT (*Parent Management Training* program).

1.2 BACKGROUND

The starting point for the present thesis was an evaluation of the two preventive parent programs PS and Comet with regard to their ability to reduce adolescent problem behaviors. The programs were developed with the purpose to be run within the preventive work of social services, offered to parents who needed support due to that their adolescent having demonstrated problem behaviors, for instance repeated conflicts with the parents, alcohol use, delinquency, or externalizing behaviors. The main purpose of the programs is to teach parents strategies to promote their adolescent's self-regulation, e.g., and internal and external self-control.

There is overall strong evidence for parent trainings' effectiveness in several populations and for several types of outcome, with the focus on child or adolescent undesirable behaviors and parental strategies to reduce them. Since poor quality of parenting is one of the strongest precursors for early onset of child conduct problems (Furlong et al., 2013), poor parenting or lacking parental skills for positive child development are addressed in parent training. Different mechanisms that facilitate changes in child behavior have been suggested, and change in parenting skills has been shown to be a strong predictor for change in child behavior (Gardner, Hutchings, Bywater, & Whitaker, 2010), while other studies have pointed out that parents perceive effects of group discussions (Patterson, Mockford, & Stewart-Brown, 2005). For instance, in the following systematic reviews and meta-analyses, it has been shown that parent training may enable reductions in child conduct problems, harsh parenting, and improvements in parents mental health and positive parenting skills (Furlong et al., 2013), reductions in antisocial behavior (i.e., temper tantrums, aggression, yelling, non-compliance, lying, stealing) among pre-school-aged and elementary school-aged children and adolescents (McCart, Priestler, Davies, & Azen, 2006), and decreases in antisocial adolescents' time spent in institutions (Woolfenden, Williams, & Peat, 2002). Also the parent programs that PS and Comet originated from are two models that have profound evidence of effectiveness. SFP 10-14 has in several studies been found to decrease adolescent alcohol use (Harrop & Catalano, 2016; and Kumpfer, Alvarado, & Whiteside, 2003), and PMT has been found to reduce parent-reported child conduct problems and increase positive parenting skills (see Eyberg, Nelson, & Boggs, 2008 for review; Forgatch & Patterson, 2010; Kjøbli, Hukkelberg, & Ogden, 2013).

As mentioned above, PS and Comet address parents of adolescents with already present problem behaviors. The programs are normally offered after a brief interview with a parent concerning their adolescent's behaviors. This procedure is less thorough than the assessments that social workers need to undertake, in accordance with the Social Services Act (SFS, 2001:453), within the procedure of formal investigations of adolescents in need of treatment intervention. Overall, the three studies within this thesis focus on this naturalistic inclusion sample that were recruited and assessed within the frame of the regular work of social services. As subjects were included for intervention using a procedure similar to that of social services, i.e., through advertising and recommendations from their staff, the sample may represent other parents who seek parent training, and their acting-out adolescents. The sample

of adolescents was considered as an at-risk group, due to their already emerged problem behaviors, but had not yet been referred to treatment. In addition to evaluating the interventions, the studies served the purpose of testing clinically relevant mechanisms within

Table 1. Overview of the three studies in this thesis with regards to research questions, assessed study samples, and outcome variables

	Domain	Research questions	Samples & assessments	Outcomes
Study 1	RCT of two parent training programs aiming to reduce adolescents' problem behaviors	Are Comet and/or PS effective compared to a control group in reducing adolescents' externalizing behavior, delinquency, substance use, and psychosocial dysfunction?	Parents and adolescents aged 12-18 years Baseline and 6-month follow-up	Adolescents' externalizing behavior, psychosocial dysfunction, delinquency, substance use
Study 2	Gender differences in problem behaviors and predictors of heavy episodic drinking and risk use	Do externalizing, internalizing, and psychosocial problem behaviors, or delinquency predict heavy episodic drinking or alcohol risk use? Are there gender differences? Do parents' ratings of externalizing behaviors and internalizing behaviors predict the adolescents' hazardous alcohol use?	Parents and adolescents aged 12-18 years Baseline and 6-month follow-up	Predictive ability of parent- and adolescent-rated problem behaviors on adolescents' heavy episodic drinking and risk use of alcohol
Study 3	Psychological risk factors as predictors for problem behavior, and peers' deviancy as amplifier	Do psychological risk factors predict already troubled female adolescents' externalizing behavior? Do psychological risk factors predict already troubled female adolescents' delinquency? Do peers' deviancy moderate the association between psychological risk factors and externalizing behavior and delinquency?	Female adolescents aged 12-18 years Baseline and 6-month follow-up	Predictive ability of psychological risk factors on female adolescents' externalizing behavior and delinquency, and perception of peers deviancy as moderator

our data, underlying the problem behaviors that the interventions aimed to alter. An overarching clinical question was: if an adolescent shows enhanced problem behaviors: which other factors do we need to inquire about and promptly intervene for? Problem behavior development and how it may be influenced or altered are in focus of much empirical and theoretical work within this thesis. Common views on adolescent development are briefly described in order to facilitate understanding of how certain development stages can be affected, and sometimes disrupted. The thesis encompasses several theories, perspectives, strategies and conclusions, which are presented as a frame for the findings of my own studies, i.e., a frame for understanding deviant development and possible strategies for intervention or prevention. It must be stressed that I do not give the full picture of existing theories, perspectives or conclusions regarding deviant behavior or its development, nor do I cover all existing prevention and intervention strategies.

In the following sections, a theoretical frame for the scientific articles within the present thesis is presented. An overview of each study's research questions, study population and outcome is presented in Table 1, above.

1.3 ADOLESCENCE AND DEVELOPMENT

Adolescence is distinct from childhood in several ways, and with increasing independence comes decreasing opportunities for parental control or monitoring. Parents end up with less information of the growing child's behavior, feelings, and social capacity than earlier during the child's life. Several of the development domains have only begun developing when a child enters adolescence, when cognitive, social, and emotional skills need to be broadened to prepare the individual for adulthood.

The adolescent period of life refers to the transition between childhood and adulthood. There are different views of when this actually occurs. While perhaps the main reasons for this variation nowadays are cultural or socioeconomic, the appearance of biological puberty tends to be quite universal. The World Health Organization (WHO) has defined adolescence to begin at the age of 10 and end at the age of 19, and suggests it to be the second largest developmental period in life – after infancy (World Health Organization, n.d). There are also other definitions used in research, and for instance Arnett (2000) defines adolescents as 10-18-year-olds who are still living with their parents, attending school and going through puberty (Arnett, 2000). Adolescence has also been referred to as the second decade of life (Molero Samuelson, 2011) – a period when young people are not yet mature enough to realize the consequences of their decisions and now and then face situations they do not know how to handle (Ogden & Hagen, 2014). In addition, adolescence has been described as perhaps the most difficult period in life, and Arnett (1999) describes adolescence as a period of storminess and stress with three dominant elements: mood disruptions, conflicts with parents, and risk behavior. Of course, different individuals are affected by these elements to

different degrees, but clearly these difficulties are more evident during adolescence than in any other period of life (Arnett, 1999).

During adolescence, cognitive development continues, and the capacity for abstraction and hypothetical thinking increases. Socio-emotional development is essential for the adolescent to become and socially function as an adult. Self-identity development reaches its peak, and is modeled and chiseled chiefly by interactions with parents, other family members, teachers, and the increasingly important peers. During this period the adolescent slowly detaches from her/his parents and becomes more independent, but most adolescents still stay committed to their parents.

Further, the period is characterized by increased development in several domains, with sexual maturation (biological), cognitive functioning (psychological), individualization and adaptation (social), and emotional maturation. When a child enters adolescence the individual's development increases tremendously in the aforementioned domains, coupled with the enhanced freedom she or he gains with increased age. However, as mentioned above, Ogden and Hagen (2014) describe that this development seldom increases in tandem with the achievement of capabilities and tools for handling new situations. This makes adolescents a vulnerable group and puts them at risk of potential harm. Also, adolescents put themselves at risk by experimenting and stretching previous boundaries. For most adolescents, the developmental phase passes by without major disruptions. But for a substantial number of them, it does not.

1.4 PROBLEM BEHAVIORS

Broadly, problem behavior encompasses a range of behaviors that violate social norms and sometimes also the law (Jessor, 1987). However, several overlapping constructs or concepts are used when describing the nosology of these behaviors. One prevailing concept is antisocial behavior. In their dissertations, Tuvblad (2006) and Kyhle-Westermark (2009) broadly distinguished between definitions from three scientific research fields: the psychiatric, the criminological/sociological, and the psychological.

In the latest edition of the Diagnostic and the Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), the psychiatric definition of antisociality refers to antisocial personality disorder, which is an overarching, severe form of personality disorder. Traits of psychopathy, sociopathy, and dissocial personality are included in the diagnosis. The disorder features a “pervasive pattern of disregard for and violation of the rights of others, occurring since age 15 years” (chapter Personality Disorders, section Antisocial personality Disorder), with behaviors that are impulsive, aggressive, deceitful, reckless, but the disorder also requires evidence of earlier conduct disorder, and that the individual is 18 years old or older. Before the age of 18, similar behaviors are defined as Conduct disorder (American Psychiatric Association, 2013).

The criminological/sociological definition of antisocial behavior refers to acts that violate the law and/or social norms (Kyhle-Westermarck, 2009; Tuvblad, 2006). Within this field, the reasons for antisocial behavior can be found in the environment within which the adolescent acts, such as family, school, neighborhood, or in the social circumstances such as living in deprived areas, or in political structures that enable/force/necessitate/encourage antisocial behavior. Within this field, antisocial children are described as early delinquents who are likely to experience adjustment problems in various areas, such as school and peer relations (Patterson, DeBaryshe, & Ramsey, 1989); the adjustment problems are not thus traits of antisocial behavior.

Tuvblad (2006) describes the definition within the psychology field, where antisocial behavior is commonly regarded as aggressive and rule-breaking behavior. Often, antisocial behaviors are seen as traits or characteristics (Andershed & Andershed, 2005), and are thought to originate within the mental developmental process.

In this thesis, antisocial behavior refers to a combined definition from the criminological/sociological and psychological field. The concept is used in Study 1, derived from the Child Behavior Checklist, a psychometric instrument that assesses child and adolescent antisocial behavior (Achenbach & Rescorla, 2001).

Other concepts of problem behavior that are used within this thesis are externalizing behavior, delinquency, adolescent alcohol use, hazardous alcohol use, and deviant behavior. These are described below, as well as in Studies 1, 2 and 3. Within the thesis, when I am not discussing each domain specifically, I use the concept *problem behavior* as an umbrella term for externalizing behavior, delinquency, adolescent alcohol use, hazardous and risk use of. In addition, there are other concepts of problem behavior that are used in research and treatment – though not in this thesis – sometimes interchangeably, such as conduct problems, conduct disorder, acting-out behavior, and offending.

1.4.1 Explanations of problem behaviors

Why adolescents develop problem behaviors has been studied and discussed for decades. Prevailing models often encompass large systems in which humans live and act, suggesting a holistic perspective for understanding the origin and maintenance of problem behaviors. Two examples of theories that consider larger structures or systems of child and adolescent development are the Problem Behavior Theory (PBT) and the Social Ecology Model (SEM). In PBT, Jessor (1987) discusses from a psychosocial point of view, that problem behaviors appear within three systems: the personality system, the environmental system, and the behavioral system. Social norms shape how these systems affect problem behaviors, involving both instigation or control of problem behavior (e.g., proneness). Psychosocially, learned behaviors are suggested to be shaped by social norms and are functional, purposive, and instrumental towards the intended goal (Jessor, 1987). Youth drinking, for instance, shows maturity and detachment from parents and their opinions – a behavior that may win

acceptance and admiration from peers. Besides this, drinking is social, relaxing, and fun. Therefore, Jessor proposes that problem behavior development may be considered to be influenced by the aforementioned psychosocial systems: the personality system, perceived environmental system, and the behavioral system. Some variables in the systems directly impact problem behavior: attitudinal tolerance for deviant behavior, and peer models for problem behavior. Others, such as self-esteem and parent-friend compatibility, have indirect effects.

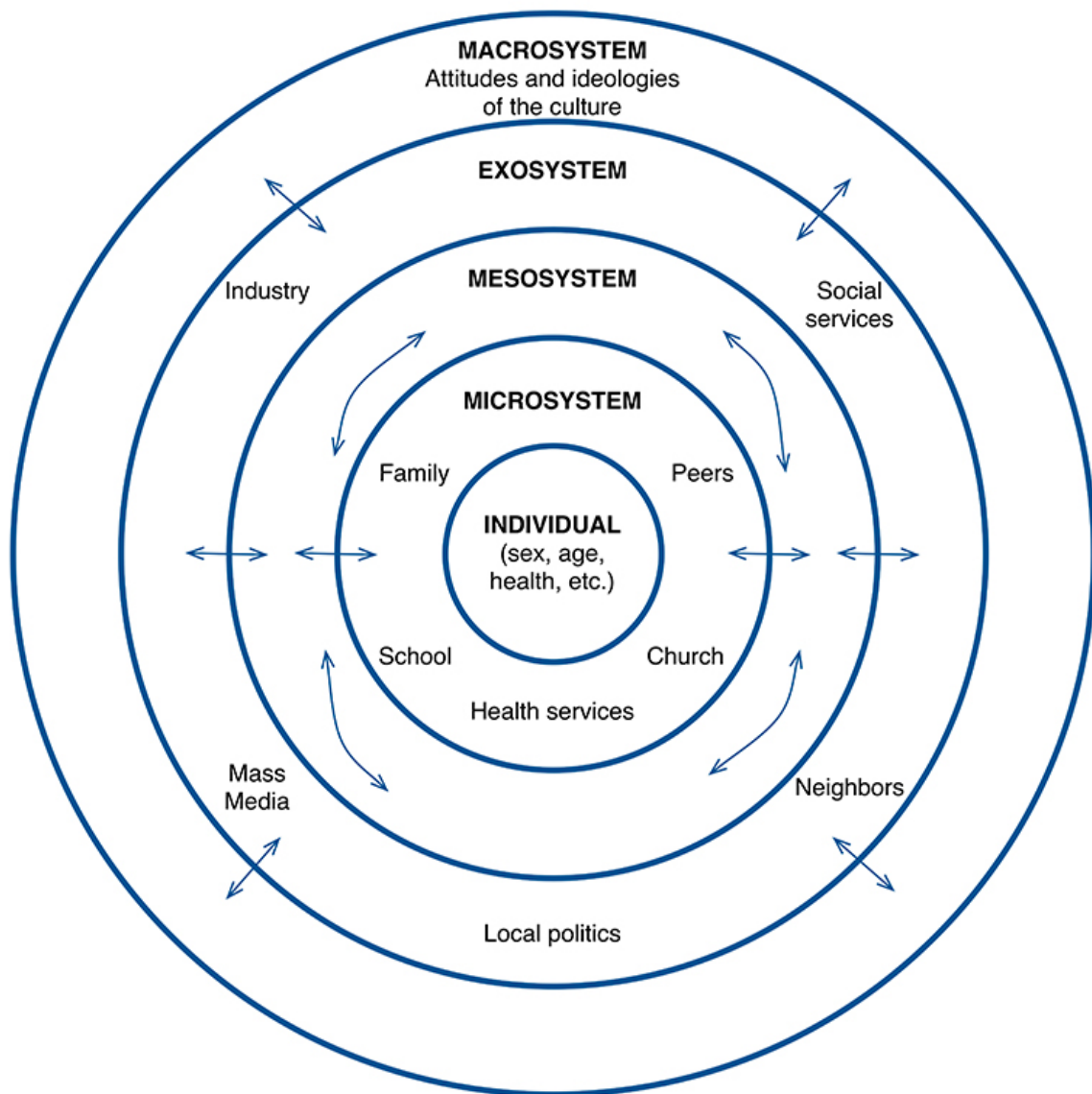


Figure 1. Illustration of Bronfenbrenner's ecological framework for human development, [https://commons.wikimedia.org/wiki/File:Bronfenbrenner%27s_Ecological_Theory_of_Development_\(English\).jpg](https://commons.wikimedia.org/wiki/File:Bronfenbrenner%27s_Ecological_Theory_of_Development_(English).jpg) (by Hchokr, 2012) Used under the Creative Commons Attribution-ShareAlike 3.0 Unported (CC BY-SA 3.0))

The second example of a holistic perspective is the SEM for development by Bronfenbrenner (Figure 1) (Bronfenbrenner, 1977). The model consists of several layers that inform us how proximal or distal the influence from a particular system is to a child's development. The microsystem refers to the proximal relations comprising for instance parents, family, peers, and school – environments in which a child lives and acts, which therefore have a large impact on the child's development. The mesosystem is where the interrelations between actors in the microsystem occur, for instance between parents and school. The next layer, the exosystem, is a distal system with regard to possible impact on a child's development. It covers systems that indirectly affects or influence the development, for instance the neighborhood but also a parent's workplace, and societal systems, such as major institutions. As the arrows in Figure 1 imply, the exosystem influences the microsystem. Lastly, the macrosystem refers to a society's shared values, common beliefs, laws, norms, but also political systems and institutional patterns – e.g., the overarching societal culture (Bronfenbrenner, 1977).

Development of problem behavior has also been discussed in terms of parent-child relationship, within the theory of coercive processes. A coercive process is a mutually reinforcing process that originates from a parent's negative reaction to a child's or an adolescent's aversive behavior. The coercive path is characterized by repeated negative feedback loops that escalate over time (Patterson, 1982). The process can be described as parents' attempt to discipline the child, who responds in a negative manner, and the parent reacts with harsher attempts to discipline the child. This feedback is a reinforcing process, where the parent's reaction amplifies or encourages the child's escalating aversive behaviors. This reinforcing process continues until the parent gives up and his or her attempts to foster the child decreases, eventually terminates, and the child gets away with the initial inappropriate behavior as well as the aversive behavior (Crosswhite & Kerpelman, 2009). When parents fail or desist to correct aversive behaviors, the child learns that her or his behaviors do not lead to negative consequences. For younger children, aversive behaviors include tantrums and outbursts, while adolescents tend to engage in behaviors also outside the family, such as stealing, vandalism, and substance use (Crosswhite & Kerpelman, 2009).

Terrie Moffitt (1993), in her seminal work on antisocial pathways, describes two categories of antisocial behavior development: 1. Once emerged it has an impressive continuity over time: 2. During adolescence, the prevalence of antisocial behavior shows more than a 10-fold increase. These findings resulted in a dual taxonomy of antisocial behavior development– the life-course-persistent and the adolescent-limited pathways, which have often been referred to in research (for instance Burt & Mikolajewski, 2008; Moffitt & Caspi, 2001; Pitzer, Esser, Schmidt, & Laucht, 2010; Zheng & Cleveland, 2015). The taxonomy implies that childhood-onset antisocial behavior is stable and may be classified as psychopathological, and those affected can be classified as antisocial individuals. The adolescent-limited pathway differs from the childhood-onset in several aspects: it emerges during adolescence, is influenced by peers, lasts for some years with a peak between age 16-17 years, to diminish through self-extinction (Moffitt, 1993). Despite the seemingly very different precursors of such antisocial

behaviors, research have pointed out environmental factors that contribute substantially to the development of antisocial behavior (Baskin-Sommers, 2016), yet underlining the advantage of considering neural factors when defining subgroups within antisocial behavior. This implies that when grouping individuals with antisocial behavior for intervention, one should consider not only the level of behavior problems but also if psychiatric conditions are present. This should be done since some conditions require other forms of interventions, rather than selective interventions.

However, recent research has found that the late-onset pathway may not be as benign as previously believed (Marmorstein & Iacono, 2005; Pitzer et al., 2010). As for the life-course-persistent pathway, the adult outcome can be poor for the adolescent-onset pathway, due to adaption of negative psychosocial strategies (Edwards, Ceilleachair, Bywater, Hughes, & Hutchings, 2007), increased levels of poor academic skills, substance abuse, and stress (Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009), a risk of continued internalizing problems, delinquency and crime, and physical health-related problems (Molero Samuelson, 2011; Piquero et al., 2009).

While females' levels of antisocial behavior have traditionally been shown to be substantially lower, and also less severe, than males' (Bongers, Koot, Van Der Ende, & Verhulst, 2003; Fernandez Castela & Kröner-Herwig, 2014; Ogden & Hagen, 2014), some researchers point out that both the type and incidence are more similar than different between genders (Moffitt, Caspi, & Rutter, 2001b; Molero Samuelson, 2011; Ogden & Hagen, 2014).

1.4.2 Externalizing behavior

Externalizing behavior is characterized by acting-out behaviors with elements of aggression, norm-breaking and disruptive behavior such as delinquency and substance use. It has correlates with psychiatric symptoms found in disorders, like Attention Deficit Disorder with or without Hyperactivity (i.e., ADHD, ADD). However, externalizing behaviors can also be found as stand-alone behaviors without psychiatric problems, and many parents of adolescents will probably recognize several features, most of which will eventually diminish when the adolescent enters young adulthood (Bongers et al., 2003). If such behaviors persist, they can be troublesome. Researchers have underlined the necessity of differentiating between behavioral clusters of externalizing behavior to enable understanding of the developmental pathways. For instance, certain externalizing behavior is normal at certain ages, and by knowing the age-specific norm levels it is possible to identify individuals who exceed what is considered a normal level. For younger children, physical aggressive behavior is more common than among adolescents, who instead engage in violation of rules (such as truancy and substance use) (Bongers et al., 2003). Although the overall levels of externalizing behavior are different between females and males, their patterns or developmental trajectories have been found to be very similar (Bongers et al., 2003; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). In a study that tested different aspects, or clusters, in females and males, it

was found that males had a higher likelihood of following a high-level trajectory of aggressive behavior, property and status violations than females (Bongers et al., 2003). In a longitudinal study comprising baseline and three yearly follow-up measurements of externalizing behavior development in a German community sample, it was found that females had significantly lower levels of such behavior. It was also found that females were overrepresented at the low level of externalizing behavior, while the males were overrepresented at the medium level and the high-decreasing level (showing a decrease towards the medium level at the 4-year follow-up) (Fernandez Castelao & Kröner-Herwig, 2014). However, despite these differences, the patterns were surprisingly similar for the genders.

Adolescent externalizing behavior is known to be a predictor of social and school difficulties in adolescence and to be associated with poor adult outcome regarding psychosocial functioning (Brosnan & Carr, 2000; Edwards et al., 2007). An example of such a relationship was shown in a Dutch study, where adolescents with high levels of externalizing behavior suffered from low identity structure, lower levels of interpersonal commitment, and also reluctance to such commitment (Crocetti, Klimstra, Hale, Koot, & Meeus, 2013). It has also been shown that self-concept may both predict and explain social functioning and problem behaviors, and is thus an important factor for mental health development (Lee & Stone, 2012).

Externalizing behavior is a domain that is sometimes used interchangeably with delinquency. In assessing externalizing behaviors, a number of questions often relate to delinquency, but also about mood disruptions, like aggression or other rule-breaking behavior with regard to common norms. In the present thesis the externalizing behavior domain is derived from a set of questions posed to the participating adolescents and their parents. The questions are about aggression and rule-breaking behaviors, and are further explained below, in the Methods section.

1.4.3 Juvenile delinquency

Delinquency refers to acts that violate the law, but also status offenses that are illegal due to the offender's status as a minor, including truancy, running away, curfew violations, and nicotine and alcohol possession and use (Kazdin, 2003). It also taps other offences that typically occur during adolescence, such as unpaid bus-rides, sneaking into movies without paying, stealing pencils at school – offences that adults do not commit because getting caught would be too embarrassing. As a consequence, delinquent acts have been explained as acts committed during the years near puberty (Moffitt et al., 1996).

A wide range of theories aiming to explain delinquency has been proposed. Two prominent sociological/criminological theories of delinquency or crime are, despite being quite different, both within the control theory paradigm, which stems from the question: what makes people *not* commit crimes? The theory of social control refers to relations and bonds in different

groups or social institutions (such as family or school) in which an individual is situated. The theory suggests that when those bonds are weakened or broken, the likelihood of committing acts that deviate from society norms or laws increases (Hirschi, 1969; Sarnecki, 2003). The other theory, the general theory of crime, explains crime to be due to the lack of self-control or self-regulation (Gottfredson & Hirschi, 1990). It has been suggested that self-control is strongly related to delinquency (Engel, 2012; Pratt & Cullen, 2000). The relationship between deviance and low self-control has been tested in several studies, and a recent meta-analysis of 99 studies showed the relationship strength to be $r = 0.56$, with a weaker relationship to substance use ($r = 0.33$) (Vazsonyi, Mikuška, & Kelley, 2017).

Theories aiming to integrate different views into overarching models have also been developed recently. It has been discussed that control theories, explaining delinquency as being due to the lack of social bonds to family and other institutions, and lack of self-control, coexist with social structures that together may prevent or risk delinquent development (Sarnecki, 2003). In this social-psychological control theory, it is assumed that both social and personal control explain delinquency (Mak, 1990). It was found that delinquency was related to social control variables such as liking school, parental bonding, and belief in moral social values and laws, but also to personal control variables such as emotional empathy and absence of or low impulsiveness control (Mak, 1990). However, the theory has been discussed as it failed to take peer influence into account, an aspect which Curcio, Mak, and George (2013) recently considered in a review exploring risk factors for delinquency and problem drinking. The results showed that delinquency and problem drinking shared several risk factors (e.g., low attachment to parents and school, low educational and occupational aspirations, low belief in the law, and impulsivity and low empathy), much like in the study by Mak (1990), but with the addition of attachment to deviant peers (Curcio et al., 2013).

Regarding the prevalence of delinquency, different proportions have been proposed. However, due to the somewhat inconsistent definition of delinquency and how it is measured (Enzmann, 2013), the question may remain somewhat unresolved. Although, in a Swedish recurrent report of adolescents in school year 9 (15-16 years old), it was shown that the prevalence was 49 % (females 46%, males 51%) of self-reported committed crimes, such as violence, theft, using drugs, or vandalism committed during the year 2014 (Brottsförebyggande rådet, 2016). Based on the same scale used to assess self-reported delinquency in all three studies within this thesis (Self-Reported Delinquency scale), the prevalence among a general population of 11-17-year-olds in the US was 81%, with a male-female difference ratio of 3:2 (Elliott, Ageton, Huizinga, Knowles, & Canter, 1983) although it should be noted that the data was collected during the years 1976-1980.

Traditionally, females have been explained to be less delinquent than males. This phenomenon has been suggested to be equalizing, with female levels catching up and females tending to mimic males behavior pattern (Miller, Malone, & Dodge, 2010). However, when entering adolescence, females' trajectory has been reported to be steeper than males',

although the proportions of increasing delinquency were equal, suggesting that when females enter adolescence they may be at higher risk of adverse development (Miller et al., 2010).

1.4.4 Adolescent alcohol use

Alcohol is the psychoactive substance most commonly used by adolescents, and consequently, adolescent drinking is a worldwide public health concern because of its relation to a number of health problems (Hibell et al., 2012; Marmorstein, Iacono, & Malone, 2010). Alcohol use during adolescence is found to be the third largest risk factor for disease development (Rehm, Shield, Joharchi, & Shuper, 2012). Besides risking adverse long-term outcomes, alcohol use during adolescence has been found to correlate with several adverse short-term outcomes such as drunk driving, committing criminal offences, accidents, injuries (Hingson, Edwards, Heeren, & Rosenbloom, 2009), sexual risk behavior (Rehm et al., 2012), delinquency, school drop-out (Townsend, Flisher, & King, 2007), and victimization (Shepherd, Sutherland, & Newcombe, 2006). Several initiatives have been taken, for instance by the World Health Organization (2010) and the European Union (2006), to reduce alcohol-related harm, and also to protect young people and children from negative consequences of alcohol. Also, national and local Swedish initiatives have been taken to work preventively with regard to alcohol-related harm. One strategy is the Swedish government's strategy for alcohol, narcotics, doping, and tobacco (ANDT) Strategy 2016-2020. The overall goals of this strategy are a society without illicit drugs and doping, to decrease the medical and social harm caused by alcohol, and to reduce the use of tobacco (Ministry of Social Health and Social Affairs, 2016). One of the six main objectives in the ANDT Strategy 2016-2020 is to postpone the age of alcohol initiation, and to reduce children's and adolescents' harm from alcohol. The strategy implies that the state delegates the assignment to governmental agencies, as well as regional and local authorities to support initiatives for prevention.

Preventive initiatives are needed, as most people have their first drinking occasion during early to mid-adolescence, and alcohol-related harm, such as those described above, is not uncommon. In the most recent results in the European School Survey Project on Alcohol and Other Drugs (ESPAD), a study of more than 100 000 European students aged 15 and 16 years, 81% reported ever having used alcohol (Guttormsson & Leifman, 2016). However, the number of Swedish 15-16-year-olds who reported having used alcohol has decreased substantially since 1995, from 89% to 65%. These are outstanding numbers when compared to the European average, which decreased from 89% to 81%. Further, 26% of the Swedish students had used alcohol during the last 30 days, compared with 51% in the rest of Europe (Guttormsson & Leifman, 2016). In the ESPAD report from 2016, data on the amount of alcohol used at the latest drinking occasion was not available, but in the report from 2011 it was shown that the Swedish students used considerably more alcohol at each occasion than the average European student (Hibell et al., 2012). Regarding Heavy Episodic Drinking, HED, the Swedish average was lower than the overall European average (31% and 39%, respectively), but it was also found that Sweden was the only country with significantly more

HED females than males (Hibell et al., 2012). So far, no Swedish prevalence study of hazardous drinking that covers the age-span in the studies in the present thesis (12-18-year-olds) has been published. Nevertheless, results from a recent undergraduate thesis based on a Swedish representative national sample of 15-19-year-olds showed that 11.6% female and 8.2% male respondents were risk drinkers, as assessed with AUDIT, and that the prevalence for females and males differed significantly (Johansson, 2016).

1.4.5 Co-existing problem behaviors

It is assumed that problem behaviors tend to cluster within certain individuals, due to a general proneness to deviant behavior, as explained within the PBT (Jessor, 1987). An example that co-existing problems often appear in certain individuals is found in the National Comorbidity Survey in the US, which shows that 40% of the diagnosed adolescents also had one or more additional diagnoses (Merikangas et al., 2010).

In the literature, several models or hypotheses have been suggested to explain why disparate dimensions may occur simultaneously. Different studies propose and test different models of antecedents, as described below, while others underline difficulties in drawing such conclusions (e.g., Ritakallio, Kaltiala-Heino, Kivivuori, & Rimpelä, 2005). One model hypothesizes that externalizing behaviors and conduct problems are antecedents of intrapsychic distress (Capaldi, 1992; Lee & Stone, 2012). For example, externalizing behaviors impinge success within the academic and social areas, and failures in these areas, if accumulated, increase the risk of developing intrapsychic problems (Capaldi, 1992; Morin et al., 2016; Patterson & Capaldi, 1990). Other studies have suggested the reverse – internalizing problems as predictors of externalizing problems (i.e., acting-out behavior) (Fernandez Castelao & Kröner-Herwig, 2014; Lee & Stone, 2012; Stone, Otten, Engels, Kuijpers, & Janssens, 2015). Evidence of mutually reinforcing relationships has also been found, and it is proposed that one problem behavior may result in social or emotional failure, which has reinforcing effects on another problem behavior. It has been hypothesized that “reciprocal effects of each behavior on the other might increase with age due to the accumulation of failure experiences” (Morin et al., 2016, p. 2). This model implies that externalizing behaviors emerge when social development and the formation of positive relationships with peers have been interrupted. It also implies that internalizing problems do not result from externalizing behaviors if an adolescent has developed close peer relations, due to experiences of the norming behavior feedback that is supposed to have an adjusting effect on a troubled adolescent (Morin et al., 2016). On the contrary, other research has found that such relationships instead may be suppressing, i.e., that levels within both decreases (Oland & Shaw, 2005).

There seems to be gender-specific circumstances with regards to the propensity for exhibit more than one problem behavior. This has been highlighted in the gender paradox hypothesis regarding antisocial behavior. It is implied that females, the group with the lower prevalence

of antisocial behavior, tend to exhibit higher levels of co-existing problems than the males, and hence be more seriously affected (Loeber & Keenan, 1994). The phenomenon has been found in several studies regarding the more comorbid and severe behaviors of females (Diamantopoulou, Verhulst, & Van Der Ende, 2011; Tiet, Wasserman, Loeber, Mc Reynolds, & Miller, 2001), while others have found no evidence for the paradox (for instance Moffitt, Caspi, & Rutter, 2001a).

In a recent study of a Swedish general adolescent population, associations between external and internal problems were found, but it was also found that these problems differed between females and males (Bask, 2015). For instance, for females, a multidimensional scaling map showed that self-esteem and psychosomatic problems were closer to externalizing problems than for males, whereas anxiety was at greater distance from externalizing problems. Females further experienced higher levels of internalizing problems as compared with males, while no differences between genders were found regarding externalizing behavior. The author discussed that following the general trend towards equal levels for externalizing problems for females and males, the increase for females may be explained by increasing self-esteem and self-privileging behavior (Bask, 2015). However, other studies have pointed out that female levels of externalizing behavior, as well as of delinquency, are increasing (Miller et al., 2010; Odgers & Moretti, 2002).

1.5 RISK FACTORS FOR PROBLEM BEHAVIOR

One of the purposes of detecting risk and protective factors is to design and promote more effective and suitable interventions. The context in which the risk factor occurs is always decisive for its influence (Odgers & Moretti, 2002). Not always do risk factors *cause* the undesired outcome, but are rather factors that *increase the probability* or amplify the risk for occurrence of a problem (Hawkins, Catalano, & Miller, 1992). Risk factors do however precede the outcome (Kraemer et al., 1997). Protective factors reduce possible consequences of risk exposure (Hawkins et al., 1992) or the possibility for a undesired outcome to occur (Kraemer et al., 1997). In the PBT, Jessor (1991) discuss that protective factors may not be regarded as merely the opposite of the risk factors for deviant behaviors, but rather be viewed as factors to hinder risk factors to develop.

Examples of general risk factors (Durlak, 1998; Jessor, 1991; Moretti, Bartolo, Craig, Slaney, & Odgers, 2014) for developing problem behaviors are presented in Table 1. Here, factors are visualized using the categories that Ogden and Hagen (2014) proposed for understanding the development and maintenance of externalizing behavior: a) individual risk (neurobiological structures (how the brain process information from the cells in the nervous system, mediating behavior), and cognitive functioning); b) family risk (family interactions and family environment); c) environmental risk (peer group and contextual influences such as school). Risk factors have been proposed to be either static or dynamic, where static factors are impossible to affect and the dynamic are possible to affect (De Matteo & Marczyk, 2005).

Examples of static risk factors are factors that already have occurred, such as early onset of alcohol use, first crime committed, but also gender or neuropsychological problems. Dynamic risk factors are for instance family conflicts, family relationships, deviant peers, own attitudes to deviant behavior, and risk use of alcohol (Åström, 2016).

Table 2. Examples of general risk factors for problem behavior development

Individual risk	Family risk	Environmental risk
Early problem onset	Parental psychopathology	Negative peer pressure
Low attachment to parents	Parental substance misuse	Negative peer modeling
Early biological maturation	Parental marital discord	Impoverished neighborhood
Low cognitive functioning	Inter-parental violence	Low quality school
Aggression	Low socio-economic status	Perception of peer deviancy
Low attachment to school	Parental harsh discipline	Low bonding to school
	Low parental warmth	

Addressing risk and protective factors has shown promise (Durlak, 1998) when trying to reduce substance use, delinquency, and other problem trajectories (Arthur, Hawkins, Pollard, Catalano, & Baglioni Jr, 2002). Durlak (1998) proposed that being exposed to one single risk factor would probably not put the individual at a greater risk of a negative trajectory than being exposed to none. But being repeatedly exposed to several risk factors – while lacking enough protective factors – jeopardizes a positive development.

One perspective on risk factors is resiliency, which has been used as a conceptual model in prevention. The Resilience process model suggests that stressors of negative life events occur, which is processed and interpreted within the individual's setup of biological/neurological structures and previous experiences, followed by a disorganization that demands environmental/social support. These factors together are decisive for reintegration and further development of resilience (Kumpfer, 1999).

1.5.1 Individual, family, and environmental factors

Even if neurological abnormalities that cause mental ill health are often persistent, the brain does not operate and react in isolation, but rather within contexts (Baskin-Sommers, 2016). For instance, individuals with ADHD symptoms do not necessarily lack quality of life, since this is highly dependent on environmental factors such as family and other relations. Exposure to risk and protective factors can contribute to whether or not an individual develops problem behavior, and for individuals who experience mental health problems and at the same time are exposed to risk factors, the mitigating or attenuating influence of the context or environment's can be crucial.

The term "at risk of adverse behavior development" or "belonging to a risk group" can be defined in different ways. Among children, those at risk are groups of individuals who are subject to several risk factors that endanger a positive development. Such factors could be the ones presented above, in Table 2. Adolescents at risk can mean something else, according to Jessor (1991). The risk lies in the already emerged problem behaviors that endanger further development of problem behavior, and perhaps increase the risk of awakening coexisting problem behaviors. The studies in this thesis included adolescents who were an at-risk group, which was defined as being at risk of developing severe antisocial behavior. It has been pointed out that regarding high-risk adolescent samples, females and males exhibit similar risk factors, but females show higher levels of risk and also more co-occurring risk factors than males (Loeber & Keenan, 1994; Silverthorn & Frick, 1999).

In the following sections, only some of the identified risk factors are addressed and discussed. The choices are mainly based on the content of the parent programs and the two prediction studies in the thesis. In the Discussion section, factors that may be needed to be included in parent programs are considered.

1.5.1.1 Individual factors

The area of research that covers biological or neurological explanations or treatments of problem behavior is not encompassed by the present thesis. However, it cannot be excluded that there are study participants who were affected by such adversities to some extent. There is one exception though, in Study 3, and therefore I will briefly address symptoms on the ADHD spectrum, which is a neurobiological structure that may affect cognitive functioning.

While the topic is primarily discussed within the field of comorbidity or co-existence of problem behaviors, as described above, the literature suggests that psychological problems may be expressed behaviorally through externalizing behaviors and delinquency (Akse, Hale, Engels, Raaijmakers, & Meeus, 2007; Capaldi, 1992; Capaldi & Stoolmiller, 1999; Patterson & Capaldi, 1990; Ritakallio et al., 2008; Wolff & Ollendick, 2006), and that depression and anxiety among children and adolescents may underlie externalizing behavior (Glaser, 1967; Morin et al., 2016; Stone et al., 2015; Wolff & Ollendick, 2006). Internalizing problems as

psychological risk factors have been studied for different types of problem behaviors, much like in Study 3. Similarly, in a general adolescent US population it was found that depressive symptoms were salient predictors for future delinquency, among females especially (Kofler et al., 2011). In a recent review that investigated a large number of studies with regard to temporal order, it was stated that there is profound evidence that internalizing behaviors, such as depression and anxiety, precedes substance use disorder (SUD) in multiple adolescent samples (O'Neil, Conner, & Kendall, 2011). A cross-sectional study has also shown that depressive disorder increases the risk of conduct disorder among preadolescent girls (Keenan et al., 2011). Neuropsychiatric symptoms found within the ADHD spectrum, such as impulsivity and hyperactivity, were another psychological risk factor in Study 3. Such symptoms have been found to increase the risk for negative outcomes. Females with high levels of ADHD symptoms, for instance, have reported relational aggression, early pregnancies, and substance use (Fontaine et al., 2008). Several studies have shown the link between ADHD symptoms and delinquency and criminality (Loeber & Keenan, 1994), recidivism in crime (Wibbelink, Hoeve, Stams, & Oort, 2017). Moreover, childhood-onset of ADHD seems to make girls particularly vulnerable for adult criminality (Dalsgaard, Mortensen, Frydenberg, & Thomsen, 2013). It is evident that ADHD symptoms constitute a considerable risk for negative development.

Early pubertal maturation has been pointed out as a risk factor for several problem behaviors (Costello, Sung, Worthman, & Angold, 2007; De Water, Braams, Crone, & Peper, 2013; Verhoef, Van Den Eijnden, Koning, & Vollebergh, 2014; Westling, Andrews, Hampson, & Peterson, 2008). For instance, advanced pubertal maturation has been found to be associated with high recent and life-time alcohol use levels among both genders, while association between sex steroids and alcohol use was found among males only (De Water et al., 2013). However, early age at menarche has been shown to increase the risk of onset of alcohol use but this effect disappeared with increasing age, i.e., after age 15 (Verhoef et al., 2014). Other developmental factors may also affect the use of alcohol, and Costello et al. (2007) found that early maturing males and females with conduct disorder (CD) had substantially heightened risk of alcohol use if they also had deviant peers, with 17-24 times higher odds for alcohol use. They further found however, that the association between early maturation and CD was seen for females only (Costello et al., 2007). Also, living in challenging psychosocial environments seem to accentuate this risk among early-maturing females, who have been suggested to be more vulnerable to adverse emotion and behavior development than counterparts maturing later (Stattin & Magnusson, 1990).

1.5.1.2 Family factors

Research has correspondingly shown that parents and the family context do have a substantial influence on both children's (Kling, Forster, Sundell, & Melin, 2010; Kosterman, Haggerty, Spoth, & Redmond, 2004) and adolescents' mental health and behavior (Woolfenden, Williams, & Peat, 2002). A lack of positive parenting can therefore be a considerable risk factor.

Certain parenting styles have been found to affect child development negatively, and are therefore regarded as possible risk factors for deviant development. Examples of such risk factors are a non-democratic family climate, harsh discipline and high levels of control (Becoña et al., 2012; Huver, Otten, De Vries, & Engels, 2010; Patock-Peckham & Morgan-Lopez, 2009; Rosli, 2014). Lenient parenting with high responsiveness, often characterized by less guidance and attention, may also cause a negative child development (Rosli, 2014). Parenting qualities have also been found to affect child development, and qualities that may prevent child and adolescent deviant development are characterized by parental responsiveness, demandingness, and guidance (Rosli, 2014). Other beneficial features to improve child psychosocial development, and decrease delinquency and somatic symptoms, include parental understanding of the child's feelings, and the ability to guide them to self-regulation and to learn from their own mistakes (Huver et al., 2010; Lundahl, Risser, & Lovejoy, 2006; Piquero et al., 2009).

Further, there seem to be some inconsistencies in research conclusions with regard to gender-specific family risk factors. For instance, family conflicts and dysfunction have been found to be more closely related to females' externalizing behavior than to males' (Moretti et al., 2014), while exposure to parental violence has been found to be associated with males' externalizing behavior, but not females' (Lee & Bukowski, 2012). Other findings have shown that exposure to parental violence affects females and males differently, where mother-perpetrated abuse on father had effects on females' aggression towards friends, while father-perpetrated abuse affected males' aggression towards friends (Moretti & Odgers, 2006).

It must be stressed that all parenting styles may not be fully applicable to all cultural contexts; those mentioned here were rather outlined with a Western society mindset (discussed for instance in Rosli, 2014).

1.5.1.3 Environmental factors

Within the sociology/criminology field of research, environment or context are seen as the main factors contributing to delinquency development. There may be individual and family factors too, but the environment will amplify or dilute the likelihood of committing a deviant behavior, such as a crime (some would include family factors in the environment, but I do not do so here). There are also other views on environmental factors that may increase the risk of deviant development, for instance living in a deprived neighborhood (Baskin-Sommers, 2016). In the review, Baskin-Sommers (2016) describes a deprived neighborhood as a "spatial concentration of poverty, reliance on public assistance, female-headed households, joblessness, density of children, residential segregation, social disorder and lack of political influence" (p. 503). In the same review, it is pointed out that community violence is a risk for the development of youth antisocial behavior, and for children with conduct problems early exposure has been linked to more severe outcome, such as aggression, somatic problems, academic failure, and future justice system involvement (Baskin-Sommers, 2016).

Individuals' perception of peers' deviancy is another important environmental factor for adolescent problem behavior development and maintenance. During adolescence, peers become increasingly influential as role models, and their behaviors are among the most important, consistent, and also proximal predictors of adolescent problem behavior, including alcohol use (Gaughan, 2006) and delinquency (Curcio et al., 2013). It has been shown that regarding adolescent onset of antisocial pathways, deviant peers are central. The effect is believed to be due to adaptation and adolescents' social mimicry (Pitzer et al., 2010), and the role of peers has been discussed in the light of social or descriptive norms. Adolescents' deviant behavior may be explained by perception of peers' deviancy, but also perception of their attitudes (Berkowitz, 2005; Cotter & Smokowski, 2016). The mechanism behind clustering with deviant peers is, according to the social norms theory, that peers are especially important for identity development, and by not accepting or adapting to social norms an adolescent risks being rejected by the peer group (Berkowitz, 2005; Cotter & Smokowski, 2016).

One of the most salient amplifiers of adolescent drinking is peer drinking or peers' deviancy (Borsari & Carey, 2001; Ennett et al., 2008; Leung, Toumbourou, & Hemphill, 2014; Vermeulen-Smit, Ter Bogt, Verdurmen, Van Dorsselaer, & Vollebergh, 2012), which was also found in Study 2. The reason for this may perhaps seem evident – drinking is commonly a social act, performed together with peers (Kuntsche, Knibbe, Gmel, & Engels, 2005). Others have found that peers' deviance mediates the association between female early maturation and substance use (Marceau & Jackson, 2017). High levels of alcohol use have been repeatedly found to be predicted by deviant or drinking peers (Brooks-Russell, Simons-Morton, Haynie, Farhat, & Wang, 2014; Vermeulen-Smit et al., 2012), and De Water et al. (2013) concluded that high drinking levels are related to high peer group status (Mayeux, Sandstrom, & Cillessen, 2008). Why this finding did not occur in the female sample in the study by De Water is unknown, and it must be stressed that we found in Study 2 that at-risk female drinking was related to perception of drinking peers in a similar way as for the at-risk males.

The perception of delinquent peers has been found to predict externalizing behavior (i.e., delinquency and aggression) similarly for both genders in a rural US normal population, and was further mediated by internalizing behavior (Cotter & Smokowski, 2016). The authors proposed that the perception of peers' delinquency might entail emotional effects, leading to own delinquency and aggression (Cotter & Smokowski, 2016). Other studies have also found that the risk factors for developing antisocial behavior are extraordinarily similar between genders (Arthur et al., 2002; Durlak, 1998; Moffitt & Caspi, 2001; Odgers & Moretti, 2002). For instance, in one study, deviant peers contributed equally to males' and females' externalizing behavior (Lee & Bukowski, 2012). Further, other research has shown that males' association with delinquent peers was a stronger predictor for delinquency (for instance Leeper Piquero, Gover, Macdonald, & Piquero, 2005). In a review by Negri and Susman (2011), the authors concluded that familiarity with delinquent friends among early-maturing girls, with no previous history of externalizing behaviors, mediated the relation

between age at menarche and norm-violation, while those with previous externalizing behavior were more likely to know delinquent peers regardless of age at menarche. Among girls with early menarche, not only externalizing behaviors such as norm violations, delinquency, and alcohol use, have been found to be related to menarche, but also problematic relations to school and with parents and peers (Marceau & Jackson, 2017; Skoog, Özdemir, & Stattin, 2016; Stattin, Kerr, & Skoog, 2011).

Notwithstanding the developmental stages with regard to family and environmental factors, the genetic predisposition explains a considerable part of problem behaviors. Genetically informed studies of twins and adoptees have found that genes explained 43% of adolescent antisocial behavior, and when studying different age groups (e.g., children, adolescents, and adults) the impact of genes decreased in favor for environmental impact (46%, 43%, and 41%, respectively) (Rhee & Waldman, 2002). Further, in the same meta-analysis it was found that in samples with females and males, there were no significant gender differences. Despite the importance of genetic predisposition as one of possible factors for adverse behavior development, the focus in this thesis is on adolescent problem behaviors that were hypothesized to be successfully altered by parent programs.

1.6 PREVENTION

Prevention science is built on the premise that there are identifiable risks for undesired outcomes and theoretical models on how these may be altered (Harrop & Catalano, 2016). Preventive efforts are designed to hinder an event from occurring or re-occurring, and this is mainly done by increasing or establishing protective factors, which can be applied within all layers of the Social Ecology Model. In social, psychological or medical prevention, different kinds of problems are in focus such as health problems or problem behaviors. Since the mid-1990s, the definitions of prevention that are most commonly used in intervention research comprise three levels: universal, selective, and indicative prevention (Ferrer-Wreder, Stattin, Lorente, Tubman, & Adamsson, 2004). Toumbourou et al. (2007) explain the prevention levels as constituting the risk of being exposed to or infected by an undesired outcome (Toumbourou et al., 2007). The levels are described as follows: *universal prevention* targets whole populations of interest, without any particular risk level in mind; *selective intervention* addresses sub-groups of people who are exposed to certain risk factors and therefore are at risk of developing a clinical problem; and lastly, *indicated intervention* often starts with a screening process to ensure that the individual is among the intervention target group. This group exhibits early warnings with more evident and severe signs of a problem, and are often at risk of developing comorbidity – usually due to the initial problem (Ferrer-Wreder et al., 2004).

1.6.1 Parent programs

Parent programs are interventions that aim to promote child well-being and positive development of psychosocial health (SOU, 2008:131). In the Swedish Government Official Reports, SOU, it is stated that parent support should provide increased knowledge of child's needs and rights, relation quality, attachment, and strengthen parents in their parenting (SOU, 2008:131). A wider term that is commonly used in Sweden is "parent support" or in Swedish: "föräldrastöd", which most of the times refers to parent programs. In 2013, the Swedish Ministry of Health and Social Affairs presented the aim of their new strategy of parent support, that all Swedish parents of children aged 0-17 years should be offered parent support with the purpose of promoting positive social, emotional, and cognitive development among children (The Swedish Government Offices, 2013). In Sweden, in February 2016, 89% of the municipalities offered at least one parent program for parents of children with norm-breaking behavior (The National Board of Health and Welfare, 2016).

In the US and Canada, extensive development and research on parent programs have taken place during the last decades, from which the European countries have to some extent learned what has already been evaluated and found to be effective. Overall, a wide array of target groups has been addressed. The risk groups perhaps most commonly addressed are children or adolescents growing up in risky environments, or having parents with substance abuse or mental problems. More seldom, parent interventions have been developed to address adolescents with increased behavior problems that put them at risk of a negative trajectory. However, family programs for parents of adolescents who are incarcerated or referred to mental health services have been developed (Moretti & Obsuth, 2009), containing both parent and adolescent sessions as well as joint family sessions. In Sweden, it is more common with programs, either universal or selective, targeting parents of younger children and addressing child disruptive behaviors. Furthermore, there is a substantial number of parent programs for parents of younger children that has been evaluated (Högström, Olofsson, Özdemir, Enebrink, & Stattin, 2016; Sou, 2008:131; Stattin, Enebrink, Özdemir, & Giannotta, 2015).

It is possible that parental satisfaction and belief in their own parenting is used as a component in several parent programs, even if it is not always stated. A concept regarding this has been formed within the social cognitive theory (Bandura, 1993) as a parenting strategy or skill that increases positive parenting, which may affect child development positively. The concept of parental self-efficacy has further been used as an important parent program component and has been used in role modeling practices and to train good parental behaviors (Bloomfield & Kendall, 2012). Parental self-efficacy concerns the appraisal of one's own parenting strategies and one's confidence in managing difficult situations with the child. It has been found that parental stress is associated with less self-efficacy, which may affect child development negatively (Bloomfield & Kendall, 2012; Jones & Prinz, 2005). There are, however, diverse findings of parental self-efficacy and its effects on child behavior, and it is suggested that a family's adaption to new parental strategies takes longer than what has been measured so far (Bloomfield & Kendall, 2012).

One way to promote positive child development is through health promotion, which has been defined as “endorsement and continuation of well-being through development of core competencies” (SOU, 2008:131), i.e., social, emotional, physical, and cognitive competencies. Rather than aiming at prevention of child problem behavior outcome, the focus is on continued positive child health. These programs are exclusively universal, and address all parents of children in the younger ages, mostly before adolescence. It has been said that all parenting programs that aim for enhancing child positive health are attachment-based, and the focus is on the quality of the parent-child relationship. Establishing attachment is possible by for instance increase a parent’s sensitivity to the child’s needs (Stewart-Brown, 2008). Other parenting strategies address not only child well-being, but also parent well-being. One such health promotion program is the Swedish ABC program, which has been tested in both a pilot study, where the children improved their independence and emotional well-being four months after intervention (Enebrink et al., 2014), as well as a full scale RCT, which found that parental self-efficacy and child health and positive development increased in comparison to a control group (Ulfsson, Enebrink, & Lindberg, 2014).

Programs that promote good development in young children are important. However, there is also a need for programs that intervene at a relatively later age and focus on decreasing adverse behavior. This is because all parents and children are not reached by health promotion programs during the child’s early ages, for a wide array of reasons, and even for those who are reached early with positive promotion development a negative developmental trajectory may occur. Therefore, both society and individuals need interventions that address adverse behaviors among children and adolescents in order to stave off or at least mitigate an escalation in negative outcomes. One such intervention is parent training.

1.6.2 Parent training

Parent training is built on the premise that parental practices are important for their offspring’s development and may be implicated in the maintenance of conduct problems (Lundahl et al., 2006), and the Coercive theory of family processes (Patterson, 1982), briefly described above, has been influential in development of parent training (Högström, 2014). Commonly, these are delivered in parent group sessions, but some also include child sessions, i.e., in family programs. The format of parent groups training aims mostly at achieving parenting skills through mechanisms acquired by using homework, roleplaying, and modeling. Another way to put instructions and strategies into practice is by stimulating group discussions between the parents regarding their experiences of performing new parenting strategies and what the results were, in order to improve their skills and support each other. Most programs are built upon social learning principles – that we learn from each other, by observation and imitation. This may be achieved through parents seeing other parents solve situations of problematic interactions with an “adolescent” via role-play or video vignettes. The most prominent social learning tool, however, is the practicing at home with the child or adolescent.

Parent training also aims at strengthening parents in the parenting role, which will facilitate a pro-social child development (Smedler, Hjern, Wiklund, Anttila, & Pettersson, 2015). Other common components are to enhance positive communication between the parent and the child, positive support, and conflict management. Some programs also focus on making parents aware of the importance of giving children age-appropriate tasks, and on working with the parents' expectations on the results (Kumpfer, Molgaard, & Spoth, 1996; Skärstrand, Larsson, & Andréasson, 2008).

Broadly, a distinction between parent training and parent behavioral training can be made: parent training aims to reduce problem behaviors by strengthening the parent-child relationship, addressing risk-and protective factors, and helping parents to achieve age-appropriate expectations of the child. Behavioral parent training (BPT) focuses on the parents' behaviors and how these influence the child. In the meta-analysis by Mc Cart et al. (2006), BPT programs are described as interventions that:

...address maladaptive parenting by training parents to use effective behavioral management strategies. Parents are first trained to define and monitor their youth's behavior. They then learn to avoid coercive interchanges by positively reinforcing youths' prosocial behavior and by implementing developmentally appropriate consequences for youths' defiance. (Mc Cart et al., 2006, p. 528)

Henceforth in this thesis, the overarching term parent training is used, unless a distinction between parent training and BPT is necessary.

There is a strong support for the effectiveness of parent training, given in different versions in different settings (examples of reviews: Allen et al., 2016; Chorpita et al., 2011; Forehand, Lafko, Parent, & Burt, 2014; Furlong et al., 2013; Piquero et al., 2009; Salari, Wells, & Sarkadi, 2014). Several reviews have concluded that in order to prevent antisocial development, the intervention should come early in a child's life (Furlong et al., 2012; Piquero et al., 2009; Salari et al., 2014); however, evidence for the possibility of intervening among adolescents exists (for instance: Allen et al., 2016; Chorpita et al., 2011; Moretti & Obsuth, 2009; Toumbourou et al., 2007). For instance, in a recent review of parent behavioral training aiming to reduce or prevent substance use, the authors concluded that also low-intensity parent interventions in community samples may prevent adolescent substance use (Allen et al., 2016). In a review by Forehand et al. (2014) it was shown that parenting affected externalizing behavior in different groups of children differently. The authors further found that discipline was a critical aspect, especially for adolescents with high levels of externalizing behaviors. They further suggested that lack of giving positive support is probably the most fundamental parenting skill for accomplishing other positive parenting behaviors (Forehand et al., 2014). Parent programs that feature behavioral components, such as focusing on parenting skills, or parent behavior modeling, have been found to have an affect, albeit small, on at-risk adolescent delinquency in at-risk groups, as discussed in the study of systematic reviews by Farrington, Gaffney, Lösel, and Ttofi (2017). In that particular review, the authors conclude that programs that aim to prevent persistent delinquency among

adolescents should be delivered as family or multimodal programs, and also that intervention intensity should be matched to the adolescent's risk level (De Vries, Hoeve, Assink, Stams, & Asscher, 2015).

The two parent training programs were evaluated within this thesis, PS and the Comet, are both are manual-based prevention programs for parents, delivered in a group-session format. The program structure is different in the two programs in some aspects, which are presented in Table 3 below.

1.6.2.1 ParentSteps

PS is a parent training program, and is the result of a revision of Step-by-Step, a version of the Strengthening Families Program: for Parents and Youth 10-14 (SFP 10-14) (Kumpfer et al., 1996) adapted to fit a Swedish context (Skärstrand et al., 2008). Like SFP 10-14, Step-by-Step targets all families with young adolescents, and the program outline is similar to the original program, with parent sessions, youth sessions, and family sessions (Molgaard, Spoth, & Redmond, 2000). Subsequently, a program that targets parents of adolescents aged 13-17 years, who were at risk of progressing into substance use problems and other norm-breaking behaviors, was modeled on the Step-by-Step program – this became PS (Larsson, Marnborg, & Nordberg, 2009). The program that emerged was in large part inspired by the SFP 10-14, albeit in a secondary prevention version and only in parent sessions. By the time for PS development, studies had shown that bringing at-risk adolescents or youths together could escalate their antisocial behavior due to an increased risk of networking with the “wrong” people (Borsari & Carey, 2001). To avoid this, the decision was made to omit the youth sessions and the family sessions, and a considerable part of the original SFP 10-14 was left out. Because of this, the program format was shortened, and consisted of parent sessions only. PS was at the time of Study 1 offered to parents by several municipalities within Stockholm County, and by the social services unit at youth alcohol intervention centers (Maria Ungdom and MiniMarior).

The theoretical basis for the SFP 10-14 rests upon the Social Ecology Model and the Resilience model, both described above, however to what extent this was implemented in the development of PS was not outlined. It is clear, that the SEM does not influence PS substantially, since the SEM in SFP 10-14 was considered as a process model for family economic stress and adolescent alcohol use. By omitting both the adolescent group sessions and family joint sessions when developing the PS, it is possible that the theoretical base was abandoned.

There is empirical evidence for the effectiveness of SFP 10-14 (Harrop & Catalano, 2016), but the Swedish Step-by-Step was not found to be effective in preventing adolescent alcohol use (Skärstrand, Sundell, & Andréasson, 2014). It has to be underlined, though, that despite the theoretical underpinnings and ideas, PS should probably not be viewed as a SFP 10-14 program. This is due to what also is described in Study 1: when developing the PS program, it is possible that the deep structure of SFP 10-14 was interfered with. The deep structure has

been referred to as the understanding of "...how cultural, social, environmental, and historical factors influence health behavior differently" (p. 274) in different populations (Resnicow, Soler, Braithwaite, Ahluwalia, & Butler, 2000). In the development of PS (i.e., the modeling of SFP 10-14), the program was probably modeled in an attempt to attain deep structure, but it is uncertain to what degree this was successful.

1.6.2.2 Comet for parents of adolescents aged 12-18 years (Comet)

Comet (COmmunication METHod), a Swedish Parent Management Training (PMT) program, is a behavioral parent training delivered in a group format. The Comet program's original target group was parents of conduct-disordered children aged 3-12 years (Kling et al., 2010), but has subsequently been remodeled to address different populations and settings, such as pre-school teachers, staff at institutional care divisions, and also addressing older children, i.e., adolescents. The administration of the Comet programs at the time of Study 1, was managed by Stockholm social services administration, where the manual had been developed (Forster & Livheim, 2009). Comet was a part of regular social services provided to citizens, and Study 1 was conducted in real-world settings.

Theoretically, Comet is based on social learning, and most evident is that parents practice new strategies at home with the adolescent, using positive reinforcement and extinction of negative behavior for altering the adolescent's behavior. One principle within social learning that is addressed in the Comet is operant conditioning, which refers to reactions and consequences of a behavior, and what stimulates the behavior (e.g., antecedents, behavior and consequences) (Kazdin, 2005). Therefore, an important component is behavior analysis, where parents are urged to learn to use positive reinforcement, i.e., to praise the desired behavior.

The PMT has been extensively evaluated and found to be effective (Forgatch & Kjøbli, 2016). In the large review by Forgatch and Kjøbli (2016) it was concluded that PMT showed the largest number of successful evaluations regarding attention and hyperactivity – however the populations consisted primarily of boys not older than 13 years. The results also showed that PMT was the most effective program for disruptive behaviors among 2-15-year-old boys when delivered in a variety of settings (for instance clinical, community, school, home, playroom, university) and program length ($ES = 0.98$) (Forgatch & Kjøbli, 2016). Also the Comet 3-11 has been found to be effective in reducing problem behavior among children with clinical levels of such behavior, showing moderate to large effect sizes ($ES = 0.48 - 0.91$) (Kling et al., 2010).

Table 3. Program comparisons		
	Comet	ParentSteps
<i>Training of group leaders</i>		
Number of full days training	6 + 2 boosters	1
Tutoring while carrying out the first group	Yes	No
<i>Program structure</i>		
Number of parent sessions	9 weekly + 1 booster	6 weekly
Duration of each session, hours	2 - 2,5	1,5 - 2
Parents in each group	4 - 8	5 - 12
<i>Trial characteristics</i>		
Number of group leaders participating	31	13
Number of parent groups	30	13
Groups held within social services routine care	28	8
Groups held by contracted leaders	2	5

1.7 INTRODUCTION SUMMARY

Adolescence, the developmental period of life that begins in childhood and ends before entering adulthood, is accompanied by great challenges that may disrupt a positive pathway. Individual predisposition with regard to genetics and neurodevelopmental diversities, in combination with family and parental strategies, peer group influences, school and neighborhood, and co-existing problems, symptoms or behaviors, all posit both risk and protection for negative development. It is clear that being exposed to several of these factors in a negative manner increases the risk of entering a negative pathway. To hinder the emergence of problem behavior, preventive efforts that address parents of younger children have been made, and several have shown effects in enhancing positive child development and positive parent strategies (Enebrink et al., 2014; Ulfsdotter et al., 2014). But, since not all

parents and children seek or are reached for prevention, there is also a need for intervention among older children, i.e., adolescents.

The empirical studies within this thesis have a clinical perspective with a focus on informing on at-risk adolescents problem behaviors, and what may influence them. Pre-clinical studies of at-risk adolescents with elevated problem behaviors are rare, and the results from studying this naturalistic inclusion sample with a short follow-up period indicate how different behaviors and symptoms in a narrow time window influence other behaviors. First of all, for clinical benefit, it is important to study if predictions can be detected within a such short time period or if coexisting problems develop over longer time periods. Secondly, for adolescents with coexisting problem behaviors, the prognosis for severe problem development is unfavorable. We do know, for instance, that antisocial behavior is a risk for adult alcohol dependency, but does it influence concurrent hazardous drinking? Short-term prediction studies in naturalistic inclusion samples of at-risk adolescents are therefore necessary to increase the knowledge of which problems require quickly intervention.

In the following, the aims, methods, and results for the three included studies are shown. First is the evaluation of PS and Comet, followed by a study of predictors, which aimed to explore problem behaviors that influence hazardous drinking in the short term. Since alcohol use in the general population increases tremendously during adolescence, it is very important to investigate how the drinking of a subgroup of at-risk adolescents with elevated problem behaviors can be influenced in the short term, to enable prompt intervention regarding these influencing factors and hopefully eliminate or at least decrease their importance. Were there factors that the interventions did not address, that influenced drinking behaviors and that needed to be dealt with to decrease hazardous drinking? Lastly, in Study 2, it became evident that the females' problem behaviors by far exceeded the males'. This urged us to further explore if there were factors influencing their problem behaviors that the interventions were not designed to address. Adolescent females with elevated levels of problem behaviors are an understudied group, probably because of their underrepresentation in delinquency and externalizing behaviors. However, it has been found that once females develop any of these behaviors, they are particularly vulnerable due to the increased risk of comorbidity and other undesirable outcomes. While longitudinal studies with longer follow-ups bring valuable information, shorter prediction periods are informative too. An effect that emerges early may lose its influence in the long run. For instance, peers influence heavy alcohol use in the short run, but this may lose its amplifying effect as an adolescent grows older, even if the adolescent's alcohol use has increased. Studies 2 and 3 bring valuable information thanks to the short-term prediction. As both Studies 2 and 3 are explorative their results will indicate which coexisting problems need to be studied further, and hopefully inspire future research on at-risk adolescents.

2 GENERAL AND SPECIFIC AIMS

The general aims of the thesis were to explore:

1. two parent interventions and their ability to alter adolescents' problem behavior, and
2. underlying risk factors for problem behaviors, i.e., predictors of problem behaviors.

2.1 SPECIFIC AIMS OF EACH STUDY

Study:

- I) The primary aim was to study the effects of the two parent programs Comet and PS. The secondary aim was to evaluate the effects in a subsample with clinical levels of psychosocial problems.
- II) Aims were to study short-term predictors of heavy episodic drinking and risk use of alcohol among a cohort of alcohol using adolescent females and males with elevated levels of externalizing behavior and delinquency.
- III) Study aims were to test if psychological risk factors predicted females' externalizing behavior and delinquency, and if such an effect was moderated by perception of deviant peers.

3 METHODS & MATERIALS

3.1 RECRUITMENT

Studies 1, 2, and 3 are based upon data from the same respondents, parents and adolescents, originally recruited to Study 1. Parents were invited to participate and receive parent training in Comet or PS, immediately or six months later, mainly via advertisements in local newspapers, but also by staff at social services, or by staff at youth alcohol treatment centers. Interested parents were requested to visit a purpose-built website where they were screened regarding their adolescent's problem behavior. Those who screened positive received an informed consent letter, one for the parent and one for the adolescent. When signed consent forms from both the adolescent and the parent were returned to the research team, the family was randomized to one of three groups: parent training in either Comet or PS, or a 6-month wait-list control group. Figure 3 shows this allocation schedule for intervention. Inclusion criteria were: both the adolescent and the parent had consented to participation, the adolescent was between 12-18 years old; the adolescent had problem behavior such as repeated conflicts with family members, delinquent behavior, alcohol use, illicit drug use; the parent or adolescent resided in any of the five participating municipalities in Stockholm county, including the city of Stockholm, where 12 of a total of 14 city districts participated. Exclusion criteria were if the adolescent had an ongoing treatment for alcohol or illicit drug use, or an out-of-home-placement, or if the parent was in an ongoing parent training.

3.2 PROCEDURE

Following randomization, the families were assigned to either the wait-list control group or the parent group (Comet or PS) within their city district in order to minimize commuting. Group leaders were informed about the assigned families and invited them to the group sessions. The parents filled out their baseline measurements at the time of the first parent group session, before the session started. A research assistant attended to collect the questionnaires. The wait-list control group received their questionnaires by post, and returned completed ones to the researcher by post. Subsequent follow-up paper-pen questionnaires were sent to all parents by post.

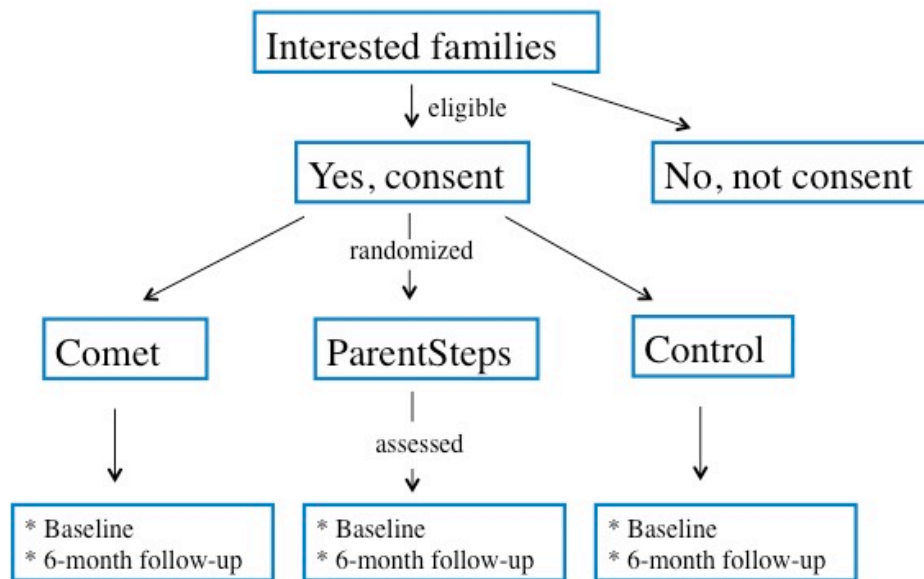


Figure 2. The randomization and allocation procedure for Study 1.

The adolescents whose parents were assigned to intervention were advised to complete their questionnaire prior to the parent's first group session. The control group adolescents answered their questionnaires during the same period of time. All adolescents completed their baseline and follow-up questionnaires through the web-based questionnaire, having been sent unique login information by e-mail. This is with the exception of a few, who received postal paper-pen questionnaires, and still fewer, who had the questions read out via telephone.

The parent sessions were carried out by two group leaders, who after every session (PS) and every second session (Comet) rated to what extent each program component had been fulfilled.

Incentives. To maximize data collection, incentives were used for completing the questionnaires. Parents in the intervention groups received 200 SEK for each completed questionnaire, while parents in the control group received 300 SEK. The adolescents received 2 or 3 tickets to the cinema for each completed questionnaire, depending on if they were allocated to intervention or control group.

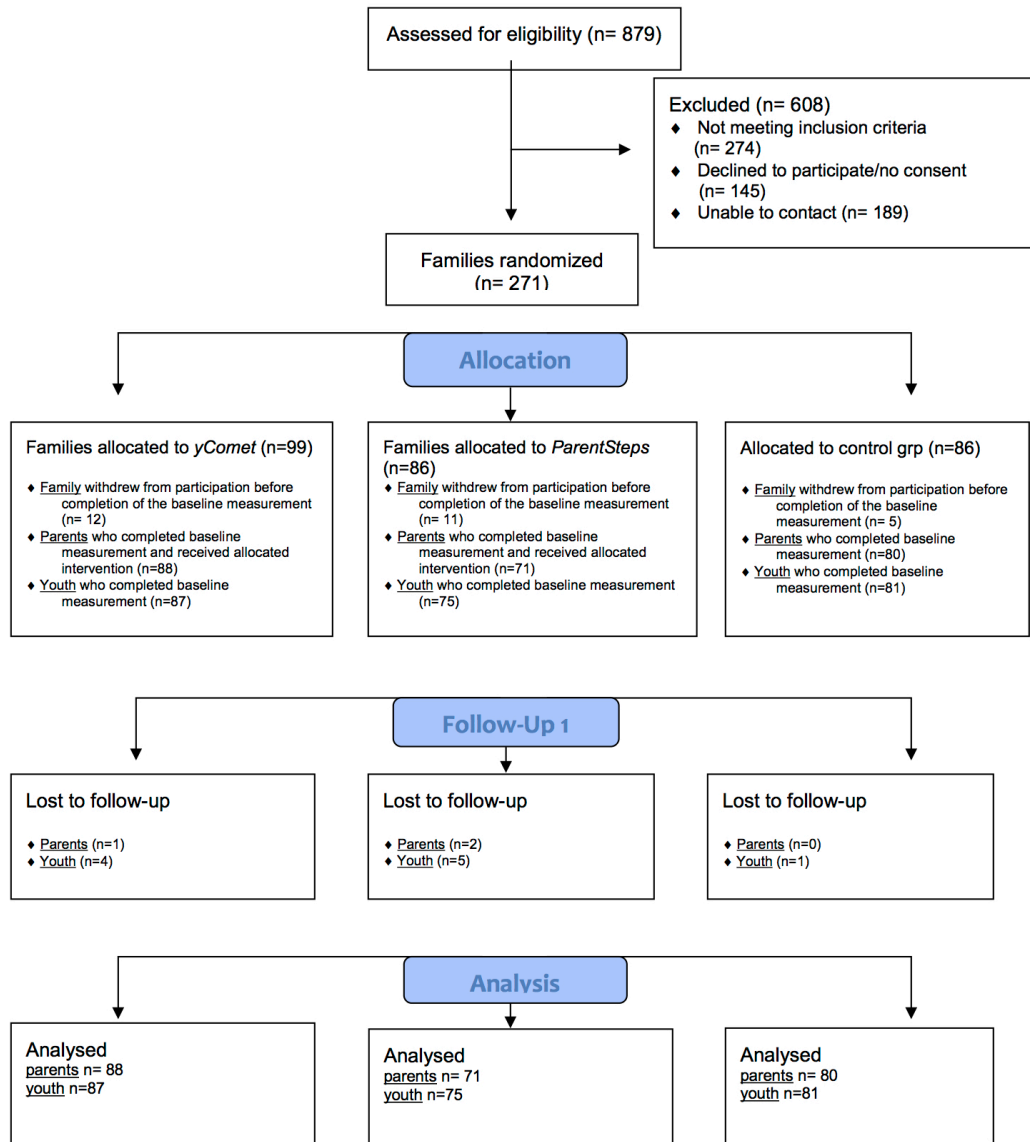


Figure 3. Consort statement flow diagram of the participants entering Study 1.

3.3 PARTICIPANTS

Data collection was conducted between August 2008 and May 2011. In total, 116 female and 127 male adolescents were recruited. The participants recruited are shown in the flow diagram above, Figure 3, which shows the randomization outcome for Study 1. In Study 1, a total of 237 adolescents, of whom 112 were females and 125 were males, (mean age 14.6, $SD = 1.73$) and their parents (93% mothers, and 42% single parents) were analyzed.

In Studies 2 and 3, two subsamples were analyzed, which in Study 2 comprised alcohol-using adolescents only ($N = 162$), i.e., those who reported having used alcohol during the last six months. The females' mean age was 14.9 years ($SD = 1.67$), and males' 15.3 years ($SD = 1.62$). In Study 3, only the female adolescent data were used, with measurements from baseline and 6-month follow-up. The subsample comprised 112 females aged 12-18 years, and mean age was 14.6 years ($SD = 1.71$). The subsamples in Studies 2 and 3 differed slightly from those analyzed in Study 1, not just depending on the subsample criteria. Firstly, because of the prediction designs, those with estimated values, i.e., Last Observation Carried Forward, were omitted prior to analyses in Studies 2 and 3. Secondly, due to using different techniques for detecting outliers, the female samples in Studies 1 and 3 were equal in numbers, but differed slightly in the makeup of individuals. Thirdly, there is also a difference in that we in Studies 2 and 3 were able to include those adolescents whose parents never entered the intervention they were allocated to, who were omitted when assessing the effects of the interventions in Study 1.

As shown in Figure 3, only 27.6% of all parents who started to fill out their application on the website participated and completed their enrollment and questionnaires.

Table 4. Baseline mean values and standard deviations (*SD*), *t*-tests or χ^2 for gender differences, and Cronbach's *alphas* for scale reliability.

	Female mean value (<i>SD</i>)	Male mean value (<i>SD</i>)	<i>t</i> -test (<i>df</i> = 160) or χ^2	<i>p</i> value	Cronbach's <i>alpha</i>
<i>Adolescent self-rated, N = 237</i>					
	<i>n</i> = 116	<i>n</i> = 127			
Age	14.54 (1.69)	14.69 (1.76)	-0.68 (241)	.500	NA
Antisocial behavior	56.03 (23.59)	37.64 (21.06)	6.38 (238)	≤ .001	.84
Externalizing behavior	20.14 (9.22)	15.05 (8.51)	4.44 (237)	≤ .001	.89
Internalizing problems	14.91 (9.14)	7.60 (6.37)	7.29 (241)	≤ .001	.88
Delinquency	33.55 (30.94)	29.92 (37.92)	0.81 (239)	.419	.92
Psychosocial distress	52.81 (29.33)	37.61 (27.09)	4.16 (236)	≤ .001	.93
Alcohol use	6.90 (7.13)	4.96 (5.94)	2.32 (241)	.021	.87
Heavy episodic drinking	56.5%	43.5%	$\chi^2 = 2.53$.074	NA
Risk use of alcohol	3.24 (3.04)	2.83 (2.92)	1.06 (241)	.289	.88
Illicit drug use	1.35 (4.32)	1.44 (4.51)	0.16 (240)	.872	.91
Delinquent friends	4.92 (3.43)	4.13 (3.85)	1.67 (240)	.095	.84
Drinking friends	58.1%	41.9%	$\chi^2 = 4.59$.023	NA
<i>Parent-rated</i>					
Antisocial behavior	50.68 (25.11)	45.60 (20.56)	1.95 (236)	.052	.94
Externalizing behavior	20.48 (9.92)	18.65 (8.91)	1.49 (235)	.138	.88
Internalizing problems	14.34 (9.38)	10.38 (7.39)	3.67 (235)	≤ .001	.88
Psychosocial distress	55.75 (30.78)	50.77 (30.68)	1.25 (232)	.212	.93

Notes: Antisocial behavior was total scale of CBCL and YSR. Risk use of alcohol was AUDIT-C (3 first items in scale).

3.4 MEASUREMENTS

Table 4 above shows the baseline values on all the parent-rated and the adolescents' self-rated measurements used in the three different studies. Comparisons between females and males were performed. Several of the females' problem levels at baseline were significantly higher than the males'.

Below, in Table 5, are the psychometric instruments that were used in the studies, with indicators of which part or subscale of each instrument that was used in the studies, the construct or domain it covers, the full name of each instrument or scale studies in which it has been used and from where the Cronbach's *alpha* was retrieved, and finally the *alpha* value from that particular study. All scales have been used in previous studies and all but two have been tested and rated as valid and reliable for this particular age group, see below in the text regarding instruments.

The scales showed good internal consistency in the present studies and are presented within each study. There was however one exception, for the Critical items in Study 3, which was omitted for the intended analyses due to the Cronbach's *alpha* = .63.

Table 5. Overview of the constructs constituting the scales

<i>Scale use</i>	<i>Construct</i>	<i>Scale</i>	<i>Used for instance in:</i>	<i>Cronbach's alpha</i>	
Total scale	Broadband scales	Antisocial behavior	Youth self-report & Child behavior Checklist (parent report), YSR & CBCL Study 1	(Achenbach & Rescorla, 2004) ^{1*} (Ebesutani, Bernstein, Martinez, Chorpita, & Weisz, 2011) ^{2*}	.95 ¹
		Externalizing behavior - such as aggressive and rule-breaking behavior	Externalizing behavior Studies 1, 2, 3		.89 ^{1,2}
		Internalizing behavior - such as anxiety, depression, somatic	Internalizing behavior Study 2		
Total scale	Delinquency - such as violence, status offences, general delinquency	Self-Reported Delinquency Scale, SRD Studies 1, 2, 3	(Elliott & Ageton, 1980) (Sundell et al., 2008)* (Bodin & Leifman, 2011)	.92	
Total scale	Cut-off scores	Alcohol use and related risk and consequences	Alcohol use disorder Identification test, AUDIT Study 1	(Santis, Garmendia, Acuña, Alvarado, & Arteaga, 2009) ^{1*} (Rumpf, Wohler, Freyer-Adam, Grothues, & Bischof, 2013) ^{2*}	.83 ¹ .77 ²
		Risk use of alcohol	Total scale cut-off score to identify risk users (≥ 6 points) Studies 1, 2	(Rumpf et al., 2013)	NA
		Heavy episodic drinking	Item 3 Item cut-off score to identify heavy drinkers (≥2 points) Study 2		NA
Total scale	Drug use and related risks and consequences	Drug Use Disorder Identification Test, DUDIT Total scale cut-off score to identify drug users (≥1 point) Study 1	(Berman, Bergman, Palmstierna, & Schlyter, 2005) ^{*1} ¹ (in population aged ≥16 years)	.80	

Subscale	Item cut-off	Perception of peers' deviancy - such as using alcohol or drugs, gets into fights	Bad friends (subscale from Peers' Deviancy Scale, PDS) Studies 2, 3	(Sundell et al., 2008)* (Keenan, Loeber, Zhang, Stouthamer-Loeber, & Van Kammen, 2009)	.71	
		Perception of peers' drinking	Item 1 from Bad friends, PDS Study 2		NA	
Total scale	Subscales	Psychosocial distress - such as arguing, defiance, communication problems	Youth Outcome Questionnaire® 2.0 (self-reports and parent reports), Y-OQ-SR® 2.0 Studies 1, 2	(Deighton et al., 2014) (Ridge, Warren, Burlingame, Wells, & Tumblin, 2009)*	.96	
			Relationship problems - such as arguing, defiance, communication problems	Interpersonal relations (Lester, 2012)	(Gillis et al., 2016)	.77
		Severe psychological problems - such as suicidal, paranoid ideation, mania, hallucination	Critical items	(Christensen, 2008)	.81	
			Norm-breaking behaviors - such as delinquency and aggression	Social problems		.84
		Psychological risk factors	Cognitive problems - such as hyperactivity, inability to organize, inattention, impulsiveness (ADHD symptoms)	Behavioral dysfunction Study 3		.81
			Internalizing problems - such as depression, anxiety, fearfulness, hopelessness	Intrapersonal distress Study 3		.91
			Somatic complaints (without known medical causes) - such as headaches, dizziness, bowel problems	Somatic Study 3		.73

Notes: * = studies from which the Cronbach's alphas in the right column are retrieved

Achenbach's *Child Behavior Checklist* and *Youth Self-Report* (CBCL and YSR) were used in **Studies 1, 2, and 3**. CBCL (parent ratings) and YSR (youth ratings) assess the adolescents' antisocial behavior during the last six months. The total problem score ranges between 0 and 210 points. Each item was rated on a 3-point Likert scale: 0 (never/seldom); 1 (sometimes); 2 (often/always). The total scale comprises two broadband syndrome scales: the internalizing and the externalizing behavior (rule-breaking and aggressive behavior). The internalizing scale reflects problems within the self, such as depression, anxiety, and somatic complaints without identified medical cause. The total score ranges between ranging from 0 and 64 points. Higher scores indicate more problem behavior (Achenbach & Rescorla, 2001).

In Studies 1, 2, and 3, the *Self-Reported Delinquency* (SRD) was used. The total scale score (with exception for the subscale hard drug use) measures overt and covert behavior that taps violence, general delinquency, and status offenses. The scale have been reported to have satisfactory psychometric properties (Elliott et al., 1983). Adolescents rate how many times they have committed any of the 40 delinquent behaviors during the last six months, and can answer from "zero" to "nine times or more". The total score ranges between 0 and 360 points (Elliott & Ageton, 1980).

In Studies 1, 2, and 3, the *Youth-Outcome Questionnaire Self-Report* (Y-OQ® & Y-OQ®SR) was used. Parent and adolescent questionnaires rating the adolescents' psychosocial functioning. The scale has been shown to have good psychometric properties (Ridge et al., 2009). Sixty-four items were each rated on a 5-point scale (range 0 and 4), including eight reversed items that tapped healthy behaviors (-2-2). The total scale score ranges from -16 to 240 points and higher scores indicate greater psychosocial problems. The cut off score ≥ 46 was used to define a subsample with clinical levels of psychosocial dysfunction (Burlingame, Wells, Cox, & Lambert, 2005).

In Study 1, the *Drug Use Disorder Identification Test* (DUDIT) was used. DUDIT measures self-reported illicit drug use on 11 items with a total scale score ranging from 0 to 44 points (Berman et al., 2005). No cut-off points are available for adolescents.

In Study 1 and Study 2, the *Alcohol Use Disorder Identification Test* (AUDIT), developed by the World Health Organization was used (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). AUDIT measures self-reported alcohol use and alcohol related problems. The instrument consists of 10 multiple choice items, with the total score ranging from 0 to 40 points. Cut-off points to define alcohol risk use are set to ≥ 8 for men and ≥ 6 for women. The

instrument has in several studies shown good validity and reliability in adolescent populations, including a German community sample of adolescents aged 14-18 years (Rumpf et al., 2013), a US adolescent sample of adolescents aged 14-18 years arriving for routine care at primary health care settings (Knight, Sherritt, Harris, Gates, & Chang, 2003) as well as a Chilean adolescent school sample (Santis et al., 2009).

In Studies 2 and 3, the *Delinquent & drinking friends* were assessed using five questions from the Peers' deviancy scale (Keenan et al., 2009), asking about the adolescents' perception of peers' deviancy: How many of your friends: use alcohol regularly; use illicit drugs; commit property crimes; fights physically; hang around in the city at night? Every item was rated on a 5-point scale (0= I don't know; 1= no one; 2= few of them; 3= some of them; 4= most of them), and the total score ranges from 0 to 20 points.

3.5 BRIEF DESCRIPTION OF THE STATISTICAL TERMS AND ANALYSES

Several statistical analyses were carried out in the studies (see Table 6). Here, I present a very brief overview of the analyses used in the studies in alphabetic order. Details about the analyses are presented within each study. Techniques on how the datasets were prepared for analyses are also presented in each study, with the exception of assumptions required for some of the analyses.

Analysis of Variance, ANOVA, is used to test differences between mean values. There are six assumptions that must be fulfilled to ensure that the test is a proper analysis for your data. These assumptions are: the dependent variable should be continuous data; the independent variables must be two or more categorical; independent groups; independence of observations; no significant outliers; the dependent variable must be normally distributed for any of the independent variables (category); and lastly there must be homogeneity of variances (Laerd Statistics, 2015b). The test is similar to the *t*-test (described below), but when there are three groups or more to compare. The procedure tests the overall fit of a linear model, taking the variance into account. In Study 1, we used *General Linear Model (GLM) repeated measures one-way ANOVAs*, which are used to assess the tested groups' differences over time, i.e., time and condition differences (Laerd Statistics, 2015a). One-way indicates that only one independent variable was entered in each model, although we did also control for gender by adding gender for co-variance in the models.

Chi-square tests (χ^2) were used in Study 2, for testing the association between two categorical variables. Besides the assumption of two categorical variables, they also need to be independent.

Cohen's d is one of the most commonly used effect size (*ES*) tests, and is used to determine the importance of a variable's effect on another variable. *ES* has also been explained as an index showing to what extent an effect has a practical or clinical value (Hojat & Xu, 2004). Normally, *ES* is between +/-1, but it can range from negative to positive infinity (Hojat & Xu, 2004). Thresholds for practical and clinical importance have been set depending on the sample being assessed. In Study 1, we calculated *ES* by subtracting the mean value differences between baseline and follow-up for group 1 from the mean value differences from group 2, divided by the standard deviation (*SD*) in the control group. When comparing two independent samples in repeated measures, Cohen (1987, p. 40) defined the magnitude of *ES* as:

ES = 0.20 (small, negligible practical or clinical importance)

ES = 0.50 (medium, moderate practical or clinical importance)

ES = 0.80 (large, important practical or clinical importance)

Kruskal-Wallis H-test is a nonparametric test of differences between two or more groups on one outcome variable and one independent variable. The four basic assumptions are: one numerous dependent variable; the dependent variable should consist of at least three categories; independence of observations; and a decision as to whether or not the categories have similar distribution shapes (Laerd Statistics, 2015a).

Moderation analyses should meet the eight assumptions for *multiple regressions* described below. For moderation analysis, the statistical PROCESS solution version 3 (Hayes, 2017) was used. The PROCESS solution produces several results for determination of moderation effects, but as no moderation effect was found in Study 3 we only declared the effect of adding the moderator to the prediction regression analyses. The terms that were used in the model were the *z*-transformed predictor, the *z*-transformed moderator, and their interaction term.

Multiple linear regressions, as were used in Study 3, test two or more independent variables as predictors for a certain continuous outcome. We used a stepwise forward selection method, where each independent variable that significantly improves the model's strength is added to the prediction model. The data must fulfill eight assumptions or basic requirements. Tests of

the assumptions indicate if multiple regression analysis fits the data properly (Field, 2013). These eight assumptions are:

1. The dependent variable (DV) is at the continuous level;
2. The two or more independent variables (IVs) are at the continuous or nominal level;
3. There needs to be independence of residuals, i.e., independent observations. The assumption was assessed by using Durbin-Watson significance test and tables for critical values (Stanford University, N.A.);
4. There needs to be a linear relationship between the DV and the IVs. Assumption of linearity was tested by a visual inspections of studentized residuals plotted with the predicted values;
5. The data must show homoscedasticity, i.e., that the residuals are equal for all predicted values. This was checked by visual inspections of the studentized residuals plotted against the predicted values, in order to preclude that data formed any type of funnel-like distribution;
6. The data must not show multicollinearity, which was analyzed by studying the correlation analyses of the IVs to ascertain that these were not highly correlated. We used a rigid cut-off value of *tolerance* > 0.2 and *VIF* < 5 (instead of the usual applied *tolerance* < 0.01 and *VIF* > 10);
7. There must be no significant outliers. To ascertain this assumption, we used jack-knife studentized residual deletion. The technique is used as a filter variable, and identifies and deletes bivariate outliers with larger critical *t*-values for $p = .01$ ($df = n - k - 2$ ($k =$ number of predictors));
8. The regression residuals should be properly normally distributed, which was ascertained by visual inspection of studentized residuals plotted against the predicted values, where the scatterplot should show a distribution close to the predicted regression line.

Assumptions 3 to 8 were statistically tested with procedures supplied within the statistical software package IBM SPSS version 23.

Multiple regression correlation (MRC) was used in Study 2 to detect possible gender differences. The MRC analyses were performed using a binary gender variable, a *z*-transformed predictor, and their interaction term (i.e., the product of the binary gender variable and the *z*-transformed predictor), and shows possible group differences in prediction slopes.

Reliability refers to “agreement between repeated assessments of phenomena when the phenomena themselves are expected to remain constant” (Achenbach & Rescorla, 2001, p. 99). *Internal consistency* is a reliability test that refers to the homogeneity of the items on the scale that is intended to capture a specific phenomenon. The chosen items on a scale should

be theoretically or logically driven (De Vellis, 2011). We used Cronbach's *alphas* in Studies 1, 2, and 3 to assess *internal consistency*. The *alpha* ranges between 0.0 and 1.0, and represents a *mean value* of the correlations of half the items on the scale with the other half (De Vellis, 2011).

Simple logistic regression, binary, as used in Study 1, is a regression often used for categorical outcome data with only two possible outcome values, for instance 0 and 1, and one independent variable. The procedure's results show the samples' merged probability to fall into one category or the other. In Study 2, we used *multiple logistic regression*, which is similar to single but used when you want to test two or more independent variables as predictors for the probability to obtain a particular value for the dichotomous dependent variable (0 or 1). There are seven assumptions to be met: a dichotomous dependent variable; mutually exclusive and exhaustive categories on the dependent variable; one independent variable; a minimum of 50 observations/independent variable; independence of observations; linear relationship between the independent variable and the log-transformed dependent variable; no multicollinearity; and no significant outliers.

A *Type 1 error* occurs when the null hypothesis is incorrectly rejected (i.e., stating that there are differences when there are not). This risk increases for instance with the number of tested variables, i.e., due to multiple testing. Studies have tested the limit for avoiding *Type 1 errors* caused by multiple testing, and having less than ten observations per predictor should not entail this risk of bias (Vittinghoff & McCulloch, 2006). *Type 1 errors* can also increase when the sample size is large, since the probability to detect significance increases with increasing sample size; choosing an *alpha* level = .02 or .01 is a common strategy to counteract this. With $p < .01$ there is 1 chance in 100 to wrongly falsify the null hypothesis. *Confidence intervals, CI* is an interval within the true population (or repeated samples) mean would lay. Usually this level is set to 95%, and indicates that 95% of the cases would bracket that sample mean.

A *Type 2 error* refers to incorrectly keeping the null hypothesis (that is, stating that there are no differences when there are). This can occur when the sample size is too small. *Type 2 errors* may also arise for other reasons, and one of them was avoided in Studies 2 and 3 by not controlling for baseline values of the outcomes (however, analyses controlling for baseline values are presented below, in 4.2, Study II, and in 4.3, Study III). Controlling for the outcome's baseline value, for instance that of externalizing behavior, may introduce bias if the externalizing behavior changed as a response to the predictor at an earlier stage before baseline measurement was taken (Glymour, Weuve, Berkman, Kawachi, & Robins, 2005).

However, when the risk of *Type 2 errors* decreases, the risk of *Type 1 errors* increases, and vice versa.

The *t*-test (Student's) is used to test differences between the means in two populations, which was done in Study 2. Commonly, it is of interest to test if two independent groups differ to a degree large enough to conclude that they are statistically different from each other in regard to the variable of interest.

Welch's *t*-test is similar to Student's *t*-test, but is used for unequal sample sizes and variances. We used this test in Studies 1, 2, and 3 when comparing the study samples' mean levels and variances with those of normal population samples. This was done to test if the adolescents in our sample had elevated levels of problem behaviors and could be considered as a risk group.

Table 6. Description of the three studies.

	<i>Design</i>	<i>Data</i>	<i>Participants</i>	<i>Analyses</i>
Study I	Randomized controlled trial, 1-1-1 randomization ratio, comprising baseline and 6-month follow-up	Questionnaires	Parents and their adolescent aged 12-18	χ^2 test, ANOVA, <i>t</i> -test, GLM repeated measures ANOVA, Binary logistic regression, Kruskal-Wallis <i>H</i> -test, Cohen's <i>d</i> , Cronbach's <i>alpha</i>
Study II	Cohort study design comprising baseline and 6-month follow-up	Questionnaires	Alcohol using adolescents aged 12-18, and their parents	χ^2 test, stepwise logistic regression, Welsh <i>t</i> -test, Cronbach's <i>alpha</i>
Study III	Cohort study design, comprising baseline and 6-month follow-up	Questionnaires	Female adolescents aged 12-18	Multiple regression, moderation analysis, Welsh <i>t</i> -test, Cronbach's <i>alpha</i>

3.6 CLINICAL TRIAL REGISTRATION & ETHICAL PERMISSIONS

Study 1 was registered in Current Controlled Trials, ISRCTN, (reg. no: ISRCTN76141538) post onset.

Further, Study 1 was approved by the Regional Ethical Review Board in Stockholm (reg. no: 2008:744-31) prior to being initiated.

Studies 2 and 3 was also approved by the Regional Ethical Review Board in Stockholm (reg. no: 2008:744-31, 2016:1321-32).

Prior to launching the research project, we applied for ethical permission to carry out the RCT. Description of study design and, in particular, keeping parents who sought support on a wait-list must be done for a good reasons and have potential benefits. Under the circumstances in which the programs were regularly run, the social services already had a wait-list due to the high demand from parents in their city district or municipality. This meant that our design did not deviate too much from the regular procedure of the social services. An argument for using a wait-list is that one of the most valid methods to evaluate interventions is by comparing outcome data between the intervention group and an untreated control group, or using treatment as usual-group (TAU), instead of not having a control condition. Both PS and Comet had, at the time of launching the project, been run in regular preventive services for more than four years without evidence of if they were effective in reducing the adolescents' problem behaviors. The ethical aspects of that are perhaps obvious, but since there is a lack of interventions that target this sub-clinical group, there was a need for such programs, which the developers tried to meet. In hindsight, the programs should have been tested more promptly.

Ethical approval for Studies 2 and 3 were applied for post-data collection, and post-RCT results. Because of the lack of program effectiveness, the original research plan was adjusted and required new permissions for using the already collected data to answer new research questions.

4 MAIN FINDINGS

4.1 STUDY I

Parent programs for reducing adolescent's antisocial behavior and substance use: a randomized controlled trial

The overall aim was to study the effects of two parent training program in comparison to a wait-list control group. The programs were delivered in real-world settings within regular preventive social services work. The study was conducted in cooperation between group leaders, social services in the 5 municipalities, including 12 city districts in Stockholm City, in Stockholm county and the research team.

Two hundred and forty-three parents' and 237 at-risk adolescents participated after a brief screening procedure and written consent. Parents were randomized to intervention or to control group, and both parents and their adolescent answered questionnaires at baseline and six months later with questions about the adolescents' antisocial behavior, delinquency, alcohol and illicit drug use, and psychosocial distress. Parent groups were four delivered during semesters, and each parent group met once a week for six to eight weeks, depending on assignment to PS or Comet. Data were collected between fall 2008 and spring 2011. The results showed no significant effect on any of the parent-rated adolescent behaviors between groups over time. Nor did the adolescents' self-ratings of own problem behaviors show any significant differences over time between groups, excepting on one outcome: illicit drug use. The findings showed that adolescents whose parents were allocated to intervention groups showed a three-fold higher risk of using drugs at follow-up, in comparison to the control group. We controlled for adolescent age and gender in all analyses, but these variables had no effect on the outcomes.

4.2 STUDY II

Gender specific predictors among at-risk adolescents' hazardous alcohol use – a cohort study

The results from Study 1 raised concerns about the ineffectiveness of the interventions. Since especially PS and to some extent Comet aim at preventing alcohol use, and alcohol use did not decrease over time, there might be other factors that influence alcohol use which were not successfully altered by the interventions. If so, this could bring clinically valuable information about factors that may be addressed in future interventions for adolescents with at-risk behavior problems.

Study aims in the paper were to investigate short-term predictors for 162 at-risk female and male adolescents' hazardous alcohol use.

The data used were adolescents' self-reports of externalizing behavior, delinquency, psychosocial distress, perception of peers' deviancy, and alcohol use, as well as parents' ratings of their adolescent's externalizing behavior, and psychosocial distress, assessed at baseline and six months later

The results showed that externalizing behavior and delinquency significantly predicted HED for both genders, as well as females' risk use of alcohol. Adolescents' perception of delinquent friends was also a predictor for females' HED and risk use, but only for HED in males. The perception of drinking friends predicted females' and males' HED, but not risk use. An interesting finding was that the parents' ratings of externalizing behavior and psychosocial distress predicted only male adolescents' alcohol use, and not the alcohol use among female adolescents. In subsidiary analyses (Table 7) we controlled for the HED and risk use at baseline, and found that perception of peers' drinking remained as a significant predictor for males' HED, while females' earlier HED was the only significant predictor. For females' risk use, earlier risk use and externalizing behavior were significant predictors, while for males, none of the predictors were significant. These results should however be interpreted in the light of testing for baseline values, as discussed above in Section 3.5 (Brief description of the statistical terms and analyses), *Type 2 errors*, and also since risk factors often develop over a longer period of time than six months.

Table 7 in here, Appendix A.

4.3 STUDY III

Psychological risk factors for female adolescents' externalizing behavior and delinquency, testing perception of peers' deviancy as a moderator

Study 3 stems from results in Studies 1 and 2, in which it became evident that the interventions did not affect externalizing behavior or delinquency, and that the females had a more severe problem behavior load, as compared with males. Earlier research has shown that females' internalizing behaviors predict externalizing behaviors in different populations, and that female ADHD predicts adult criminality but also a range of undesirable outcomes during adolescence. Further, perception of peers' deviancy has been identified as a salient amplifier of adolescent problem behaviors. To understand mechanisms behind at-risk, pre-clinical female adolescents' problem behaviors, we tested psychological risk factors as predictors for problem behaviors. The results would bring clinically important indications of how at-risk females' elevated levels of problem behaviors are influenced by coexisting psychological problems, and if perception of peers' deviancy further amplified such a relation.

Study aims were to test if psychological risk factors predicted females' externalizing behavior and delinquency, and if such an effect was moderated by perception of deviant peers.

The females were assessed at baseline and at a 6-months follow-up with regard to self-reports of externalizing behavior, delinquency, cognitive problems (symptoms on the ADHD spectrum), internalizing and somatic problems, and perception of peers' deviancy. As described above, we did not control for baseline values of the outcomes, since ADHD symptoms may have affected the females' externalizing behavior and delinquency prior to our assessment period under the assumption that ADHD traits debut early in life and are pervasive. Also, risk factors tend to develop over a longer period of time than six months. However, here the results from subsidiary analyses are presented (data not shown), when controlling for delinquency at baseline ($\beta = .513$ [$CI\ 99\% = 0.30, 0.90$] $p \leq .001$), ADHD symptoms fell short of significance ($\beta = .162$ [$CI\ 99\% = -0.01, 0.03$] $p = .095$). When controlling for externalizing behavior at baseline ($\beta = .452$ [$CI\ 99\% = 0.18, 0.77$] $p \leq .001$), ADHD symptoms did not remain significant ($\beta = .192$ [$CI\ 99\% = -0.12, 0.62$] $p = .076$).

When not controlling for the baseline values, as discussed above in Section 3.5 and Study 2, which we also discuss in Study 3, we found that the only psychological risk factor that significantly predicted externalizing behavior and delinquency was ADHD spectrum cognitive problems. Perception of peers' deviancy did not significantly amplify the effect of cognitive problems on externalizing behavior and delinquency.

5 DISCUSSION

5.1 RESULTS SUMMARY

In Study 1, the first Swedish evaluation of parent training programs for reducing at-risk adolescents' antisocial behavior was conducted. The two parent training programs were evaluated in a randomized controlled trial with regard to their ability to decrease antisocial behavior, delinquency, substance use, and psychosocial dysfunction among adolescents aged 12-18 years, with problem behaviors already present. However, the results from the evaluation study showed that possible alterations of parental factors did not affect the adolescents' problem behaviors, which was shown both in the adolescents' self-reports and in the parents' ratings of their adolescent's problem behaviors. However, we found that the adolescents whose parents participated in parent training had a three-fold increased risk of using illicit drugs. The following two studies were based on the same data, with a clinical focus, to understand if there were other factors that might signal risk of alcohol use, delinquency and externalizing behaviors over the short term. We found that perception of peers' drinking predicted the adolescents' HED and risk use of alcohol, and, for females, externalizing behavior also predicted risk use of alcohol. Since we found that the females had more severe problem behaviors than the males, Study 3 explored the coexisting problem behaviors among females only. The results showed that of the psychological risk factors within the internalizing, somatic and cognitive domains, only cognitive problems predicted delinquency and externalizing behaviors. The perception of peers' deviancy did not influence the cognitive problems' effect on these outcomes.

It has been stated that preventive efforts for child well-being are most promising at an early stage (Baumrind, 1966; Piquero et al., 2009). Hwang and Nilsson (2011) state that attachment, for instance, progresses from age 2 to 12, which suggests that the most promising age to alter or enhance attachment is in this span. To strengthen parents in their parenting, various efforts have been implemented and extensively tested for effectiveness. Parental self-efficacy seems to have good returns in positive child development (for instance Jones & Prinz, 2005; Ulfsdotter et al., 2014), as well as seeming to prevent parental stress (Bloomfield & Kendall, 2012). However, not all families with young children are reached through parent programs, some may not be affected by the programs, and some adolescents develop problem behavior at a later stage. Therefore, society needs interventions for adolescents as well.

5.2 THE ABSENCE OF EFFECTS OF PS AND COMET

There are several studies showing that parent training can decrease problem behavior among children and adolescents. Examples are presented in review articles by Furlong et al. (2012) and by Högström et al. (2016). However, there is still a lack of studies in Swedish settings that evaluate parent training targeting parents of adolescents, and especially at-risk adolescents. The results from the Swedish studies that have been conducted indicate that targeting parents in parent training may not help in reducing or delaying adolescents' problem behavior, such as alcohol use. One example is a Swedish adapted version of SFP 10-14, the *Step-by-Step programme* (Skärstrand et al., 2008), which showed no effects in postponing adolescents' alcohol use (Skärstrand et al., 2014). Attempts to target adolescents through parents by arranging parent information meetings in the school setting have been made. This was done in a Swedish school-based parent program with the aim to delay and prevent alcohol misuse among adolescents aged 13-16 years, the *Örebro Prevention Programme* (ÖPP), but the program was found not to delay or reduce adolescent alcohol use (Bodin & Strandberg, 2011). Nonetheless, in the review by Harrop and Catalano (2016) a modified version of ÖPP, called EFFEKT, has been suggested to be a promising program for delaying alcohol initiation. *Step-by-Step* and ÖPP are both universal programs, and *Step-by-Step* is also a primary program, and it is possible that in Sweden, prevention at the universal level may not affect adolescents because of the developmental stage that they are in. Their autonomy, especially from their parents, increases as they get older, and peers and their perception of peers' behavior, such as alcohol use, influence their own behavior to a large extent, as described above. The adolescents who were included for intervention in Study 1 had substantially elevated levels of problem behavior. Altering such behavior indirectly via the parents, i.e., parent group leader → parent → adolescent, may be too difficult due to the autonomy process that the adolescents are in.

Continuing on the theme of intervention timing, it has been found that early parent or family interventions are promising in preventing antisocial behavior in adolescence (Piquero et al., 2009). Also, in order to achieve parental involvement at all, it is necessary to involve the parents early, and Hindelang, Dwyer, and Leeming (2001) stated that to increase parental involvement when a child has reached the teenage years "is much like closing the barn door after the horse has left" (Hindelang et al., 2001, p. 82). This implies that in order to prevent adolescent antisocial or norm-breaking behavior, the interventions should come early and address parental involvement. Other researchers have shown that parent intervention in combination with other interventions, for example being institutionalized or incarcerated, can

reduce antisocial behavior, delinquency and re-arrest among adolescents with more severe antisocial behavior (Moretti & Obsuth, 2009; Woolfenden et al., 2002). However, problem behaviors may also debut in adolescence, or childhood-onset problems may not have been prevented successfully in childhood.

The only significant result from Study 1 needs a special comment –the three-fold increased risk for adolescents of intervention parents to use illicit drugs. The result indicates that the interventions might have caused this increased risk, and results that point to the risk of causing harm are very important to report. As mentioned in the discussion of Study 1, such a result is hard to understand. In the intervention groups the illicit drug use increased by 5 percentage units in Comet and units 10 in PS, while it decreased 10 units among the control group. Given that drug use among adolescents normally increases between the ages 15-18 (Can, 2016), the decrease in the control group should probably be understood as a measurement error. Also, the wide confidence intervals 95% *CI* (1.24, 10.72) together with the low occurrence of drug users suggests that the estimation of the odds ratios are uncertain.

My overall interpretation is that for adolescents with elevated levels of problem behavior, there should be additional components to parent training, such as individual treatment or family sessions. It is possible that if the program structure from SFP 10-14 had been left intact, so that PS also comprised parent sessions, youth sessions, and joint family sessions, the program could have reduced the at-risk adolescents' problem behaviors. With regard to the Comet program, there are no program components or sessions that have been left out; the program without additional components seems unable to reduce at-risk adolescents' problem behavior.

5.2.1 Factors predicting alcohol use and externalizing behavior and delinquency

Earlier research has found that problem behaviors, such as delinquency and antisocial behavior, are related to alcohol use (Harrop & Catalano, 2016; Mason, Hitchings, McMahon, & Spoth, 2007), and also predicts both alcohol use (Harford & Muthén, 2000) and substance use (including alcohol use) (Hawkins et al., 1992; Monahan, Rhew, Hawkins, & Brown, 2014). Also, symptoms within the internalizing domain, e.g., depression, have been found to predict alcohol use as reported from some studies (Marmorstein et al., 2010; McCarty et al., 2013). In Study 2 however, only externalizing behavior predicted females' alcohol risk use. Instead, our findings show that the adolescents had elevated co-existing problems that should

be dealt with promptly, due to the increased risk of harm that comorbidity entails. Indeed, this indicates that adolescents prior to intervention should be carefully examined for different types of problem behaviors. The results in Study 2 further suggest that this may be especially important for females, since they had significantly higher problem load on almost all problem behaviors, compared with males.

In Study 3, where we explored females only, the results also suggest the importance of a thorough examination of possible co-existing problem behaviors. We found that they had severe problem levels in additional domains, e.g., among the psychological risk factors that were used as predictors for externalizing behavior and delinquency. The level comparisons were made between the females and a community adolescent sample from the US (Ridge et al., 2009). One of the domains where the females had elevated levels was cognitive problems found on the ADHD spectrum, which was found to significantly predict both externalizing behavior and delinquency. Unlike in Study 2, where perception of peers' drinking emerged as a strong predictor for HED and risk use, perception of peers' deviancy did not moderate the effect of cognitive problems on externalizing behavior or delinquency. However, one of the aims in Study 3 was based on earlier research findings that have demonstrated that peers' deviancy is one of the most evident amplifiers of problem behaviors. With that in mind, we needed to further explore if this amplifier influenced ADHD symptoms' effect on problem behavior. The findings have good clinical bearing, since it was shown among ADHD females that perception of peers' deviancy did not strengthen the ADHD effect on externalizing behavior or delinquency. This finding may be explained by other research, which has suggested that females with ADHD demonstrate increased friendship difficulties, peer rejection, and low social skills functioning (see Kok, Groen, Fuermaier, & Tucha, 2016, for review). Additionally, drinking alcohol may largely be seen as a social act commonly performed with friends, while ADHD is a set of symptoms of cognitive function, which is not present as a result of social relations – rather it may affect them negatively.

With regard to the females' severe problems, including cognitive problems, it may be important to reach them with treatment efforts at an earlier stage in order to intervene against a negative trajectory. Recalling research discussed above, there are several advantages with intervening before problem behaviors consolidate, such as parental influence on development during childhood being greater, the ability to attain parental involvement being larger in early parenthood, and peers not yet having reached the status as the increasingly important role models. This calls for improved detection through increased knowledge among those who act in the females' environment. If we understand females' signs of acting-out behavior, specific

traits on cognitive problems, peers' amplifying effect on alcohol use, and that they may suffer from a range of co-existing problems, we can be more observant and react before the behaviors become consolidated.

5.2.1.1 Parents' perceptions

Interestingly, in Study 1, there was a significant decrease in parents' ratings over time, which coincided with an equivalent decrease in the control group. There are several possible reasons for these findings. As parents in this trial sought help because of distress and worry about the adolescent, it is possible that regression to the mean (RTM) could explain the time effect observed in parent reports (Kazdin, 2003). For example, Finney (2008) argues that substance use disorder patients seek treatment when they peak in poor functioning and are coerced to enter treatment. When reassessing the problem level at follow-up extreme values tend to have decreased towards the population mean (Finney, 2008). In this trial, such a peak could probably have occurred when the parents entered and were assessed at baseline. Since all groups in this trial improved, some effect may be due to RTM. Another partial explanation for the decrease in the control group may be the effect of reading and responding to the advertisements and going through the screening process, which could trigger a range of thoughts and actions among parents such as reflecting over their parenting, searching for advice on the internet, or talking to friends about parenting strategies –actions that may have affected the control parents' perception of their parenting's effect on the adolescent's behaviors.

Another interesting result with regard to the parents' ratings was from Study 2, where it was found that parents' perception of their sons' externalizing behavior predicted risk use of alcohol, but not their daughters'. This was perhaps due to a culturally encoded expectation of their sons' externalizing behavior and alcohol use, which may indicate a better understanding of males' behavior problems among parents. Recalling the results from study 3, where we found substantially higher levels of problem behaviors and ADHD symptoms among females compared to males, and the reasoning that the studied interventions came too late, is perhaps due to a weaker culturally encoded perception of females' problem behaviors, and alcohol use. Since parents' perceptions of adolescents' behavior are often the reason that parents seek intervention programs, it seems that the parents of the males in our studies, searched for parent training at an earlier stage in their sons' problem behavior development, compared to parents of females. This suggests that there might be differences in parents' perception of females' and males' problem behaviors.

To summarize, PS and Comet did not decrease at-risk adolescents' externalizing behavior, delinquency, psychosocial distress, alcohol use, or illicit drug use. Based on the results from the three studies within the thesis and previous research, it may be suggest that the programs in their current format do not address domains that influence hazardous alcohol use or cognitive problems, nor the complexity of co-existing problem behaviors. As good as the program parent training components may be, the enhanced problem level these adolescents demonstrated may have meant that the programs were insufficient.

5.3 THEORETICAL AND CLINICAL IMPLICATIONS

As exemplified throughout the thesis, several aspects may have contributed to the development of the problem behaviors among the studied adolescents. Possible family-environmental disadvantages may have interrupted desired development. For instance, the development of temperament, i.e., physiological and emotional reaction to stimuli, and self-regulation, i.e., the ability to control emotional and behavioral expression, are affected by genetics, environment, and maturation (Vanderbilt-Adriance et al., 2015). Self-regulation skills has been found to be important to prevent or preclude maladaptive behaviors, such as delinquency and substance use (Luyckx et al., 2011), and parenting practices are crucial for development of positive self-regulation in children and adolescents (Morris, Silk, Steinberg, Myers, & Robinson, 2007). However, individual factors, such as genetic or neurocognitive factors, may affect the likelihood of the family realizing a favorable development. Similarly, environmental factors, such as living in an impoverished neighborhood where externalizing behavior may be endorsed, or having peers who you believe drink a lot of alcohol, may stimulate or amplify negative development. By altering parenting practices, a negative trajectory for the child or adolescent may be interrupted, but adolescents who already have enhanced levels of problem behavior might need more qualified interventions, such as individual or family therapy. For instance, Functional Family therapy – a short intensive 3-month family therapy focusing on supervision, emotional support and discipline – has been shown to reduce delinquency and drug use among delinquent adolescents at risk of institutionalization. In the same overview of preventive efforts for adolescent substance use, Harrop and Catalano (2016) list Multisystemic therapy (MST), as a solid, 3-5-month indicated family and community intervention for severe adolescent antisocial behavior, to have effects on family relations, delinquency, internalizing behavior, prosocial behavior, and mental health. Another recent overview of MST showed that when implemented in multiple settings, such as home-based and clinical settings, thus ensuring treatment adherence, the

program yielded almost uniformly positive results on adolescents' behaviors (Henggeler & Schaeffer, 2016). A further example is Multidimensional family therapy (MDFT), which focuses on adolescents' already present substance use disorder, delinquency, and comorbid psychopathology, on parents' child-rearing skills and personal functioning, on family relations and communication, and on interactions between family members and key social systems. In a review of MDFT, it was concluded that adolescents' delinquency, externalizing behaviors, substance use, and co-existing problems were reduced after intervention, but with a small effect size ($d=.26$) (Van Der Pol et al., 2017). So, even though the intention of both PS and Comet parents' efforts was good, the adolescents would probably have benefited from indicated intervention with a more holistic approach. When considering that the individual during adolescence strives for autonomy from her/his parents, and that conflicts are therefore common, it is perhaps difficult to achieve alteration in the adolescent's behavior without individual treatment, such as therapy. Also, adolescents with severe problem load should perhaps be referred to treatment instead of prevention. However, as earlier implied, there have been difficulties in diagnosing females with cognitive problems, such as ADHD, and parents with antisocial girls may need support to claim treatment. Social services could pay attention to this problem and support those parents.

With all three studies' results in mind, it becomes evident that the interventions were not effective in reducing the adolescents' externalizing behavior, delinquency, alcohol and drug use, or psychosocial distress, and that perception of peers' drinking and ADHD acted as possible barriers for problem decrease. Considering that perception of peers' drinking strongly predicted hazardous alcohol use among both females and males, and that ADHD symptoms among females predicted future problem behaviors, the parents were assigned a very difficult task in trying to alter the adolescents' problem behaviors. As the theoretical holistic SEM implies (discussed above), it might be necessary to address several layers of context surrounding an adolescent to affect a negative development (Bronfenbrenner, 1977), implying that parent training would be insufficient for adolescents already on a negative pathway. With regard to the females' ADHD symptoms, research has found that females with ADHD have an increased risk of peer rejection (Diamantopoulou, Henricsson, & Rydell, 2005), which in other research has been suggested to increase the risk of problem behavior development (Kok et al., 2016). It is possible that peer resistance skills may be included in interventions for at-risk adolescents' problem behavior and hazardous alcohol use, preferably with the addition of relationship training for females with ADHD symptoms. Further, according to previous literature and in line with the gender paradox (Loeber & Keenan, 1994), females traditionally exhibit higher prevalence in internalizing problems and lower

prevalence in delinquency and externalizing behavior (Fernandez Castela & Kröner-Herwig, 2014; Ogden & Hagen, 2014; Wolff & Ollendick, 2006). But, they tend to display higher rates of comorbidity for other undesirable outcomes, and hence are more seriously affected than males, who have higher prevalence of antisocial behaviors but lower rates of comorbidity (Diamantopoulou et al., 2011; Loeber & Keenan, 1994; Tiet et al., 2001). In Studies 2 and 3 it became evident that the females in our sample had high problem levels in several domains, i.e., externalizing behavior predicted risk use of alcohol, and ADHD symptoms predicted externalizing behavior and delinquency. Also, it was clear that our sample had higher levels of externalizing behavior and psychosocial distress than general adolescent populations in Sweden and in the US (Broberg et al., 2001; Ridge et al., 2009), as shown in Studies 1 and 3. These results suggest that prior to intervention, adolescents must be thoroughly investigated for additional problems and its severity, besides what is going on within the family, such as dysfunctional relationships (Scott & Dadds, 2009). The adolescents would possibly also have benefited from thorough problem investigation and that addressed psychological domains, such as depression and anxiety. It should be mentioned that in Study 3, we studied females only, but the possibility that the males also exhibited ADHD symptoms should not be disregarded.

5.4 METHODOLOGICAL CONSIDERATIONS, LIMITATIONS & STRENGTHS

5.4.1 Methodological considerations

Both PS and Comet have been offered by social services since 2004 in several municipalities in Sweden. The purpose of the study was to test the programs as they were delivered by social services, within the course of regular work, led by their regular staff. The recruitment of parents, mainly by advertising in local newspapers, also mimicked the regular procedure of social services. The procedure differed from their regular procedure in one aspect, however. Since the parents were randomly assigned to either PS or Comet, and there were not enough parent groups within regular services, we had to arrange additional PS groups. Therefore, group leaders were hired from municipalities that were not participating in the study, to lead the groups in rented group rooms. Also, a few group leaders in Comet were hired to manage the influx of participating parents, but to a much lesser extent than in PS (see Table 3). There is a possibility that the group leaders' performance was somehow affected by this fact. For instance, hired staff could have felt more enthusiastic since they on an individual level had

the choice to participate or not, which regular staff had not, and therefore may have been more persuasive group leaders. If so, it could have effects on the parents' training and in turn on the adolescents' behaviors. Since we did not find any positive effects of the interventions, and because the lesser part of group leaders was hired, this did not appear to have biased the results.

5.4.1.1 Sample considerations

One of the possible complications with selective programs is that they require a considerable effort in order to reach the proper population and include them in the study. Such a procedure could probably be carried out with a more stringent method than in our recruitment. Our intention was to include parents and their at-risk adolescents, and there are multiple strategies that can be employed to ensure that an at-risk sample is reached. For instance, this can be accomplished by a strict recruitment procedure using inclusion criteria or screening tests, and a lower cut-off for adolescent problem behavior can be applied. Also, an upper cut-off value could be applied, as discussed above, to avoid an overly heavy problem load. Another strategy is that assessments of those included in the sample can be compared with norm data or other samples, to ensure that the targeted group is reached. Within this research project two procedures were applied: firstly, with a brief un-validated screening test used as an inclusion criterion, and secondly, comparisons of general and clinical populations' data and our study sample's data were conducted. Further, in Study 1, we compared our sample's mean Y-OQ[®]SR values to general population means and tested them for mean differences using *t*-tests. In one of the psychometric instruments, comparisons were made between the study population and US population. When comparing with a foreign sample it is recommended to consider possible cultural differences, which was not done in the Study 1, although it was mentioned in Studies 2 and 3. Examples of cultural variations can be translation of the questionnaire, differences between study populations, and data collection routines, but also the culturally inherited willingness, sincerity, or social desirability when answering questionnaires. Cross-cultural tests have been carried out to study cultural effect on CBCL and YSR, where it was found that there was an *ES* between 8-11% due to cultural variation (Crijnen, Achenbach, & Verhulst, 1997), which reflects that the CBCL and YSR provides a "robust" methodology for comparisons between diverse cultures. However, despite the uncertainty from these comparisons with the US mean values (Ridge et al., 2009), and also from the 22-year-old values from the Swedish validation study of YSR (Broberg et al., 2001), the results indicate that the present sample was an at-risk sample. Building on the above reasoning, it is possible that the problem behavior level of the group of adolescents in Study 1

was too high for the programs. However, in subsidiary analyses of subgroups with different problem levels on the YSR and Y-OQ®SR, no program effects occurred. These results demonstrated that the programs had no effects on subgroups with higher or lower problem levels (data not shown – with exception of tests on a clinical subgroup based on Y-OQ®SR in Study 1).

As mentioned above, the lack of an upper problem behavior limit for inclusion in the study could hamper the interpretation of the programs' effectiveness. This is exemplified in Studies 2 and 3, where it becomes evident that especially the female adolescents had high levels of alcohol use, externalizing behavior, and delinquency, as well as some of the psychosocial problems. At the planning stage, we were not attentive to the risk that an overly problem-loaded group might be included in the study. It was assumed that parents of adolescents with severe problems would seek other interventions. Given the difficulties to diagnose females' ADHD due to females tending to exhibit somewhat different symptoms, albeit within the spectrum: i.e., females demonstrate more inattentive problems compared to males who demonstrate more problems with impulsivity and hyperactivity (see Nussbaum, 2012, for review) it could reflect that these females' parents who entered the study in order to receive parent training, may have tried to get other support through child and adolescent psychiatry, without receiving any. Since we did not assess the complete ADHD spectrum we do not have the full picture of the females' degrees of ADHD, and it is possible that they exhibit only those symptoms that we assessed. However, it is possible that especially the females in the study had too severe problem-loads for the programs to decrease. Still given the variation within the sample, some decreasing effects would have been possible to detect if the programs had been effective. Since these intended effects did not occur, an interpretation may be that interventions are needed that directly target adolescents with already elevated problem behaviors, in order to alter their behavior, possibly in combination with a parent program.

Another fact that is worth mentioning is the lack of norms in regard to the group of adolescents aged 12-18 years for three of the psychometric instruments used. This means that we cannot be certain if the adolescents exhibited normal or high values of delinquency, illicit drug use, or reported high values of perception of delinquent friends. With regard to delinquency, it is easy to state that all delinquency is too much, since it departs from social norms and sometimes violates the law. However, some adolescent delinquency is to be expected since adolescents do test boundaries and limits in order to detach from parents and become autonomous individuals. Despite this, with norm values, it is possible to identify samples with elevated levels, and to study precursors and predictions or underlying

mechanisms in order to develop suitable interventions. So, even if we do not have access to a psychometric validation of the SRD, we compared our SRD results with a Swedish study evaluating the effects of MST using the SRD, among other instruments. The adolescents were aged 12-17 years ($M = 15.0$) and fulfilled diagnostic criteria of conduct disorder according to DSM-IV. In all, 67% had been arrested at least once prior to study inclusion. For the intervention group the mean value on SRD total scale was 44.6 ($SD = 41.7$), and for TAU it was 48.8 ($SD = 50.0$) (Sundell et al., 2008). In the sample in Study 1 the mean value was 31.6 ($SD = 34.71$), indicating that they had more moderate levels as compared to the MST sample and probably exhibited at-risk levels. In Study 2, however, which comprised only drinking adolescents, the females' mean values was 42.99 ($SD = 39.89$), and the males' 38.23 ($SD = 42.12$), showing that those who used alcohol were also more delinquent. The sample in Study 3, which consisted of females only the mean value was 36.76 ($SD = 37.69$). The above reasoning implies that the sample recruited for the three studies within this thesis had at-risk levels for several domains, and even clinical levels for some.

Related to the question of inclusion is also the chosen prevention level (i.e., selective). In our case, we applied the same inclusion requirements as social services apply in their ordinary procedure for recruitment to parent training to reach similar groups of parents as they usually do. As shown in Studies 1-3, the population's problem behavior levels were clearly above those of the normal population, but slightly below those of the clinical population, which might indicate that the group was hard to influence through parent training due to the adolescents' severe problems.

5.4.2 Limitations

A considerable possible limitation is that the participants in Study 1 filled out their baseline questionnaire after enrollment to intervention or control condition. Despite our awareness of the great advantages with pre-randomization baseline measurement, such measurement was not possible due to logistical reasons and because of the very short timeframe from study inclusion to first parent training session. It is possible that this procedure may have biased the parents' answers in particular, and maybe the two groups of parents that would receive parent training were more positive to the study. There were no significant differences between the groups at baseline, but it should be kept in mind that this procedure might have affected the parents.

In the effectiveness study, there is also a lack of assessment of each parent's presence at the parent sessions. The idea, when the study was at a planning stage, was to evaluate the programs in a real-world setting and mimic true conditions, i.e., it is common that during an eight-week long program parents will be absent from group sessions now and then. Since the programs were ineffective in this RCT, the lack of a measure of absence truly hampers the interpretation of dose-response effects. It is possible that the extent of received dose would have moderated the outcome.

Another limitation in Study 1 is the insufficient measure of program fidelity. This was assessed by group leaders' self-assessments of the extent to which the program contents were fulfilled. First of all, Comet group-leaders filled out a program fidelity questionnaire after every second parent group meeting, while the PS group leaders did this after every meeting. This means that we did not have adequate data to assess if the core components of the programs were fulfilled. If they were carried out to an insufficient extent, one could expect that vital parts of the efficient parental strategies were never expedited.

5.4.3 Strengths

The main strength in Study 1 is clinical applicability: it was carried out in real-world setting. That means that the results may be generalized to the population of at-risk adolescents that social services aim to address through Comet and PS within their regular work. Recruitment to parent training given under such circumstances can be difficult, in comparison to universal programs. For universal programs, it is common to reach parents and offer them parent training via their children's school, but when the intervention is designated for a certain adolescent problem level, an invitation to these adolescents' parents would entail a risk for stigmatization of the adolescents. Stigmatization entails a risk for further problem development, why other strategies to reach the intended at-risk population must be applied. For the present research project, the recruitment procedure was designed to be equivalent to that ordinarily used by social services. The recruitment was carried out mainly through advertisements, but also via recommendations by social services staff. Related to the participant inclusion process is the process to keep the participants throughout the project, for intervention and measurements. In this research project, there was an exemplary low attrition rate between baseline and follow-up measurements. Also, all studies are mainly based on psychometrically tested instruments, which increases the possibilities for comparisons to other studies, populations, and settings.

The fact that data were longitudinal because of the RCT, was also an advantage in Studies 2 and 3. Very often, “prediction” studies are in fact based on correlations observed within cross-sectional data, relying on theoretical arguments for inferring causality, whereas prediction research requires longitudinal designs. Our longitudinal designs strengthen both Studies 2 and 3. However, the benefits of studying risk factors within such a short time span as six months can be discussed. Even if there is a need for short-term predictions to understand how close in time a factor may influence problem behaviors, the time it takes for a risk factor to have an influence may sometimes be longer. Despite that, during adolescence a time period of six months can be meaningful and change in problem behaviors quite rapid, and therefore tests of short-term predictors are important as well.

5.5 FUTURE RESEARCH

Support for PS’s and Comet’s ability to prevent or decrease adolescents’ antisocial behavior in their current formats was not found in Study 1. There is, however, a lack of studies that have tested parent programs addressing this particular population of parents and at-risk adolescents, and drawing definite conclusions about these programs after this single effectiveness study would perhaps be premature. Future research should conduct studies on the programs’ effectiveness, but also gradually add evidence-based components, or strategies for identified predictors, and assess the effects of their inclusion. By including the left-out parts of SFP 10-14’s original structure, it would for instance be possible to assess if these parts would add something essential with regard to the effectiveness for at-risk Swedish adolescents. When conducting this research, a lower and an upper cut-off value for inclusion could be used to ensure that intended population is studied.

Related to the issue of problem levels comparisons between countries is the lack of Swedish norms for some of the psychometric instruments used in the studies within this thesis. Despite the suggestions by Crijnen et al. (1997), that there is evidence for cross-cultural comparisons, it may not be applicable for all types of instruments. For instance, drinking habits among adolescents differ between countries and cultures, and this may affect norm values in some cases. Because of this, it is important to carry out norm studies, and also to test psychometric properties of the measures. This area of research is crucial for prior clinical screening to enable assignation of the proper intervention for an individual.

As the results from Study 3 indicate, the females’ cognitive problems predicted delinquency and externalizing behaviors. It is possible that this would also be true for the males. It is also

possible that cognitive problems are an underlying factor for illicit drug use. Future research should explore the impact of both females' and males' ADHD symptoms as factors on externalizing behaviors, delinquency, illicit drug use, and hazardous alcohol use in longitudinal studies with longer follow-up periods than 6 months, preferably in larger samples.

Since parental strategies have been shown to play a significant role in universal and health promotion programs for younger children (Finney, 2008; Kazdin, 2003), it is likely that parenting style or practices would have an effect on the adolescents' outcome, too. Also, knowledge of parents' own health, and especially their mental health, would enable possible moderation analyses, to explore if parents' mental health influence parent programs' effect on adolescents' problem behaviors. This would be a contribution to both research and intervention developers, facilitating an understanding for which parental strategies that affect adolescents with at-risk behavior, and revealing if program effects are related to parental health. Longer follow-ups would enable to study parental self-efficacy as a mediator; parents in the programs may gain a sense of increased effectiveness in their parenting strategies, which confidence might lead to effects later on. Future research could study whether this might be the case

Moreover, researchers must, in collaboration with intervention developers, promptly design methods for how to reach and intervene with adolescents with elevated levels of problem behavior that have not yet been identified by social services or other authorities.

5.6 CONCLUSION

In many societies in the world, parent programs are offered at different stages of the child developmental path, to tackle or prevent different problems. Recently, other perspectives on parent programs emerged, addressing a salutogenic perspective, such as in the ABC program, described by Lindberg et al. (2013). When parents at an early stage are encouraged to practice positive strategies together with adequate support that enable a child's social, emotional and cognitive development to proceed, it may in the long perspective lead to healthy adults. For adolescents who already have developed problem behavior other measures need to be applied. In the present thesis I have outlined possible explanations for the development of problem behaviors, and how they may be managed through interventions. The two evaluated programs did not, however, succeed in decreasing the adolescents' problem behaviors. When exploring their other coincident problems it became evident that other types of intervention

should have been offered, since the task to intervene with social skills training, cognitive training, peer resistance skills training, when also altering their own strategies and behaviors, would probably have been insurmountable for most parents. Perception of peers' drinking should be considered in interventions for decreasing hazardous alcohol use, and that females with risk use may have externalizing problems as well. Lastly, females with high levels of externalizing problems and delinquency may exhibit ADHD symptoms, and a thorough investigation of co-existing problems might be crucial to hinder a negative developmental pathway. From a clinical point of view, it can be concluded that these programs in their current format were not suitable for this population of at-risk adolescents. Clearly, interventions for at-risk adolescents need to improve, as well as strategies to reach these adolescents.

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Appendix A

Table 7. Subsidiary analyses, controlling for the outcomes' (HED and risk use of alcohol) baseline values

	Female HED				Male HED				Female risk use				Male risk use			
	<i>OR</i>	<i>P</i>	<i>CI</i>	<i>R_N²</i>	<i>OR</i>	<i>P</i>	<i>CI</i>	<i>R_N²</i>	<i>OR</i>	<i>P</i>	<i>CI</i>	<i>R_N²</i>	<i>OR</i>	<i>P</i>	<i>CI</i>	<i>R_N²</i>
				0.38				0.43				0.52				0.35
Externalizing behavior									6.88	.009	1.00, 1.39					
Peers' drinking	5.75	.016	0.03, 1.13		8.69	.003	0.02, 0.77		2.75	.097	0.06, 1.86		3.66	.056	0.06, 1.51	
HED at baseline	7.62	.006	1.07, 7.93		4.37	.037	0.82, 7.06									
Risk use at baseline									9.02	< .000	1.04, 1.60		2.81	.094	0.93, 1.39	