ANTISOCIAL BEHAVIORS:
COURSES AND CONSEQUENCES FROM TODDLERHOOD TO LATE ADOLESCENCE

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Antisocial Behaviors:
Courses and Consequences from Toddlerhood to Late Adolescence

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CHAPTER 1

GENERAL INTRODUCTION

Antisocial behaviors are socially unacceptable or threatening behaviors such as physical aggression and theft, which negatively affect other people or the community in general. However, antisocial behaviors may impose adverse effects on the individual’s future well-being as well, due to their continuing adversity and interactions with the environment. For instance, antisocial children and youths are shown to have increased risk of substance abuse (e.g., Hawkins, Catalano, & Miller, 1992; Lynskey & Fergusson, 1995), engaging in risky sexual behaviors (e.g., Bennett & Bauman, 2000; Woodward & Fergusson, 1999) and serious criminal acts (e.g., Broidy et al., 2003; Nagin & Tremblay, 1999), and having poor educational qualifications (e.g., Fergusson & Horwood, 1998; French & Conrad, 2001) in late adolescence. Thus, antisocial behaviors constitute a serious individual and societal problem that for the sake of community mental health needs attention from the field of developmental psychopathology to address its development and outcomes, and to identify modifiable factors affecting its course.

To understand the course of antisocial behavior and its adverse outcomes in adolescence a developmental perspective is essential. This perspective focuses on change of behavior problems over time, and individual and contextual characteristics that may influence their course. The presence of positive child or family/social resources is suggested to increase chances of successful adaptation, whereas lack of these resources increase chances of a problematric development (Cicchetti & Cohen, 1995). In addition, to understand how adverse outcomes arise from problematic development, antisocial behaviors should be viewed as a construct comprised of different subtypes of antisocial behavior that may be differentially linked to these outcomes. The studies reported in this thesis aimed to address several unsolved issues in the developmental literature regarding antisocial behavior, including issues of co-occurrence, continuity and change, and adverse outcomes. Specifically, they aimed at questions regarding the role of life stress in the continuity of and transaction between behavioral and emotional problems over the course of early childhood to late adolescence, understanding decreasing antisocial behavior in adolescence, as well as the disentanglement of subtypes of externalizing behavior - and their course and mutual influence over time - leading to poor outcomes in late adolescence. Before we move on to the specific foci of this thesis, several issues concerning the variety in expressions of antisocial behavior and its development will be discussed.
Forms of antisocial behavior

As antisocial behavior comprises of quite a variety of behaviors it is often divided in subcategories. Several distinctions in antisocial behavior have been suggested. (Note that in the literature antisocial behavior is often also referred to as externalizing behavior, behavior problems or conduct problems. These terms will be used interchangeably throughout this thesis.) First, a rather broad distinction is made in Achenbach’s Child Behavior Checklist (CBCL; Achenbach, 1991; Achenbach & Rescorla, 2001) which differentiates externalizing problems in serious rule-breaking behaviors and aggressive behaviors. Specifically, the broad-band Externalizing Behavior scale consists of a subscale including delinquent or rule-breaking behaviors (e.g., vandalism and stealing) and an aggressive subscale which is comprised of both physical aggressive and oppositional behaviors (e.g., fighting and stubbornness). In the general population delinquent behavior typically increases in adolescence, whereas aggressive behavior tends to decrease as children grow up (Bongers, Koot, van der Ende, & Verhulst, 2003).

Another distinction has been made in the DSM-IV handbook of differential diagnoses (APA, 1994), widely used by clinicians, which is based on severity of antisocial symptoms, with Oppositional Defiant Disorder (ODD) consisting of difficult behavior and social problems, and Conduct Disorder (CD) representing a more severe pattern of aggressive and delinquent behaviors such as fighting, vandalism and theft. Research has indicated that ODD often precedes the more serious diagnosis of CD (Loeber, Green, Keenan, & Lahey, 1995).

Finally, Frick and colleagues (Frick et al., 1993) proposed a more specific, empirically derived grouping of antisocial behaviors, which may particularly be of assistance in describing true development of antisocial behavior, in addition to understanding its associated outcomes. The authors analyzed the results of 60 factor analyses of more than 40 studies on antisocial behavior in childhood and adolescence, and showed that symptoms of conduct problems vary along two dimensions. One dimension runs from open and obvious behaviors to more hidden and secret behaviors (i.e., overt vs. covert), while the other runs from destructive to nondestructive behaviors. Together, these dimensions yield a quadrant of four subtypes of antisocial behaviors: the overt/destructive type includes aggressive behaviors such as fighting, physically attacking and threatening, whereas the overt/nondestructive type is oppositional behavior including, arguing, disobedience and temper tantrums. The covert/destructive type is labeled property violations including cruel to animals, stealing and vandalism, whereas the covert/nondestructive type, labeled status violations, include authority conflicting behaviors such as running away from home, swearing and truancy. Depending on the focus of study, either the Achenbach distinction of externalizing behavior (1991; 2001) or the four subtypes by Frick (1993) will be used throughout this thesis.
Development of antisocial behavior

A number of theories on development of antisocial behavior have been influential in the literature (Loeber et al., 1993; Moffitt, 1993; Patterson, DeBaryshe, & Ramsey, 1989). Each of them takes a different angle on antisocial development and will be exerted for different purposes in this thesis. To start, Loeber and colleagues (1993) formulated the three pathway model, which is a variable-based theory describing boys’ disruptive problem behaviors escalating into delinquency over time. This model posits that with increasing age, the severity of conduct problems increases, escalating for a minority of boys into serious forms of delinquency in adolescence. In the first and common authority conflict pathway, antisocial problems are proposed to manifest themselves as early oppositional behaviors (stubborn, defiance), which are followed by authority conflicts such as, truancy, and running away from home (status violations). A second, covert pathway consists of property violations like lying or cheating, followed by fire setting, vandalism, and eventually serious theft, such as fraud, break and entry. The third, overt pathway is postulated to consist of minor aggression, followed by physical fighting, and ending with physical violence, such as rape, and attack. According to this theory, the early and common authority conflict path may trigger engagement in both the overt and covert antisocial path. Furthermore, escalation in the overt antisocial behavior path is suggested to enhance covert antisocial development, whereas escalation in the covert antisocial path is less associated to overt antisocial development.

Although Loeber’s three pathways have not been tested as an entire model, some research findings are suggestive of an authority conflict path consisting of childhood oppositional problems that precedes more serious conduct problems in adolescence (Loeber et al., 1995). Furthermore, the behaviors in each of the pathways are similar to the four subtypes of antisocial behavior as proposed by Frick et al. (1993). Longitudinal studies demonstrated that these subtypes have distinct developmental trajectories from childhood to adolescence, suggesting these forms of antisocial behaviors are indeed distinct from one another. For instance, Bongers and colleagues (Bongers, Koot, van der Ende, & Verhulst, 2004), in addition to Lahey (Lahey et al., 2000), found that both aggressive and oppositional behavior were elevated in childhood but decreased to lower levels in adolescence, with continuously higher levels of oppositional than aggressive behavior. Status violations increased in adolescence, whereas somewhat mixed results have been reported for property violations with either stable (low) levels over time or increasing levels in adolescence.

Other theories proposed a person-centered approach to antisocial development (Patterson et al., 1989; Patterson & Yoerger, 1997; Moffitt, 1993). For instance, Patterson proposed the coercion model (Patterson et al., 1989; Patterson & Yoerger, 1997) in which an early onset of antisocial behavior in children is suggested to be unintentionally reinforced by inadequate
parenting styles and poor parental monitoring. Reinforcement of noncompliant behavior occurs when parents fail to use a consistent and effective strategy when the child responds negatively to requests. As a consequence, a negative interaction pattern between the child and parent develops and further triggers antisocial behaviors which are subsequently extended to the school setting. The next step in antisocial development is failure in school and association with deviant peer groups, eventually leading to chronic offending. A second, late onset path is theorized to start in early to middle adolescence and is primarily reinforced by deviant peers and to a lesser extent by the family context.

Similar to Patterson’s model, the dual taxonomy model proposed by Moffitt (1993) includes two developmental courses of antisocial behavior differing in timing of onset. A rare life-course persistent path (LCP) is characterized by an early onset of behavioral problems which continues and worsens in severity throughout childhood and adolescence and even adulthood. LCP individuals are suggested to suffer from subtle neuro-cognitive impairments manifested through difficult temperament, hyperactivity, or cognitive deficits, which put them at risk for uncontrolled, impulsive behaviors reinforcing antisocial behavior. In addition, the experience of adverse family and social circumstances exacerbates antisocial development in these individuals. Second, an adolescent-limited (AL) path is characterized by a pubertal onset of antisocial behavior, not likely to be continued beyond the transition to adulthood. The AL type is suggested to be much more common than the LCP path. That is, in the pubertal years individuals experience a gap between their biological maturation and access to mature privileges and responsibilities (‘maturity gap’). Adolescents subsequently strive for autonomy from their parents (or other authorities) by mimicking the delinquent and ‘independent’ lifestyles of their deviant peers. However, as these adolescents had normal child developments, they succeed to desist from crime as they reach real maturity. Thus, AL offenders’ backgrounds are considered to be normative and not characterized by pathology and environmental adversity like in LCP offenders.

Results from empirical studies indeed support the distinction between childhood and adolescent onset trajectories of antisocial behavior that was suggested by Moffitt (1993) and Patterson (1989) (Broidy et al., 2003; Fergusson & Horwood, 2002; van Lier, Wanner, & Vitaro, 2007a; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Moffitt & Caspi, 2001; Moffitt, Caspi, Harrington, & Milne, 2002). Most studies report that a minority of the youths (approximately 5 - 10%) engage in persistent problems across the childhood and adolescence period, whereas a larger group (approximately 30%) shows an adolescent limited path. Further, Moffitt and Caspi (2001) found evidence that the LCP path, but not the AL path, was associated with neurocognitive problems, ADHD symptoms, difficult temperament, peer rejection, and exposure to poor parenting. In addition, a study by van Lier et al. (2007a) showed that the childhood onset path was maintained by the child’s tendency to associate with
increasingly deviant friends. The increase of antisocial behaviors in the adolescent onset path, however, was preceded by affiliation with deviant friends, confirming the hypothesis of a more active role of deviant peer affiliations in the development of antisocial behavior in adolescence than in the early onset path.

Influences on antisocial development

Development is suggested to be the result of a continuous interplay between individual characteristics and influences from the environment (Rutter et al., 1997). The variety of influences on adjustment can be organized according Bronfenbrenner’s ecological system (Bronfenbrenner, 1986). This model assumes that (risk) factors of (mal) adjustment occur in a variety of contexts of functioning, differing in distance to the individual. At the most proximal, individual level, characteristics such as difficult temperament, neurocognitive impairments, and ADHD symptoms have been shown to predict antisocial development (Moffitt & Caspi, 2001; Moffitt et al., 1996). At the micro-system level, which includes children’s immediate environment such as the family and the peer group, factors such as negative parent-child relationship, harsh parenting and deviant peer affiliations have often been shown to be related to antisocial problems (Atzaba-Poria, Pike, & Deater-Deckard, 2004; Dishion, 2000; Bender et al., 2007). At the more distal exo-system level, socio-economic status and neighborhood quality have been reported to be associated with antisocial behavior (Ingoldsby et al., 2006; Stouthamer-Loeber, Loeber, Wei, Farrington, & Wikstrom, 2002). Various factors from these domains will be considered as potential influences on antisocial development throughout this thesis.

Foci of this thesis

Focus 1: Continuity in externalizing problems and transactions to internalizing problems

Longitudinal studies have demonstrated that externalizing behavior problems are fairly persistent over the course of development from childhood to adolescence (Dekovic, Buist, & Reitz, 2004; Heijmens Visser, van der, Koot, & Verhulst, 2000; Hofstra, van der Ende, & Verhulst, 2000). For instance, Hofstra et al. (2000) found stability coefficients in the .30 range between childhood aggressive behaviors and externalizing behaviors 14 years later, in young adulthood. According to the social selection hypothesis (Conger, Patterson, & Ge, 1995), negative environmental conditions, which may generally be indexed by negative life events, may cause emotional or social difficulties which increase the risk for both externalizing and internalizing problems. In concordance with this hypothesis, many studies have shown associations between the experience of life stress and later antisocial behavior (see review by Grant, Compas, Thurm, McMahon, & Gipson, 2004). However, recent longitudinal findings
by Kim and colleagues (Kim, Conger, Elder, & Lorenz, 2003) showed that during the adolescence years externalizing problems evoke stressful events which in turn increase levels of externalizing symptoms. These findings suggest, in line with the reciprocity hypothesis (Compas, Wagner, Slavin, & Vannatta, 1986), an ongoing, mutual reinforcement of life stress and behavioral maladjustment over time. Finally, it is well known that externalizing and internalizing problems tend to co-occur (Angold & Costello, 1993; Beyers & Loeber, 2003; Lavigne et al., 2001; Wiesner & Kim, 2006). However, the nature of this association is still unclear, as it may be the result of, for example, child and adolescent vulnerabilities underlying both types of psychopathology, a spurious factor influencing both, or the effect of these problems mutually influencing each other over time. In Chapter 2 we aim to extend on the findings by Kim et al. (2003) by investigating whether stressful events truly contribute to the continuity of externalizing problems by taking development of internalizing symptoms into account. In addition, it is examined whether this process sets on from early childhood already, as well as whether life stress in fact contributes to the transaction between externalizing and internalizing problems over time, and vice versa.

Focus 2: Change in antisocial development: decreasing problems

Despite the substantial stability in antisocial behavior over the course of childhood and adolescence, children may also change in their rank order of behavior problems with age. That is, children may have lower (or in contrast, higher) antisocial behavior scores in adolescence than expected based on their childhood levels of behavior problems, such as aggression. Previous research extensively focused on studying why children grow into or persist in antisocial problems (e.g., Ary, Duncan, Duncan, & Hops, 1999; Fergusson & Horwood, 2002; Hawkins et al., 1998; Moffitt et al., 1996; Stouthamer-Loeber et al., 2002). However, knowledge about factors that are associated with better outcomes in adolescence than expected (i.e., lower problem levels) may be more fruitful for intervention and even prevention purposes, compared to the findings in risk research, as it identifies variables that are directly associated with the desired outcome of intervention (i.e., reductions in antisocial behavior). Therefore, the current study will focus on understanding decreasing levels of behavior problems. This will be done in two different ways. First, we will examine which children show the largest decreases in behavior problems in adolescence (Chapter 3). We will investigate which factors from the individual, family and social context in childhood predict lower levels of antisocial behavior in adolescence than expected, based on the childhood level of aggressiveness.

Second, we will examine how children who desist from antisocial behavior in adolescence can be discriminated in (early) childhood from children with persistent antisocial courses (Chapter 4). In contrast to the many studies aimed at identifying distinct predictors of early/persistent and increasing courses of antisocial problems (e.g., van Lier et al., 2007a; Moffitt & Caspi,
2001; Nagin & Tremblay, 2001; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998), little attention has been paid to discriminating children with persistent high problems from children with initial high but desisting behavior problems. This is surprising, as research findings indicate that approximately half of all children who exhibit high level behavior problems in childhood do ultimately not develop into high persistent antisocial adolescents (e.g., Moffitt et al., 1996; Moffitt et al., 2002; Nagin & Tremblay, 1999). Knowing which children are, and which are not at risk of a persistent antisocial development, is essential as the early and valid identification of those children at true risk is critical for prevention programs to be both effective and efficient.

Focus 3: Adverse adolescent outcomes of externalizing development

Many longitudinal studies have reported that children and youth who exhibit externalizing behavior problems have increased risk of a wide range of adverse adolescent outcomes including substance use problems (Biederman et al., 1997; Fergusson, Horwood, & Ridder, 2005; Hawkins et al., 1992; Lysney & Fergusson, 1995), engagement in risky sexual behavior (e.g., teenage pregnancy, sexually transmitted diseases) (Bennett & Bauman, 2000; Fergusson & Woodward, 2000; Woodward & Fergusson, 1999), engagement in, sometimes serious and violent, delinquency (Broidy et al., 2003; Fergusson et al., 2005; Moffitt et al., 2002; Nagin & Tremblay, 1999), and dropping out of school (Fergusson & Horwood, 1998; Fergusson & Woodward, 2000; French & Conrad, 2001; Newcomb et al., 2002).

It is yet uncertain however, which of the different forms of externalizing behavior in fact contribute to these associations. That is, research has demonstrated that subtypes of externalizing problems are differently linked to underlying personal characteristics. For instance, high level physical aggression across adolescence is found to be linked with low neurocognitive functioning (verbal IQ, executive function) whereas theft is associated with higher neurocognitive functioning (Barker et al., 2007). This suggests that specific externalizing behaviors (e.g. aggressive versus non-aggressive types) are differentially predictive of a diversity of adverse adolescent outcomes, as these different types come along with different tendencies in daily functioning. Results of two studies show evidence for differential predictive value of specific forms of externalizing behavior (Broidy et al., 2003; Nagin & Tremblay, 1999). These studies demonstrated that in predicting delinquency in adolescence, physical aggression was a better predictor of delinquency than oppositional problems when trajectories of both physical aggression and opposition were considered simultaneously.

Given the potential value of differentiating between subtypes of externalizing problems for prevention and intervention purposes, this thesis aims to add to the understanding of true associations between different forms of externalizing problems and maladaptive outcomes in
adolescence. This will be done in two alternative ways. First, we study the link between subtypes of externalizing problems and late adolescent health risk behaviors (i.e., substance use, risky sexual behavior), while accounting for the co-occurrence of and developmental courses in all subtypes with age (Chapter 5). Secondly, based on Loeber’s pathway model, we aim to detect developmental pathways leading to late adolescent societal failure (i.e., delinquency and academic underachievement), by taking continuity within subtypes of externalizing behavior as well as the transactional nature between subtypes into account (Chapter 6).

Research aims of this thesis

This thesis' general goal is to understand the course of antisocial behavior and its adverse adolescent outcomes in a general sample of males and females followed from age 2/3 to 18 years. Specifically, the aims were to examine:

1. Whether stressful events contribute to the ongoing development of and co-occurrence between behavioral and emotional problems from early childhood to late adolescence;
2. Which child, family and social context factors predict decreasing (i.e., lower than expected) levels of externalizing problems in adolescence;
3. Whether children with high childhood but decreasing levels of antisocial behavior in adolescence can be discriminated in childhood from children with early and persistent antisocial problems;
4. Which child/adolescent subtypes of externalizing behavior contribute to late adolescent adverse outcomes including substance use, risky sexual behavior, delinquency and academic underachievement.

Design

This thesis reports the results of the third follow-up (2005) of a sample including of 420 Dutch children aged 2/3 years drawn from the general population in 1989 (Koot, 1993; Koot & Verhulst, 1991; Koot, Van Den Oord, Verhulst, & Boomsma, 1997). The number of respondents at each time of assessment for each informant is given in Table 1.1. Table 1.2 presents all measures at each assessment that were included in the current analyses.

Respondents at Time 1, 2 and 3

At Time 1 (1989) the sample consisted of 420 2 and 3 years aged children (mean age = 2.58 years; SD = 7.3 months; 208 males, 212 females). At the first follow-up (Time 2, 1991) usable parent information was obtained for 396 of the children at Time 1 (mean age = 4.83 years; SD = 8.4 months; 201 males, 195 females), and usable teacher information was obtained for 342
of the children at Time 1. At the second follow-up, in 1997 (Time 3), usable information was obtained for 358 of the children participating at Time 1 (mean age = 10.46 years; SD = 7.2 months; 180 males, 178 females). Usable teacher-reports were obtained for 294 children who participated at Time 1, and of 295 children self-reported information was obtained.

Table 1.1. Respondents at Each Time of Assessment and Percentage of Original Time 1 Sample

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
<th>Time 4</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Age 2/3</td>
<td>Age 4/5</td>
<td>Age 10/11</td>
<td>Age 18/19</td>
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<tr>
<td>N</td>
<td>420</td>
<td>396</td>
<td>358</td>
<td>324</td>
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<tr>
<td>N (%)</td>
<td>95</td>
<td>81</td>
<td>70</td>
<td>77</td>
</tr>
<tr>
<td>Parents</td>
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<td></td>
</tr>
<tr>
<td>Teachers</td>
<td>-</td>
<td>342</td>
<td>294</td>
<td>-</td>
</tr>
<tr>
<td>Children/Adolescents</td>
<td>-</td>
<td>-</td>
<td>295</td>
<td>311</td>
</tr>
<tr>
<td>N (%)</td>
<td></td>
<td></td>
<td>70</td>
<td>74</td>
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</tbody>
</table>

Respondents at Time 4

In 2005, all 420 respondents of the original sample at Time 1 were invited to participate in the third follow-up of the study. Adolescents were contacted by phone to obtain initial consent (in addition to written consent) to sending them a package of questionnaires or the webpage with online questionnaires. In addition to filling out questionnaires, adolescents were asked to participate in an interview by phone. Self-reports were obtained for 311 adolescents (mean age = 18.21 years; SD = 8.6 months; 152 males, 159 females), 247 of them also participated in the interview. Forty respondents were untraceable (no address information, emigrated) and two respondents died between the third and fourth assessment. Forty-five adolescents refused participation and 22 ultimately did not participate despite their consent.

Parents were only invited to the third follow-up study when their children had given us permission to do so. After obtaining initial consent by the parents by phone (in addition to written consent), parents could choose between a package of paper and pencil questionnaires, or online questionnaires. Parent-reports were obtained of 324 children (mean age = 18.19 years; SD = 8.4 months; 165 males, 159 females). Thirty-seven parents refused or did not get permission from their children to participate. Forty-one parents were unreachable, and children of 2 parents died between the third and fourth assessment. Finally, 16 parents who initially gave their consent to participate never returned their questionnaires. The majority of the adolescent and parent-reports were obtained between January and November 2005, the majority of the interviews with adolescents were conducted between May 2005 and February 2006.
### Table 1.2. Measures Used at Each Time of Assessment

<table>
<thead>
<tr>
<th>Measures</th>
<th>Time 1</th>
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<th>Time 4</th>
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<td><strong>Parent-reports</strong></td>
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<td>CBCL/4-18</td>
<td>CBCL/4-18</td>
<td>CBCL/6-18</td>
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<td>MCDI</td>
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<td>DOTS-R</td>
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<td>-</td>
<td>-</td>
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<tr>
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<td>Substance Use</td>
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<tr>
<td>Social Support</td>
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*Note.* CBCL/2-3 = Child Behavior Checklist for 2-3 year olds; CBCL/4-18 = Child Behavior Checklist for 4-18 year olds; CBCL/6-18 = Child Behavior Checklist for 6-18 year olds; LSI = Language Screening Instrument; MCDI = Minnesota Child Development Inventory; DOTS-R = Dimensions of Temperament Survey-Revised; LEQ = Life Events Questionnaire; FAD = Family Adversity Device; NPSI = Nijmegen Parenting Stress Index; YASR = Young Adult Self-Report; NOSP = Nijmegen Observation Scale for Preschoolers; TRF = Teacher’s Report Form; RCP = Revised Class Play; YSR = Youth Self-Report; WHO = World Health Organization; ISRD = International Self-Report Delinquency Study; SLES = Stressful Life Events Schedule; SPPC = Self-Perception Profile for Children; SSSC = Social Support Scale for Children.
Structure of this thesis

In Chapter 2, we examined whether stressful events account for the continuity of both externalizing and internalizing problems, as well as the cross-influence between externalizing and internalizing problems from age 3 to 18 years using a cross-lagged autoregressive model. Chapter 3 investigated which of a variety of promotive factors (i.e., positive resources, absent negative resources) in late childhood are associated to better than expected (i.e., lower) externalizing levels in adolescence. In Chapter 4, we examined (early) childhood factors that discriminate children with high level but decreasing behavior problems in adolescence from children who show early and persistent levels of antisocial problems. Based on Moffitt’s theory we included factors reflecting vulnerability as well as personal and environmental risk and protective resources. In Chapter 5, we disentangled which child/adolescent forms of externalizing behavior account for late adolescent risky sexual behavior and substance use. Both the level and developmental change in externalizing behaviors were used as predictors of the poor outcomes. Chapter 6 identifies developmental pathways of behavior problems leading to delinquency and academic underachievement in late adolescence. We used cross-lagged (auto-)regressive models including transactions between different forms of behavior problems in addition to continuity within behavior problems. In Chapter 7, the main findings and conclusions of the five studies in this thesis are discussed, as well as implications for research and practice, and recommendations for future research.
CHAPTER 2

THE ROLE OF STRESSFUL EVENTS IN THE
DEVELOPMENT OF BEHAVIORAL AND
EMOTIONAL PROBLEMS FROM EARLY
CHILDHOOD TO LATE ADOLESCENCE

Maartje Timmermans, Pol A. C. van Lier, and Hans M. Koot, submitted for publication.

Abstract

There is growing evidence on the importance of experiences of stressful events in the development of psychopathology. This study aimed to investigate the role of stressful events in the continuity of internalizing and externalizing problems, as well the cross-influence of these problems from early childhood to late adolescence. Data came from a general population sample of 396 children followed from age 3 to 18 years. Parent-ratings of internalizing and externalizing problems at ages 3, 5, 10 and 18 years were used. Parents also reported on the presence of stressful events between ages 3 to 5 years, and 5 to 10 years. Adolescent reports on stressful events over the ages 10 to 18 years were used. Structural equation models were used to disentangle/analyze the role of stressful events in the development of externalizing and internalizing problems. From age 3 years onwards externalizing symptoms predicted experiences of stressful events. In turn, these experiences predicted later externalizing problems. Stressful events also explained part of the continuity of internalizing problems from age 10 years onwards, but not during childhood. From childhood onwards, cross-influences from externalizing problems to subsequent internalizing problems were found to run through stressful events. Only in adolescence cross-influences from internalizing problems to externalizing problems were found, again via stressful events. From childhood onwards to late adolescence, stressful events play a significant role in both the continuity and the co-occurrence of externalizing and internalizing problems. Theoretical and methodological implications of these findings are discussed.
Introduction

Many studies have reported associations between stressful events and child/adolescent behavioral and emotional problems (e.g., Berden, Althaus, & Verhulst, 1990; Grant et al., 2004; Morales & Guerra, 2006; Patton, Coffey, Posterino, Carlin, & Bowes, 2003; Swearingen & Cohen, 1985; Williamson, Birmaher, Anderson, Alshabbout, & Ryan, 1995). However, there is still debate about the true role of stressful events in the development of psychopathology. Previously researchers argued that life stress truly influences the development of psychopathology (Berden et al., 1990; Grant et al., 2004). In contrast, others regarded experiences of stressful events as the consequence of already existing psychopathology, and stressful events to not influence the development of psychopathology (Swearingen & Cohen, 1985; Williamson et al., 1995). However, there is now a growing consensus that stressful events and psychopathology mutually influence each other over time (Kim et al., 2003; Patton et al., 2003; Sandler, Tein, & West, 1994). That is, experiences of stressful events are indeed more observed among those who already had elevated levels of psychopathology. However, once such stressful events are experienced, this does add uniquely to the explanation of the continuation of psychopathology. In support of this, Kim et al. (2003) showed in a 5-wave longitudinal study (age 12 to age 18) that externalizing and internalizing symptoms predicted future experiences of stressful events. In turn, these experiences of stressful events predicted future increases in behavioral and emotional problems.

Thus, there is growing evidence that experiences of stressful life events – in part – account for increases in and therefore the continuity of both behavioral and emotional problems. However, several important issues are yet unsolved. The first issue concerns the question whether stressful events influence the continuity of both externalizing and internalizing problems. Note that, studies that explored the influence of stressful events on the development of behavioral and emotional problems addressed those outcomes separately. However, emotional and behavioral adjustment problems are not separate problems, but rather are likely to co-occur (Angold & Costello, 1993; Beyers & Loeber, 2003; Keenan, Loeber, & Green, 1999; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002; Lavigne et al., 2001; Wiesner & Kim, 2006). To illustrate, co-morbidity rates of Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) in children and adolescents with major depressive disorder range from 21% to 83% in clinical and community samples (Angold & Costello, 1993). Thus, when studying what the role of life events is in the development of both externalizing and internalizing problems, the co-occurrence between them should not be ignored – which, unfortunately, has been done yet. For instance, in the important study by Kim et al. (2003) the role of stressful life events was tested for externalizing and internalizing problems separately,
which may have led to the unwarranted conclusion that stressful events are of importance in the continuity of both externalizing and internalizing problems.

Second, apart from influencing the continuity of externalizing and internalizing problems themselves, stressful events may also play a role in the cross-influence between externalizing and internalizing problems. This latter part has, to our knowledge, not been tested previously. However, we know that externalizing and internalizing problems are linked across time, in that externalizing problems may lead to the onset of internalizing problems (Gilliom & Shaw, 2004; Lahey et al., 2002; Mesman, Bongers, & Koot, 2001) and that internalizing problems influence the development of externalizing behaviors (Beyers & Loeber, 2003). The so-called failure model, developed by Capaldi and Patterson (Capaldi, 1991; Capaldi, 1992; Capaldi & Stoolmiller, 1999; Patterson, Reid, & Dishion, 1992) suggests that stressful events may partly account for this cross-influence. These authors suggested that the influence from externalizing problems to the onset of internalizing problems occurs through failure experiences. Specifically, behavioral problems are expected to lead to stressful experiences such as interpersonal conflicts, lack of support and social rejection, which subsequently trigger feelings of failure, and which ultimately lead to depression.

Results from a study by Rowe, Maughan and Eley (2006) indeed showed that stressful life events stood in between the link of delinquency and oppositional behavior to depressed mood. Note that the Capaldi and Patterson model particularly refers to failure experiences that are evoked directly by externalizing behaviors, such as conflicts with teachers or rejection by peers as a result of children’s aggressive attitude. However, in addition to this, maladjusted youths are found to be unproportionately exposed to other, less direct, stressful circumstances such as multiple caretaker changes, father’s history of conviction, and a negative parent-child relationship (Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001). Moreover, Capaldi and Patterson’s failure model further posits that as children progress to later stages of development, depressive feelings which were initially triggered by externalizing problems and stress may in turn start to predict elevated levels of antisocial behaviors. Although this proposition has not been clearly demonstrated yet, Wiesner and Kim (2006) recently showed in their longitudinal study that stressful life events were correlated to co-occurring pathways of delinquent behaviors and depressive symptoms in mid-adolescence. Thus, it seems clear from the previous that in order to study the role of stressful events on externalizing and internalizing problems, both should be considered simultaneously as stressful events are expected to play a role in both the continuity within, and the cross-influence between behavioral and emotional problems. This study’s first aim is therefore to test the contribution of stressful events in both the continuity and cross-influence between externalizing and internalizing problems in a general population sample.
A third issue that needs clarification is the role of stressful events in the development of behavioral and emotional problems during the childhood period. From the longitudinal study by Kim and colleagues (2003), we know that experiences of stressful events explained part of the continuity of behavioral and emotional problems during adolescence. However, findings of effects of stressful events on psychopathology during childhood are limited. One study which focused on childhood did report a predictive association from stressful life events to elevated symptoms of overall psychopathology two years later (e.g., Berden et al., 1990). However, to our knowledge no studies examined the true role of stressful events on both externalizing and internalizing problems covering both the childhood as well as the adolescent years. Thus, our third aim is to add to this previous work by testing the role of stressful events to the continuity of, and cross-influence between externalizing and internalizing problems from the age of 3 years on to age 18 years. Finally, although previous research has indicated that responses to stressful events are very similar in both sexes (Gore, Aseltine, & Colton, 1992; Kim et al., 2003; Wiesner & Kim, 2006), we aim to test sex differences in the role of stressful events in psychopathology development, as in childhood boys tend to show higher levels of externalizing problems, whereas in adolescence girls show more rapid increases in internalizing symptomatology (e.g., Bongers et al., 2003).

To summarize, our objective was to investigate the role of stressful events in the continuity of, and cross-influence between behavioral and emotional problems in a general population sample of males and females followed from early childhood to late adolescence. Based on the findings by Kim et al. (2003) in adolescence, we expected to find transactional links between stressful events and externalizing and internalizing problems. That is, experiences of stressful events are predicted by prior externalizing and internalizing problems, but once experienced, stressful events explain – in part – why individuals continue in having externalizing or internalizing problems. We also hypothesized that in accordance with the failure model (Capaldi, 1991; 1992; Capaldi & Stoolmiller, 1999; Patterson et al., 1992) the cross-influence between externalizing and internalizing problems occurs through the experience of stressful events. Finally, we expected that stressful events play a role in the development of, and cross-influence between behavioral and emotional problems from childhood onwards; in addition to that effects of stressful events were expected to be equal in both sexes.

Methods

Sample
The sample is described in detail elsewhere (Mesman & Koot, 2000; Timmermans, van Lier, & Koot, 2008). In short, the original sample of 420 children was taken randomly from the Dutch province of Zuid-Holland, using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). Data were collected using multiple
informants when children were 3 (1989), 5 (1991), 10 (1997) and 18 years old (2005). Written informed consent was obtained from parents at the age 3, 5, 10 and 18 assessments and from adolescents at the age 18 assessment. Parent data was available for 420 children at the first assessment (mean age = 2.58 years, SD = 7.3 months), for 397 children (95%) at the second assessment (mean age = 4.83 years, SD = 8.4 months), for 358 children (85%) at the third assessment (mean age = 10.46 years, SD = 7.2 months) and for 324 adolescents (77%) at the forth assessment (mean age = 18.19 years; SD = 8.4 months). At the latter assessment, adolescent interviews were available for 247 participants.

**Instruments**

*Stressful life events*

At age 5 and 10 years parents completed the Life-Events Questionnaire (LEQ; Berden et al., 1990), which assesses 32 potentially stressful events, such as parental divorce, death of a family member, and long-term hospitalization. At age 10 a short form of the LEQ was used including 12 items. The items have a yes-no response format to indicate whether an event had occurred during the period between the age 3 and 5, and the age 5 and 10 assessment. The item scores (0, 1) are summed into a total stressful life events score.

At age 18 years, adolescents were interviewed using an adapted version of the Stressful Life Events Schedule (SLES; Williamson et al., 2003). This interview originally included 96 items concerning the participant him or herself, his or her family members (relative and/or member of the household), or his or her best friends on various topics such as health (e.g., Hospitalized or had surgery, Family member or friend had serious injury or accident), school/work (e.g., Failed major exams), death (e.g., Family member or friend died), and relationships (e.g., Major problems with family member or friend, Parents divorced). Thirty-one events were excluded because these events were considered normative (e.g., Started menstrual cycle; 4 items) or irrelevant to this age period (e.g., Problems with your child’s conduct; 11 items), or applied to second or third degree relatives not living in participant’s household (6 items). In some cases events were possibly confounders of the results through effects of hereditary (e.g., Mental illness of close relative; 2 items), were not applicable to the Netherlands (e.g., Failed to get accepted to sports team, club or organization; 5 items), or the events were already covered elsewhere (e.g., Unexpected bad news; 3 items). Experiences of the remaining 65 items over the period between age 10 (3rd data wave) and age 18 (4th data wave) were assessed through interviewers with the adolescent. The total number of stressful events (including multiple occurrences of the same event) was used for the current analyses. The SLES has been found to have a good reliability and validity (Williamson et al., 2003).
Behavioral and emotional problems
Parent-reported externalizing and internalizing behavior were assessed through the Dutch version of the Child Behavior Checklist for ages 2 and 3 years (CBCL/2-3; Achenbach, 1992) at the first assessment, the Child Behavior Checklist for ages 4 to 18 years at the 5 and 10 year assessment (CBCL/4-18; Achenbach, 1991), and the updated version for ages 6 to 18 years at the final assessment (CBCL/6-18; Achenbach & Rescorla, 2001). For all instruments the response format is a 3-point Likert scale (0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). Cronbach’s alphas were .90, .86, .91 and .93 for the externalizing scales at age 3, 5, 10 and 18 respectively, and .80, .72, .85 and .88 respectively at those ages for the internalizing scales.

Procedure
The study was approved by the Erasmus Medical Center Ethical Committee. At the first assessment in 1989 (age 3), parents received a letter inviting them to participate in the study. Interviewers made an appointment for an interview at home. Parents were again approached in 1991 (age 5). After obtaining consent by phone, parents again were interviewed at home. In 1997 (age 10), all parents in the original sample were invited by mail to participate in the third assessment, regardless of participation at the second assessment. Respondents were contacted by phone to obtain consent to send them a package of questionnaires by mail as well as to send a number of questionnaires to the child and its teacher. In 2005 (age 18), all traceable adolescents and parents in the original sample were approached by mail for the fourth assessment. Parents were only invited after consent from the target adolescent. Parents could fill out questionnaires through mail (49.5%) or by internet. Adolescents were interviewed by phone.

Statistical Analyses
The analyses were conducted in two phases. In the first phase we aimed to confirm previous findings on the role of stressful events in psychopathology development, as this serves as the starting point to coming to our (final) model, testing all hypothesized effects at once. First, to test for the role of stressful events in the continuity of externalizing and internalizing problems, without the conditionality between both outcomes, externalizing an internalizing problems were analyzed separately (2 models). Then, to confirm our expectations of cross-influences between externalizing and internalizing problems, a model for externalizing and internalizing only was fitted. These three models were tested by fitting autoregressive cross-lagged models (Jöreskog, 1970; 1979). For example, for externalizing problems in the autoregressive part of the model, externalizing scores and stressful events were regressed on their immediate prior values. To test for the transactional relationship between externalizing behavior and stressful events, cross-lagged paths were included.
Then, in the second phase of the analyses externalizing and internalizing problems were combined in an autoregressive cross-lagged model together with stressful events. To test for sex-differences, a multiple group model was fitted (one for males, one for females). To test for model fit, the comparative fit index (CFI; Hu & Bentler, 1995) and the Tucker-Lewis index (TLI; Hu & Bentler, 1995) with critical values of $= .90$ and the root mean squared error of approximation (RMSEA), critical value $= .08$ (Browne & Cudeck, 1992) were used. The structural models were fitted in Mplus version 4.21 (Muthén & Muthén, 1998-2007).

Results

Preliminary analyses

Cases with available data on stressful events on any assessment were included in the analyses ($N = 396$). Mean levels of stressful events on each of the assessments are presented in Table 2.1. Table 2.2 shows correlations between all study variables. We then fitted the three separated structural models. The model of externalizing problems and stressful events (see Figure 2.1, upper part) had a good fit to the data (CFI $= .98$, TLI $= .94$, RMSEA $= .06$). Only significant paths at $p < .05$ are presented (estimates represent betas). It showed that from age 3 to age 18 years, externalizing problems predicted later stressful events, which in turn predicted subsequent externalizing problems. The middle section of Figure 2.1 shows the results for internalizing problems and stressful events (CFI $= .97$, TLI $= .92$, RMSEA $= .05$). Similar findings as for externalizing were found apart that no significant link was found between internalizing symptoms at age 3 years leading to stressful events. The third model (see Figure 2.1, lower model; CFI $= 1.00$, TLI $= .99$, RMSEA $= .03$) showed that in addition to continuity within both externalizing and internalizing problems cross-effects are found from age 3 and 5 externalizing problems to age 5 and 10 internalizing problems, respectively, and from age 10 internalizing problems to age 18 externalizing problems. To resume, these results confirm the role of stressful events in externalizing and internalizing development when considered separately, as well as the cross-influence between externalizing and internalizing problems over time.

<table>
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<th>Period</th>
<th>$N$</th>
<th>Males</th>
<th>Females</th>
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<td>372</td>
<td>1.39 (1.62)</td>
<td>.92 (1.27)</td>
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<td>Age 5-10</td>
<td>357</td>
<td>.69 (1.18)</td>
<td>.77 (.91)</td>
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<td>Age 10-18</td>
<td>247</td>
<td>5.90 (4.24)</td>
<td>7.68 (4.97)</td>
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Table 2.2. Correlations between Repeatedly Assessed Study Variables

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<th>Variables</th>
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<td><strong>Externalizing</strong></td>
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<tr>
<td>1. Age 3</td>
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<td>.34**</td>
<td>.40**</td>
<td>.33**</td>
<td>.36**</td>
<td>.19**</td>
<td>.16**</td>
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<td>2. Age 5</td>
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<td>.62**</td>
<td>.43**</td>
<td>.17**</td>
<td>.44**</td>
<td>.43**</td>
<td>.17*</td>
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<td>3. Age 10</td>
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<td>.62**</td>
<td>.11*</td>
<td>.28**</td>
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<td>4. Age 18</td>
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<td>6. Age 5</td>
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<td><strong>Stressful events</strong></td>
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Note. ** p < .01; * p < .05.
Figure 2.1. Results of Autoregressive Cross-lagged Models on the Role of Stressful Events in Externalizing Problems (upper), and Internalizing Problems (middle). Autoregressive Cross-lagged model on the Co-occurrence Between Externalizing and Internalizing Problems (lower). **p < .01; *p < .05. (EX = Externalizing problems; IN = Internalizing problems; LEQ = Life Events Questionnaire; SLES = Stressful Life Events Schedule).
The role of stressful events on the continuity of, and cross-influence between externalizing and internalizing problems.

We then fitted the model containing both externalizing and internalizing problems in addition to stressful events. Results are in Figure 2.2. Only path estimates (betas) significant at $p < .05$ are printed. The model fitted the data well (CFI = 1.00, TLI = .99, RMSEA = .03). This model showed continuity within externalizing and internalizing problems. No direct paths between experiences of stressful events were found. With respect to the continuity of externalizing problems, this model also showed that across the entire time span, externalizing problems predicted subsequent stressful events, which in turn predicted subsequent externalizing problems. To examine whether the continuity of externalizing problems were – in part – explained by experiences of stressful events we tested for the significance of the indirect paths from externalizing problems to subsequent externalizing problems via stressful events (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

The results showed that the indirect path from age 3 externalizing problems to subsequent stressful events to age 5 externalizing problems ($B = .02, SE = .01, \beta = .02, p < .05$), and from age 5 externalizing problems to subsequent stressful events to age 10 externalizing problems ($B = .03, SE = .01, \beta = .03, p < .05$) were significant. Although not significant at the .05 level, the results indicate a trend toward significance for the path of externalizing problems at age 10 to externalizing problems at age 18 via intermediate stressful events ($B = .04, SE = .02, \beta = .04, p = .08$).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Fig22.png}
\caption{Full Autoregressive Cross-Lagged Model on the Role of Stressful Events on the Continuity within, and the Cross-influence Between Externalizing and Internalizing Problems. **$p < .01$; *$p < .05$. (EX = Externalizing problems; IN = Internalizing problems; LEQ = Life Events Questionnaire; SLES = Stressful Life Events Schedule).}
\end{figure}
In contrast to externalizing problems, over the childhood years, internalizing problems did not predict subsequent experiences of stressful events. Hence, the previously significant path from internalizing problems at age 5 years to stressful events was no longer significant, once externalizing problems were accounted for. However, internalizing problems at age 10 years predicted stressful events during adolescence, which in turn predicted internalizing problems at age 18 years. Again, this indirect path was tested. It showed a trend towards significance: $B = .04, SE = .02, \beta = .03, p = .09$.

In the childhood years, only cross-influence from externalizing to internalizing problems was found. Specifically, two direct paths, one from age 3 externalizing problems to age 5 internalizing problems and one from age 5 externalizing problems to age 10 internalizing problems were found. In addition to these direct paths two indirect paths via intermediate stressful events at the same time interval were found (see Figure 2.2). To test whether the direct effects of externalizing to internalizing were in part accounted for by experiences of stressful events, we tested for the significance of the indirect paths. The results showed that both paths were significant: age 3 externalizing to age 5 internalizing, $B = .01, SE = .01, p < .05$; age 5 externalizing to age 10 internalizing, $\beta = .02; B = .03, SE = .01, \beta = .03, p < .05$.

Finally, indirect paths from age 10 externalizing problems to age 18 internalizing via stressful events, and vice versa were tested. Both these indirect paths were marginally significant: externalizing age 10 years to internalizing age 18 years: $\beta = .03; B = .02, SE = .04, p = .08$; internalizing to externalizing: $\beta = .05; B = .03, SE = .04, p = .09$.

**Sex-differences**

To test whether the findings applied to both males and females, we compared the final model in which paths were constrained to be equal between both sexes to a sex-specific model in which estimates were allowed to vary. The chi-square difference test was not significant ($\chi^2 (37) = 47.74, p > .05$), indicating that the paths were not significantly different for males and females.

**Missing data**

As stated, for 37% of the cases data on stressful events was missing at one or two of the assessments. T-tests and $\chi^2$-tests showed no differences between cases with complete data or cases with missing data with respect to sex ($\chi^2 (1, N = 396) = 2.34, p > .05$), age ($t = .05, p > .05$), internalizing ($t = -1.73, p > .05$) and externalizing problems ($t = .57, p > .05$) at age 2/3 years, however, cases with missing data were more often of lower SES ($\chi^2 (2, N = 365) = 9.40, p = .01$). To test whether missing data influenced the model estimates we refitted the final model using only the restricted sample with no missing data ($n = 247$). All except two paths found in our full sample remained significant; the path from stressful events to age 5
internalizing problems and from age 10 internalizing problems to subsequent stressful events failed to reach conventional levels of significance. To test whether this was due to truly different estimates, or because of lack of statistical power due to the smaller sample, we fixed the parameter estimates of these two paths in the full sample, to the estimates found in the smaller sample. Chi-square difference test showed no significant difference ($\chi^2(2) = 1.57, p > .05$), indicating that estimates of the now insignificant paths were not different from the estimates found in the full sample, but became insignificant due to lack of power.

Discussion

This study found new evidence that stressful events influence the continuity as well as the cross-influence between externalizing and internalizing problems from early childhood to late adolescence, while being influenced by externalizing problems themselves. Specifically, these are our findings. (1) Throughout childhood and adolescence, stressful events account – in part – for the continuity of externalizing problems. (2) Stressful events also account for the continuity of internalizing problems, but only during adolescence. (3) In childhood, stressful events partially account for the cross-influence of externalizing to internalizing problems. During the adolescent years, externalizing to internalizing cross-influences, and vice versa, run through the experiences of stressful events. These findings apply to both males and females.

With respect to externalizing problems, our results corroborate the proposition that indeed, experience of stressful events and behavior problems work together in a cycle of ongoing adjustment problems and experience of life stress, and in this way explain why externalizing problems persist (cf., Kim et al., 2003; Steinberg & Avenevoli, 2000) from as early as age 3 years on. However, it should be noted that the indirect paths via life stress contributing to continuation in externalizing problems in adolescence turned just below the adopted level of significance. Nevertheless, given the consistency of the results reaching significance at $p < .10$ level in adolescence (also for continuation in internalizing problems and cross-influence between externalizing and internalizing problems between age 10 and 18 years), the hypotheses of stressful events contributing to the development of psychopathology in adolescence could not be rejected with any certainty.

This study also showed the importance of accounting for the co-occurrence between externalizing and internalizing problems when studying the influence of stressful events on psychopathology. Specifically, it showed that when considered separately, life stress and internalizing problems were mutually related to each other in both childhood and adolescence. However, during the childhood years, the paths of internalizing problems to stressful events were accounted for by co-occurring externalizing problems. Thus, in accordance with prior
studies (Kim et al., 2003; Patton et al., 2003), experiences of life stress are important in explaining the continuity of internalizing problems during adolescence. During childhood, co-occurring externalizing problems seem to account for the influence of stressful events in the course of internalizing problems. Perhaps because the manifestation of depression and anxiety symptoms becomes more profound in adolescence (e.g., Bongers et al., 2003), this may lead to increasing negative social consequences of internalizing behaviors such as social rejection.

Experience of stressful events also contributed to the cross-influence between externalizing and internalizing problems. As outlined by Caron and Rutter (1991) two of a number of possible explanations of true co-morbidity are shared risk factors, and one disorder creating an increased risk for the other. Our results seem to support the latter for the childhood years and both for the adolescent years. That is, in childhood there is only a cross-over effect from externalizing problems to (new) internalizing symptoms (possibly) via stressful events. For the adolescence years, life events account for both the continuity of externalizing problems and internalizing problems, and the transaction from externalizing to internalizing problems and vice versa. Note that these findings are also fully in accordance with Capaldi’s and Patterson’s failure model (Capaldi, 1991; 1992; Capaldi & Stoolmiller, 1999; Patterson et al., 1992). Our findings are also consistent with earlier findings in adolescence suggesting that the association between delinquency and depressed mood was mediated by negative stressful events (Rowe, Maughan, & Eley, 2006), and in addition with findings by Wiesner and Kim (2006) showing that stressful life events correlated with co-occurring pathways of delinquency and depressive mood.

The current results should be viewed against some limitations. First, the interval between the subsequent assessments was quite large, especially in the adolescence period (between ages 10 and 18 years). We could not control for the interval between the experience of life stress and the assessment of behavior and emotional problems. This raises an issue of the potential difference in impact of distant versus recent stressors on psychological symptoms, with distant events being less intrusive than recent ones. However, a study by Ensel and colleagues (Ensel, Peek, Lin, & Lai, 1996) showed that of stressors occurring in a 15-year period, early stressors had a significant impact on current depressive symptoms above and beyond the effect of recent stressors. Also, particularly the large time span between age 10 and age 18 years may have caused a recall bias in adolescents, as recent events are more likely to be recalled than early events. However, the extensive list of possible stressful events provided in the SLES (Williamson et al., 2003) may have minimized the chance of missing out on events that had occurred in the earlier years of the adolescent period. A third limitation related to the gap between the age 10 and age 18 years is that we could not study the possible direct effect of stressful events on increases in externalizing and internalizing problems in adolescence. That is, adolescence is pre-eminently the period in which individuals experience high levels
of stressful events as well as in which both externalizing and internalizing problems tend to increase (Arnett, 1999; Farrington, 1986; Ge, Conger, & Elder, 2001; Moffitt, 1993).

Despite these limitations, our findings may have important implications for both research and practice. This study clearly underlines the necessity to account for stressful events when trying to understand the continuity of, and co-occurrence between emotional and behavioral problems. With regard to prevention practices, the findings underscore the importance of the assessment of stressful events from childhood onwards. Specifically, practitioners should be aware of young children’s behavioral responses to stressful experiences, because these put them at risk for increasing life stress, and subsequent behavioral and emotional problems, resulting in an ongoing cycle of increasing life stress and behavioral and emotional maladjustment.
CHAPTER 3

PREDICTING DECREASING BEHAVIOR PROBLEMS IN ADOLESCENCE: WHO DO BETTER THAN EXPECTED?

Maartje Timmermans, Pol A. C. van Lier, and Hans M. Koot, submitted for publication.

Abstract

This study examined childhood factors from the individual, family and social domain that predicted decreases in externalizing problems in late adolescence. Males and females from a general population sample (N = 310) were followed longitudinally from age 3 to age 18 years. A multi-informant method was used. A decrease in problem behavior was defined as having a lower externalizing behavior score in late adolescence than expected based on the childhood level of aggressive behavior. Consistent with our hypothesis, high social skills and positive mood (individual factors), and indicators of adequate parenting such as low parenting stress, low parental psychopathology, good general family functioning and low life stress (family factors) were associated with decreasing externalizing problems in adolescence. After controlling for the other factors, low levels of social problems and parenting stress uniquely predicted decreasing externalizing problems. Findings confirm the significance of adequate social skills in children and the parenting quality in reducing externalizing problems, which was suggested in other types of research. The current findings may be of significant value in empirically deriving suggestions for prevention and intervention of behavior problems.
Introduction

Childhood aggressive behavior problems are a strong predictor of adolescent externalizing problems, such as serious and violent delinquency (Broidy et al., 2003; Haapasalo & Tremblay, 1994; Nagin & Tremblay, 1999). In fact, externalizing behavior problems are fairly persistent over the course of development from childhood to adolescence (Dekovic et al., 2004; Hofstra et al., 2000; Mathijssen, Koot, & Verhulst, 1999). For instance, Hofstra et al. (2000) found stability coefficients in the .30 range in both males and females between childhood aggressive behaviors and externalizing behaviors 14 years later, in young adulthood. However, this stability coefficient also indicates that many children change in their rank order of externalizing problems with age. That is, many children will have lower, or in contrast, higher externalizing behavior scores in adolescence than expected based on their childhood levels of aggression. In this study, we aim to identify factors in childhood that are associated with decreases in externalizing behavior in late adolescence.

Several developmental studies have indeed shown that decreases in the level of externalizing behavior from childhood to adolescence are likely. For instance, Nagin and Tremblay (1999) studied trajectories of aggressive behavior from age 6 to age 15 years. They found that a significant group followed a trajectory that started with high levels of aggression in childhood, but with decreasing levels of these problems into adolescence (high desisters; 28% of all boys in the sample). Similarly, in a large cross-national study by Broidy and colleagues (2003) 12 - 30% of all males followed such high desisting trajectories into adolescence. In the studies by Moffitt and colleagues (Moffitt et al., 1996; Moffitt et al., 2002), a number of highly antisocial males during childhood was found to desist from antisocial behavior in adolescence and adulthood (recovery group; approximately 8% of total sample). Moreover, Stouthamer-Loeber and colleagues (Stouthamer-Loeber, Wei, Loeber, & Masten, 2004) showed that approximately 40% of the males in their high-risk sample who were high on delinquency in adolescence desisted from delinquent behaviors in young adulthood. It should be noted however, that in contrast to the other studies, these authors studied trajectories from adolescence to early adulthood.

Thus, although externalizing behaviors are found to be stable with age, a significant portion of children will have decreases in such behavior problems over the adolescent years. Despite this, little research has been directed at identifying factors that are associated with such decreasing levels of externalizing behavior between childhood and adolescence. In fact, research is primarily aimed at identifying predictors of the onset and/or persistence of maladaptive behaviors in childhood and adolescence (Fergusson & Horwood, 2002; Hawkins et al., 1998; Moffitt & Caspi, 2001; Moffitt et al., 1996; Moffitt et al., 2002; Nagin & Tremblay, 2001; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003; van Lier et al., 2007a;
In identifying which childhood factors are associated to reductions in externalizing problems, Bronfenbrenner’s ecological model (1986) may be of assistance. This model assumes that (risk) factors of (mal) adjustment occur in a variety of contexts of functioning, differing in distance to the individual. For instance, at the individual level, temperament factors, and at the micro-system level (i.e., family, school), the parent-child relationship have often been related to behavior problems, while at the more distal exo-system level, neighborhood quality has been reported to be associated with externalizing problems. A study by Atzaba-Poria and colleagues (Atzaba-Poria et al., 2004) indicated that risk factors that are directly linked to the child (i.e., proximal factors) are more important predictors of externalizing behavior problems than distal predictors. For instance, the authors found that particularly the mother-child relationship (i.e., micro-system level) appeared the most important predictor of externalizing problems. Consistent with this finding, Mathijssen and colleagues (1999) showed that a positive parent-child relationship was associated with reduced externalizing levels under the risk condition of a negative marital relationship between the parents. Moreover, in a study which was specifically aimed at detecting factors that are associated with decreasing levels of externalizing problems in a sample of at risk males (Stouthamer-Loeber et al., 2004) the authors considered individual, peer, family, and neighborhood factors measured between age 13 to 16 years and age 17 to 19 years as potential predictors of desistance from delinquency in early adulthood. It was found that decreasing problems were uniquely predicted by three factors at ages 13 to 16 years from the individual, peer and family context, namely: believing it likely to get caught, having good peer relationships and no or little physical punishment used by caretaker(s) respectively. Thus, from these initial results we know that decreases in externalizing problems in early adult males was dependent on individual attitudes, adolescents’ social relationships, and parenting factors across the adolescence period.

Together, these results suggest that factors proximal to the child (individual and micro-system factors) may be the most salient determinants of the quality of children’s interactions with their direct environment, and may therefore be potential predictors of reductions in externalizing problems in adolescence. However, it should be stressed here that the Stouthamer-Loeber study (Stouthamer-Loeber et al., 2004) focused on (early and late)
adolescent predictors of outcomes in young adulthood. In order to identify earlier predictors of reductions in externalizing problems in adolescence (at age 18), we aim to add to this initial study by identifying childhood factors (at age 10) from the individual, familial, and social context using a general population sample of males and females.

A variety of potential factors that might be associated to reductions in externalizing behaviors will be included in the current study. Both factors of protective kind and of absent risk are considered. At the individual level, factors include for instance (positive/negative) mood, general high activity level, self-perceived competences in various domains, social functioning, sociability, and school functioning. Family factors include socioeconomic status, (family) life events, parenting stress, good family functioning, and parental psychopathology. Social support received from friends, teachers and parents are considered as social factors. Based on previous findings (Atzaba-Poria et al., 2004; Lacourse et al., 2002; Mathijssen et al., 1999; Stouthamer-Loeb et al., 2004) variables of good social functioning, and of low risk parenting and family conditions are hypothesized to predict reductions in adolescent externalizing behavior levels.

Methods

Sample
The original sample of 420 children was taken randomly from the Dutch province of Zuid-Holland, using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). Data were collected using multiple informants when children were 3 (1989), 5 (1991), 10 (1997) and 18 years old (2005). Written informed consent was obtained from parents at the age 3, 5, 10 and 18 assessments, from teachers at the age 5 and 10 assessments and from adolescents at the age 18 assessment.

At the first assessment (age 3) 420 parents (212 boys, 208 girls; mean age = 2.58 years, SD = 7.3 months) participated in the study. At age 5, 397 parents (95%) of the original sample were reached (201 boys, 195 girls; mean age = 4.83 years, SD = 8.4 months). Teacher information was obtained for 342 of these children (86%). At age 10, 358 parents (85%) of the original sample participated in this assessment (180 boys, 178 girls; mean age = 10.46 years, SD = 7.2 months). Teacher information was collected for 294 of these children (82%). Self-reports were obtained for 295 children (82%). At age 18, all parents and adolescents in the original sample were again approached. Two children deceased between age 10 and 18 years. Of the original sample 324 parents (77%; 165 boys, 159 girls; mean age = 18.19 years; SD = 8.4 months) completed questionnaires. Thirty-seven parents refused or got no permission from their children to participate, while 41 parents were unreachable (no address information, or emigrated). Finally, 16 parents who initially gave their consent to participate never returned.
questionnaires. Self-reports were obtained for 311 adolescents of the original sample (74%, 152 boys, 159 girls). Forty adolescents were untraceable (no address information, emigrated). Forty-five adolescents refused participation and 22 did not return questionnaires.

**Instruments**

*Childhood Aggressive behavior*

*Parent ratings of aggressive behavior* in childhood was rated through the Aggressive Behavior scale of the Dutch version of the Child Behavior Checklist for ages 2 and 3 years (CBCL/2-3; Achenbach, 1992) and the Child Behavior Checklist for ages 4 to 18 years at the 5 and 10 year assessment (CBCL/4-18; Achenbach, 1991). For both instruments the response format is a 3-point Likert scale (0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). The Aggressive Behavior scale of the CBCL/2-3 includes 9 items (a = .76), the CBCL/4-18 Aggressive Behavior scale includes 13 items (a = .86/.90). The structure of the Dutch translation of the CBCL was found to be similar to the American version (De Groot, Koot, & Verhulst, 1994). Good reliability and validity of the translated version have been confirmed (Verhulst, van der Ende, & Koot, 1996).

*Teacher ratings of aggressive behavior* in childhood were obtained through the Aggressive Behavior scale (25 items) of the Dutch version of the Teacher’s Report Form (TRF; Achenbach, 1991) at the age 5 and age 10 assessment. The response format is a 3-point Likert scale (0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). Cronbach’s alphas were .93/.95 at the age 5 and 10 assessments respectively.

*Age 18 Externalizing behavior*

*Parent ratings of externalizing behavior* at age 18 years were obtained through the broadband Externalizing Behavior scale (33 items, a = .93) of the CBCL/4-18 (Achenbach, 1991).

*Self-reports of externalizing behavior* were obtained through the Dutch version of the broadband Externalizing Behavior scale (32 items, a = .84) of the Youth Self Report (YSR; Achenbach, 1991), which is the equivalent of the parent- and teacher-reports of emotional and behavioral problems.

**Individual factors**

*Negative Mood and General High Activity* at age 10 years were assessed by parents through the Dimensions of Temperament Survey revised (DOTS-R; Windle & Lerner, 1986).
measuring temperament attributes in children on a 4-point Likert scale. Two negatively formulated items of the Negative Mood scale were selected ($a = .61$), including Does not smile a lot, Does not laugh about a lot of things and six items of the General Activity scale ($a = .65$) reflecting a high activity (e.g., Seems to move ceaselessly, Not able to stay calm for a long period).

**Social Problems** at age 10 years were assessed using the 15 items Social Problems scale of the CBCL ($a = .83$) and TRF ($a = .85$), including Not liked by peers, Clumsy.

**Sensitivity-Isolation** at age 10 years was rated by teachers who completed the Revised Class Play (RCP; Masten, Morrison, & Pellegrini, 1985) including three scales describing social roles. The Sensitive-Isolated scale (7 items, $a = .78$) describes negative roles, including Is very shy, Rather plays alone than with others.

**Positive Mood and Positive Task-Orientation** at age 10 were assessed by parents through the DOTS-R (Windle & Lerner, 1986). Positively formulated items of the Mood scale (5 items, $a = .84$) were used (e.g., Generally cheerful mood, Smiles a lot) as well as positively formulated items from the Task-Orientation scale (7 items, $a = .78$), including Keeps busy until task is finished, Once busy nothing distracts him/her from the task.

**Academic Functioning** at age 10 years was rated by teachers on a scale from 1 (low) to 5 (high) on a subscale of the TRF competence scale (Achenbach, 1991).

**Classroom Functioning** at age 10 years was reported by teachers on a subscale of the TRF competence scale (Achenbach, 1991) including 4 items ($a = .83$): How hard is he or she working, How appropriately is he or she behaving, How much is he or she learning, How happy is he or she.

**Sociable-Leadership** at age 10 years was assessed through the RCP (Masten et al., 1985) describing positive social roles, such as Has many friends, Helps others (15 items, $a = .85$).

**Self-Perceived Competence** at age 10 years was rated using the Self-Perception Profile for Children (SPPC; Harter, 1985b) a self-report assessing competence across several domains. The SPPC consists of six subscales, each containing 6 items on a 4-point scale: Academic Competence ($a = .79$), Social Competence ($a = .80$), Athletic Performance ($a = .72$), Physical Appearance ($a = .80$), Behavioral Conduct ($a = .75$), and Global Self-Worth ($a = .80$). The Dutch translation was found to be reliable and internally valid in measuring the self-concept of Dutch children (Van Dongen-Melman, Koot, & Verhulst, 1993).
Family factors

*Socio-economic status (SES)* of the family was assessed on the basis of current parental occupation and highest level of education completed. Socioeconomic status was categorized in low, intermediate, and high; calculations were based on the scoring of Statistics Netherlands (Statistics Netherlands, 1993).

*Life Events* at age 10 years were rated using a short form of the Life Events Questionnaire (LEQ; Berden et al., 1990), which is a parent-reported questionnaire assessing 12 stressful life events (yes/no response). Life Events were considered a family factor as most items included family-related events (e.g., Death of a parent or sibling, Divorce or separation of parents).

*Parenting Stress* at age 10 years was assessed through parents using the Nijmegen Parenting Stress Index (NPSI), which is a modified Dutch version of Abidin’s Parenting Stress Index (Abidin, 1983) measuring the level of perceived parental stress originating from parent characteristics in the caregiving context (De Brock, Vermulst, & Gerris, 1990). The Parenting Stress scale consists of 13 items (α = .88) and were scored on a 6-point Likert scale. We used a short form including items such as Parenting this child is harder than I thought, I often have the feeling that I cannot manage things very well.

*Parental Psychopathology* at age 10 years was rated using the Young Adult Self Report (YASR; Achenbach, 1997). We used a short form consisting of 34 items (Achenbach, 1997), which were summed into a total score of emotional and behavioral problems (α = .87).

*Good Family Functioning* at age 10 years was rated by parents through the McMaster Family Assessment Device (FAD; Epstein, Baldwin, & Bishop, 1983) on a 4-point Likert scale. Only positively formulated items of the General-Family-Functioning scale (6 items, α = .78) were used in the current study (e.g., Trust each other, Show feelings).

Social context factors

*Perceived Social Support* at age 10 years was rated through the Social Support Scale for Children (SSSC; Harter, 1985a), which is a self-report questionnaire measuring child-perceived support from four sources (each including 6 items on a 4-point scale): Parents (α = .53), Close Friends (α = .84), Teachers (α = .76), and Classmates (α = .80). Considering the low alpha of Social Support from Parents, this scale was excluded from analyses.
**Procedure**

At the first assessment in 1989 (age 3), parents received a letter inviting them to participate in the study. Interviewers made an appointment for an interview at home. Parents were again approached in 1991 (age 5). After obtaining consent by phone, parents again were interviewed at home. Parents were also asked for permission to send questionnaires to the child’s teacher. In 1997 (age 10), all parents in the original sample were invited by mail to participate in the third assessment, regardless of participation at the second assessment. Respondents were contacted by phone to obtain consent to send them a package of questionnaires by mail as well as to send a number of questionnaires to the child and its teacher. In 2005 (age 18), all traceable adolescents and parents in the original sample were approached for the fourth assessment by mail. Parents were only invited after consent by the target adolescent. Participants could fill out questionnaires through mail (49.5% of parents, 19.2% of adolescents) or by internet. The majority of the data was obtained between January and November 2005.

**Statistical analyses**

To identifying those children with lower than expected behavior problem scores based on their childhood aggression levels (i.e., decreasing externalizing problems), in late adolescence a discrepancy score was computed in the following steps. We first considered two latent factors in Mplus 4.21 (Muthén & Muthén, 1998-2007), one for childhood aggressive behavior, and one for late adolescent externalizing behavior. Parent-reported aggression at ages 3, 5, and 10 years, and teacher-reported aggression at age 5, and 10 years were used as indicators of the latent childhood aggressive construct. Parent-, and self-reported externalizing behavior at age 18 were used as indicators for the latent adolescent externalizing construct. By regressing the adolescent externalizing construct on the childhood aggressive construct (while controlling for sex), we could obtain children’s individual residual scores, which provide information on the match between predicted factor scores and observed factor scores at age 18 years. For instance, when the residual factor score was zero, the predicted factor score of age 18 externalizing behavior (based on aggregated childhood aggression levels) perfectly matched the observed factor score of age 18 externalizing behavior. When the residual factor score was large and negative, the observed score was in fact lower than the predicted factor score (i.e., true decrease). Reversely, a large positive residual factor score indicated a higher observed factor score than was predicted. Given our objective of study, we then submitted the decreasing cases (i.e., children with negative residual factor scores) to a hierarchical regression model to identify factors that were associated with their decrease in externalizing problems between childhood and late adolescence.
Results

Preliminary analyses

One-hundred-and-eighty-three children were identified as having decreases in externalizing problems, whereas 127 had stable or increasing levels of externalizing problems. To validate our identification of children with decreasing externalizing problems, we first ascertained that these individuals were not different from individuals classified as having increasing externalizing problems in adolescence, with respect to their level of aggression already in childhood. Means and standard deviations of the observed and latent aggressive behavior scores in childhood are given in Table 3.1. The results showed no differences in the observed or latent aggressive variables in childhood (except teacher reported scores at age 5 years) between children in the decreasing or increasing group. Second, we tested whether the decreasing group indeed had lower levels of externalizing problems at age 18 than the stable/increasing group. Table 3.1 shows that the level of externalizing behavior among the decreasing group at age 18 was significantly lower than among the stable/increasing group.

Table 3.1. Means, Standard Deviations, and F-scores of Observed and Latent Variables in Childhood and at Age 18 Years for Children with Decreasing and Increasing Levels of Behavior Problems

<table>
<thead>
<tr>
<th>Observed scores</th>
<th>Decreasing n = 183</th>
<th>Increasing n = 127</th>
<th>Group difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Childhood aggressive behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 3 Parent-report</td>
<td>13.44</td>
<td>7.45</td>
<td>13.94</td>
</tr>
<tr>
<td>Age 5 Parent-report</td>
<td>7.69</td>
<td>5.07</td>
<td>6.76</td>
</tr>
<tr>
<td>Age 5 Teacher-report</td>
<td>5.38</td>
<td>7.67</td>
<td>2.92</td>
</tr>
<tr>
<td>Age 10 Parent-report</td>
<td>5.92</td>
<td>5.45</td>
<td>5.01</td>
</tr>
<tr>
<td>Age 10 Teacher-report</td>
<td>4.34</td>
<td>6.72</td>
<td>4.44</td>
</tr>
<tr>
<td>Age 18 externalizing behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 18 Parent-report</td>
<td>3.17</td>
<td>3.96</td>
<td>9.59</td>
</tr>
<tr>
<td>Age 18 Adolescent-report</td>
<td>8.47</td>
<td>5.04</td>
<td>13.02</td>
</tr>
<tr>
<td>Latent factor scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood aggressive behavior</td>
<td>-.98</td>
<td>3.69</td>
<td>-1.56</td>
</tr>
<tr>
<td>Age 18 externalizing behavior</td>
<td>-1.88</td>
<td>2.59</td>
<td>2.02</td>
</tr>
</tbody>
</table>

Note. ** p < .01.
Finally, to establish the clinical significance of this difference in age 18 externalizing behavior problems, the number of individuals with a score at or above the (borderline) clinical cut-off on the age 18 CBCL/YSR Externalizing scale (T-score = 60) was identified for both groups. Of the stable/increasing group, 24% was at or above the borderline clinical range. In contrast, only 3 – 6% (based on parent-, and adolescent-reports respectively) of the decreasing group fell in borderline-clinical range. This difference in percentage was significant: ?² (1) = 21.99, \( p < .01 \). Together, these statistics support the identification of cases with truly decreasing externalizing problems between childhood and adolescence.

**Predictors of decreasing externalizing problems**

To establish which variables are candidate predictors of decreasing externalizing problems, we first examined which variables are related to externalizing behavior at all. Therefore we correlated all studied variables with the age 18 externalizing behavior latent factor using all cases with available data (\( N = 310 \)). Results are in Table 3.2, left column. Significant positive correlations with externalizing behavior were found for all factors implying a risk for behavior problems, except Negative Mood. In addition, variables implying a protective link (i.e., associations with reductions in behavior problems) showed significant negative associations with externalizing behavior, except for Good Family Functioning, Academic Competence, Athletic Competence, Social Support from Best Friend and Social Support from Teacher (assessed at age 10 years). As our goal was to identify variables that predict decreases in externalizing problems, all variables which were not significantly associated with externalizing problems in the first place, were excluded from further analyses.

We then determined for the decreasing group only (\( n = 183 \)) which of the remaining variables had significant correlations with decreasing behavior problems (Table 3.2, right column). Positive Mood, School Functioning and Behavioral Competence had positive associations with decreasing levels of externalizing behavior, which indicates that high levels of these protective factors are related to large decreases in behavior problems in adolescence. Negative associations were found for parent reported Social Problems, General Activity Levels, Life Events, Perceived Parenting Stress, and Parental Psychopathology. This indicates that absence of or low scores on these risk factors are related to large decreases in behavior problems. All variables that significantly correlated with decreasing problem behavior were then submitted to a hierarchical regression model including two blocks. Only individual factors were entered in the first block. In the second block, the family factors in addition to significant individuals predictor(s) were included. Results are in Table 3.3. Only low levels of Social Problems appeared a significant predictor of decreasing externalizing levels in adolescence while controlling for other individual factors (block 1). In the second block, low levels of Parenting Stress significantly predicted decreasing problems, while the effect of low Social Problems remained significant.
### Table 3.2. Pearson Correlations between Childhood Factors and Age 18 Externalizing Problems and between Childhood Factors and Decreasing Externalizing Problems in Adolescence

<table>
<thead>
<tr>
<th></th>
<th>Age 18 Externalizing Problems</th>
<th>Decreasing Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 310</td>
<td>n = 183</td>
</tr>
<tr>
<td><strong>Individual factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Problems (P)</td>
<td>.30**</td>
<td>-.32**</td>
</tr>
<tr>
<td>Social Problems (T)</td>
<td>.30**</td>
<td>-.10</td>
</tr>
<tr>
<td>Sensitive-Isolated (T)</td>
<td>.27**</td>
<td>-.11</td>
</tr>
<tr>
<td>General Activity Levels (P)</td>
<td>.31**</td>
<td>-.22**</td>
</tr>
<tr>
<td>Positive Mood (P)</td>
<td>-.21**</td>
<td>.22**</td>
</tr>
<tr>
<td>Positive Task Orientation (P)</td>
<td>-.14*</td>
<td>.02</td>
</tr>
<tr>
<td>Academic Functioning (T)</td>
<td>-.16*</td>
<td>.13</td>
</tr>
<tr>
<td>Classroom Functioning (T)</td>
<td>-.20**</td>
<td>.17*</td>
</tr>
<tr>
<td>Sociable-Leadership (T)</td>
<td>-.30**</td>
<td>.12</td>
</tr>
<tr>
<td>Global Self-Worth (C)</td>
<td>-.25**</td>
<td>-.03</td>
</tr>
<tr>
<td>Social Competence (C)</td>
<td>-.25**</td>
<td>.03</td>
</tr>
<tr>
<td>Behavioral Competence (C)</td>
<td>-.30**</td>
<td>.19*</td>
</tr>
<tr>
<td>Physical Attractiveness (C)</td>
<td>-.17**</td>
<td>-.03</td>
</tr>
<tr>
<td><strong>Family factors</strong></td>
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<td></td>
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<tr>
<td>SES (P)</td>
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<td>-.01</td>
</tr>
<tr>
<td>Life Events (P)</td>
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<td>-.20**</td>
</tr>
<tr>
<td>Perceived Parenting Stress (P)</td>
<td>.34**</td>
<td>-.43**</td>
</tr>
<tr>
<td>Parental Psychopathology (P)</td>
<td>.23**</td>
<td>-.20**</td>
</tr>
<tr>
<td><strong>Social factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Support - Classmates (C)</td>
<td>-.22**</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note. ** p < .01; * p < .05. P = Parent-report; T = Teacher-report; C = Child-report.*
Table 3.3. Hierarchical Regression Model for Decreasing Externalizing Problems

<table>
<thead>
<tr>
<th>Model</th>
<th>Decreasing Problems</th>
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<tr>
<td></td>
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<td>$B$</td>
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<tr>
<td>Block 1</td>
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<tr>
<td>Social Problems (P)</td>
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<td>.01</td>
<td>.08</td>
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<td>Positive Mood (P)</td>
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<td>.01</td>
<td>.13</td>
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<td>Classroom Functioning (T)</td>
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<td>.01</td>
<td>.02</td>
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<tr>
<td>Block 2</td>
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<td>Social Problems (P)</td>
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<td>.02</td>
<td>-.17*</td>
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<tr>
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<td>.04</td>
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<tr>
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<td>.01</td>
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<tr>
<td>Parental Psychopathology (P)</td>
<td>.00</td>
<td>.01</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note. $R^2 = .14$ for block 1; $R^2 = .22$ for block 2; P = Parent-report; T = Teacher-report; C = Child-report. N = 183. **$p < .01$; * $p < .05$.

Discussion

This study aimed to identify which childhood factors are linked to decreasing problem behavior (i.e., better than expected outcomes) across adolescence in a sample of males and females from the general population studied from age 3 years onward. Both protective factors as well as absence of risks for behavior problems were considered. Based on previous findings we included a variety of variables from the individual, family and social support context. It was hypothesized that variables of adapted social functioning and of a low risk parenting and family context would predict decreasing levels in externalizing behavior between childhood and adolescence.

As anticipated, most of the predictor variables were significantly associated with externalizing problems at age 18. However, far fewer factors were actually associated with decreasing problem behaviors, which is in accordance with findings in the Stouthamer-Loeber study (2004). The results from the correlational analysis suggested that children’s social and behavioral skills and easy temperament, and exposure to low parenting stress and low risk family conditions may be important predictors of having lower levels of behavior problems in adolescence than was expected from childhood level of aggressive behavior.
In the next step we investigated which of the correlates in childhood uniquely contributes to decreasing behavior problems. The results from the hierarchical regression model showed that when controlling for individual factors and other family variables, both indicators of adapted social functioning (i.e., low levels of social problems) and low exposure to family risk conditions (i.e., low parenting stress) predicted adolescent decreases in externalizing problems. These results are in line with findings from various types of research. First, in the desistance study by Stouthamer-Loeber et al. (2004) also indicators of little exposure to risky parenting style (i.e., low physical punishment) and of adolescents’ social skills (i.e., good peer relationships) were found to uniquely predict desistance from delinquency in early adulthood. Apparently, the same factors during the adolescence years as in childhood are of importance in the process of decreases in externalizing problems later in development. Second, it should be noted that in addition to many other domains, the parenting domain and social competence domain have also been identified as influential in risk research (Mesman et al., 2001; Moffitt & Caspi, 2001). The fact that these domains are now found to be predictors of decreasing externalizing problems in two desistance-related studies covering different ages as well as in risk research, underscores the potential effectiveness of programs aimed at improving parenting quality and children’s social competence. Indeed some recent studies have reported that interventions aimed at improving parenting strategies and/or social skills are successful in reducing conduct problems (Brotman et al., 2003; Lacourse et al., 2002; Gardner, Shaw, Dishion, Burton, & Supplee, 2007; Patterson et al., 2002).

The present findings should be viewed against some limitations. First, the limited sample size prohibited us from testing sex-specific predictors of decreasing externalizing problems in separate analyses for males and females. Second, although a substantial set of predictor variables was included in this study, variables not considered here (e.g., relationship with parents, quality of peer relations) may be of importance too.

The fact that many of the ubiquitous findings on associations between individual and family factors in childhood and later externalizing problem levels were replicated in this study, suggested sufficient variance in our sample to draw valid conclusions. Important to note in this light, is that of all variables that were associated with levels of externalizing behavior, fewer of them were also associated with decreases in externalizing behavior across adolescence. This coincided with the previous study on decreases in externalizing problems (Stouthamer-Loeber et al., 2004), suggesting that the pool of factors which may be fruitfully targeted by intervention and prevention programs is probably much narrower than previously suggested based on findings from risk research. Thus, an important implication of our study may be that it is not sufficient to look for factors that are simply related to the degree of behavior problems at a certain time point. Instead, variables of interest should be related to a change in behavioral problems across time. In addition, empirically derived suggestions for
prevention of behavior problems has largely come from risk research identifying predictors of high and stable, or increasing levels of externalizing problems. However, the current study directly related childhood factors to the desired outcome (i.e., unexpected decreasing externalizing problems in late adolescence) and confirmed findings reported from both risk and intervention/prevention studies. In sum, our findings contribute to a straightforward validation of prior findings in intervention and prevention studies that aim to reduce behavior problems through enhancing social skills in children and improving parenting quality by reducing parenting stress. Of course, only longitudinal intervention studies are fit to test the causal nature of the predictive associations between these factors and desirable outcomes that were demonstrated in this study.
CHAPTER 4

CHILDREN WITH STABLE HIGH VERSUS HIGH BUT DECREASING ANTISOCIAL BEHAVIOR FROM AGE 3 TO 18 YEARS: CAN THEY BE DISCRIMINATED IN CHILDHOOD?

Maartje Timmermans, Pol A. C. van Lier, and Hans M. Koot, submitted for publication.

Abstract

Although only 5-10% of the population will follow a persistently high course in antisocial behavior (ASB; life-course persisters; Moffitt, 1993), in childhood, the number of children with serious ASB is likely to be double this percentage. This study examined which factors discriminate between children with stable high ASB and children with high childhood, but decreasing adolescent ASB in a general sample of boys and girls followed from age 3 to 18 years. Childhood variables that reflect a (possibly inherited) vulnerability (temperament, ADHD symptoms), and personal and environmental risk- and protective factors were tested. Results showed that children with decreasing ASB in adolescence had lower scores on childhood temperament problems and ADHD symptoms, and had a better verbal development, compared to stable high cases. Decreasing cases were also at lower risk of having poor social relations, had better behavioral competences and were less likely to grow up under adverse family conditions. These findings indicate that children truly at risk of becoming persistently high antisocial children can be discriminated from children who will grow out of ASB in adolescence on both their vulnerability scores, and their personal characteristics and environmental conditions. Implications for screening and early prevention are discussed.
Introduction

Ever since Moffitt has proposed the dual taxonomy model of antisocial behavior (Moffitt, 1993), many developmental studies have been focused on understanding the onset and developmental courses of life-course persistent (LCP) antisocial behavior (ASB) and adolescent-limited pathways (AL). According this model, a small minority of children starts exhibiting antisocial problems early in life, and continues with such problems throughout adolescence and into adulthood. In contrast, most who engage in ASB have their onset in adolescence, and their antisocial behavior is expected to desist in early adulthood. Studies indeed found support for this distinction as only 5-10% of the total population are characterized as following a life course persistent path as compared to approximately 30% who engage in adolescent onsets of problem behavior (Fergusson & Horwood, 2002; Moffitt et al., 1996; Moffitt & Caspi, 2001; Moffitt et al., 2002).

Thus, a minority of the total population will have serious ASB in both childhood and adolescence. What is intriguing however is that the number of children with high level antisocial problems in childhood is likely to be twice as high or even more. That is, likely half of all children with high level behavior problems in childhood do not move on to become persistent antisocial adolescents. For instance, Moffitt and colleagues (1996; 2002) reported that approximately 50% of those classified as having high level ASB in childhood, did not remain high on antisocial acts in adolescence and adulthood. This so called recovery group included approximately 8% of the total sample, compared to 9% of the total sample rated as life course persisters. Nagin and Tremblay (1999), who focused specifically on physical aggression (i.e., not other forms of antisocial behavior) covering the period of age 6 – 15 years, found that the vast majority of physically aggressive children actually did not move on to remain high on such behavior in adolescence. Specifically, they found that only 4% of their sample had chronic high level physical aggression from age 6 to age 15 years. This contrasted with 28% of the total sample who followed a trajectory of high level physical aggression in childhood, but had decreasing levels of these problems into adolescence (‘high desisters’).

Thus, several studies reported that likely half of the children, or even more, who exhibit high level ASB in childhood, are actually not at risk of becoming persistently high antisocial youths. Knowing which children are ‘false positives’ is essential as the early and valid identification of truly at risk children is critical for prevention purposes (Tremblay, 2006). That is, for prevention to be optimally efficient, programs should be aimed at preventing the poor personal outcomes (and costs for society) of those at risk for life-course persistent antisocial behavior (Fergusson et al., 2005; Moffitt et al., 2002). In contrast, the portion of highly antisocial children with problems restricted to the childhood period will, independent of prevention efforts exhibit decreasing problems in adolescence. In addition, to determine
whether prevention strategies are effective, it is important that empirically derived target variables are based on samples of persistent high antisocial individuals only.

When trying to discriminate the group of children with decreasing ASB in adolescence from those with persistent problems, Moffitt’s theory – supported by later empirical findings (Moffitt, 1990; Moffitt, 1993; Moffitt & Caspi, 2001) – suggests two foci of potential fruitful research. After all, according to the theory and supported by empirical data, life-course persistent youths are characterized by (1) having inherited vulnerabilities, expressed as a difficult temperament, hyperactivity, and subtle neuro-cognitive impairments including low IQ, poor verbal ability, delayed motor development and neuropsychological memory. These inherited risks are (2) exacerbated by a high risk environment/absence of protective personal variables, including being exposed to inadequate parenting and poverty, and having poor social relations. Thus, in trying to understand which children, despite high level childhood behavior problems, do not move on to remain persistently high on antisocial behaviors we need to study whether this group, compared to stable high children, is either less vulnerable, or less exposed to adverse personal and environmental factors during childhood, or both at the same time.

Until now, only little research has been directed at understanding why children start off with high level problem behavior in childhood but desist from antisocial behaviors in adolescence. However, a number of studies did (Ingoldsby et al., 2006; Moffitt, 2003; Moffitt et al., 1996; Nagin & Tremblay, 2001). Most of these studies found no differences between stable high and decreasing children (Ingoldsby et al., 2006; Moffitt, 2003; Moffitt et al., 1996). For instance, partly unpublished analyses reported by Moffitt and colleagues revealed that their ‘recovery group’ (Moffitt, 2003) had similar levels of inherited vulnerabilities (temperament problems, low IQ) and family adversity in childhood as LCP youths (Moffitt, 2003; Moffitt et al., 1996), and no protective variables were identified explaining their desistance (Moffitt, 2003). Nagin and Tremblay (2001) found no indication that children with desisting pathways had lower levels on inattention or IQ (possibly referring to inherited risk) than chronic high individuals. However, they did find that ‘high desisters’ were less likely to be exposed to a risky environment, expressed by a lower probability to be born to a teenage mother, or a mother who was low educated.

Thus, from the limited research a diverse picture emerges on the possibility to discriminate children with truly stable high ASB, from those who will eventually grow out of their antisocial problems in adolescence. The goal of the present study is to add to the limited research base by studying if, and if so, what factors discriminate children with high problem behavior but decreasing levels of ASB in adolescence from children who remain high on ASB in a general sample of boys and girls followed from age 3 to 18 years. Based on the dual
taxonomy model (Moffitt, 1993), we will consider the same factors reflecting both developmental vulnerability, as well as personal and environmental risk and protective factors, measured in early, middle and late childhood. Measures of temperament, ADHD symptoms (attention problems and hyperactivity) and developmental factors (e.g., motor development) are used as indicators of vulnerability. Personal factors include measures of social competence, social relations and school functioning, and environmental factors include family factors, and perceived social support.

Methods

Sample
The original sample of 420 children was taken randomly from the Dutch province of Zuid-Holland, using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). Data were collected using multiple informants when children were 3 (1989), 5 (1991), 10 (1997) and 18 years old (2005). Written informed consent was obtained from parents at the age 3, 5, 10 and 18 assessments, from teachers at the age 5 and 10 assessments and from adolescents at the age 18 assessment.

At the first assessment (age 3) 420 parents (212 boys, 208 girls; mean age = 2.58 years, \(SD = 7.3\) months) participated in the study. At age 5, 397 parents (95%) of the original sample were reached (201 boys, 195 girls; mean age = 4.83 years, \(SD = 8.4\) months). Teacher information was obtained for 342 of these children (86%). At age 10, 358 parents (85%) of the original sample participated in this assessment (180 boys, 178 girls; mean age = 10.46 years, \(SD = 7.2\) months). Teacher information was collected for 294 of these children (82%). Self-reports were obtained for 295 children (82%). At age 18, all parents and adolescents in the original sample were again approached. Two children deceased between age 10 and 18 years. Of the original sample 324 parents (77%; 165 boys, 159 girls; mean age = 18.19 years; \(SD = 8.4\) months) completed questionnaires. Thirty-seven parents refused or got no permission from their children to participate, while 41 parents were unreachable (no address information, or emigrated). Finally, 16 parents who initially gave their consent to participate never returned questionnaires. Self-reports were obtained for 311 adolescents of the original sample (74%, 152 boys, 159 girls). Forty adolescents were untraceable (no address information, emigrated). Forty-five adolescents refused participation and 22 did not return questionnaires.
Instruments

Childhood measures of Aggressive behavior

Parent ratings of aggressive behavior at age 3, 5 and 10 years was rated through the Aggressive Behavior scale of the Dutch version of the Child Behavior Checklist for ages 2 and 3 years (CBCL/2-3; Achenbach, 1992) and the Child Behavior Checklist for ages 4 to 18 years at the 5 and 10 year assessment (CBCL/4-18; Achenbach, 1991). For both instruments the response format is a 3-point Likert scale (0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). The Aggressive Behavior scale of the CBCL/2-3 includes 9 items (a = .76), and the CBCL/4-18 Aggressive Behavior scale 13 items (a = .86/.90). The structure of the Dutch translation of the CBCL was found to be similar to the American version (De Groot et al., 1994). Good reliability and validity of the translated version have been confirmed (Verhulst et al., 1996).

Teacher ratings of aggressive behavior at age 5 and 10 years were obtained through the Aggressive Behavior scale (25 items) of the Dutch version of the Teacher’s Report Form (TRF; Achenbach, 1991). The response format is a 3-point Likert scale (0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). Cronbach’s alphas were .93 and .95 at the age 5 and 10 assessments respectively.

Age 18 measures of Externalizing behavior

Parent ratings of externalizing behavior at age 18 years were obtained through the broadband Externalizing Behavior scale (33 items, a = .93) of the CBCL/4-18 (Achenbach, 1991).

Self-reports of externalizing behavior were obtained through the Dutch version of the broadband Externalizing Behavior scale (32 items, a = .84) of the Youth Self-Report (YSR; Achenbach, 1991), which is the equivalent of the parent- and teacher-reports of emotional and behavioral problems.

Children’s vulnerability factors

Temperament factors. At age 5 and 10 years parents completed the Dimensions of Temperament Survey revised (DOTS-R; Windle & Lerner, 1986) measuring temperament attributes in children on a 4-point Likert scale. The Mood scale (7 items; a = .71/.74) including items such as Generally cheerful mood, Smiles a lot was used as well as the Task-Orientaton scale (8 items; a = .69/.65) including Keeps busy until task is finished, Once busy nothing distracts him/her from the task.
**ADHD symptoms.** At age 3 the Overactive scale of the CBCL (5 items, \(a = .77\)) was used including items such as, Quickly shifts activity, Can not sit still. At age 5 and 10 years the Attention Problems scale of the CBCL (11 items, \(a = .66/.73\)) and the TRF (21 items, \(a = .90/.90\)) were used including items such as Can not concentrate, Can not sit still. Additionally, the General Activity scale (7 items; \(a = .74/.70\)) of the DOTS-R (Windle & Lerner, 1986) was used, including items such as Seems to move ceaselessly, Not able to stay calm for a long period.

**Motor and language development.** At age 3 parents completed the Minnesota Child Development Inventory (MCDI; Ireton & Thwing, 1974), an early developmental assessment instrument for children between 6 months and 6 years. It includes eight subscales, of which the two motor development scales were used. The fine motor development scale (44 items; \(a = .76\)) includes items such as Sticks fingers in bottlenecks or little holes of other objects, and the gross motor development scale (34 items; \(a = .76\)) includes items like Walks without assistance. Both scales have a yes/no response. At age 5 we assessed language impairment using the LSI (Language Screening Instrument; Gerritsen, 1988), which consists of three parts: a formal test of the child’s language competence (37 items for 4-year olds, and 39 items for 5-year-olds), supplemented by a parent and a teacher rating scale (12 and 6 items, respectively). The test part measures active and passive vocabulary, verbal comprehension, and syntax. The parent and teacher questionnaires assess information on language use, comprehension, and development (\(a = .71\)).

**Children’s personal and environmental risk and protective factors**

**Social competences.** At age 5 years the Nijmegen Observation Scale for Preschoolers were assessed by teachers (NOSP; Rost, 1992). Items were scored on a 7-point Likert scale. Three scales were used in the current study: Task-related Behavior (11 items; \(a = .89\)) including items such as When performing a task, this child works carefully, Social Behavior (17 items; \(a = .91\)) including items like This child is able to cooperate with other children, and Affect (6 items; \(a = .77\)) including for example, This child is able to cope well with disappointments.

Self-Perceived Competence at age 10 years was rated using the Self-Perception Profile for Children (SPPC; Harter, 1985b), a self-report assessing competence across several domains. Four subscales of the SPPC were used, each containing 6 items on a 4-point scale: Academic Competence (\(a = .79\)), Social Competence (\(a = .80\)), Behavioral Conduct (\(a = .75\)), and Global Self-Worth (\(a = .80\)). The Dutch translation was found to be reliable and internally valid in measuring the self-concept of Dutch children (Van Dongen-Melman et al., 1993).
**Social relations.** At age 5 and 10 years the Social Problems scale of the CBCL (15 items; a = .66/.83) and TRF (a = .73/.85) were used, including items such as Not liked by peers, Does not get along with peers.

Sociable-Leadership at age 10 years was assessed through the Revised Class Play (RCP; Masten et al., 1985) describing 15 positive social roles, such as Has many friends, Helps others (a = .85).

**School Functioning.** Academic Functioning at age 10 years was rated by teachers on a scale from 1 (low) to 5 (high) on a subscale of the TRF competence scale (Achenbach, 1991). Classroom Behavior at age 10 years was reported by teachers on a subscale of the TRF competence scale (Achenbach, 1991) including 4 items (a = .83): How hard is he or she working, How appropriately is he or she behaving, How much is he or she learning, How happy is he or she.

**Family.** Socio-economic status (SES) of the family was assessed on the basis of current parental occupation and highest level of education completed. Socioeconomic status was categorized in low, intermediate, and high; calculations were based on the scoring of Statistics Netherlands (Statistics Netherlands, 1993).

Life Events at age 5 and 10 years were rated using the Life Events Questionnaire (LEQ; Berden et al., 1990), which is a parent-reported questionnaire assessing 32 stressful life events (yes/no response). At age 10 a short form was used including 12 items. Life Events were considered a family factor as most items included family-related events (e.g., Death of a parent or sibling, Divorce or separation of parents).

Parenting Stress at age 5 and 10 years was assessed through parents using the Nijmegen Parenting Stress Index (NPSI), which is a modified Dutch version of Abidin’s Parenting Stress Index (Abidin, 1983) measuring the level of perceived parental stress originating from parent characteristics in the caregiving context (De Brock et al., 1990). The Parenting Stress scale consists of 13 items (a = .85/.88) and were scored on a 6-point Likert scale. We used a short form including items such as Parenting this child is harder than I thought, I often have the feeling that I cannot manage things very well.

Parental Psychopathology at age 10 years was rated using the Young Adult Self-Report (YASR; Achenbach, 1997). We used a short form consisting of 34 items (Achenbach, 1997), which were summed into a total score of emotional and behavioral problems (a = .87).

Family Functioning at age 10 years was rated by parents through the McMaster Family Assessment Device (FAD; Epstein et al., 1983) on a 4-point Likert scale. The General-
Family-Functioning scale consists of 12 items (a = .86) including, Trust each other, Show feelings.

Self-perceived Social Support. At age 10 years social support was rated through the Social Support Scale for Children (SSSC; Harter, 1985a), which is a self-report questionnaire measuring child-perceived support from four sources (each including 6 items on a 4-point scale): Parents (a = .53), Close Friends (a = .84), Teachers (a = .76), and Classmates (a = .80). Considering the low alpha of Social Support from Parents, this scale was excluded from analyses.

Procedure
At the first assessment in 1989 (age 3), parents received a letter inviting them to participate in the study. Interviewers made an appointment for an interview at home. Parents were again approached in 1991 (age 5). After obtaining consent by phone, parents again were interviewed at home. Parents were also asked for permission to send questionnaires to the child’s teacher. In 1997 (age 10), all parents in the original sample were invited by mail to participate in the third assessment, regardless of participation at the second assessment. Respondents were contacted by phone to obtain consent to send them a package of questionnaires by mail as well as to send a number of questionnaires to the child and its teacher. In 2005 (age 18), all traceable adolescents and parents in the original sample were approached for the fourth assessment by mail. Parents were only invited after consent by the target adolescent. Participants could fill out questionnaires through mail (49.5% of parents, 19.2% of adolescents) or by internet. The majority of the data was obtained between January and November 2005.

Statistical analyses
To discriminate children with stable high ASB from those with decreasing problems in adolescence we calculated the risk status, based on the aggressive behavior scores over childhood (age 3 – 10 years) and the level of externalizing behavior at age 18 years. Two latent factor scores were constructed using Mplus 4.21 (Muthén & Muthén, 1998-2007) The childhood latent factor used the parent reported aggressive behavior scores at ages 3, 5, and 10 years, and the teacher reported aggressive behavior scores at age 5, and 10 years as indicators. The adolescent latent factor used the parent, and self reported externalizing behavior scores at age 18 years as indicators. Both latent factors were controlled for (male) sex. Next, to identify deviant cases on both latent factors, children with scores at or above the (borderline) clinical cut-off range (i.e., T-score = 60), provided by the ASEBA measures (Achenbach & Rescorla, 2001), were recoded as high level problems, whereas scores below this cut-off represent low level problems. By combining these scores, four groups were computed. Individuals with a T-score < 60 in both childhood and adolescence were labeled as...
Using these four groups (with a focus on stable high vs. decreasers), we tested for mean group differences in the level of variables representing (inherited) vulnerability factors, and the level of personal and environmental risk and protective factors in childhood using multivariate analysis of variance (MANOVA). Planned (simple) contrasts were used to contrast the decreasing group (reference category) from the stable high group.

Results

Identification of children with stable high and decreasing antisocial behavior

According to previous findings (Moffitt et al., 1996; Moffitt et al., 2002) we anticipated finding that approximately half of those classified as being at high level ASB in childhood, did not move on to become persistent antisocial youths throughout adolescence. Using the ASEBA borderline clinical cut-offs, 57 children were classified as having high level ASB in childhood (covering a period of 3 to 10 years, using both the parent and teacher ratings). In adolescence, across raters (parent- and self-report) 56 participants were classified as having high level ASB. When combining these periods, 225 children showed low level ASB in both childhood and adolescence (73%; stable low group; 44% males), 28 participants showed low level ASB in childhood, and high level problems in adolescence (9%; increasers; 43% males). Of the 57 children who had high ASB in childhood, 28 participants (49% of all children with persistently high ASB) had both high level ASB in childhood and adolescence (9% of total sample; stable high group; 64% males). The remaining 29 participants – 51% of high level ASB in childhood – had below cut-off problem levels in adolescence (9% of total sample; decreasers; 79% males). Thus, our percentage of children having persistent ASB and decreasing problems was in accordance with previous findings (Moffitt et al., 2002).

Although both the stable high group and the decreasers had persistently high levels of aggressive behaviors in childhood, we explored whether persisters had more extreme childhood aggression scores than decreasers. The means and standard deviations of both the observed and latent aggressive behavior scores in childhood for all groups are in Table 4.1. It showed that the latent factor scores of decreasers were lower than among the high stable group. A closer observation of the observed scores shows that parent and teacher reported aggressive behavior at age 3 and 5 years are equally high in the decreasing group and stable high group. However, decreasers had significantly lower parent and teacher rated aggressive
behavior scores at age 10 years. But when compared to low cases (stable low, or adolescent increasers), our decreasing group had significantly higher levels of parent reported aggressive behavior at age 10 years than both low childhood groups respectively (difference = 6.54, SE = .79, p < .01; difference = 4.35, SE = 1.05, p < .01). Thus, the level of aggressive behavior of decreasers was lower than for the stable high group in late childhood only. This may not be surprising given their further decreasing ASB into adolescence. Note that according to previous findings (Moffitt, 2003), decreasers are not expected to become completely problem free in adolescence, but to remain higher on ASB than stable low cases. Results showed that despite their decrease in ASB, our decreasers indeed still had higher levels of parent reported problems at age 18 than stable low cases (see Table 4.1, superscript a indicates a significant difference between these two groups).

To ascertain that the decreasing group, besides having higher scores on childhood aggressive behavior than stable low cases, were different from stable low cases on the vulnerability, and personal and environmental conditions (i.e., to ascertain that decreasers were consistently truly at risk in childhood, apart from the high level of childhood aggressive problems), we conducted a MANOVA including all study variables, with planned contrasts using the decreasing group serving as a reference category. Findings confirmed that compared to the stable low group, decreasing cases had significantly higher levels of ADHD symptoms at ages 3, 5 and 10 years, higher levels of a negative mood at age 10, lower levels of social competence at age 5 and 10, and more social problems and adverse family conditions at age 5 and 10 (see Table 4.2, superscript a indicates a significant difference between these two groups).

Understanding 'false-positive' cases: factors discriminating decreasers from stable high cases

After having established that the characteristics of our decreasers was in accordance with previous findings, we moved on exploring what discriminates decreasers from stable high cases on their childhood characteristics. Table 4.2 presents the group means, standard deviations, overall effects and contrast effects of the vulnerability factors, including temperament factors, ADHD symptoms, and developmental factors. One MANOVA, with planned contrasts (decreasers vs. other groups) was used to test for significant differences between groups on all variables. The overall test statistic was significant indicating group differences on the factors (F (38, 114) = 3.05, p = .00).

Significant overall group differences were found for all indicators of vulnerability, except fine and gross motor development at age 3. The planned contrasts showed with regard to temperamental factors, the decreasing group had higher scores than the stable high group on task orientation at age 10 years, with a trend towards significance already at age 5 years.
Table 4.1. Descriptives of Observed and Latent Antisocial Behavior Scores in All Four Groups

<table>
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<th>Observed Scores</th>
<th>Stable Low $n = 225$</th>
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<th>Stable High $n = 28$</th>
<th>Decreasing $n = 29$</th>
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<td>Age 5 Parent</td>
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<td>7.15</td>
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Note. $M =$ Mean score; $SD =$ Standard Deviation. $^a$ Significant difference between decreasing group and stable low group ($p < .05$).
No difference was found between both groups for negative mood at age 5 and 10 years. With respect to symptoms of ADHD, no significant difference was found between decreasers and the stable high group on scores of overactivity at age 3. However, both parent- and teacher reported attention problem scores were lower for the decreasing group at age 5 and at age 10 years (parent-report only), as compared to stable high children. In addition, parent rated activity level at age 5 and 10 was lower for the decreasing group than individuals in the stable high group. When regarding developmental outcomes, decreasers had lower scores on language impairment than in the stable high group.

The results with regard to measures of personal and environmental risk and protective variables are presented in Table 4.3. Again, overall group differences were found for all personal factors (with a trend toward significance for academic competence at age 10), and for the environmental factors (with a marginally statistical significant effect for family functioning at age 10), except perceived social support received from best friends and teachers at age 10. The planned contrasts between the decreasing and high stable groups on the personal factors showed, with regard to measures of social competence, a higher level of self reported behavioral conduct at age 10 ($p = .05$) in the decreasing group than in the high stable group, no significant differences for teacher reported social behavior, affect and task-related behavior at age 5, and self-reported global self-worth and social competence at age 10.

Considering the measures of social relations, the results showed that decreasers have lower levels of teacher reported social problems than the stable high group at age 5, but showed no difference in parent reported social problems at that age. At age 10, both parent- and teacher reported levels of social problems were lower in the decreasing group compared to the high stable group. A trend toward significance was found for (higher) sociable-leadership at age 10 in the decreasing group compared to the high stable group. The results for school functioning showed a marginally significant effect for teacher reported classroom behavior at age 10, with higher scores in the decreasing group compared to the high stable group, whereas the two groups were not different on teacher-reported academic functioning and self reported academic competence at age 10.

Comparisons of the environmental risk/protective factors shows with regard to family factors, lower levels of parenting stress levels at age 5 and 10 in the decreasing group than in the stable high group, and marginally significant higher scores ($p = .06$) on family functioning at age 10 in the decreasing group. No differences are found on family SES at age 3, stressful life events at age 5 and 10, or parental psychopathology at age 10. Regarding self-perceived social support, no significant difference is found between both groups in social support received from classmates.
### Table 4.2. Comparisons on Vulnerability Factors

<table>
<thead>
<tr>
<th>Vulnerability factors</th>
<th>Scale Range</th>
<th>Stable Low n = 225</th>
<th>Increasing n = 28</th>
<th>Stable High n = 28</th>
<th>Decreasing n = 29</th>
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<th>Decreasing vs. Stable High</th>
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<td>.20 .26</td>
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<td>1.70 (.44)</td>
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<td>.09 .42</td>
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<td>.66 (.54)</td>
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<td>1.58 (.49)</td>
<td>1.06 (.51)</td>
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<td>.00 1.26</td>
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<td>1.49 (.49)</td>
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<td>1.74 (.58)*</td>
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<td>.01 .58</td>
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*Note.* P = Parent-report; T = Teacher-report. $d =$ effect size of mean difference (Cohen’s $d$). * Significant difference between decreasing group and stable low group ($p < .05$).
## Table 4.3. Comparisons on Personal and Environmental Factors

<table>
<thead>
<tr>
<th>Personal and Environmental Factors</th>
<th>Scale Range</th>
<th>Stable Low n = 225</th>
<th>Increasing n = 28</th>
<th>Stable High n = 28</th>
<th>Decreasing n = 29</th>
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<th>Decreasing vs. Stable High p</th>
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Table 4.3 (continued)

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Note. P = Parent-report; T = Teacher-report; C = Child-report. $d =$ effect size of mean difference (Cohen’s $d$). * Significant difference between decreasing group and stable low group ($p < .05$).
Discussion

In accordance with previous findings by Moffitt and colleagues (Moffitt et al., 1996; Moffitt et al., 2002), this study also found that approximately half of the children classified as having persistent and pervasive high level ASB over the childhood years, actually do not move on to become highly antisocial adolescents. As especially chronically high antisocial children account for the personal and societal ‘costs’ associated with antisocial problems (Fergusson & Horwood, 1998; Moffitt et al., 2002), a valid and early identification of those truly at risk for persistent antisocial problems is needed to effectively direct prevention effort to these truly high risk children. This study aimed at addressing this by studying which childhood factors differentiate between desisting ASB and high stable levels of problems during adolescence. Guided by Moffitt’s theory of antisocial development (Moffitt, 1993; Moffitt & Caspi, 2001), we explored whether individuals with decreasing levels of ASB would have lower scores on variables inducing a (possibly inherited) vulnerability, and/or on variables reflecting a less risky environment, or better personal competences, as compared to persistent antisocial individuals.

Our findings suggest that both domains of variables discriminate children who were initial high but who had decreased ASB in adolescence from children who remained high on antisocial problems throughout development. In short, this study revealed that despite their pervasive and persistent problems in childhood, children with decreasing ASB in adolescence, compared to stable high cases, had lower scores on childhood temperament problems and ADHD symptoms, and have a better verbal development. These children also were at lower risk of having poor social relations, had better behavioral competences and were less likely to grow up under adverse family conditions. Although these findings are highly consistent with our expectations drawn from Moffitt’s theory (Moffitt, 1993; Moffitt & Caspi, 2001), they only very limitedly accord with previous findings. In fact, our finding contrast the results found by Moffitt and colleagues, as they found no differences between their LCP and recovery group. Like the LCP, children in the recovery group had extreme under-controlled temperament (Moffitt et al., 1996) and they also suffered from low IQ, delayed motor development, and adverse family adversity in childhood (Moffitt, 1990, 2003). Nagin and Tremblay (2001), although specifically focusing on physical aggression, found no differences in the level of ADHD symptoms (inattention, hyperactivity) or prosocial skills between individuals with persistently high physical aggression and individuals with desisting levels from age 6 to age 15 years. However, these authors did find that persistently high children were more likely to be exposed to family risk variables (teenage motherhood, mother’s low education) than children on the desisting trajectories. This seems comparable to our results of lower levels of parenting stress among our decreasing children. However, the findings on family adversity by Nagin and Tremblay were not replicated by Ingoldsby and colleagues.
Although they covered only the period from early to late childhood, they found that the early onset and high/decreasing groups were generally similar in terms of early parent-child conflict and living in disadvantaged neighborhood circumstances.

In sum, the current findings are to a great extent consistent with the proposition that risk for life course persistent antisocial behavior emerges from inherited or acquired vulnerabilities, as well as from personal and environmental risk sources (Moffitt, 1993; Moffitt & Caspi, 2001). That is, our results indicate that the reason why not all children with high level ASB in (early) childhood develop into a life course persistent path of antisocial behavior, lies in the fact that part of these children – the decreasers – are less vulnerable in terms of hyperactivity, difficult temperament, and verbal impairment, and are at lower risk of family adversity and have better social competences and social relations than individuals with high persistent behavior problems. It must be mentioned that some of the factors associated to decreasing antisocial problems were measured at the age of 10 years, the time point at which antisocial levels in the decreasing group were not as high anymore as in the stable high group. However, it is important to note that the differences between our stable high group and our decreasers were not solely explained by these age 10 years differences; rather, differences in their level of (inherited) vulnerability factors and risk factors were found already in early childhood, when antisocial behavior was still equally high in the decreasing and stable high groups. This indicated that these factors are not merely indicators of already improved functioning at age 10, but that children who will eventually decrease in ASB from late childhood onwards can already be discriminated from stable high cases through their early childhood vulnerability scores, and their exposure to risky environments.

The present findings should be viewed against some limitations. Due to the use of a community sample of limited size, the number of cases with initial high but decreasing ASB, and with stable high ASB were rather limited (although percentages were in line with previous findings). This may have caused several results to be marginally significant; in addition to that it prevented us from conducting gender-specific analyses. Furthermore, the present findings are drawn from a mixed gender community sample and may not be generalized to an at risk (mostly male) sample characterized by serious levels of antisocial behavior.

The current study has implications for the screening of children at risk of high persistent antisocial behavior and for research on the development of antisocial behavior. Numerous studies on the course of antisocial behavior and the influence of risk variables on its course concluded that in order to prevent persistently high antisocial behavior and related poor functioning in at risk children, we should start with intervention as early as possible (e.g., Capaldi, Chamberlain, & Patterson, 1997; Tremblay, 2006). To use prevention effort in an
efficient and effective way, it should be aimed only at those children at risk for persistently high levels of antisocial problems. This study, in accordance with previous studies showed that approximately half of the children with persistently and pervasive antisocial problems in childhood actually showed decreases in such problems over the adolescent years. Thus a screening of children, to identify truly persistent cases in early childhood is of much needed, also because directing prevention at each of the children with high childhood levels of antisocial problems would result in too optimistic conclusions on the effectiveness of the intervention. Half would have improved regardless of intervention. Our study showed that (high) childhood levels of antisocial behavior are not informative in this regard. Rather, attention should be paid to child characteristics such as having (lower) vulnerability scores (e.g., lower temperament problems, lower ADHD symptoms), to having less social difficulties, as well as to the environment in which the child is raised, such as family risk conditions (e.g., lower parenting stress).

With regard to research on the development of antisocial behavior, our study suggests that the previous findings and conclusion by Moffitt and colleagues warrants further study. As for our positive findings on differences between stable high and decreasing cases, the previous conclusion that desisters were similar to LCP on all hypothesized predictor variables needs to be affirmed in other samples. For now, our study seems to convey a more positive message. That is, we found clear evidence that children with persistently high levels of antisocial problems in childhood, but who recover over the adolescent years, can be discriminated from persistently high cases.
CHAPTER 5

WHICH FORMS OF CHILD/ADOLESCENT EXTERNALIZING BEHAVIORS ACCOUNT FOR LATE ADOLESCENT RISKY SEXUAL BEHAVIOR AND SUBSTANCE USE?


Abstract

Health risk behaviors like substance use (alcohol, tobacco, soft/hard drugs) and risky sexual behavior become more prevalent in adolescence. Children with behavior problems are thought to be prone to engage in health risk behaviors later in life. It is however unclear which problems within the externalizing spectrum account for these outcomes. Three-hundred-nine children were followed from age 4/5 years to 18 years (14 year follow-up). Level and course of parent rated opposition, physical aggression, status violations and property violations were used to predict adolescent reported substance use and risky sexual behavior at age 18 years. Both level and change in physical aggression were unique predictors of all forms of adolescent health risk behavior. Levels of status violations predicted smoking and soft drug use only, while change in property violations predicted each of the health risk behaviors. The links between opposition and health risk behaviors were accounted for by co-occurring problem behaviors. Of externalizing problems, physical aggression is the best predictor of adolescent substance use and risky sexual behavior from childhood onwards. Possible explanations and implications of these findings, and future research directions are discussed.
Introduction

Worldwide, substance use, risky sexual behavior and their adverse consequences are common among adolescents. After a decrease in the eighties, illicit substance use in the US increased again in the early nineties (Crockett, 1997). Frequent and excessive use of substances increases the risk for lung cancer, heart and vascular disease, and brain damage (e.g., Windle & Windle, 2003). Risky sexual behavior is increasing worldwide, given the increasing prevalence of adolescent pregnancies and sexually transmitted diseases (STDs) (Creatsas, 1997). STDs can eventually lead to fertility problems or cervical cancer (e.g., Diclemente & Crosby, 2003). Moreover, these health risk behaviors have been related to alcohol or drug dependence, psychological disorders, teenage parenthood, educational failure, and conviction (Viner, 2005).

There is an abundance of evidence linking childhood externalizing behaviors to adolescent substance use (e.g., Fergusson et al., 2005; Hawkins et al., 1992; Lysy & Fergusson, 1995) and risky sexual behavior or teenage pregnancy (Bennett & Bauman, 2000; Fergusson & Woodward, 2000; Woodward & Fergusson, 1999). However, externalizing behavior is comprised of rather different behaviors. In fact, through meta-analyses, Frick et al. (1993) identified four clusters of behaviors within broader externalizing problems: opposition (e.g., argues a lot, disobedient), physical aggression (e.g., gets in many fights, physically attacks people), status violations (e.g., runs away from home, truancy), and property violations (e.g., lying, vandalism). Because of this, several researchers have emphasized the need to distinguish between these forms of externalizing problems when studying their link with poor outcomes (Bongers et al., 2004; Tremblay, 2000).

To our knowledge, no studies have explored which of the distinct externalizing problems identified by Frick and colleagues (1993) are linked to substance use and risky sexual behaviors. A number of studies did explore links from multiple externalizing forms to adverse adolescent outcomes (however, not for risky sexual behavior). For instance, White and co-workers (White, Xie, Thompson, Loeber, & Stouthamer-Loeber, 2001) found that when adolescent Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) were considered, CD predicted both alcohol and marihuana use at age 18, whereas ODD predicted only alcohol use. However, these influences were not tested simultaneously. Biederman et al. (1997) did control for co-occurring behaviors and showed that childhood CD, and not ODD predicted substance use disorders in adolescence, while effects of Attention Deficit Hyperactivity Disorder (ADHD) on substance use disorders were mediated by conduct problems. However, DSM-IV CD is comprised of four clusters of behavior problems (physical aggression/violence, destruction/vandalism, deceitfulness or theft, and serious violations of rules). Thus, although CD may be a better predictor of poor outcomes than
ODD, we still do not know whether all forms of problem behaviors that comprise CD account for these outcomes. Results from two studies (Broidy et al., 2003; Nagin & Tremblay, 1999) suggest that the predictive association from (deviant levels of) opposition to delinquency (which might comprise substance use) is, by and large, accounted for by (deviant levels of) physical aggression. To our knowledge, with respect to CD symptoms such as property and status offences, no findings on their unique prediction to adverse adolescent outcomes have been reported.

When studying the link between specific forms of externalizing problems and health risk behaviors, it is important to account for the role of developmental change of these behaviors in this association. However, some of the longitudinal studies described above (e.g., Biederman et al., 1997; White et al., 2001) actually studied the rank order between externalizing behavior and outcomes at two points in time, thus ignoring the influence of individual change in externalizing behavior and its association to the outcomes. However, many children exhibit some forms of, for instance, physical aggression in early childhood, but most desist from such problems when they grow older (Broidy et al., 2003; Nagin & Tremblay, 1999; NICHD, 2004). Especially those who followed a stable high path of aggression (i.e., the deviant non-desisting path) were at highest risk for poor outcomes (Broidy et al., 2003; Nagin & Tremblay, 1999). We therefore studied the link between the level and change of opposition, physical aggression, status violations, and property violations in concert in their link to substance use and risky sexual behavior. We explored the degree to which each of these forms of externalizing problems are uniquely linked to substance use and risky sexual behavior.

Finally, many studies on the prediction of health risk behaviors relied on a single rater of both predictor and outcome measures, thereby ignoring the risk of biased results. This study tries to avoid a potential rater bias by relating parental reports of externalizing behaviors in childhood and adolescence to self-reports of health risk behaviors in adolescence.

**Methods**

**Sample**
The original sample of 420 children aged 2 or 3 years was taken randomly from the Dutch province of Zuid-Holland, using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). Data were collected when children were 2/3 (1989), 4/5 (1991), 10/11 (1997) and 18 years old (2005). For the current study, parent reported behavior problems at the age 4/5, 10/11 and 18 years assessment and adolescents’ self-reports at 18 years were used. Written informed consent was obtained from parents at the age 4/5, 10/11 and 18 assessments as well as from adolescents at the age 18 assessment.
At age 4/5, 95% of the original sample was reached (201 boys, 195 girls; mean age = 4.83 years, $SD = 8.4$ months). At age 10/11, response was 85% (180 boys, 178 girls; mean age = 10.46 years, $SD = 7.2$ months). At age 18, 324 parents (77%; 165 boys, 159 girls; mean age = 18.19 years; $SD = 8.4$ months) completed questionnaires. Thirty-seven parents refused or got no permission from their children to participate, while 41 parents were unreachable (no address information, or emigrated). Two children died between age 10/11 and 18 years. Finally, 16 parents who initially gave their consent to participate never returned questionnaires.

Self-reports were obtained for 311 participants (152 boys, 159 girls; 74% of original sample). Forty adolescents were untraceable (no address information, emigrated) and 2 children died between 10/11 and 18 years. Forty-five adolescents refused participation and 22 did not return questionnaires.

**Instruments**

*Parent rated behavioral problems* over the past six months were assessed using the Child Behavior Checklist/4-18 (CBCL/4-18; Achenbach, 1991; Verhulst et al., 1996) at age 4/5 and 10/11 and the updated version (CBCL/6-18; Achenbach & Rescorla, 2001) at age 18. Parents rated 112 emotional and behavioral problem items on a 3-point Likert scale (0 = *not true*, 1 = *somewhat true or sometimes true*, and 2 = *very true or often true*). Good reliability and validity of the Dutch translation of the CBCL have been confirmed (Verhulst et al., 1996).

Items reflecting the four clusters of externalizing behavior (Frick et al., 1993) were used. Opposition consists of 7 items: *Argues a lot, Disobedient at home, Disobedient at school, Stubborn, sullen or irritable, Sulks a lot, Teases a lot,* and *Temper tantrum or hot temper.* Physical aggression covered 3 items: *Gets in many fights, Physically attacks people,* and *Threatens people.* Status violations included 3 items, *Runs away from home, Swearing or obscene language, Truancy or skips school.* Property violations contained 6 items: *Cruel to animals, Lying or cheating, Sets fires, Steals at home, Steals outside the home,* and *Vandalism.* All these items were also summed to a general externalizing behavior score. The 2-week test-retest reliabilities ($N = 89$, all $ps < .01$) are $r = .79$ for opposition, $r = .78$ for physical aggression, $r = .54$ for status violations, $r = .80$ for property violations, and $r = .83$ for general externalizing behavior.
Outcomes

Self reported substance use (tobacco, alcohol, and drugs) were assessed through the World Health Organization survey of Health Behavior in School-aged Children (Currie et al., 2004). For tobacco use, frequency of smoking, and number of cigarettes smoked a day \((r = .46, p < .01)\) were combined to rate seriousness of smoking behavior \((0 = \text{smokes never or rarely (anymore)}, 1 = \text{smokes occasionally,} 2 = \text{smokes regularly but} \leq 5 \text{ cigarettes a day,} 3 = \text{smokes regularly and} \leq 5 \text{ cigarettes a day;} \text{ or smokes daily but} \leq 5 \text{ cigarettes a day,} 4 = \text{smokes} 6-14 \text{ cigarettes each day,} 5 = \text{smokes} \geq 15 \text{ cigarettes each day.}\) This variable correlated .92, \((p < .01)\) with the z-scores for frequency of smoking and amount of cigarettes smoked a day items, indicating that this combined variable appropriately represented of the original items.

Alcohol use was assessed through two items (frequency of alcohol use, and frequency of drunkenness; \(r = .48, p < .01\)). These items were combined \((0 = \text{drinks never (anymore) or drinks very rarely,} 1 = \text{drinks rarely and got} \leq 2 \text{ times drunk;} \text{ or drinks rarely but got} > 2 \text{ times drunk; or drinks occasionally and got} > 2 \text{ times drunk;} \text{ or drinks occasionally and got} > 10 \text{ times drunk; or drinks regularly and got} > 10 \text{ times drunk;} 2 = \text{drinks daily but got} = 2 \text{ times drunk;} \text{ or drinks regularly and got} 3 - 10 \text{ times drunk;} 3 = \text{drinks regularly but got} = 2 \text{ times drunk;} \text{ or drinks occasionally and got} 3 - 10 \text{ times drunk;} 4 = \text{drinks daily but got} > 10 \text{ times drunk;} 5 = \text{drinks daily and got} > 10 \text{ times drunk;} 6 = \text{drinks daily and got} > 10 \text{ times drunk.}\) This variable correlated .97 \((p < .01)\) with the sum of the two original items’ z-scores.

Soft drug use (including marihuana and hashish) scores were scored on a 5-point scale: \(0 = \text{never uses soft drugs (anymore),} 1 = \text{uses soft drugs rarely,} 2 = \text{uses soft drugs regularly,} 3 = \text{uses soft drugs often,} 4 = \text{uses soft drugs daily.}\)

Hard drug use (e.g., cocaine, amphetamine, speed, XTC, LSD) was scored as: \(0 = \text{never used hard drugs,} 1 = \text{ever used hard drugs.}\)

Risky sexual behavior was scored through nine items: age of first sexual activity other than intercourse, age of first intercourse, number of sexual partners, number of variable sexual partners (without a relationship), no condom use while having varying sexual partners, has suffered from sexually transmitted diseases (STD’s), partner has had many sexual contacts, partner possibly HIV infected, got (someone) accidentally pregnant, had sex in exchange for something else. For females an item was added on (improper or no) use of oral anti-conception (conditional upon they are sexually active). Each response was dichotomized \((0 = \)
non-risky behavior, 1 = risky behavior). These items were summed and divided by the number of items (9 for males, 10 for females).

**Procedure**
At the age 4/5 year assessment all parents were interviewed at home by trained female interviewers. At age 10/11, parents were send questionnaires by mail. At the final assessment, all traceable participants received a letter asking participation, and contact information. Parents were only phoned after consent by the target adolescent. Participants could fill out questionnaires through mail (49.5% of parents, 19.2% of adolescents) or by internet. No effects of rating method (mail vs. internet) on parent reported externalizing scores ($t = -.14, p > .05$) or the percentage of adolescents reporting no versus one or more risky outcomes ($\chi^2(2, N = 309) = .07, p > .05$) were found.

Figure 5.1. Growth Parameters of Physical Aggression (PA) Predicting Late Adolescent Health Risk Behaviors, Controlled for Sex, and Time Varying Opposition (OP), Status Violations (SV), and Property Violations (PV).

**Statistical analyses**
The analyses were conducted in two stages. In the first stage a growth model on general externalizing behavior was fitted in which the development of externalizing problems was described through an intercept (initial level) and slope (change with age). The outcome variables were regressed on the growth parameters to estimate the link between externalizing...
problems and health risk behaviors. After ascertaining the link between general externalizing problems and health risk behaviors, in the second stage, we analyzed the link between specific forms of externalizing problems. Using aggression as an example, we first specified the baseline model in which the growth parameters of aggression predicted the outcomes. In the subsequent model, the scores on opposition, status and property violations at each assessment were included in the model as time varying covariates, thus controlling for their co-occurrence in predicting the outcomes. The final model is depicted in Figure 5.1. The same procedure was used for opposition, status and property violations. All models were run in Mplus 4.21 (Muthén & Muthén, 1998-2007).

Results

Preliminary analyses

Only cases of which outcome variables and at least one childhood assessment were available were used (309 children; 151 boys, 158 girls). Compared to the original sample (420 children) included children did not differ with respect to sex and age, and to externalizing problems at age 2/3 years. Excluded children were of lower SES ($\chi^2(3, N = 420) = 26.52, p < .01$), and their parents were more likely to be divorced or never married ($\chi^2(4, N = 420) = 14.29, p < .01$). Frequencies of alcohol use, smoking, soft drug use and hard drug use are presented in Table 5.1. A higher percentage of males than females were in the higher risk categories on alcohol ($\chi^2(6, N = 309) = 39.87, p < .01$) and soft drug use ($\chi^2(4, N = 309) = 17.38, p < .01$). The percentage of adolescents that reported using substances (i.e., alcohol, tobacco, and

<table>
<thead>
<tr>
<th>Score</th>
<th>Alcohol (Max = 6)</th>
<th>Smoking (Max = 5)</th>
<th>Soft Drugs (Max = 4)</th>
<th>Hard Drugs (Max =1)</th>
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<tbody>
<tr>
<td></td>
<td>Boys (n = 150)</td>
<td>Girls (n = 158)</td>
<td>Boys (n = 149)</td>
<td>Girls (n = 157)</td>
</tr>
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<td>8.7</td>
<td>7.6</td>
<td>64.4</td>
<td>72.0</td>
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<tr>
<td>1</td>
<td>2.7</td>
<td>13.9</td>
<td>4.0</td>
<td>4.5</td>
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<td>2</td>
<td>19.3</td>
<td>34.8</td>
<td>6.0</td>
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<td>3</td>
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<td>4</td>
<td>21.3</td>
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<td>12.8</td>
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<td>5</td>
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<td>6</td>
<td>2.7</td>
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Note. Descriptions of categories are in the methods section. Max = Maximum value on outcome.
marihuana) was comparable to the general Dutch population (Monshouwer, Van Dorsselaer, & Gorter, 2004). Boys and girls had similar scores of risky sexual behavior ($M = .09$, $SD = .15$ for both boys and girls). These values indicate that adolescents on average endorsed one of the risks associated with sexual behavior; however the majority of the adolescents endorsed none of the risks (66.1%) whereas a smaller portion endorsed one or multiple risks (33.9%).

To ascertain that externalizing behaviors were well represented by opposition, aggression, status violations and property violations over time, a model in which these four scales load on an overall externalizing behavior factor at each time point was fitted. A final model allowing for auto-regression of scales (e.g., aggression) across adjacent time points had a good fit to the data ($CFI = .93$; $RMSEA = .07$, C.I. = .06 -.09). Parameter estimates of development of general and specific externalizing behaviors, and sex-differences in the growth parameters are displayed in Table 5.2.

### Table 5.2. Parameter Estimates and Model Fit for the Baseline Models of General Externalizing Behavior and Opposition, Physical Aggression, Status, and Property Violations

<table>
<thead>
<tr>
<th>Baseline Models</th>
<th>Parameter Estimates</th>
<th>Sex effect</th>
<th>Model Fit</th>
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<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>Slope</td>
<td>Intercept</td>
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<tr>
<td>General Externalizing</td>
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<td>-.08** (.02)</td>
<td>.94** (.29)</td>
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<tr>
<td>Opposition</td>
<td>3.30** (.13)</td>
<td>-.09** (.01)</td>
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<tr>
<td>Physical Aggression</td>
<td>.35** (.04)</td>
<td>-.01** (.00)</td>
<td>.27** (.06)</td>
</tr>
<tr>
<td>Status Violations</td>
<td>.39** (.04)</td>
<td>.002 (.005)</td>
<td>.29** (.06)</td>
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<tr>
<td>Property Violations</td>
<td>.32** (.04)</td>
<td>-.001 (.003)</td>
<td>.11* (.05)</td>
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</table>

*Note.* Values in parentheses are standard errors. Dashes indicate no sex-differences in growth parameter (females are reference category). C.I. = Confidence Interval. N = 309 (151 boys, 158 girls). **$p < .01$; *$p < .05$.

As illustrated in Figure 5.2 (top), on average, general externalizing levels decreased over time (bold line). Individual differences in intercept (i.e., level) and slope (i.e., change) are depicted by high versus low and increasing versus decreasing individual trajectories (normal lines). With respect to the specific forms of externalizing behaviors, parameters in Table 5.2 show that oppositional problems and physical aggression decreased with age, whereas status violations and property violations were constant over time. Compared to females, males had higher levels of each form of externalizing problems, except on opposition. Males’ levels in physical aggression decreased at a higher rate than females; no sex differences were found in the slopes of the other forms of externalizing behavior.
Figure 5.2. Average and Individual General Externalizing Growth Trajectories (Top) and Relationships between the Intercept (Bottom Left), and Slope (Bottom Right) of General Externalizing Behavior and Late Adolescent Smoking.
Externalizing problems and health risk behaviors

As a starting point, we estimated the associations between the growth parameters of general externalizing problems and health risk behaviors at age 18 years (model 1, see Table 5.3). Positive associations were found between the intercept of externalizing problems and each substance use outcome, and between growth in externalizing problems and each of the health risk behaviors (see Figure 5.2 for an illustration of the relationship between the intercept (bottom left), and slope (bottom right) of general externalizing behavior and smoking as a health risk outcome). To test for sex differences in these associations, a multiple group model (males vs. females) was fitted in which the associations between the growth parameters and outcomes were held equal between the sexes. Model fit did not significantly improve when sex-specific associations were allowed for (\( \chi^2 = 15.46, df = 10, p > .05 \)), indicating sex-invariance in the associations between externalizing behavior and health risk behaviors. Therefore, subsequent models were fitted for males and females combined.

Opposition, aggression, status and property violations and health risk behaviors

Opposition. We first fitted the baseline model (model 2, see Table 5.3) in which the growth parameters of opposition predicted the outcomes. Estimates were controlled for sex, but not yet for other forms of externalizing problems. Positive associations between the intercept and slope of opposition and smoking and hard drug use were found. Additionally, a positive association between its slope and alcohol use was found. We then controlled for aggression, status violations and property violations by including them as time-varying covariates in the model (model 3). None of the previous associations remained significant, indicating that earlier oppositional problems do not predict late adolescent substance use or risky sexual behavior after other forms of externalizing problems are accounted for. Physical aggression. In the baseline model (model 4), the intercept of physical aggression was associated with alcohol use, smoking, soft drug use and hard drug use, whereas its slope was positively associated with hard drugs only. After controlling for the other three clusters of externalizing behavior (model 5), the intercept remained a significant predictor of alcohol use, soft drug use, and hard drug use, whereas the slope of physical aggression predicted each of the health risk behaviors. Status violations. As no variance was found in the slope of status violations, only an intercept model was specified. In the baseline model (model 6), this intercept predicted each health risk behavior except risky sexual behavior. However, when the other externalizing problems were accounted for, the associations remained only significant for smoking and soft drugs use (model 7). Property violations. Estimates of the baseline model (model 8) show positive associations between the intercept and slope of property violations and smoking and hard drug use (model 9). After controlling for the other clusters, all associations with the intercept became nonsignificant. However, the positive associations between its slope and each of the outcome variables remained significant.
<table>
<thead>
<tr>
<th></th>
<th>Alcohol</th>
<th>Smoking</th>
<th>Soft Drugs</th>
<th>Hard Drugs</th>
<th>Risky Sexual Behavior</th>
<th>Model Fit</th>
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</tr>
</tbody>
</table>

*Note.* I = intercept; S = slope; OP = Opposition; PA = Physical Aggression; SV = Status violations; PV = Property violations; C.I. = Confidence Interval. $N = 309$.

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


Discussion

Of all behavior problems from the externalizing spectrum, childhood and adolescent physical aggression was most consistently linked to late adolescent health risk outcomes. Note that, in accordance with previous research, physical aggression declined from childhood onwards (Bongers et al., 2004; Broidy et al., 2003; Nagin & Tremblay, 1999; NICHD, 2004). This suggests that stable high levels of physical aggression indicate developmental deviance, and our findings indicate that as such they are unique predictors of adolescent health impeding behaviors. This is in accordance with previous studies on health risk behaviors (Biederman et al., 1997; Underwood, Kupersmidt, & Coie, 1996) and coincides with findings on the prediction of delinquent outcomes (Broidy et al., 2003; Nagin & Tremblay, 1999). Research has shown that physical aggression, as well as substance use and risky sexual behavior are associated with poor behavior control (Donohew et al., 2000; Luengo, Carrillo-de-la-Pena, Otero, & Romero, 1994; Tarter et al., 2003), suggesting that poor behavior control may underlie the association between aggression and these health risk behaviors. It may also underlie the predictive association of property violations as such problems have also been linked to difficulties in behavior control (Luengo, et al., 1994). However, alternative explanations, such as tension/stress reduction (e.g., Bennett & Bauman, 2000) or sensation seeking (Eysenk, 1997) may additionally account for the link.

High levels of status violations (e.g. truancy, running away from home) predicted smoking and soft drug use in late adolescence. Deviant peer influences may underlie this link as both status violations and substance use are typically influenced by peers (Allen, Donohue, Griffin, Ryan, & Turner, 2003; Keenan, Loeber, Zhang, Stouthamer-Loeber, & Vankammen, 1995). For instance, young adolescents who skip classes, tend to do this in the companionship of a friend, and may stimulate each other in smoking cigarettes or marihuana (Hawkins et al., 1992; Bryant & Zimmerman, 2002). Additionally, low academic achievement may also account for the link, as it has been found to be highly associative of both truancy (included in status violations) and substance use (Bryant & Zimmerman, 2002).

Strong points of this study were its 14 year longitudinal design, covering childhood and adolescence, the use of a general population sample, and the use of multiple informants. A limitation of this study is the relatively small sample size of 309 participants. Although the prevalence of substance use was in accordance with the general Dutch population (Monshouwer et al., 2004), the absolute number of youths, especially in the high risk categories, was low. The sample size also prohibited the study of sex differences in the predictive associations between the subtypes of externalizing problems and health risk behaviors. However, no sex differences in the association between general externalizing behavior scores and health risk was found, which is consistent with Fergusson et al. (2005).
Two limitations regard the measures used in this study. The first limitation concerns the use of parent reported externalizing problems. Parents may be unaware of certain covert behaviors such as truancy or stealing. However, the parent reported CBCL delinquency scale, which includes such items was found to predict contact with police, academic problems and having received mental health services (Verhulst, Koot, & van der Ende, 1994) in addition to DSM-IV disruptive behavior disorders 14 years later (Hofstra, van der Ende, & Verhulst, 2002). Moreover, when compared to teacher and self-reports, only parent reported conduct disorder symptoms predicted police contacts (Loeber, Green, Lahey, & Stouthamer-Loeber, 1991). Additionally, the results with respect to status violations should be regarded in light of the relatively low test-retest reliability of this variable. Second, our substance use measures were obtained through adolescents’ self-reports, however they were not biochemically validated.

A final limitation is the use of only three assessments, making it impossible to study non-linear trends in externalizing problems or to account for a possible middle-adolescence crime-curve (D'Unger, Land, & McCall, 2002). However, the tested linear models fitted the data well.

**Conclusion**

Of all included forms of externalizing behaviors physical aggression appeared the best predictor of late adolescent engagement in health risk behaviors. Physical aggression is present from infancy (Alink et al., 2006; Tremblay et al., 2004) and toddlerhood (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; NICHD, 2004) onwards, and a significant predictor of adolescent delinquency (Broidy et al., 2003; Nagin & Tremblay, 2001), and health risking behaviors (e.g., Lysneky & Fergusson, 1995; White et al., 2001. However, for the latter outcome no control for other co-occurring problem behaviors was made so far. The current study clearly showed that physical aggression (as well as property violations) uniquely contributes to each of the health risk behaviors from preschool onwards. This suggests that preventive interventions aiming physical aggression could already be initiated in early childhood in an effort to reduce the risk of each of these outcomes.

This study also underscored the need to distinguish between aggressive and oppositional behaviors. In several studies that linked conduct problems to substance use and risky sexual behaviors in adolescence or adulthood, symptoms of conduct disorder (e.g., destruction of property, stealing) were lumped together with oppositional items (e.g., disobedience, irritability) (e.g., Fergusson et al., 2005; Fergusson & Woodward, 2000; Lysneky & Fergusson, 1995). Our results suggest that such a combination may result in an underestimation of the associations of physical aggression with adolescent risk behaviors.
Physical aggression diminishes with age, even in individuals following high trajectories (cf., Bongers et al., 2004; Broidy et al., 2003). Despite this, it is still predictive of various problematic behaviors in (late) adolescence. To understand the pathways towards these adolescent (health) risk behaviors, we would need to focus on the developmental sequencing within the externalizing behavior spectrum and simultaneous development of health risk behaviors. Moreover, future research should address the influence of underlying mechanisms and co-occurring processes (e.g., poor behavioral control, peer influences) that may explain the link between early physical aggression and adolescent substance use and risky sexual behavior.
CHAPTER 6

PATHWAYS OF BEHAVIOR PROBLEMS FROM
CHILDHOOD TO LATE ADOLESCENCE LEADING
TO DELINQUENCY AND ACADEMIC
UNDERACHIEVEMENT

Maartje Timmermans, Pol A. C. van Lier, and Hans M. Koot, submitted for publication.

Abstract

Delinquency and academic underachievement in late adolescence impose a high risk for poor adult functioning. Although both are linked with child and adolescent behavior problems, little is known about the behavioral pathways leading to these adverse outcomes. Parent reported aggression, opposition, status violations, and property violations were available for 307 children at ages 5, 10 and 18 years, and adolescent reports of delinquency and academic functioning at age 18 years. At age 18, status violations were linked to delinquency, and property violations to academic underachievement. Engagement in status violations and property violations was in part set off by earlier oppositional problems. Findings suggest that 1) disaggregated forms of externalizing behavior should be used to truly understand behavioral pathways to adverse outcomes, 2) prevention of delinquency and academic underachievement should be aimed at early oppositional problems.
Introduction

Delinquent behavior and academic underachievement are important indices of dysfunction in late adolescence and pose a high risk for pervasive societal failure in adulthood. For instance, adolescents who engage in delinquent behaviors are at increased risk of running into conflict with the law, being convicted, engaging in drug-related and violent crime, and lacking educational qualifications to get a good job by the time they enter adulthood (Moffitt, 2001; Moffitt et al., 2002). Academic underachievement such as grade retention and school drop out leads to poor educational qualifications and thus to low employment status, low income or being in receipt of benefit, and low future (socioeconomic) status (Chen & Kaplan, 2003; Eide & Showalter, 2001; Fergusson, Swain-Campbell, & Horwood, 2002; Jimerson, 1999; Ronka, Kinnunen, & Pulkkinen, 2000). Thus, it is clear that especially delinquency and academic underachievement knife off the youths’ future chances of adaptive adult societal functioning. This may be in contrast to other indices of risky adolescent development, such as alcohol and drug use or risky sexual behavior. Although these risk behaviors are also linked to maladaptive adult functioning, they do not necessarily imply a high risk for poor societal function, as alcohol and drug use is quite common among (even well functioning) adults in the general population (for Dutch population, see Trimbos Institute, 2007). Thus, understanding how children develop into delinquent and academically underachieving adolescents is of special importance in trying to understand poor societal functioning, or even societal drop-out in adulthood.

It is generally accepted that delinquency and academic underachievement do not emerge newly in late adolescence. (Note that we refer to academic underachievement, which is operationalized as completing a lower level of education than expected, or dropping out of school. We do not refer to poor academic achievement, which is mostly linked to cognitive abilities.) Rather they – in part – are outcomes of an earlier problematic development. Specifically, the coercion model (Patterson et al., 1992; Capaldi et al., 1997) states that children’s early noncompliant and aggressive behaviors learned at home, generalize to the school setting where they, possibly through processes of deviant peer affiliation and peer influences, lead to academic failure and to aggravated behavior problems that ultimately escalate into delinquent behaviors. Indeed, many studies have found predictive links from earlier externalizing problems to both delinquency and academic failure (Campbell, Spieker, Burchinal, & Poe, 2006; Fergusson & Horwood, 1998; Fergusson & Woodward, 2000; French & Conrad, 2001; Newcomb et al., 2002; Patterson et al., 1989). However, externalizing problems reflect a rather broad array of problems, ranging from oppositional behavior, (physical) aggression, vandalism, and theft to severe rule breaking behaviors (Fergusson, Horwood, & Lynskey, 1994; Frick et al., 1993). Despite these different forms of behaviors, previous research has generally aggregated different forms of externalizing behavior, or
studied a single subtype of externalizing problems when trying to predict adverse adolescent outcomes (e.g., physical aggression; Broidy et al., 2003). Consequently, it is uncertain whether each of these different subtypes of externalizing problems uniquely predicts delinquency and academic underachievement. In fact, there is some evidence that this is not the case. For instance, when both physical aggression and oppositional behaviors were considered together, physical aggression was found to be a stronger predictor of delinquency than opposition (Broidy et al., 2003; Nagin & Tremblay, 1999). Although not directly linked to delinquency itself, Timmermans et al. (2008) studied which forms of externalizing problems best predicted hard drug use and risky sexual behavior, two outcomes that co-occur frequently with delinquency. They found that physical aggression and property violations (vandalism, theft), but not opposition and status violations (running away from home, truancy) predicted these outcomes.

Thus, lumping various forms of externalizing problems may prevent us from getting insight in the specific behavioral problems that precede delinquency, or academic underachievement. However, simply statistically controlling for the co-occurrence between subtypes of externalizing problems may mask important influences between different forms, as with age, the manifestation of externalizing problems may change. That is, externalizing problems may start of with opposition and physical aggression in early childhood, which in turn may predict engagement in other forms of problems later on (i.e., developmental cascades of behavior). Indeed, studies on the development of different subtypes of behavior found that physical aggression and opposition have their onset probably already in the infancy/toddlerhood period (Alink et al., 2006; Koot et al., 1997; Tremblay, 2004). In contrast, although some property violations, and status violations already occur in childhood, they are found to increase in late childhood and adolescence (Lahey et al., 2000).

The idea of developmental pathways in which forms of externalizing problems predict the engagement in other types of externalizing problems was first developed by Loeber and colleagues (Loeber, Keenan, & Zhang, 1997; Loeber et al., 1993). These authors proposed a three pathway model of adverse development. In the first pathway, externalizing problems manifest themselves as early authority conflicts, indicated by oppositional behaviors (stubborn, defiance), which are followed by status violations such as truancy, and running away from home. A second, covert pathway consists of property violations like lying or cheating, followed by fire setting, vandalism, and eventually serious theft, such as fraud, break and entry. The third, overt pathway is postulated to consist of minor aggression, followed by physical fighting, and ending with physical violence, such as rape, and attack. According to this theory, early oppositional problems predict engagement in both the overt and covert path. There is some evidence for this. For instance, of all new cases with a clinical diagnosis of Conduct Disorder (CD) 80% had a prior diagnosis of Oppositional Defiant
Disorder (ODD) (Loeber et al., 1995), which suggests oppositional problems to be the forerunner of more serious externalizing problems. Thus, to understand how externalizing problems ultimately result in serious delinquency and academic underachievement, it seems that we need to consider multiple subtypes of behavior problems from childhood to (late) adolescence, and study the continuity within the subtypes, as well as the transitions from one form of problem behavior (e.g., opposition) to the other types (e.g., property violations).

The first aim of the present study was therefore to explore which subtypes of externalizing problems in adolescence account best for engagement in late adolescent delinquency and academic underachievement. The second aim was to study whether these predictor(s) are the result of continuity of the same subtype of behavior problems, or – in part – the result of the transaction between subtypes of externalizing problems. Using a Dutch general population sample of youth followed from age 5 to 18 years, and based on the limited previous research on this topic, we hypothesized aggression and property violations to appear as unique predictors of delinquency and academic underachievement. We also expected to find evidence for transactional influences between subtypes of externalizing problems. Specifically, we expected early childhood oppositional behaviors to account for engagement in other forms of externalizing problems (aggression, property violations, and status violations) and aggression and property violations to ultimately account for engagement in delinquency and academic underachievement in late adolescence.

**Method**

**Sample**

The original sample of 420 2 and 3 year old children was drawn randomly from the Dutch province of Zuid-Holland, using inoculation registers and the municipal population register of Rotterdam in 1989 (Koot & Verhulst, 1991). For the current study, parent-reports at three follow-up assessments (ages 5, 10, and 18 years) were used as well as self-reports at age 18. Written informed consent was obtained from parents at each assessment and from adolescents at the age 18 assessment.

At follow-up at age 5 (1991) a response rate of 95% of the original sample was reached, including 201 males and 195 females (mean age = 4.83 years; $SD = 8.4$ months). At age 10 (1997) usable information for 85% of the original sample was obtained (180 males, 178 females; mean age = 10.46 years; $SD = 7.2$ months). At age 18 (2005), 77% of the parents in the original sample (1989) provided information about their children (165 males and 159 females; mean age = 18.19 years; $SD = 8.4$ months), and 74% of the adolescents (152 males and 159 females) about themselves. Detailed information on sample attrition can be found
elsewhere (Mesman & Koot, 2000; Timmermans et al., 2008). The study was approved by the Erasmus Medical Center Ethical Committee.

**Instruments**

**Outcomes**

Self reported delinquency was measured through the International Self-Report Delinquency Study (ISRD; Junger-Tas, Terlouw, & Klein, 1994) assessing violent (6 items; e.g., Did you join a public fight, Did you carry a weapon with you, Did you wound someone with some kind of weapon), and nonviolent delinquency (28 items; e.g., Did you dodge fare in public transport (train), Did you go joyriding with someone else’s car, Have you destroyed public/someone’s property on purpose) in the past 12 months. Items were scored on a 6-point scale running from (0) never, (1) once, (2) twice, (3) 3-5 times, (4) 6-10 times, and (5) 11 times or more. Cronbach’s alpha for the total delinquency scale was .82. Because the delinquency score was skewed a square-root transformed score was used in the analyses.

Academic (under)achievement was based on the discrepancy score between the early adolescent academic (advised) school level, and the actual school level in late adolescence, or actual degree obtained. When children leave elementary school in the Netherlands, they can choose between four levels of secondary education (aside from special education), ranging from low, intermediate, and high pre-vocational education, to pre-university training. The Dutch law prescribes that elementary school directors and teachers advise each child which secondary school level to choose. This advice is based on the child’s entire elementary school record and is highly decisive of the level which will be followed during the secondary school period. To account for possible deviance from the elementary school advice (in some cases the parents/child may deviate from this advice), we also recorded the actual level attended in first grade secondary school.

At age 18 years, actual academic achievement was recorded as the current level of education and/or the obtained degree, and years in school. Academic underachievement (coded as 1) represented 1) children who followed their advised school level but who had a two-year (or more) delay (e.g., repeated a class), 2) children who were in a lower school level (or degree) than advised (possibly with an additional delay), 3) children who dropped out of school without a degree. Expected achievement (coded as 0) represented 1) children who performed at a higher level than expected, based on their advised school level, 2) children who followed their advised level, and 3) children who followed their advised level with only one year of delay.
Behavioral antecedents

(Subtypes of) externalizing behaviors were rated by parents through the Dutch version of the Child Behavior Checklist for ages 4 to 18 years (CBCL/4-18; Achenbach, 1991; Verhulst et al., 1996) at age 5, and 10. At age 18, the updated version of the CBCL (CBCL/6-18; Achenbach & Rescorla, 2001) was completed. The response format is a 3-point Likert scale running from (0) not true to (1) somewhat true or sometimes true, and (2) very true or often true. Good reliability and validity of the Dutch translation of the CBCL were reported (Verhulst et al., 1996).

CBCL items corresponding to the four clusters of externalizing behavior as identified by Frick et al. (1993) were used. These authors showed that externalizing behaviors vary along a nondestructive/destructive dimension and an overt/covert dimension. Opposition represents the nondestructive/overt cluster and contained seven items, Argues a lot, Stubborn (sullen or irritable), Sulks a lot, Teases a lot, Temper tantrums (or hot temper), Disobedient (at home), and Disobedient at school. Aggression represents the destructive/overt cluster and consisted of four items, Cruelty, Fights, Attacks people, and Threatens people. Status violations, representing the nondestructive/covert cluster, originally contained four items, Runs away from home, Swearing or obscene language, Truancy or skipping school, and Uses alcohol or drugs for non medical purposes. However, we decided to exclude the latter item because it had no variance at the age 5 and age 10 assessments. Finally, property violations represents the destructive/covert cluster and consisted of six items, Cruel to animals, Vandalism, Sets fires, Steals at home, Steals outside home, and Lying or cheating. Two-week test-retest reliabilities (N = 89, all ps < .01) of the four subtypes were computed and are r = .72 for opposition, r = .81 for aggression, r = .54 for status violations, and r = .80 for property violations. Because aggression, status violations, and property violations were non-normally distributed a square-root transformed score for these scales was used in the analyses. Skewness of opposition scores was within acceptable limits (< 2) and these were therefore not transformed.

Male sex (code 1 = male, 0 = female) and socio-economic status (SES; coded as low, intermediate, high) based on the scoring of Statistics Netherlands (Statistics Netherlands, 1993) were included in this study to control for sex- and SES differences respectively.

Procedure

At age 5 years, all parents who had participated in the first assessment (1989) were approached by phone. Parents were visited by one of four female interviewers, who had a master’s degree in psychology. At age 10, again all parents were asked to participate, regardless of participation at age 5. A package of questionnaires was sent to the parents after
they gave their consent on the phone. At age 18 all parents and adolescents who could be traced (regardless of earlier participation), received an invitation for the fourth assessment. Parents were only phoned in case the target adolescent gave permission to do so. Participants could either choose to complete paper-and-pencil questionnaires or online questionnaires. Questionnaires were identical in both situations.

**Statistical analyses**

An autoregressive cross-lagged model (Jöreskog, 1970; 1979) was used to test our hypotheses. In the autoregressive part of the model, the four clusters of externalizing problems were regressed on their immediate prior value. The model can be extended by allowing earlier lagged values to influence the current value (i.e., cross-influences; e.g., opposition at age 5 predicting (new) engagement in aggression at age 10). In this way, the estimate of age 18 aggression, opposition, status violations, and property violations, respectively, represented the actual score controlled for all prior scores within the same cluster, and all possible cross-influences from other subtypes from each of the prior time-points. Delinquency and (dummy coded) academic underachievement scores were regressed on all age 18 externalizing subtypes simultaneously to test which subtypes were uniquely associated with these outcomes. All parameter estimates of the model were controlled for sex and SES. Model fit was evaluated using the comparative fit index (CFI), Tucker-Lewis Index (TLI), and root mean square error of approximation (RMSEA). For CFI and TLI, a value > .95 was considered to be a good fit (Bentler, 1990). The critical value of RMSEA is = .08 (Browne & Cudeck, 1993). All estimated parameters were controlled for gender and SES. Analyses were conducted using Mplus 4.21 (Muthén & Muthén, 1998-2007).

**Results**

**Preliminary analyses**

Only cases of which both outcome variables and at least one CBCL assessment were available were included in the analyses ($N = 307$). Compared to the original sample ($N = 420$) excluded children did not differ with respect to sex ($\chi^2 (N = 420) = 1.72, p > .05$) and scores on the CBCL externalizing scale ($t = .93, p > .05$). However, excluded children more often came from lower SES families than included children ($\chi^2 (N = 418) = 27.64, p < .01$).

Raw mean delinquency scores were 9.34 ($SD = 10.03$) for males, and 3.98 ($SD = 7.04$) for females. Of all adolescents 77% (136 males, 100 females) showed at least one nonviolent delinquent act in the past 12 months, while 21% (47 males, 17 females) showed at least one physical violent offence. According to our criteria for academic underachievement, 15% (19 males, 28 females) were categorized as performing worse than expected. Raw means and standard deviations for males and females for each of all externalizing subtypes at each
assessment are in Table 6.1. The correlations between the repeatedly assessed subtypes of externalizing behavior are in Table 6.2. To test the association between each of the externalizing subtypes at age 18 separately with delinquency and academic underachievement, simple regression, and logistic regression models, respectively, were run. For delinquency, significant associations were found with opposition \((B = .17, SE = .04, \beta = .24)\), aggression \((B = 1.06, SE = .23, \beta = .26)\), status violations \((B = 1.01, SE = .15, \beta = .36)\), and property violations \((B = .97, SE = .20, \beta = .28)\). Academic underachievement was associated with opposition \((OR = 1.15; CI = 1.02 – 1.30)\), and property violations \((OR = 2.20, CI = 1.27 – 3.81)\), but not significantly with aggression \((OR = 0.94, CI = .43 – 2.07)\) or status violations \((OR = 1.52, CI = .92 – 2.52)\).

### Table 6.1. Raw Means, and Standard Deviations for Opposition, Aggression, Status Violations, and Property Violations at Age 5, 10 and 18 Years

<table>
<thead>
<tr>
<th>Cluster (n items)</th>
<th>Age</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opposition (7)</td>
<td>5</td>
<td>3.52</td>
<td>2.36</td>
<td>2.98</td>
<td>2.35</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>3.16</td>
<td>2.48</td>
<td>2.54</td>
<td>2.37</td>
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<tr>
<td></td>
<td>18</td>
<td>2.12</td>
<td>2.25</td>
<td>2.09</td>
<td>2.37</td>
</tr>
<tr>
<td>Aggression (4)</td>
<td>5</td>
<td>.44</td>
<td>.84</td>
<td>.11</td>
<td>.47</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>.55</td>
<td>.97</td>
<td>.11</td>
<td>.36</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>.25</td>
<td>.66</td>
<td>.08</td>
<td>.36</td>
</tr>
<tr>
<td>Status violations (3)</td>
<td>5</td>
<td>.42</td>
<td>.65</td>
<td>.13</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>.32</td>
<td>.53</td>
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<td>.36</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>.60</td>
<td>.82</td>
<td>.36</td>
<td>.82</td>
</tr>
<tr>
<td>Property violations (6)</td>
<td>5</td>
<td>.30</td>
<td>.56</td>
<td>.22</td>
<td>.45</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>.29</td>
<td>.72</td>
<td>.81</td>
<td>.57</td>
</tr>
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<td></td>
<td>18</td>
<td>.34</td>
<td>.87</td>
<td>.15</td>
<td>.51</td>
</tr>
</tbody>
</table>

*Note.* Entries represent raw data scores. In the statistical analyses, square-root transformed scores for aggression, status violation, and property violations were used. \(N\) (age 5) = 297; \(N\) (age 10) = 286; \(N\) (age 18) = 296.
Table 6.2. Correlations between Repeatedly Assessed Subtypes of Externalizing Behaviors

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Age 5</th>
<th>Age 10</th>
<th>Age 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OP</td>
<td>AG</td>
<td>SV</td>
</tr>
<tr>
<td>Age 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP</td>
<td>-</td>
<td>.43**</td>
<td>.36**</td>
</tr>
<tr>
<td>AG</td>
<td>-</td>
<td>.36**</td>
<td>.30**</td>
</tr>
<tr>
<td>SV</td>
<td>-</td>
<td>.26**</td>
<td>.24**</td>
</tr>
<tr>
<td>PV</td>
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<td>.12*</td>
<td>.14*</td>
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<tr>
<td>Age 10</td>
<td></td>
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<td>.53**</td>
<td>.46**</td>
</tr>
<tr>
<td>AG</td>
<td>-</td>
<td>.43**</td>
<td>.41**</td>
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<tr>
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<td>-</td>
<td>.37**</td>
<td>.35**</td>
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<tr>
<td>Age 18</td>
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<tr>
<td>OP</td>
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<td>.55**</td>
<td>.58**</td>
</tr>
<tr>
<td>AG</td>
<td>-</td>
<td>.39**</td>
<td>.39**</td>
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<tr>
<td>SV</td>
<td>-</td>
<td>.45**</td>
<td></td>
</tr>
<tr>
<td>PV</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. OP = Opposition, AG = Aggression, SV = Status Violations, PV = Property Violations. ** p < .01; * p < .05.

Cross-lagged associations between externalizing behaviors from childhood to late adolescence predicting delinquency and academic underachievement

The results of the autoregressive cross-lagged model are in Figure 6.1. As no significant associations between age 18 aggression and status violations and academic underachievement were found in the preliminary analyses, these two paths were not specified in the autoregressive model. The model had a good fit to the data: CFI = .99; TLI = .97; RMSEA = .04.

With regard to the associations between the age 18 subtypes of externalizing problems and delinquency and academic underachievement, we found significant links with status violations and property violations when controlling for other forms of externalizing problems. Specifically, delinquency was associated with status violations ($B = .61, SE = .41, \beta = .29$). Academic underachievement was associated with age 18 property violations (OR = 2.21, CI = 1.08 – 4.54).
The results further showed that status violations and property violations at age 18 were the result of continuity within these subtypes (i.e., significant autoregressive paths) and the cross-lagged influence from prior oppositional difficulties (see Figure 6.1). To test our hypothesis that especially early childhood opposition accounts – in part – for the engagement in later types of behavior problems, ultimately leading to delinquency and academic underachievement, the indirect paths from age 5 opposition to age 18 status violations, and to age 18 property violations were estimated. (Note that in contrast to our hypothesis, no link between age 18 years physical aggression and delinquency or underachievement was found. Therefore no indirect paths from age 5 opposition to age 18 aggression were explored).

Figure 6.1. Behavioral Cascades to Delinquency and Academic Underachievement at Age 18. AG = Aggression; OP = Opposition; SV = Status Violations; PV = Property Violations. Age 18 PV scores range from 0 to 2.45. ** $p < .01$; * $p < .05$.

When regarding age 18 status violations, two indirect paths from age 5 opposition were possible: age 5 opposition to age 10 opposition, leading to age 18 status violations; and age 5 opposition to age 10 status violations, leading to age 18 status violations. Results showed a significant overall indirect influence from early opposition to age 18 status violations via these two pathways: $B = .03$, $SE = .01$, $\beta = .13$. Regarding age 18 property violations, only one indirect path from age 5 opposition was possible: age 5 opposition to age 10 property violations, subsequently leading to age 18 property violations. This indirect pathway was significant: $B = .01$, $SE = .004$, $\beta = .06$. 
Finally, it must be noted that the age 18 delinquency and academic underachievement outcomes were assessed at the same time as the age 18 parent reported forms of externalizing behavior. As a result, it is unclear whether status and property violations have a (cross sectional) correlation with these outcomes, or actually predict delinquency and academic underachievement over time (longitudinal association). We therefore specified a model in which the age 18 subtypes of externalizing problems were excluded. The results remained the same: significant predictive links were found from age 10 status violations to delinquency ($B = .46, SE = .23, \beta = .13$), and from age 10 property violations to academic achievement (OR = 3.42; CI = 1.54 – 7.59).

**Discussion**

This study’s aims were 1) to explore which of several subtypes of externalizing problems uniquely predict delinquency and academic underachievement in late adolescence, and 2) to understand the problem behavior pathways from early childhood to late adolescence that resulted in these undesirable outcomes.

While controlling for other subtypes of externalizing problems at age 18, status violations were linked with delinquency, and property violations with academic underachievement. We also found that these links were not merely concurrent, age 18 years associations, but also were predictive from age 10 years onwards across the 8-year period. As engagement in status and property violations were uniquely linked to delinquency and academic underachievement respectively, we explored the behavioral pathways leading towards these specific forms of externalizing problems. We found that both the continuity within property violations and status violations, and the cross-influence of early childhood oppositional problems accounted for the manifestation of property and status violations at age 18 years. The demonstrated influence of early oppositional problems on the development of other forms of externalizing behavior is in accordance with our hypothesis, supports the developmental pathway model of Loeber and colleagues (1993), and is in accordance with recent findings on the importance of oppositional problems in predicting later deviant trajectories of conduct problems (van Lier, van der Ende, Koot, & Verhulst, 2007b).

In contrast to our expectations (Broidy et al., 2003; Nagin & Tremblay, 1999) no link between physical aggression and delinquency was found. This may have several explanations. The association found in earlier studies may be carried by only a limited number of individuals, most notably those with life-course persistent antisocial behavior. Also, physical aggression itself decreases with age (Bongers et al., 2004; Lahey et al., 2000). In accordance with this not many of the adolescents in this study engaged in physical violence at age 18 years, as tapped
by our delinquency measure. Indeed, the vast majority of participants engaged in some form of nonaggressive offenses, while only 21% engaged in a form of – mostly nonserious - physical violence at age 18 years. Although this was in accordance with findings in other population samples (Woodward & Fergusson, 2000), it may have hindered us in demonstrating an association between delinquency and aggression.

Our finding that adverse late adolescent outcomes are only associated with two forms of problem behavior out of the overall externalizing behavior cluster questions the use of aggregated forms of externalizing problems when trying to understand adolescence poor functioning. In fact, our findings do not stand alone. Externalizing behaviors have been found to be distinct (Frick et al., 1993), these distinct forms were shown to have different developmental courses (Bongers et al., 2004), and in our study the concurrent correlations between the subtypes were only small to moderate. Moreover, previous research also showed that not all forms uniquely predicted adolescent delinquency and serious drug use (Broidy et al., 2003; Nagin & Tremblay, 1999). Other studies demonstrated that subtypes of externalizing problems are differently linked to underlying personal and environmental factors. For instance, the continuity of physical aggression from childhood to adolescence was largely accounted for by genetic influences, whereas the continuity of non-physical aggression was largely accounted for by environmental influences (Eley, Lichtenstein, & Moffitt, 2003). Similarly, high level physical aggression across adolescence was found to be linked with low neurocognitive functioning (verbal IQ, executive function) whereas theft was associated with higher neurocognitive functioning (Barker et al., 2007). Thus, there is evidence that we should disaggregate externalizing problems to understand how such problems lead to late adolescent poor functioning. This study demonstrated that age should also be accounted for. That is, at different ages different aspects of the externalizing spectrum of problems become evident and trigger the development of subsequent, more serious behavior problems, which in turn account for late adolescent delinquency and academic underachievement. Thus, neither lumping nor simply statistically controlling for the co-occurrence between subtypes of externalizing problems is desirable. Instead, we have to take the transactional nature between subtypes of externalizing problems into account to detect likely developmental pathways.

The finding that status violations and property violations predict later delinquency and academic underachievement by no means suggests a causal relation. A non-included variable, shared by the predictors and outcomes may account for the associations found in this study. For instance, behaviors in the status and property violations cluster (e.g., truancy, theft, vandalism) are suggested to be influenced by deviant peer affiliations (Dishion, 2000; Rowe, Maughan, Worthman, Costello, & Angold, 2004; Barnow, Lucht, & Freyberger, 2005), which in turn may account for the link with both academic underachievement and serious delinquency. Deviant peer associations have been found to predict school drop-out (Battin-
Pearson et al., 2000) and high level delinquency in adolescence (van Lier et al., 2007a; Vitaro, Pedersen, & Brendgen, 2007).

This study is not without limitations. The first concerns the use of a relatively small community sample. This, for instance, prohibited us from the modeling of sex-specific pathways to delinquency and academic achievement. Although sex-effects were controlled for, future studies among larger samples are needed to test whether the found associations are similar among males and females. In addition, is has been demonstrated that girls may engage in other forms of behavior problems, such as relational aggression (Crick & Zahn-Waxler, 2003). Future studies on sex-specific pathways should also account for this possible difference in the manifestation of behavior problems leading to poor adolescent outcomes.

Second, only parent-reports of externalizing behavior were used as predictors. Parents may not be well aware of the problem behaviors their children engage in, especially in adolescence when parents’ ignorance of their children’s experiences may increase, because children are more outside direct parental supervision (Lahey et al., 2000). However, Loeber, et al. (1991) have shown that when parent-, teacher-, and self-reports were considered, only parent-reported problem behavior was associated with later police contacts. Moreover, our results showed that parent-reported status violations and property violations were linked with self-reported delinquency, and an unbiased rating of academic underachievement.

A third limitation is the rather large gap in the data collection between the age 10 and the age 18 assessments. Studies have indicated that some externalizing problems might show an increase through mid-adolescence and a subsequent decline (Farrington, 1986; Moffitt & Caspi, 2001). Therefore, the associations between externalizing behavior types might in fact be more complex than our results suggest, although this is not expected from the developmental model outlined by Loeber et al. (1993).

**Implications for Research, Policy and Practice**

Research has shown that engagement in delinquent behaviors, and underachieving in school are the most salient indicators of future adult poor functioning or even societal drop-out. The results of this study imply that in trying to understand the causes of such poor late adolescent functioning, research should not use aggregated forms of externalizing problems. Rather, multiple forms of externalizing problems, their mutual influence with age, and their (unique) associations with underlying variables and putative mechanisms should be considered from childhood onwards. Our findings also point at the prevention of especially early oppositional behaviors, as these behaviors constitute a marker of childhood problem behavior, which is likely to set off a chain of behavior problems from childhood into adolescent conduct...
problems (Loeber et al., 1993; Patterson et al., 1989) resulting in adolescent failure such as delinquency and low academic qualifications.
CHAPTER 7

GENERAL DISCUSSION

The main goal of this thesis was to contribute to understanding the course of antisocial behavior across childhood and adolescence and its adverse consequences for late adolescent functioning, using data from a general sample including males and females from age 2/3 years to age 18 years. Specifically, we investigated: (1) the continuation of behavioral and emotional problems from early childhood to late adolescence and the role of stressful events; (2) childhood factors predicting decreasing development of antisocial behavior in adolescence; (3) early discriminators between children with high childhood but decreasing antisocial behavior in adolescence versus children with early and persistent high problems; and (4) specific child/adolescent forms of externalizing behavior leading to the engagement in substance use, risky sexual behavior, delinquency and academic underachievement in late adolescence. With respect to the final aim, we adopted a classification of externalizing behaviors used by Frick and colleagues (1993), in which behavior problems were represented by four clusters including aggression, opposition, status violations, and property violations.

Understanding continuity in adjustment problems

In Chapter 2, we aimed to extend on initial findings by Kim et al. (2003), suggesting stressful events to structurally contribute to the continuation of behavioral and emotional problems throughout adolescence. We did this by considering several unattended issues regarding the co-occurrence of and the transaction between behavioral and emotional problems. In short, we tested the contribution of stressful events to the continuity in externalizing and internalizing problems simultaneously, as well as their contribution to the transaction between externalizing and internalizing symptoms, in a period covering early childhood to late adolescence.

Results from the tested cross-lagged autoregressive model revealed that stressful events contributed to the continuity of externalizing problems from early childhood to adolescence, and also to the continuity of internalizing problems, but only during adolescence. In addition, from early childhood onwards, externalizing problems added to increases in internalizing problems over time. Stressful events were in between this relation at each successive measurement (i.e., transaction or cross-influence). Also, internalizing problems predicted
engagement in (new) externalizing behavior, but only during adolescence. Again, the experience of stressful events contributed to this cross-influence. These results entirely support the proposition that the experience of stressful events and behavior problems in fact work together in a cycle of ongoing adjustment problems and experience of life stress, and in this way explain continuity in externalizing problems (Steinberg & Avenevoli, 2000; Kim et al., 2003). This process was found to be present already from toddlerhood on. In concordance with other studies, experiences of life stress appeared also important contributors to the continuity of internalizing problems during adolescence (Kim et al., 2003; Patton et al., 2003). During childhood however, co-occurring externalizing problems seem to account for the influence of stressful events on the continuity in internalizing problems. Perhaps because the manifestation of depression and anxiety symptoms becomes more profound in adolescence (e.g., Bongers et al., 2003), internalizing problems may from this period on start to evoke negative social consequences (e.g., social rejection, being bullied) that may in turn influence the course of externalizing problems.

The results on the transaction between both types of problems are in accordance with Patterson and Capaldi’s failure model (Patterson & Yoerger, 1997) which suggests that the influence from externalizing problems to the onset of internalizing problems occurs through failure experiences. Specifically, behavioral problems are suggested to lead to stressful experiences such as interpersonal conflicts, lack of support and social rejection (i.e., life stress), which subsequently trigger feelings of failure, and which ultimately lead to depressive symptoms. The model also posits, that as children progress to later stages of development, depressive feelings which were initially triggered by externalizing problems and stress, in turn start to predict elevated levels of antisocial behaviors. In sum, our findings demonstrated that especially behavioral responses to stressful experiences seem to put children at risk for increasing life stress, and subsequent emotional and behavioral problems, resulting in an ongoing cycle of increasing life stress and behavioral and emotional maladjustment.

Change in antisocial development: Understanding decreasing problems

In Chapters 3 and 4 we focused on children who show decreasing antisocial problems in adolescence. First, we examined which factors in childhood (age 10 years) promote decreasing levels of externalizing behavior across adolescence. Subsequently it was tested whether children with high but desisting courses could be discriminated in (early) childhood from children who persist in antisocial behavior. With regard to predicting decreasing levels of behavior problems (Chapter 3) we considered factors from the individual, family and social domains as potential factors associated with having lower levels of externalizing behavior in late adolescence than could be expected based on the childhood level of aggressiveness. It was demonstrated that although most childhood factors were associated with externalizing
problem levels in adolescence, far fewer were predictive of reductions in externalizing behavior (Stouthamer-Loeber et al., 2004). Children’s social and behavioral skills, good school functioning and easy temperament (child individual factors), and little exposure to stressful events, low parenting stress, and low parental psychopathology (family factors) were associated with decreasing problems. Multivariate analyses indicated that little exposure to parenting stress (possibly indicating exposure to good parenting quality), and low child social problems (i.e., being socially competent) were uniquely predictive of (unexpected) decreasing problem behaviors throughout adolescence. These results were consistent with those reported by Stouthamer-Loeber et al. (2004) who found indicators of little exposure to risky parenting style (i.e., low physical punishment) and of adolescents’ social competence (i.e., good peer relationships) as unique adolescent predictors of decreased delinquent behavior in early adulthood. Interestingly, findings from risk research similarly demonstrated that factors predictive of (high) externalizing problems, among many other domains, come from the parenting and the social competence domain (Capaldi et al., 1997; Mesman et al., 2001; Moffitt & Caspi, 2001). Thus, it seems that the same sources of influence may constitute risk as well protection against the adolescent development of behavioral problems.

As childhood factors were related directly to the desired outcome (i.e., reductions of externalizing behavior), our findings can be seen as a straightforward validation of previous findings in prevention and intervention research that aim to reduce behavior problems by improving parenting quality (e.g., through reducing parenting stress) and children’s social competence (Brotman et al., 2003; Lacourse et al., 2002; Gardner et al., 2007; Patterson et al., 2002).

In Chapter 4 we tested how children with high but desisting courses in antisocial problems can be discriminated from children with persistent antisocial courses. As previously found in the studies by Moffitt et al. (1996; 2002), our results demonstrated that approximately 50% of all children with high level behavior problems in childhood do ultimately not move on to become persistent antisocial adolescents. We suggested that this finding may have important implications for prevention of antisocial development if those at risk for persistence could be distinguished early from those who desist. That is, for prevention to be optimally efficient, programs should be aimed at preventing the poor personal outcomes (and costs for society) of those at risk for life-course persistent antisocial behavior (Fergusson et al., 2005; Moffitt et al., 2002). Also in determining whether prevention strategies are likely effective, it is important that empirically derived target variables are based on contrasting samples of persistent high antisocial individuals with samples of desisters.

The findings suggested that indicators of both child vulnerability, and of personal and environmental (i.e., family conditions) risk are of importance in discriminating desisting cases
from persistent cases. More specifically, it was shown that children with pervasive and persistent behavioral problems in childhood, but who desisted in adolescence, compared to stable high cases, had lower scores on early childhood temperament problems and ADHD symptoms, and had a better verbal development. These children also were at lower risk of having poor social relations, had better behavioral competences and were less likely to grow up with parents experiencing parenting stress.

These findings are new in that, although they are consistent with the proposition that risk for life course persistent antisocial behavior emerges from inherited or acquired vulnerabilities, as well as from personal and environmental risk sources (Moffitt, 1993; Moffitt & Caspi, 2001), they are among the first to indicate that these factors may discriminate between persistent and desisting groups. So far, research has reported similar levels of under-controlled temperament (Moffitt et al., 1996), ADHD symptoms as expressed by inattention and hyperactivity (Nagin & Tremblay, 2001), (low) IQ, delayed motor development, family adversity in childhood (Moffitt, 1990; 2003), and prosocial skills (Nagin & Tremblay, 2001), across both groups. Only Nagin and Tremblay (2001) did find children on the high but desisting trajectories to be less likely exposed to family risk (teenage motherhood, mother’s low education) than persistently high antisocial children, which is comparable to our findings of lower parenting stress exposure for desisting children.

It may seem surprising that our study, in contrast to others, identified multiple (early) discriminating characteristics of children who desist from antisocial behavior versus persistent antisocial children. The non-identification of these characteristics in other studies may have been due to the use of different criteria with respect to having ‘high’ or ‘low’ level antisocial problems across studies. Moreover, using criteria of differential stringency in childhood (i.e., stringent) versus adolescence (i.e., less stringent) (Moffitt et al., 1996; Moffitt et al., 2002), may have resulted in ‘misclassification’ of certain cases. This may to some extent have created mixed groups (i.e., the persistent group containing some desisting cases), in turn hindering the detection of differences between the persistent and desisting groups. Nevertheless, the question whether children following desisting courses in antisocial behavior can be discriminated from persistently high antisocial children in (early) childhood already certainly warrants further study.

**How does antisocial development lead to poor adolescent functioning?**

In Chapters 5 and 6 we investigated developmental links between specific forms of externalizing problems (aggression, opposition, status violations, and property violations) and a variety of adverse outcomes at age 18 years (i.e., health risk behaviors, poor societal functioning). With regard to late adolescent health risk behaviors, results reported in Chapter
5 showed that physical aggression appeared the best predictor of late adolescent engagement in risky sexual behavior (e.g., unsafe sex with variable partners, accidental pregnancy) and substance use including frequent smoking and alcohol use, and the use of soft and hard drugs. More specifically, the results showed that from age 5 onwards, high and increasing levels of physical aggression, as well as increasing property violations (e.g., vandalism, theft) uniquely contribute to engagement in health risk behaviors at age 18 years. The association between physical aggression and these health risk behaviors may be explained by poor behavioral inhibition. For instance, children with low levels of behavioral inhibition have been shown to be at subsequent risk for developing substance use disorder (Tarter et al., 2003). The same mechanism may also underlie the link between development in property violations and health risk behaviors as such problems have also been linked to low behavior control levels (Luengo, Carrillo-de-la-Pena, Otero, & Romero, 1994).

The results further demonstrated that high levels of status violations (e.g., truancy, running away) predicted smoking and soft drugs use in late adolescence. This link may be explained by deviant peer affiliations, as both substance use and authority conflicts are suggested to be typical peer-influenced acts (Allen, et al., 2003; Keenan, et al., 1995). Interestingly, courses of oppositional behavior were not uniquely predictive of any of the health risk outcomes. That is, looking separately at oppositional behavior, a deviant course (i.e., high and increasing levels) in opposition predicted alcohol use, smoking and hard drugs use. However, these links were completely accounted for by other forms of externalizing behavior. This is in accordance with previous findings showing that, particularly following a deviant physical aggressive trajectory is a stronger predictor of other adverse outcomes, such as delinquency, than deviance in an oppositional trajectory (Nagin & Tremblay, 1999).

In Chapter 6 we aimed at identifying developmental pathways or cascades of antisocial behaviors leading to adolescent poor functioning in terms of delinquency and academic underachievement. As with age, the manifestation of externalizing problems is thought to develop from rather innocent behaviors to serious antisocial acts (Loeber et al., 1993), cross-influences between different forms of externalizing behavior over time should be considered. Therefore, in our analyses not only continuity within each subtype of behavior (opposition, aggression, status violations, and property violations) was taken into account, but also cross-influences between these subtypes over time. The results of cross-lagged (auto-)regressive analyses demonstrated that early childhood oppositional problems (at age 3) constitute a marker for engagement in later aggressive behaviors, property violations and status violations. This result fits in Loeber’s idea (1993) of an early authority conflict path including oppositional problems influencing further antisocial development. It was also in accordance with recent findings on the importance of oppositional problems in predicting later deviant trajectories of conduct problems (van Lier et al., 2007b).
The results further demonstrated that engagement in status violations and property violations, both influenced by early oppositional problems, eventually accounted for delinquency, and academic underachievement in late adolescence, respectively. It must be noted that the demonstrated associations with delinquency and academic underachievement can not be interpreted as causal relations. The associations may well be explained by another variable, related to each of the predictors and outcomes. For instance, acts of status violations and property violations (e.g., truancy, theft, vandalism) have been shown to be influenced by deviant friends (Dishion, 2000; Barnow et al., 2005), which in turn increase the risk of school drop-out (Battin-Pearson et al., 2000) and adolescent engagement in serious delinquency (van Lier et al., 2007a; Vitaro et al., 2007).

These findings point out clearly that different aspects of the externalizing spectrum of problems become evident at different ages and trigger the development of subsequent, more serious behavior problems, which in turn account for late adolescent failure (Loeber et al., 1993). To illustrate, dysfunction in late adolescence, as expressed by engaging in delinquency and underachieving in school, is likely a result of the development from early oppositional problems into later, more serious, authority conflicts (i.e., status violations) and property violations, rather than the continuation of a single form of externalizing behavior.

Interesting to note is that, although the findings reported in Chapters 5 suggested deviant courses in oppositional problems are not directly predictive of adverse functioning in adolescence, the findings in Chapter 6 imply that early opposition does have an indirect impact on adolescent functioning by influencing the development of other antisocial behaviors which in turn predict poor outcomes in late adolescence. Taken together, these findings show the importance of taking simultaneously a developmental, and a differential perspective on antisocial behavior in understanding how antisocial development may lead to poor outcomes later in life.

**Limitations**

It is important to note that this study was originally not designed as a longitudinal project to study (early) predictors and future outcomes of externalizing development in childhood and adolescence, but to validate the CBCL/2-3 for Dutch preschoolers (Koot et al., 1997). As a consequence, a limited range of important early risk and promotive factors was available. For instance, measures of temperament, family functioning and parenting variables were not included at Time 1 (ages 2/3 years) yet. This may have prevented us from finding differences between childhood limited antisocial children and early persistent antisocial children already in toddlerhood. In addition, no measures of deviant peer affiliation, or association with prosocial peers were included in the data collection, despite their suggested influence on externalizing problems, and adverse outcomes such as engagement in delinquency or
substance use (Hawkins et al., 1992; Hawkins et al., 1998; Patterson et al., 1989). Therefore we were not able to test for explanatory mechanisms such as deviant peer influence, possibly underlying the associations found between specific antisocial behaviors and adolescent adverse outcomes. Further, the timing of assessments has not been planned in advance, which resulted in quite a large gap between the Time 2 and Time 3 measurements in childhood (age 5 – age 10 years) and between Time 3 and Time 4 in adolescence (age 10 – age 18 years). This is especially unfortunate in adolescence, which is pre-eminently the period of change in many domains of adolescents’ lives (e.g., behavioral and biological processes, social relations).

Another limitation of this study concerns the limited sample size, which prevented us from conducting sex-specific analyses. As a consequence, we do not know to what degree our findings regarding the course of antisocial behavior, its predictors, and outcomes are the same for males and females. Although sample attrition is an important cause of the limited sample size in this study, and in longitudinal studies in general, it must be noted that attrition was fairly small given the time period covered. Ultimately, more than 75% of the cases in the original Time 1 sample participated in the study 16 years later. Finally, our findings are solely based on questionnaire and interview data. The inclusion of observational data as well as psycho-physiological and neuropsychological measures would have been a valuable validation of the current study’s findings.

Strengths

Despite these limitations this study also has several strengths that are worth noting. First, the current study covers an extended period from age 2/3 to age 18 years, thereby including the early years of childhood, which are often unattended in long-term longitudinal studies. Second, this study used a multi-informant method: not only parent-reported information was obtained, also teacher- and self-reports on the child’s functioning were assessed when possible. Teachers provided information about children during primary school (Time 2, 3), but not at age 18 (Time 4), when adolescents are taught by many different teachers in high school or do not attend school anymore. Self-reports were obtained as soon as children are suggested to reliably provide information (from age 10 on; Time 3 and 4). The use of different informants of adverse adolescent outcomes (self-reports) versus externalizing problems (parent-reports) in Chapter 5 and 6 provides confidence in the results obtained, as the agreement between different informants is generally found to be low (Achenbach, Mcconaughy, & Howell, 1987). Particularly parent-reports of externalizing problems tend to underestimate the actual level of externalizing behaviors displayed by the children, and even more so in adolescence, due to the fact that adolescents are more outside direct parental supervision. This in fact may have led to an underestimation of the predictive links found
from earlier antisocial behaviors to adverse adolescent outcomes in Chapters 5 and 6. In addition, in Chapter 3 and 4 cases were classified across raters into stable low, increasing, decreasing, and stable high groups of externalizing problems, likely resulting in a more robust classification than using only a single informant of externalizing problems.

Second, the use of a general sample and the relatively low attrition across time is beneficial for the generalizability of our findings. However, as severe deviancy (e.g., physical violence) is likely less prevalent in a general sample as compared to risk samples, we may have overlooked potentially important associations and pathways leading to adolescent dysfunction.

A final strength is the use of new approaches to the research on development of antisocial behavior. That is, we used distinct forms of antisocial behavior and their unique developmental course. In addition, cross-lagged analyses were used to capture the transactional nature of antisocial development. Furthermore, decreasing externalizing problems in adolescence were operationalized as a direct measure of change across time based on the level of behavior problems in childhood (i.e., lower levels than expected).

**Implications for future research**

The studies in this thesis have several important implications for empirical research on the development of antisocial behavior and its outcomes. First, our findings underline the necessity to account for stressful events when trying to understand the continuity of and cross-influence between externalizing and internalizing problems. It appeared (in accordance with prior studies not accounting for co-occurring internalizing and externalizing problems) that stressful life events are important in explaining continuity of both externalizing and internalizing problems, at least in adolescence.

Second, our results with respect to understanding and promoting decreasing externalizing problems in adolescence clearly showed that study variables should not only simply be associated to the degree of problems at a certain time point, but rather should be related to change (i.e., decreases) in symptoms across time. In contrast to the risk factors associated with deviant levels of antisocial behavior as identified in risk research, this approach yields a more restricted pool of factors that may be predictive of reductions in antisocial problems. Thus, research relating study variables directly to the outcome of interest (i.e., reductions in behavior problems) seems to be more fruitful for purposes of prevention and intervention than risk research limited to associations between risk factors and levels of behavior problems. Indeed, our results ultimately indicated that an indicator of parenting quality (i.e., low parenting stress levels) and of children’s social skills (i.e., low social problems) have unique
value in predicting reductions of externalizing behaviors in adolescence. Improvement of both parenting quality and children’s social competences have been found to be fruitful targets in prevention and intervention studies aimed at reducing antisocial behavior (Brotman et al., 2003; Lacourse et al., 2002; Gardner et al., 2007; Patterson et al., 2002).

Finally, our findings with respect to understanding poor adolescent outcomes suggest research should use disaggregated forms of antisocial behavior given the variety in associations with adverse outcomes. Moreover, as antisocial behavior in itself may change over time in terms of its course and expression, research should account for this development in understanding the links to poor functioning.

Clinical implications

The findings reported in this thesis may have implications for the clinical setting, regarding both screening and prevention. To use prevention efforts in an efficient and effective way, it should only be aimed at those children at risk for persistently high antisocial problems. To obtain a selective inclusion of truly at risk children, children who exhibit high but desisting antisocial problems in adolescence should be accurately discriminated from the persistently high cases. Our findings suggest that screening of children truly at risk of antisocial development should include, other than the level of antisocial behavior itself, repeated assessments across the childhood years of indicators of vulnerability (high inattention and hyperactivity symptoms, impaired language development), as well as poor personal competences (having social problems), and adverse family conditions (exposed to high levels of parenting stress, poor general family functioning).

Regarding the prevention of antisocial development several suggestions can be done. First, our findings underscore the importance of assessing life stress, from early childhood onwards, in the continuation of antisocial development. They suggest that caregivers and clinicians should be aware of young children’s behavioral responses to stressful experiences, because these put them at risk for increasing life stress, and subsequent emotional and behavioral problems, resulting in an ongoing cycle of increasing life stress and behavioral and emotional maladjustment. Second, with respect to promoting decreasing levels of antisocial problems in adolescence, the findings indicate that the reduction of parenting stress levels and improvement in social skills in children may be fruitful targets for prevention and intervention programs.

Third, prevention of late adolescent engagement in health risk behaviors such as substance use and risky sexual behavior is suggested to be initiated in early childhood already, and to be primarily aimed at children following deviant courses (i.e., having high and increasing levels)
in physical aggression and property violations (e.g., lying/cheating, vandalism). Property violations may also be a fruitful target, in addition to authority conflicting behaviors (i.e., truancy, running away), in preventing children from having poor academic qualifications, and engaging in serious or violent delinquency, respectively, in late adolescence. However, the findings further suggested these behaviors are in turn influenced by earlier oppositional problems, which may therefore be an important candidate for early preventive purposes.

Conclusions and Future directions

The current study allows for several conclusions regarding the development of antisocial behavior during childhood and adolescence and adverse consequences in late adolescence in the general populations. First, we found evidence for an ongoing, mutual reinforcement between life stress and behavioral problems from early childhood to late adolescence and between life stress and emotional problems in adolescence (Chapter 1). From this we can conclude that stressful life experiences truly contribute – in part - to the continuation of externalizing problems over the childhood and adolescence period, and to continuing internalizing problems in adolescence. Moreover, they also play a role in the transaction from externalizing problems to internalizing symptoms across time, and from internalizing problems to externalizing problems in adolescence. It is clear from the results that when studying the continuity in maladjustment, both behavioral and emotional problems should be taken into account. In future research, attention should be paid to specific stressful events that are responsible for the reciprocity between life stress and maladjustment.

Second, it is demonstrated that although multiple factors (in the child, family and social domain) are associated to externalizing problems, little exposure to parenting stress and children’s low social problems are associated with decreasing levels of externalizing problems, and are therefore suggested to be key factors to be influenced when aiming to reduce externalizing problems across adolescence (Chapter 3). As both these variables have been shown to be fruitful targets to aim preventive intervention programs at, we may conclude that findings of desisting-related research are of high value in guiding prevention and intervention strategies. However, longitudinal intervention studies are needed to test whether the associations demonstrated in this chapter represent true causal relations between those variables and reduced behavior problems. We can further conclude that children with high childhood but decreasing antisocial behavior in adolescence can already be discriminated from children with early and persistent high problems in (early) childhood (Chapter 4). Distinctive characteristics include both the degree of vulnerability such as inattention, hyperactivity and language impairment, and personal variables and family conditions such as the degree of children’s social abilities, and exposure to parenting stress and the quality of family functioning. As these are initial findings underlining the distinction between high but
desisting antisocial children and persistent antisocial children, replications of our results in other, larger, samples are highly needed.

A final conclusion from this thesis is that not all forms of antisocial behavior are equally strong and similarly predictive of late adolescent poor outcomes of earlier problematic development (Chapter 5 and 6). Thus, in studying the association between the course of antisocial behavior and future adverse outcomes research should disaggregate antisocial behaviors. Chapter 5 demonstrated that children following a deviant course in aggression and in property violations are most at risk of engaging in these health risk behaviors later in life. Moreover, we can conclude from Chapter 6 that behavioral pathways or developmental cascades between externalizing behaviors eventually linking to the outcomes, can be of value to further disentangle the behavioral development towards poor adolescent functioning. The findings demonstrated that early oppositional problems trigger later more serious behavioral problems including status and property violations, which ultimately lead to the engagement in delinquency and academic underachievement in late adolescence. This again underlines the importance of disaggregating antisocial behaviors and to consider their development when studying the association between antisocial behavior and its adverse consequences. In future studies more female types of antisocial behavior such as relational aggression should be considered as well. The consideration of both growth within subtypes of antisocial behavior and their mutual transactional influences simultaneously, could be of additional value in understanding the role of development in antisocial behavior in the link to adverse outcomes.
Antisociaal gedrag bij kinderen en jongeren vormt een ernstig individueel en sociaal-maatschappelijk probleem en verdient omwille van de jeugdgezondheid en de maatschappij de aandacht van de ontwikkelingspsychologie. Dit proefschrift heeft dan ook als hoofddoel het bestuderen van de ontwikkeling van antisociaal gedrag en haar negatieve consequenties voor later functioneren, alsmede het identificeren van factoren die van invloed zijn op deze ontwikkeling. Een ontwikkelingsperspectief waarbij het beloop van antisociaal gedrag van de vroege kindertijd tot de late adolescentie, en individuele-, gezins-, en omgevingskenmerken die daarop van invloed zijn in kaart wordt gebracht is daarbij essentieel. Om te begrijpen hoe antisociaal gedrag tijdens de jeugd kan resulteren in toekomstig onaangepast functioneren zoals delinquentie, middelengebruik, risicovol seksueel gedrag en ondermaats schoolpresteren (bijvoorbeeld schooluitval) in de adolescentie, onderscheiden we vier verschillende vormen van antisociaal gedrag, die we elk relateren aan de negatieve uitkomsten in de adolescentie. Deze vier vormen zijn door Frick et al. (1993) getypeerd als (fysieke) agressie (vechten), opstandigheid (ongehoorzaamheid), ‘status violations’ of gezagsondermijnend gedrag (weglopen van huis, spijbelen, drugsgebruik) en ‘property violations’ (bedriegen, stelen, vandalisme) (Zie: General Introduction).

Uitgaande van een aantal hiaten in de literatuur omtrent de ontwikkeling van antisociaal gedrag behandelt dit proefschrift een viertal onderwerpen. (1) We onderzoeken de rol van stressvolle gebeurtenissen in de continuïteit van gedragsproblemen en emotionele problemen van de peuters tot de late adolescentie. (2) We bestuderen factoren (op de leeftijd van 10 jaar) die een vermindering in antisociaal gedrag in de adolescentie voorspellen. (3) We onderzoeken welke (vroege)kinderlijke factoren (op leeftijd 3, 5 en 10 jaar) onderscheid kunnen maken tussen kinderen met persistent hoog antisociaal gedrag tot in de adolescentie, en kinderen met een aanvankelijk hoog, maar in de adolescentie verminderd niveau van antisociaal gedrag. (4) Tot slot bestuderen we welke subtypen van antisociaal gedrag (opstandigheid, agressie, ‘status violations’ of ‘property violations’) bijdragen aan later
onaangepast gedrag inclusief drugs-, tabak-, en alcoholgebruik, seksueel risicovol gedrag, delinquentie en falen op school op de leeftijd van 18 jaar.

**Steekproef**

In het onderzoek werd gebruik gemaakt van een steekproef van 420 kinderen uit de algemene bevolking die 2 of 3 jaar oud waren in 1989 (Tijdstip 1). Op dat tijdstip werd door ouders gerapporteerde informatie over probleemgedrag, motorische ontwikkeling en stressvolle levensgebeurtenissen verzameld. In 1991, toen de kinderen 4 of 5 jaar oud waren (Tijdstip 2), werden over 396 kinderen (95%) van de oorspronkelijke steekproef bruikbare ouder-rapportages verzameld, waaronder dezelfde informatie als op Tijdstip 1 en bovendien informatie over het temperament en de taalontwikkeling van het kind, en stress bij de ouders. Ook werd over 342 kinderen bruikbare informatie geleverd door leerkrachten met betrekking tot probleemgedrag en schoolcompetentie. In 1997, toen de kinderen 10 of 11 jaar oud waren (Tijdstip 3), werd over 358 kinderen (85%) van de oorspronkele steekproef informatie via ouders verzameld, waaronder dezelfde onderwerpen als op Tijdstip 2 en bovendien informatie over gezinsfunctioneren en ouderlijke psychopathologie. Over 294 kinderen werd informatie aangeleverd door de lerkrachten met betrekking tot dezelfde onderwerpen als op Tijdstip 2 aangevuld met informatie over de sociale vaardigheden van het kind. Ook vulden 295 kinderen zelf vragenlijsten in met betrekking tot zelf-waargenomen competenties en ervaren sociale steun. In 2005, toen de jongeren de leeftijd van 18 of 19 jaar hadden bereikt (Tijdstip 4) vulden 311 jongeren (74%) vragenlijsten in over probleemgedrag, delinquentie, middelengebruik, schoolprestaties en risicovol seksueel gedrag. Ook namen 247 van deze jongeren (79%) deel aan een uitgebreid telefonische interview over stressvolle gebeurtenissen tussen het derde en vierde meetmoment. Ouder-rapportages van 324 ouders (77%) met betrekking tot probleemgedrag van hun kind werden verzameld.

**Bevindingen**

In Hoofdstuk 2 rapporteren we over onderzoek naar de bijdrage van stressvolle gebeurtenissen aan de continuïteit van antisociale en emotionele problemen, alsmede hun bijdrage aan de beïnvloeding van (transactie tussen) beide vormen van onaangepast functioneren in de periode van de vroege kindertijd tot de late adolescentie. Antisociale en emotionele problemen werden op 4 tijdstippen (3, 5, 10, en 18 jaar) gemeten, en stressvolle gebeurtenissen in de drie tussenliggende perioden. De resultaten van de toetsing van een reeks zogenaamde autoregressieve cross-lagged modellen lieten zien, dat antisociaal gedrag vanaf de leeftijd van 3 jaar het meemaken van stressvolle gebeurtenissen voorspelt, terwijl deze gebeurtenissen op hun beurt latere antisociale problemen voorspellen (wederzijdse beïnvloeding). Stressvolle
Samenvatting (Summary)

gebeurtenissen speelden ook een rol bij de continuïteit van emotionele problemen, echter pas vanaf 10 jaar. De resultaten wezen verder uit dat stressvolle gebeurtenissen, vanaf de kindertijd al, een rol spelen bij de overdracht (transactie) van antisociaal gedrag naar emotionele problemen. Omgekeerd, de transactie van emotionele problemen naar antisociale problemen vond alleen plaats in de adolescentie. De bevindingen in dit hoofdstuk wijzen op een continue cyclus van bekrachtiging waarbij antisociaal gedrag het meemaken van stressvolle gebeurtenissen kan bevorderen, en deze stressvolle gebeurtenissen vervolgens (weer) antisociaal gedrag en later ook emotionele problemen, aanwakkeren en in stand houden.

De studie gerapporteerd in Hoofdstuk 3 onderzocht factoren in de kindertijd (op 10 jaar) die een afname in antisociaal gedrag tussen de schoolleeftijd en late adolescentie voorspellen. Een afname werd hierbij gedefinieerd als een lager niveau van antisociale symptomen op 18 jaar dan verwacht op basis van het niveau van agressief gedrag tijdens de gehele kindertijd. Op basis van bevindingen uit eerder onderzoek selecteerden we factoren uit de individuele-, gezins-, en sociale context van het kind; deze bleken nagenoeg alle geassocieerd met het absolute niveau van antisociaal gedrag op 18 jaar. Goede sociale vaardigheden en een positieve stemming bij het kind (individuele factoren), en indicatoren van een adequate opvoeding, zoals een laag niveau van opvoedingsstress en een laag niveau van psychopathologie bij de ouders, goed algemeen gezinsfunctioneren en een lage blootstelling aan stressvolle gebeurtenissen (gezinsfactoren) bleken samen te hangen met een afname in antisociaal gedrag in de adolescentie. Uit een multiple (hierarchische) regressieanalyse bleek dat van deze factoren alleen een laag niveau van sociale problemen bij het kind en een laag niveau van ouderlijke opvoedingsstress unieke predictoren zijn van een afgenomen niveau van antisociale problemen op 18 jaar. Omdat de studievariabelen direct werden gerelateerd aan een *afname* in antisociaal gedrag (zoals in ‘desistance’ onderzoek) - in tegenstelling tot (risico-)onderzoek waarin variabelen aan de (hoge) *mate* van antisociaal gedrag op een bepaald tijdstip worden gerelateerd - dragen de huidige resultaten bij aan een *rechtstreekse* validering van eerdere bevindingen van preventie- en interventieonderzoek, welke wijzen op het verbeteren van zowel sociale vaardigheden bij het kind als de kwaliteit van de opvoeding, bijvoorbeeld door het reduceren van stress bij de ouders.

De studie in Hoofdstuk 4 had als doel te onderzoeken welke factoren in de (vroegere) kindertijd (op 3, 5 en 10 jaar) onderscheid kunnen maken tussen kinderen met een stabiel deviant patroon van antisociaal gedrag tot in de late adolescentie, en kinderen met een hoog niveau van antisociaal gedrag in de kindertijd maar een vermindering daarvan in de adolescentie. Gebaseerd op enkele uitgangspunten van Moffitt’s theorie over antisociale ontwikkeling (1993) testten we variabelen die een (aangeboren) kwetsbaarheid (temperament, ADHD symptomen) representeren, variabelen die een risico-omgeving reflecteren en variabelen die
persoonlijke competenties meten. De resultaten van de contrast-analyses lieten zien dat ten opzichte van de hoog stabiele groep, de kinderen met hoog maar dalend niveau van antisociaal gedrag in de adolescentie, in de (vroege) kindertijd al minder ADHD symptomen (op de leeftijd van 5 en 10 jaar) en een minder moeilijk temperament hadden (leeftijd 10 jaar), evenals een betere verbale talontwikkeling (leeftijd 5 jaar). Ook had deze groep minder risico in de kindertijd doordat zij minder problematische sociale relaties hadden (leeftijd 5 en 10 jaar), betere gedragsmatige competenties (leeftijd 10 jaar) en onder betere gezinsomstandigheden opgroeiden (minder stress bij ouders op leeftijd 5 en 10 jaar, beter gezinsfunctioneren op leeftijd 10 jaar). In tegenstelling tot bevindingen uit voorgaande studies laten deze resultaten zien dat, zowel op basis van de mate van hun kwetsbaarheid als op basis van persoonlijke en omgevingskenmerken, het mogelijk is om kinderen die daadwerkelijk risico lopen op een pervasieve antisociale carrière al vroeg teonderscheiden zijn van de kinderen die uiteindelijk ‘vanzelf’ uit hun antisociale ontwikkeling groeien.

In Hoofdstuk 5 onderzochten we in welke mate de vier subtypen van antisociaal gedrag geassocieerd zijn met middelengebruik (roken, alcohol, soft drugs, hard drugs) en risicovol seksueel gedrag (onveilig wisselend seksueel contact, sex als ruilmiddel, ongewenste zwangerschap) in de late adolescentie. Daartoe onderzochten we met behulp van zogenaamde groeimodellen de relaties tussen zowel het niveau van agressie, opstandigheid, ‘status violations’ en ‘property violations’, als de ontwikkeling van ieder van deze gedragingen vanaf de leeftijd van 5 jaar als voorspellers van het middelengebruik en risicovol seksueel gedrag op de leeftijd van 18 jaar. Uit de resultaten bleek dat van deze vormen van antisociaal gedrag met name een hoog niveau en een deviante ontwikkeling in fysieke agressie, en een deviante ontwikkeling in ‘property violations’ unieke voorspellers zijn van middelengebruik en risicovol seksueel gedrag in de late adolescentie. Een hoog niveau van ‘status violations’ voorspelde alleen soft drugsgebruik en roken, terwijl het verband tussen opstandigheid en de genoemde uitkomsten op de leeftijd van 18 jaar verdween, wanneer rekening werd gehouden met de invloed van de andere vormen van antisociaal gedrag. Deze bevindingen suggereren dat preventieve interventies om risicovol gedrag in de late adolescentie te verminderen zich al vroeg in de kindertijd zouden kunnen richten op destructieve vormen van antisociaal gedrag (agressie en ‘property violations’) bij kinderen.

Hoofdstuk 6 had als doel het blootleggen van ‘ontwikkelingspaden’ (van 5 tot 18 jaar) van vier typen antisociaal gedrag die leiden tot (sociaal) disfunctioneren, in termen van delinquent gedrag en falen op school (ondermaatse schoolprestaties) in de late adolescentie. De resultaten wezen ten eerste uit dat - van alle subtypen - ‘status violations’ zowel cross-sectioneel (op 18 jaar) als prospectief (vanaf 10 jaar) geassocieerd zijn met delinquent gedrag, en ‘property violations’ geassocieerd is met ondermaats schoolprestaties. Autoregressieve cross-lagged modellen lieten vervolgens zien dat ‘status violations’ en ‘property violations’ op 18 jaar
(gedeeltelijk) het resultaat zijn door oppositionele problemen in de kindertijd. Deze bevindingen zijn consistent met Loeber’s ‘common authority conflict path’, welke veronderstelt dat oppositionele en autoriteitsproblemen het vroege begin zijn van ernstiger destructieve ('overt') en heimelijke ('covert') antisociale ontwikkelingspaden. De resultaten gerapporteerd in Hoofdstuk 6 laten duidelijk zien dat op verschillende leeftijden verschillende aspecten van het spectrum aan gedragsproblemen aan de orde zijn, welke de ontwikkeling van latere, meer ernstige problemen op gang brengen, die vervolgens weer later disfunctioneren (delinquentie, schooluitval) tot gevolg hebben. Hiermee wordt gesuggereerd dat voor een vroege preventie van delinquentie en ondermaatse schoolprestaties men zich al zou moeten richten op oppositionele problematiek bij jonge kinderen.

Conclusies

De studies in dit proefschrift leveren een bijdrage aan het inzicht in de ontwikkeling van antisociaal gedrag tijdens de kindertijd en adolescentie en de consequenties ervan voor het latere functioneren. Ten eerste werd duidelijk dat het meemaken van stressvolle gebeurtenissen gedurende de hele kindertijd en adolescentie een rol speelt bij de continuïteit van antisociale problemen, en vanaf de adolescentie ook in de continuïteit van emotionele problematiek (Hoofdstuk 2). Ook spelen zij een rol bij de overdracht van antisociale problemen naar emotionele problemen vanaf de kindertijd en, andersom bij het overvloeien van emotionele problemen in antisociale symptomen vanaf de adolescentie.

Ten tweede, in tegenstelling tot het grote aantal (individuele, gezins- en sociale context) factoren dat in veel onderzoek geassocieerd wordt met een hoog niveau van antisociaal gedrag, lijkt een veel beperker aantal factoren een rol te spelen als het gaat om het voorspellen van een afname in probleemgedrag (Hoofdstuk 3). Uit de resultaten bleek dat lage blootstelling aan opvoedingsstress bij de ouders en weinig sociale problemen rechtstreeks verband houden met een reductie in antisociaal gedrag tijdens de adolescentie. Beide factoren zijn in eerder interventie- en preventieonderzoek als belangrijke foci van behandeling aangewezen. Het feit dat de huidige ‘desistance’-gerelateerde studie deze resultaten replicateert suggeerte dat dit type onderzoek van grote waarde zou kunnen zijn bij de ontwikkeling van effectieve preventie- en interventiestrategieën.

Als derde kunnen we uit de resultaten van Hoofdstuk 4 concluderen dat kinderen die deviant en persistent antisociaal gedrag laten zien (serieuze risicogroep), al vroeg in de kindertijd (op leeftijd 5 jaar) te onderscheiden zijn van kinderen met eerst hoog maar later afnemend antisociaal gedrag. Deze onderscheidende karakteristieken omvatten: een hogere mate van kwetsbaarheid zoals meer aandachtsproblemen en hyperactiviteit, en grotere taalontwikkelingsachterstand op jonge leeftijd, en minder gunstige persoonlijke en
gezinskenmerken zoals het hebben van veel problemen in sociale relaties, meer stress bij de ouders met betrekking tot de opvoeding en een algemeen slecht gezinsfunctioneren. Deze kennis kan van belang zijn bij het voeren van een efficiënt en effectief preventiebeleid dat zich selectief zou moeten richten op de groep met serieuze en persistente gedragsproblemen.

Ten slotte is uit dit proefschrift gebleken dat niet alle subtypen van antisociaal gedrag even sterk en gelijk voorspellend zijn voor latere vormen van disfunctioneren (Hoofdstuk 5 en 6). Zo bleek uit Hoofdstuk 5 dat met name destructieve vormen van antisociaal gedrag (fysieke agressie, ‘property violations’) het gebruik van middelen en risicovol seksueel gedrag voorspellen. Hoofdstuk 6 laat bovendien zien, dat door rekening te houden met de wederzijdse beïnvloeding tussen de verschillende vormen van antisociaal gedrag over de tijd, bepaalde ontwikkelingspaden van antisociaal gedrag resulterend in disfunctioneren in de adolescentie kunnen worden bloot gelegd. Zo bleek uit de resultaten dat vroegkinderlijke opstandigheid latere, meer serieuze gedragsproblemen zoals ‘status violations’ en ‘property violations’ aanwakkeren, welke uiteindelijk resulteren in delinquent gedrag, falen op school en schooluitval.

**Implicaties**

De bevindingen in dit proefschrift hebben een aantal interessante implicaties voor zowel de klinische setting als voor empirisch onderzoek naar antisociale ontwikkeling en haar consequenties voor het latere functioneren. De klinisch relevante bevindingen hebben vooral implicaties voor screening- en preventie-doelstellingen. Een correcte screening van risicokinderen is van groot belang voor het voeren van een effectief en efficiënt preventiebeleid. De bevindingen suggereren dat een selectie van risicokinderen met een, waarschijnlijk persistent antisociaal gedragspatroon uit een veel grotere groep kinderen met hoog antisociaal gedrag tijdens de kindertijd al op jonge leeftijd mogelijk is. De resultaten geven aan dat bij correcte screening van deze risicokinderen niet slechts op de mate van antisociaal gedrag moet worden gelet, maar dat indicatoren van een hoge kwetsbaarheid (hyperactiviteit, aandachtsproblemen) en slecht ontwikkelde sociale vaardigheden en ongunstige gezinsomstandigheden (ouderlijke stress) van groot nut kunnen zijn bij het onderscheiden van de echte risicokinderen van de probleemkinderen waarbij de deviante gedragsontwikkeling uiteindelijk niet doorzet tot in de adolescentie.

Preventie van antisociale ontwikkeling zou zich kunnen richten op enerzijds de reductie van stress bij de ouders over de opvoeding en anderzijds op de verbetering van sociale vaardigheden bij de kinderen. De resultaten benadrukken tevens de rol van stressvolle gebeurtenissen in de continuïteit in antisociaal gedrag. Antisociaal gedrag als respons op dergelijke gebeurtenissen verdient de aandacht van opvoeders en hulpverleners, omdat dit
gedrag op zijn beurt stressvolle gebeurtenissen met zich meebrengt en deze op hun beurt weer verhoogde (emotionele en) gedragsproblemen tot gevolg hebben, tesamen resulterend in een onafgebroken cyclus van verhoogde stress en onaangepast gedrag.

Ten slotte, de preventie van risicogedrag zoals zwaar middelengebruik en risicovol seksueel gedrag in de late adolescentie zou zich al vroeg in de kindertijd moeten richten op kinderen die een afwijkend ontwikkelingspatroon (hoge niveau’s en stabiel hoog of toenemend verloop) vertonen in openlijk en heimelijk destructief gedrag (agressie en ‘property violations’). Heimelijk gedrag zoals wegbreken van huis (‘status violations’) en bedriegen of stelen (‘property violations’) zijn belangrijke voorlopers, en dus potentiële foci van preventie, van respectievelijk, serieuze en geweldadige delinquentie en falen op school. Echter, dit soort heimelijk antisociaal gedrag, zo blijkt uit de resultaten, wordt weer voorafgegaan door vroege oppositionele problemen, welke om die reden wellicht een belangrijke kandidaat zijn voor vroege preventie-doeleinden.

Wat betreft de implicaties voor toekomstig onderzoek, is duidelijk geworden dat om de hoge mate van continuïteit in antisociaal gedrag te kunnen begrijpen, men rekening moet houden met de continue invloed van stressvolle gebeurtenissen tijdens de kindertijd en de adolescentie (en de wederzijdse beïnvloeding door antisociaal gedrag en stress), alsook de rol van stressvolle gebeurtenissen bij de overdracht van antisociale problemen naar emotionele problemen en later in de adolescentie ook van emotionele problemen naar antisociaal gedrag.

Ten tweede, om te onderzoeken welke factoren effectief kunnen zijn in de reductie van antisociale problemen zouden studievariabelen niet slechts gerelateerd moeten worden aan een deviant *niveau* van probleemgedrag op een bepaald tijdstip. Een ‘desistance’-gerelateerd benadering waarbij factoren direct geassocieerd worden met een *verandering* (d.w.z. afname) in probleemgedrag zou een meer vruchtbare middel kunnen zijn voor het selecteren van kandidaten om preventie- en interventieprogramma’s op te richten.

Tot slot pleiten de resultaten uit dit onderzoek voor de desegregatie van antisociaal gedrag als men wil begrijpen hoe disfunctioneren in de late adolescentie (zoals delinquentie, middelengebruik) voortkomt uit een vroegere problematische ontwikkeling. Aangezien antisociaal gedrag op zichzelf een veranderd construct is in termen van beloop en expressie over tijd, zou dit ontwikkelingsaspect moeten worden ingecalculeerd in onderzoek naar het verband tussen antisociaal gedrag en later onaangepast gedrag.
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