Childhood Maltreatment and Social-emotional Functioning in Delinquent Adolescents

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Chapter 1

General introduction

Background

Detained adolescents constitute a complex group, characterized by serious conduct problems (Colins, Vermeiren, Schuyten, Broekaert, & Soyez, 2008), high rates of mental disorders (Abram, Teplin, McClelland, & Dulcan, 2003; Colins et al., 2010; Vermeiren, Jespers, & Moffitt, 2006; Vreugdenhil, Doreleijers, Vermeiren, Wouters, & van den Brink, 2004) and marked psychosocial adversity (Kroll et al., 2002). Clinicians working with this group are faced with these serious issues on a day to day basis. This dissertation sets out to advise these clinicians, by aiming to increase knowledge on childhood maltreatment and social-emotional functioning in delinquent adolescents. For the purposes of this dissertation, *social-emotional functioning* is used as an overarching term for psychopathic traits, mental health problems, aggression and defective social decision making. Although each of these issues has received research attention in forensic psychiatry (e.g., Koenigs, Kruepke, & Newman, 2010; Kolla et al., 2013; Sevecke, Lehmkuhl, & Krischer, 2009), there are gaps in literature on their interrelation and neural correlates, especially in detained adolescents. While in most previous studies participants were guaranteed that their data were used for research purposes only, another limitation of existing research relates to the generalizability to clinical practice of professionals working with young detainees. When young detainees know their answers are viewed and filed by a clinician, they may report differently on questionnaires, in an attempt to present themselves better or worse than they are (e.g., McDermott, Dualan, & Scott, 2013). The current dissertation bridges this gap between research and clinical practice, by using data from routine mental health screening. As Juvenile Detention Centers (JDCs) generally have a limited number of mental health professionals available, they are unable to offer each youth an elaborate mental health assessment (Colins, Grisso, Mulder, & Vermeiren, 2014). High quality routine mental health screening at the time of juveniles' JDC entry can help clinicians to focus their attention on those who need it most (Grisso, Vincent, & Seagrave, 2005). This dissertation will examine specific risk factors such as childhood maltreatment and psychopathic traits, and how these relate with aggression and mental health problems. Although JDC clinicians usually have no other option than to rely on self-report questionnaires for mental health screening (Colins et al., 2008), scholars debate whether constructs such as psychopathic traits can actually be tapped by self-report (Lilienfeld & Fowler, 2007). Therefore, the clinical usefulness and value of a psychopathic traits self-report instrument will be studied.

Social-emotional functioning in delinquent adolescents is likely in part related with neurobiological factors (Cohn et al., 2013; Fairchild, van Goozen, Calder, & Goodyer, 2013). There is increasing research attention for the question whether neurobiological risk factors for aberrant behavior can be of clinical value in forensic populations (Popma & Raine, 2006). In line with this question, one study in this dissertation will also explore whether task-related brain activity differs in delinquent versus typically developing adolescents.

Mental health

As a growing number of studies, published during the first decade of this century, gave evidence for the high prevalence of mental disorders in juvenile detainees (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002; Vreugdenhil et al., 2004), the lack of sufficient mental health care in JDCs was problematized internationally. It became clear that when juveniles are admitted to a JDC, they are likely to have urgent mental health needs. For example, in the Netherlands, a 2007 government report expressed concern for the safety of detained adolescents and recommended a routine mental health screening procedure be administered at admission (Jeugdzorg, Onderwijs, Gezondheidszorg, & Sanctietoepassing, 2007). In collaboration with the child- and adolescent psychiatry departments of Curium-LUMC and VU University Medical Center, a procedure was developed in two JDCs: JDC Lelystad and Teylingereind. Three studies described in this volume make use of data derived from this project, so findings can be regarded as practice-based. Consequently, this dissertation is in line with efforts to translate research to clinical practice directly (ZonMW, 2009).

Detained girls are known to carry even higher rates of mental disorders than boys (Colins et al., 2010; Hamerlynck, Doreleijers, Vermeiren, & Cohen-Kettenis, 2009). This includes not only disorders traditionally associated with antisocial behavior, such as conduct disorder and substance dependence, but also depressive disorder, posttraumatic stress disorder and other disorders in the internalizing spectrum (Coleman & Stewart, 2010; Colins et al., 2010; Hamerlynck et al., 2009; Teplin et al., 2002). This gender difference has been described as the so-called gender paradox. The gender paradox holds that much less girls than boys show delinquent behavior and are detained for it, while those who are detained, form an exceedingly more serious group than their male peers as regards behavior and comorbidity (Loeber & Keenan, 1994). Most studies in this dissertation focus on detained boys and thus it is unclear to what extent their findings can be applied to girls. Therefore, one study in this dissertation is directed at differences between detained girls and boys.

Aggression

Aggression constitutes an imminent safety threat inside JDCs and, when left untreated, also outside JDCs. Therefore, knowledge on detainees with a high risk of displaying aggression is essential for JDC clinicians. Scholars have distinguished two types of aggression: reactive and proactive aggression (e.g., Dodge, Lochman, Harnish, Bates, & Pettit, 1997; Raine et al., 2006). While reactive aggression is an impulsive, violent reaction to a (perceived) threat, proactive aggression concerns the premeditated, goal-directed use of violence. In populations with high levels of aggression, such as forensic samples, these types of aggression are often found to occur together (Kempes, Matthys, de Vries, & van Engeland, 2005). However, in aggression-reduction

programs these subtypes likely need different types of treatment. For example, in the treatment of reactive aggression the improvement of emotion regulation could be an important goal. In order to enable the development of individualized treatments, it is of interest to examine whether risk factors such as maltreatment and psychopathic traits relate differentially to these aggression subtypes.

Risk factors for mental health problems and aggression: maltreatment and psychopathic traits

Studies have shown that detained youths with a history of maltreatment and those with high levels of psychopathic traits are especially likely to show mental health problems and aggression (Cima, Smeets, & Jelicic, 2008; King et al., 2011; Lexcen, Vincent, & Grisso, 2004; Marsee, Silverthorn, & Frick, 2005; Muñoz & Frick, 2012; Salekin, Leistico, Neumann, DiCicco, & Duros, 2004). For the treatment of mental health problems and aggression, it may be important to know whether maltreatment experiences or psychopathic traits are at play (Caldwell, 2011; Caldwell, McCormick, Wolfe, & Umstead, 2012; Kerig & Alexander, 2012). When clinicians learn about these risk factors and related problems at the start of detention, they will be better able to tailor treatment.

Unfortunately, multiple maltreatment experiences are rule rather than exception in detained adolescents (Abrantes, Hoffmann, & Anton, 2005). Several scholars have shown that having experienced multiple types of maltreatment increases the likelihood of developing mental health problems and aggression cumulatively (Boxer & Terranova, 2008; Edwards, Holden, Felitti, & Anda, 2003; Green et al., 2010; Teicher, Samson, Polcari, & McGreenery, 2006). This cumulative detrimental effect is likely to worsen specifically when emotional maltreatment is involved. Victims of physical and sexual abuse were shown to have more mental health problems and act more violently when they were also emotionally maltreated (Duke, Pettingell, McMorris, & Borowsky, 2010; Mills et al., 2013; Teicher et al., 2006). Only recently, studies have indicated that emotional maltreatment is at least as harmful as more intrusive types of abuse (Mills et al., 2013). In detainees, research on sequelae of emotional maltreatment is scarce and knowledge on multiple maltreatment is also limited (Kimonis, Fanti, Isoma, & Donoghue, 2013; King et al., 2011). This dissertation sets out to fill this gap in literature.

Psychopathic traits refer to a constellation of narcissistic, cold-unemotional and impulsive characteristics that designate an especially serious, persistent and aggressive group of delinquent youth (Frick, 2009; Hare & Neumann, 2009; Lynam & Gudonis, 2005). These traits are considered to be a precursor of adult psychopathy, although continuity over time has not been adequately studied to date (Andershed, 2010). Delinquent youths with a high level of psychopathic traits are more likely to use proactive aggression than those with low psychopathic traits. Also, they bear high levels of mental health problems, specifically externalizing problems (attention deficit

and hyperactivity, substance abuse, anger/irritability). Although treatment of juveniles with psychopathic traits is traditionally seen as hard and barely effective (Hawes & Dadds, 2005), more recently, intensive and individualized treatment forms have been found to give some improvement (Caldwell et al., 2012; Reidy, Kearns, & DeGue, 2013). Assessing psychopathic traits in detained juveniles could therefore be used to allocate appropriate, intensive treatment forms to high-scoring youths.

The assessment of psychopathic traits involves an extensive interview and file study by a trained professional (Psychopathy Checklist Youth Version, PCL-YV, Forth, Kosson, & Hare, 2003), making it too costly to administer to every individual. Therefore, an indication of the level of psychopathic traits using a self-report instrument could be helpful. However, as psychopathy is associated with manipulation, impression management and lying, self-report is traditionally seen as a less suitable assessment method (Lilienfeld & Fowler, 2007). This could be especially problematic in settings where juveniles know their information is viewed and filed by a clinician, such as in JDCs during routine screening. Notwithstanding this concern, self-report has some advantages over other modes of assessment. Self-report questionnaires can capture motivations for actions (e.g., using charm to con others), and features (e.g., feelings of guilt) that are best known to the individual and may be obscured to others (Raine et al., 2006). Furthermore, self-report enables the study of psychopathic traits in settings and circumstances where parents, teachers or other informants are not available or unwilling to cooperate (e.g., Colins et al., 2008). Self-report questionnaires are also easy to complete for the participants and require only minimal training of the test administrator (Lilienfeld & Fowler, 2007). This economic advantage makes self-report questionnaires appealing for use in JDC settings. Before self-report questionnaires assessing psychopathic traits can be applied in clinical practice, it is important to gain more information on their clinical usefulness. As this dissertation examines self-reported psychopathic traits in a routine mental health screening context, it will increase knowledge on it's usefulness in a setting where anonymity and confidentiality are not guaranteed.

When studying both maltreatment and psychopathic traits as risk factors, it is important to keep in mind that they are likely to be interrelated. Early theorists have postulated that there are two forms of psychopathy: primary and secondary psychopathy (Karpman, 1941, 1946). Primary psychopathy is not preceded by maltreatment and is therefore considered to be primarily hereditary. Secondary psychopathy is caused by maltreatment experiences affecting emotion regulation and empathy, and is therefore accompanied by high levels of anxiety, and other mental health problems. Adolescents with a combination of multiple maltreatment experiences and psychopathic traits could therefore be a subgroup with especially high levels of mental health problems and aggression, but this has not been studied explicitly to date. For this reason, this dissertation explores whether detained adolescents with various combinations of maltreatment and psychopathic traits levels are different with regard to their levels of mental health problems and aggression.

Neurocognitive risk factors for antisocial behavior

Research on neurocognitive risk factors for antisocial behavior in adolescents is still in its infancy, and many studies, although informative, do not include the most severe group: adolescents found in JDCs (e.g., Decety, Michalska, Akitsuki, & Lahey, 2009; Marsh & Blair, 2008). In order to be able to examine possible clinical uses in JDCs, further research is needed. While behavioral differences between heavily delinquent adolescents and typically developing adolescents are evident, knowledge on neural correlates is limited. This dissertation will explore differences between delinquent and typically developing youths while participants perform a social decision making task. As described above, the group of delinquent adolescents is highly heterogeneous, for instance regarding their level of psychopathic traits. Therefore, in the fMRI-study described in this dissertation, the relation of psychopathic traits to differential task behavior and related brain activity will be explored.

The present dissertation

This dissertation aims to increase understanding on childhood maltreatment and social-emotional functioning in delinquent adolescents. The studies described will advise JDC clinicians on young detainees' maltreatment experiences, psychopathic traits and interrelations of these risk factors with aggression, mental health problems and neural mechanisms for social decision making. In addition, as clinicians working with young detainees may be interested to screen for psychopathic traits using youth self-report, we will give attention to the clinical usefulness of this assessment method.

To investigate these aims, we used the samples described in Table 1. In May 2008, two male-only JDCs in the Netherlands started to use a standardized method for mental health screening and assessment for each youth entering the institution. Three studies in this dissertation were conducted with data derived from this procedure (Chapters 2, 4, 5). During the time frame of these studies, adjustments were made in the set of questionnaires used. Therefore, each of these studies has a different sample size. One study in this dissertation included Flemish detained boys and girls, making the examination of gender differences and an international comparison possible (Chapter 3). Different from the Dutch situation, in this study, participants consented to fill out questionnaires for research purposes only. Finally, the fMRI-study included a subset of detained adolescents from one of the two Dutch JDCs, as well as adolescents following a forensic treatment program and typically developing controls, who all followed an active informed consent procedure involving both youths and parents (Borst-Eilers & Sorgdrager, 1998).

Table 1. Samples in this dissertation

Chapter	Title	Sample from	*N*	*M* age in years (range)
2	Emotional maltreatment among Detained Male Adolescents: Relations with Aggression and Mental Health Problems	JDCs Teylingereind and Rentray, the Netherlands	772 males	16.5 (12-18)
3	Gender differences in childhood emotional maltreatment and related mental health problems among detained adolescents	JDCs De Kempen and De Zande, Belgium	156 males and 185 females	15.9 (12-17)
4	Psychopathic traits and maltreatment: relations with aggression and mental health problems in detained boys	JDCs Teylingereind and Rentray, the Netherlands	448 males	16.5 (12-18)
5	Psychopathic-like traits in detained adolescents: clinical usefulness of self report	JDCs Teylingereind and Rentray, the Netherlands	365 males	16.5 (12-18)
6	Neural correlates of social decision-making in severely antisocial adolescents	Schools JDC Teylingereind De Jutters, forensic treatment center	17 males 7 males 10 males	18.3 (15-21)

Outline of dissertation

Chapter 2 investigates emotional maltreatment as a risk factor for mental health problems and aggression. Internalizing and externalizing mental health problems, proactive and reactive aggression are compared in four mutually exclusive groups with various combinations of maltreatment experiences: detained boys with (1) no maltreatment, (2) emotional maltreatment (emotional abuse and/or emotional neglect), (3) physical maltreatment (physical neglect, physical abuse and/or sexual abuse) and finally (4) combined emotional and physical maltreatment (physical neglect, physical abuse and/or sexual abuse + emotional maltreatment).

Chapter 3 examines gender differences with regard to emotional maltreatment as a risk factor for internalizing and externalizing mental health problems, over and above the influence of other types of maltreatment (sexual abuse, physical abuse and neglect).

Chapter 4 studies in what way combinations of risk factors, i.e. maltreatment and psychopathic traits, are associated with severity of mental health problems and aggression. Mental health problems and proactive and reactive aggression are compared between six groups of detained adolescents with different, mutually exclusive combinations of risk factors: those with (1) a low level of psychopathic traits who did not report maltreatment; (2) a low level of psychopathic traits reporting one type of maltreatment; (3) a low level of psychopathic traits reporting multiple types of maltreatment; (4) a high level of psychopathic traits who did not report maltreatment; (5) a high level of psychopathic traits reporting one type of maltreatment

and finally (6) a high level of psychopathic traits reporting multiple types of maltreatment. We study mental health problems both dimensionally (level of problems) and categorically (disorders).

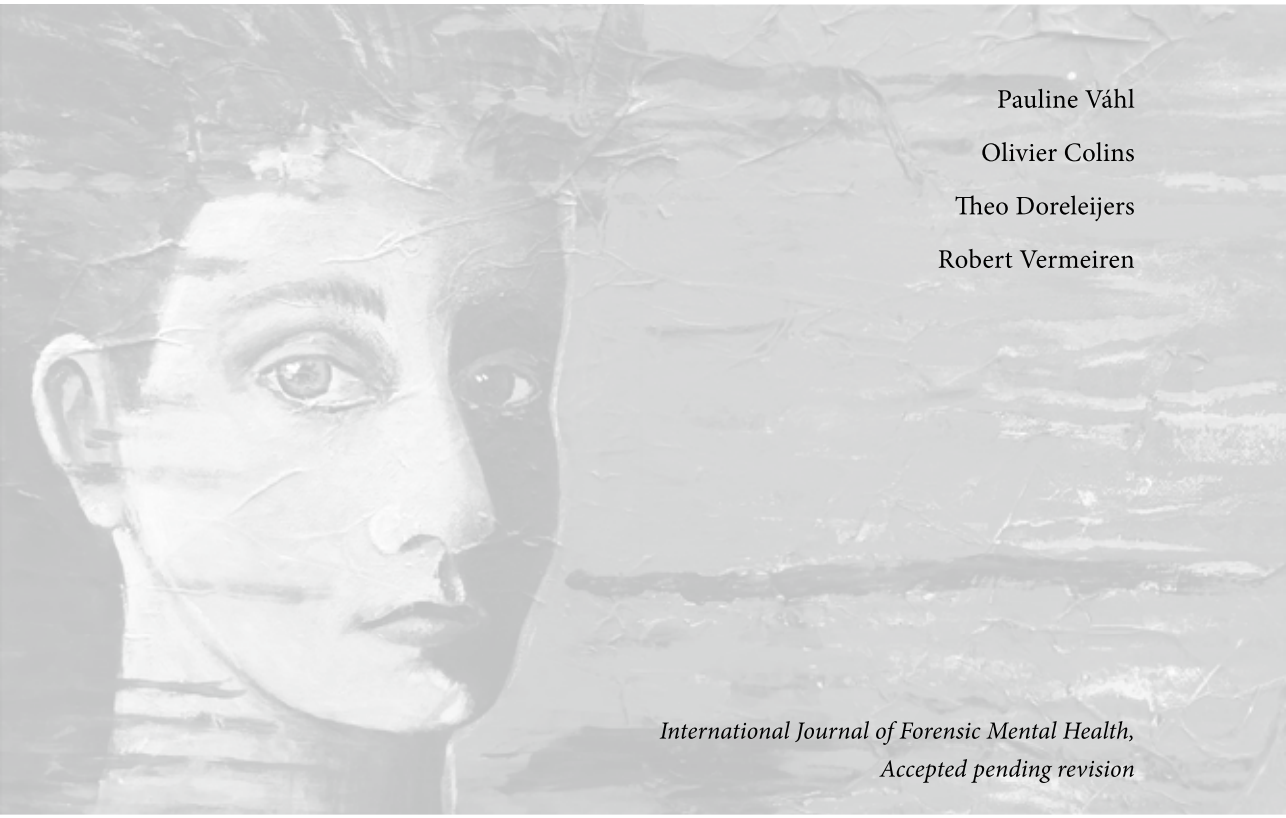
Chapter 5 examines the clinical usefulness of a psychopathic traits self-report instrument in the setting of a JDC routine mental health screening procedure. We examine whether relations with emotional and behavioral problems known from literature can be confirmed using data from a clinical context.

Chapter 6 investigates whether severely antisocial boys behave differently in a social decision making situation compared to healthy peers, and whether there are neural correlates for behavorial differences. Also, we explore how self-reported psychopathic traits relate with behavior and activity in the involved brain areas.

Finally, in chapter 7, the findings of these five studies are summarized, and the theoretical and practical implications are discussed, along with directions for future research.

Chapter 2

Emotional maltreatment among detained male adolescents: relations with aggression and mental health problems



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Abstract

There is limited information on detained juveniles who experienced emotional maltreatment in their past. This study used data from the routine mental health screening of 762 detained male adolescents aged 13-18 years. Detained boys with a history of emotional maltreatment are at an increased risk for reactive aggression and mental health problems, especially when they also report having experienced physical abuse, physical neglect and/or sexual abuse. Regarding proactive aggression, no differences were found between boys who experienced emotional maltreatment, other types of maltreatment or multiple types of maltreatment, while all scored higher than those not maltreated.

Background

Many detained adolescents have a history of maltreatment (e.g., Colins et al., 2009; King et al., 2011). Prevalence reports for maltreatment in juvenile offenders indeed are impressive, with 27-87% for physical abuse; 20-32% for physical neglect and 3-61% for sexual abuse (Burton, Foy, Bwanausi, Johnson, & Moore, 1994; Crimmins, Cleary, Brownstein, Spunt, & Warley, 2000; Dembo et al., 1988; Gover, 2004; Gover & MacKenzie, 2003; Haapasalo & Hamalainen, 1996; King et al., 2011; Krischer & Sevecke, 2008; Lahlah, van der Knaap, & Bogaerts, 2013; Mason, Zimmerman, & Evans, 1998; Moore, Gaskin, & Indig, 2013). The few studies in detained adolescents on experiences with emotional forms of maltreatment indicate these are common, with a prevalence of 33-69% (Aebi et al., 2015; Haapasalo & Hamalainen, 1996; Kimonis, Fanti, et al., 2013; Moore et al., 2013). Research interest in sequelae of emotional maltreatment in offenders is increasing, as there is evidence from general and maltreated population studies that – similar to other types of maltreatment – emotional maltreatment is related to antisocial behavior, as well as with aggression and mental health problems (Burnette, Oshri, Lax, Richards, & Ragbeer, 2012; Murray & Farrington, 2010; Teicher et al., 2006). A recent study on juvenile offenders showed that most maltreated youths had also experienced emotional maltreatment, and that multiple maltreatment was related with more mental health problems (Aebi et al., 2015). Although this study was very informative, it does not increase knowledge on the specific types of mental health problems and aggression young offenders with emotional maltreatment in their past display. The current study was designed to address this limitation.

Emotional maltreatment is a pattern of non-physical interactions, which potentially harm the victim's health and development. This type of maltreatment consists of two components: emotional neglect and emotional abuse (Glaser, 2002). Emotional neglect involves parents'/caretakers' failure to provide significant warmth, support, emotional stimulation, and/or attunement to the child, whereas emotional abuse may include ongoing parents'/caretakers' criticism, rejection, devaluation, or humiliation (Briere & Jordan, 2009). Historically, while sexual abuse was considered the most damaging, emotional maltreatment has been considered the least harmful form of maltreatment in terms of psychological damage (Lau et al., 2005). However, parental warmth and emotional availability are essential for children's psychological development, and a lack of those negatively impacts self-image, emotion regulation and mental health (Hildyard & Wolfe, 2002; Yap, Pilkington, Ryan, & Jorm, 2014). Therefore, viewing other types of maltreatment as more damaging, is likely to underestimate the potential harm caused by emotional abuse and neglect.

The emotion regulation deficit associated with emotional maltreatment has been theorized to cause later aggression (Steiner et al., 2011). It is thought that this deficit can precipitate a violent, non-planned response to a (perceived) provocation, which is known as reactive aggression. In literature, reactive aggression is differentiated from proactive aggression, which refers to the unemotional, planned use of violence to attain goals (Kempes et al., 2005). Interestingly,

there is some evidence that different types of maltreatment have unique associations with reactive and proactive aggression. In young detainees, emotional maltreatment was specifically and positively associated with reactive aggression, and more strongly than other types of maltreatment (Kimonis, Fanti, et al., 2013). In addition, there is some evidence from general and clinical population studies that physical abuse is uniquely associated with proactive aggression (Connor, Steingard, Cunningham, Anderson, & Melloni, 2004; Dodge et al., 1997; Jensen et al., 2007). It is possible these findings cannot be replicated in detained male adolescents, who often display high levels of both reactive and proactive aggression (Kempes et al., 2005). For instance, in a sample of juvenile violent offenders, those displaying proactive aggression did not differ from their peers, regarding previous physical abuse (Dodge et al., 1997). Therefore, it is of interest to study how types of maltreatment relate with proactive and reactive aggression in adolescent detainees.

Also, there is some evidence from general and clinical population studies, that emotional maltreatment is associated with specific mental health problems (English et al., 2005). Emotionally maltreated children, for example, develop more internalizing problems (such as anxious and depressed feelings) than physically abused children (Gibb, Chelminski, & Zimmerman, 2007; Litrownik, Newton, Hunter, English, & Everson, 2003; Mills et al., 2013; Yap et al., 2014). Physically abused children, on the other hand, have more externalizing problems (e.g. attention deficit, hyperactivity, substance abuse, rule-breaking behavior) (Litrownik et al., 2003; Mills et al., 2013). Findings on physical abuse have been replicated in offenders (van der Put, Lanctôt, de Ruiter, & van Vugt, 2015), but information on the specific mental health problems of detained adolescents with past emotional maltreatment experiences is lacking.

Individuals who have experienced multiple types of maltreatment show more aggression and mental health problems than those who experienced one type of maltreatment (Aebi et al., 2015; Edwards et al., 2003; Green et al., 2010; van der Put et al., 2015). This cumulative detrimental effect seems to worsen specifically when emotional maltreatment is involved. It has, for example, been shown that victims of physical and sexual abuse have more aggression and mental health problems when they also were emotionally maltreated (Mills et al., 2013; Teicher et al., 2006). Therefore, it is relevant to tease apart the impact of emotional maltreatment on aggression and mental health problems (Armour, Elklit, & Christoffersen, 2014). If emotionally maltreated offenders are shown to be a particularly affected group, this may have consequences for screening procedures and it may help the development of treatment programs.

This study

In sum, it seems appropriate to examine emotional maltreatment as a risk factor for aggression and mental health problems. However, to date there is more information on how emotional maltreatment negatively impacts personality development (e.g., Kimonis, Fanti, et al., 2013; Krischer & Sevecke, 2008; Nederlof, Van der Ham, Dingemans, & Oei, 2010), than on its relationship with aggression and mental health problems (Aebi et al., 2015; Burton et al., 1994;

Colins et al., 2009; Gover & MacKenzie, 2003). So, this study was designed to gain insight in the specific issues emotionally maltreated juvenile offenders have regarding proactive and reactive aggression, internalizing and externalizing mental health problems. In line with prior studies (Lau et al., 2005; Mills et al., 2013), detained boys were assigned to four mutually exclusive groups: those who reported (1) no maltreatment, (2) only emotional maltreatment, (3) only physical maltreatment (including sexual abuse) and (4) both emotional and physical maltreatment. Pair-wise group comparisons were performed with regard to reactive aggression, proactive aggression and an array of internalizing as well as externalizing mental health problems. We tested our hypotheses that

(I) Levels of aggression and mental health problems in emotionally maltreated boys are at least as high as the levels in boys who experienced physical maltreatment, all having higher levels than non-maltreated boys;

(II) The group with combined physical and emotional maltreatment experiences displays the highest levels of aggression and mental health problems.

Methods

Sample

Between July 2009 and September 2012, 772 male adolescents (aged 13 to18, M = 16.5 years) completed a standardized mental health intake procedure in two Juvenile Detention Centers in the Netherlands. For the current study, ten boys were excluded due to missing maltreatment data, resulting in a final sample size of 762. Almost all of these youths (95%) were in pre-trial detention. The participants had been accused of offences ranging from attempted homicide to drug offences, shoplifting, fraud, etc. The majority (80%) of the sample had a migration background, meaning that they themselves or one of the parents were born outside of the Netherlands, being Morocco (27%), Surinam (13%,) Turkey (9%) and Dutch Antilles (7%), or other locations (25%). This sample composition is representative for Dutch JDC populations (e.g., Colins et al., 2015).

Measures

Childhood maltreatment. Emotional and physical maltreatment were assessed by means of the Dutch version (Thombs, Bernstein, Lobbestael, & Arntz, 2009) of the 28-item *Childhood Trauma Questionnaire – Short Form (CTQ-SF)* (Bernstein et al., 2003), on which youths report experiences with five types of maltreatment. For the purposes of the current study we added the scores of the *Emotional Abuse* and the *Emotional Neglect* scales to form an *Emotional Maltreatment* scale (10 items; α = .80); and we did the same for the *Physical Neglect, Physical Abuse* and *Sexual Abuse* scales to form a *Physical Maltreatment* scale (14 items; α = .70). Items are scored on a Likert-type response scale to reflect the frequency of maltreatment experiences:

1 = 'never true'; 2 = 'rarely true', 3 = 'sometimes true', 4 = 'often true', 5 = 'very often true'. The CTQ cut-off scores from the manual (Bernstein & Fink, 1998) were used to determine the seriousness of the experiences with the five types of maltreatment: 'none (or minimal)', 'low (to moderate)', 'moderate (to severe)' or 'severe (to extreme)'. In line with prior work (Bernstein et al., 2003), detained adolescents scoring in the low, moderate, severe or extreme ranges were considered maltreated.

Reactive and proactive aggression. Aggression was assessed by means of the Dutch version (Cima, Raine, Meesters, & Popma, 2013) of the 23-item *Reactive Proactive Aggression Questionnaire (RPQ)* (Raine et al., 2006), on which youths report on behaviors related to *Proactive* (11 items, α = .85) and *Reactive aggression* (12 items, α = .86). Previous studies have found the RPQ to be reliable and valid in school and in juvenile offender populations (Cima et al., 2013; Raine et al., 2006). The frequency of aggressive behaviors is scored: 0 = 'never', 1 = 'sometimes', 2 = 'often'. *Proactive* and *Reactive aggression* scores are calculated by summing the appropriate items, and *Total aggression* is the sum of the two subscale-scores.

Mental health. Mental health problems were assessed by means of the Dutch versions (Colins, 2015) of the *Massachusetts Youth Screening Instrument second version (MAYSI-2)* (Grisso & Barnum, 2000), and the *Strengths and Difficulties Questionnaire (SDQ)* (Goodman, 1997; van Widenfelt, Goedhart, Treffers, & Goodman, 2003). The MAYSI-2 is a 52 yes/no item screening tool on which youths report the presence or absence of symptoms or behaviors related to several areas of emotional, behavioral, and psychological disturbances experienced "within the past few months" (Grisso & Barnum, 2000). The MAYSI-2 was specifically developed, normed, and validated for use with adolescents entering a juvenile justice setting (Colins et al., 2015; Grisso, Barnum, Fletcher, Cauffman, & Peuschold, 2001; Lennox, O'Malley, Bell, Shaw, & Dolan, 2014). For the purposes of this study, the following MAYSI-2 subscales were used: *Depressed/Anxious* (9 items; α .66), *Somatic Complaints* (6 items; α .59), *Suicide Ideation* (5 items; α .74), *Alcohol/ Drug Use* (8 items; α .83) and *Angry/Irritable* (9 items; α .77).

The SDQ is a 25-item screening instrument on which youths report to what extent they experienced psychological and social problems in the past six months ('not true', 'somewhat true', 'certainly true'). Although developed and validated for the general population (Goodman, 2001), the SDQ has previously been used in juvenile justice populations (Colins et al., 2013; Váhl et al., 2014) . For the purposes of this study, the following SDQ subscales were used: *Hyperactivity* (5 items, α .80) and *Conduct Problems* (5 items, α .55).

Procedure

Before youths started filling out the questionnaires and interviews of the routine mental health screening, an assessment associate explained the procedure. Youths were instructed to tell the assessor if they did not understand items or words in the questionnaires. When an adolescent

could not read well enough, the questionnaires were read to him. Furthermore, youths were informed that information derived from the questionnaires and interviews would be evaluated by a mental health professional from the detention center. Almost all adolescents (96%) were tested within seven working days after admission. When they refused to cooperate with mental health screening, there were no consequences for their judicial status or stay in the juvenile detention center.

The Medical Ethical Review Board of the Leiden University Medical Centre certified that the current study was conducted in agreement with Dutch laws and regulations for behavioral research. The involved institutional and scientific boards approved this study and the procedure. According to the applicable Dutch law, written informed consent is waived when institutions study aggregated, anonymized data, derived as part of their own clinical assessment.

Data analysis

First, we present descriptive statistics and Pearson correlations (based on continuous scores) for all variables of interest. A significant association of .70 or higher was considered a very strong relationship and .50 to .69 strong, .30 to .49 moderate, .10 to .29 weak and .01 to .09 negligible relationships (Kraemer et al., 2003). Second, in line with previous research (Lau et al., 2005; Mills et al., 2013), we created mutually exclusive groups of detained adolescents with various combinations of maltreatment experiences. These groups consisted of detained adolescents who (1) report no maltreatment (the No Maltreatment group); (2) only report emotional abuse and/or emotional neglect (the Emotional Maltreatment group); (3) only report physical neglect, physical abuse and/or sexual abuse (the Physical Maltreatment group) and finally (4) report both emotional and physical maltreatment (the Combined Maltreatment group).We compared these groups with regard to their levels of aggression and mental health problems, using oneway analysis of variance with Tamhane's T2 corrected post-hoc tests, with $p < .05$ (two-tailed) as standard for statistical significance, and p-values between .05 – .1 reported as a trend to significance. Tamhane's T2 corrects for multiple comparisons, and can be used for variables with non-homogeneous variance.

Results

Descriptives and correlations of main study variables

Almost half of the total sample reported at least one type of maltreatment (46%), with emotional neglect (31%) being the most prevalent type, followed by physical neglect (21%), emotional abuse (13%), physical abuse (11%), and sexual abuse (3%). One fifth of the boys experienced at least two types of maltreatment. Of the 762 boys, 54% were assigned to the No Maltreatment group; 11% to the Physical Maltreatment group; 19% to the Emotional Maltreatment group, and 16% to the Combined Maltreatment group (see Table 1 for group details regarding type of

maltreatment). Correlation analyses showed that emotional maltreatment was strongly related with physical maltreatment, both showing weak to moderate positive relations (*r* .12-.33) with proactive and reactive aggression and mental health problems (Table 2).

Table 1. Group details regarding type of maltreatment (*n* above cutoff)

Maltreatment type	No Maltr (*N* = 410)	Physical Maltr (*N* = 83)	Emotional Maltr (*N* = 144)	Combined Maltr (*N* = 125)
Physical Abuse	0	21	0	62
Physical Neglect	0	62	0	94
Sexual Abuse	0	9	0	14
Emotional Abuse	0	0	41	60
Emotional Neglect	0	0	119	114
Multiple Maltr	0	9	16	125

Note. Maltr= Maltreatment

Table 2. Descriptive statistics and correlations* (*N* = 762)

Scale		*M*	*SD*	Min-Max	Physical Maltr (*r*)	Emotional Maltr (*r*)	CTQ Total (*r*)
Physical Maltreatment		17.2	3.9	15-44	__	.64	.87
Emotional Maltreatment		14.9	5.6	10-42		__	.94
CTQ Total		32.1	8.6	25-79			__
RPQ	Proactive aggression	2.5	3.1	0-18	.23	.24	.26
	Reactive aggression	7.4	4.4	0-21	.23	.24	.26
	Total aggression	9.9	6.8	0-37	.25	.26	.28
MAYSI-2	Depressed/anxious	1.2	1.5	0-8	.33	.33	.36
	Somatic complaints	1.7	1.4	0-6	.15	.12	.15
	Suicide ideation	.2	.7	0-5	.26	.22	.26
	Alcohol/drug use	1.2	1.9	0-8	.24	.27	.28
	Angry/irritable	1.9	2.1	0-9	.29	.33	.34
SDQ	Conduct problems	1.9	1.6	0-9	.28	.32	.34
	Hyperactivity	3.1	2.5	0-10	.18	.30	.28

Note. Maltr= Maltreatment; * all correlations significant at $p < .01$

Levels of proactive and reactive aggression by maltreatment group

Adolescents in the Emotional Maltreatment group scored significantly higher than the No Maltreatment group on proactive, reactive and total aggression (Table 3). Boys in the Combined Maltreatment group scored significantly higher on proactive, reactive and total aggression than those in the No Maltreatment group, while there were no significant differences with the Physical and the Emotional Maltreatment groups. Youths in the Physical Maltreatment group scored higher than the No Maltreatment group on proactive and total aggression.

Table 3. Aggression by maltreatment group

RPQ-scale	A	B	C	D	(Trend to) significant difference between[a]
	No Maltr (*N* = 410)	Physical Maltr (*N* = 83)	Emotional Maltr (*N* = 144)	Combined Maltr (*N* = 125)	
Proactive aggression	1.8	3.2	3.0	3.7	A < B,C,D
Reactive aggression	6.4	7.8	8.3	9.1	A < C,D A<B (p = .07)
Total aggression	8.2	11.0	11.3	12.7	A < B,C,D

Note. Maltr= Maltreatment

[a] reported differences have significance level $p < .05$ two-tailed, corrected for multiple comparisons, significance levels p = .05-.01 reported between parentheses

Levels of mental health problems by maltreatment group

Boys in the Emotional Maltreatment group had significantly higher levels of depressed/anxious feelings, alcohol/drug use, anger/irritability, conduct problems and hyperactivity than boys in the No Maltreatment group, and also higher levels of hyperactivity than the Physical Maltreatment group-boys (Table 4). Youths in the Combined Maltreatment group had significantly higher levels of all mental health problems than those who did not report any maltreatment; significantly higher levels of depressed/anxious feelings and conduct problems than boys in the Physical Maltreatment and Emotional Maltreatment groups, and significantly higher levels of suicide ideation, alcohol/drug use, anger/irritability, and hyperactivity than those in the Physical Maltreatment group. Boys in the Physical Maltreatment group did not significantly differ on any mental health problem from the No Maltreatment group.

Table 4. Mental health problems by maltreatment group

Scale	A No Maltr (*N* = 410)	B Physical Maltr (*N* = 83)	C Emotional Maltr (*N* = 144)	D Combined Maltr (*N* = 125)	(Trend to) significant difference between[a]
Depressed/anxious (MAYSI-2)	.8	1.1	1.4	2.0	A < C,D D > B, C
Somatic complaints (MAYSI-2)	1.6	1.9	1.7	2.1	A < D C < D (p = .07)
Suicide ideation (MAYSI-2)	0.1	.2	.3	.5	D > A,B A < C (p = .09)
Alcohol/drug use (MAYSI-2)	.8	1.0	1.7	2.2	A < C,D B < D B < C (p = .07)
Angry/irritable (MAYSI-2)	1.4	2.1	2.5	3.0	A < C,D B < D A < B (p = .05)
Conduct problems (SDQ)	1.5	1.9	2.1	2.8	A < C,D D > A,B,C
Hyperactivity (SDQ)	2.6	2.8	3.9	4.1	A,B < C,D

Note. Maltr= Maltreatment

[a] reported differences have significance level $p < .05$ two-tailed, corrected for multiple comparisons, significance levels p = .05-.01 reported between parentheses

Discussion

The current study aimed to gain more insight in the exact issues of detained adolescent boys with a history of emotional maltreatment, regarding proactive and reactive aggression, internalizing and externalizing mental health problems. Partly in line with our first hypothesis, we found that boys with a history of emotional maltreatment, compared to those not maltreated, had higher levels of aggression and mental health problems. Unexpectedly, physically maltreated boys had comparable levels of mental health problems to those who were not maltreated. Our second hypothesis was also partly confirmed: boys who reported a combination of emotional and physical maltreatment had the highest levels of mental health problems of all groups. Aggression levels however, were comparable with boys who reported either physical or emotional maltreatment.

In line with findings from general population studies, emotionally maltreated boys showed the highest levels of reactive aggression. Emotion regulation skills are essential for inhibiting aggressive responses, and these skills are known to be underdeveloped in children who have experienced a lack of parental responsiveness to their feelings (Glaser, 2002). In addition,

parental verbal aggression has previously been found to be associated with high levels of anger-hostility (Teicher et al., 2006), which in turn is likely to increase reactive aggression. Interestingly, in the current study proactive aggression did not differ significantly between emotionally maltreated boys and physically maltreated boys, whereas prior work in general population and psychiatrically referred samples showed a specific proactive aggression relation with physical abuse (Connor et al., 2004; Dodge et al., 1997). A possible explanation may be that emotionally maltreated offenders care relatively less about the feelings of others (Kerig, Bennett, Thompson, & Becker, 2012), decreasing their consideration of the potential impact of proactive aggression on the victim (Kimonis, Cross, Howard, & Donoghue, 2013). Of note, our findings confirm concerns that subtypes of aggression are hard to discern from each other in relatively more violent populations such as detained boys (Kempes et al., 2005): levels of proactive and reactive aggression in the various maltreatment groups were similar.

Our findings contradict with general population studies showing that types of maltreatment are differentially related with various mental health problems. For example, in the general population, emotional maltreatment was demonstrated to be related mainly with internalizing problems, whereas physical abuse was found to be related with externalizing mental health problems (Litrownik et al., 2003; Mills et al., 2013; Yap et al., 2014). The present study however, showed that detained boys who were emotionally maltreated, especially those who had also experienced physical maltreatment, displayed the highest levels of internalizing as well as externalizing mental health problems. Also, mental health problems in physically (and not emotionally) maltreated boys were comparable to those who did not report any maltreatment. This set of findings suggests that in detained youths emotional rather than physical maltreatment drives the relation of maltreatment with mental health problems. These results all together support previous concerns that emotional maltreatment is an important indicator of future detrimental outcomes (Weich, Patterson, Shaw, & Stewart-Brown, 2009).

In line with previous research, we found evidence for a cumulative effect on mental health problems when emotional maltreatment was experienced together with physical and/or sexual maltreatment (e.g., Aebi et al., 2015). Remarkably, this effect was not there for aggression, whereas a previous study in the general population found a 35 to 144% increase in violence in those who experienced multiple types of maltreatment (Duke et al., 2010). As boys in our sample were incarcerated for various offences, often also violence-related, it is likely that levels of aggression are relatively high and differences between subgroups may be small. This finding emphasizes that, when generalizing results from the general population to specific populations such as detained juveniles, caution is needed.

The current study was conducted in the context of routine care, which can be considered a strength. This context increases external validity, as detained adolescents may answer questionnaires differently when they know their information is viewed and filed by a clinician compared to when they are guaranteed their data is used for research purposes only (e.g., Colins et al., 2015). Another strength includes the use of well validated questionnaires. In addition,

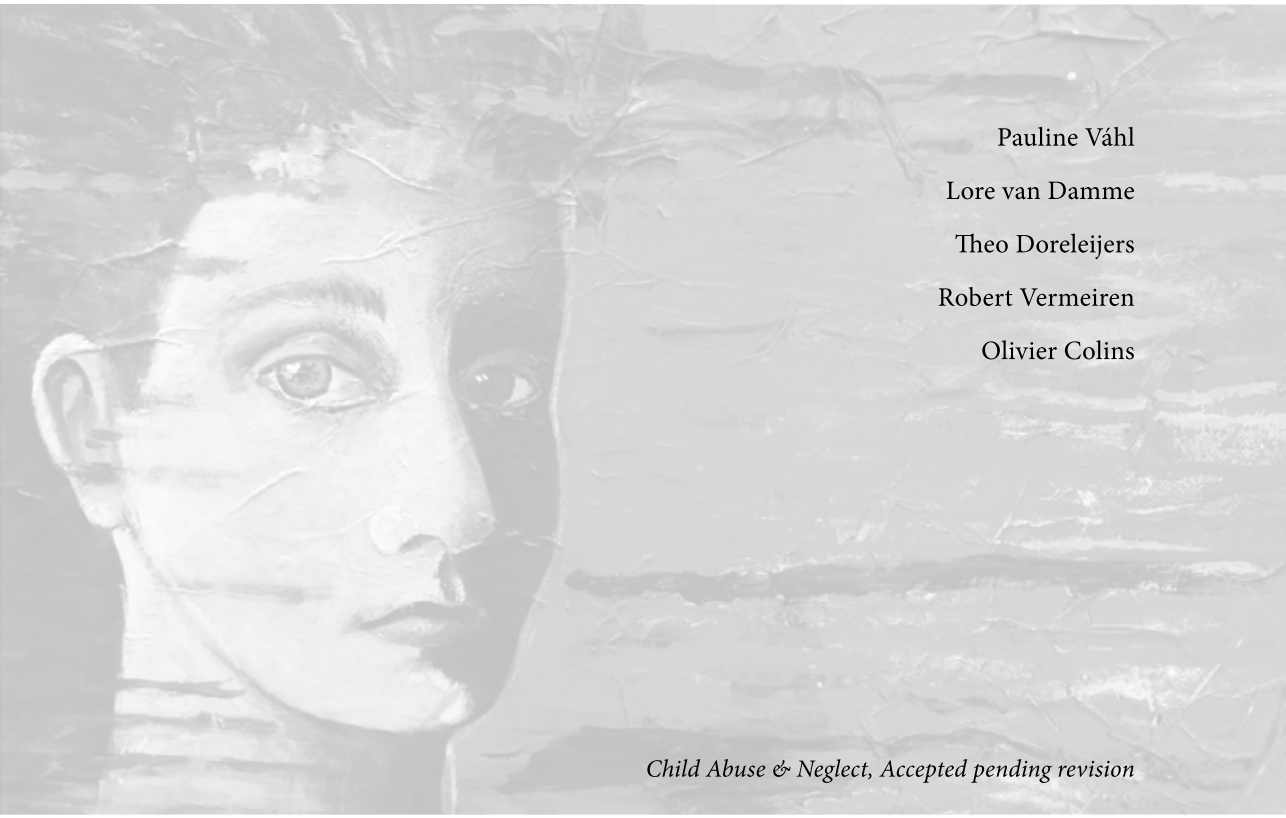
a fairly large sample participated. So, we were able to study the specific impact of emotional maltreatment. Notwithstanding these strengths, our findings must be interpreted in the context of several limitations. First, as our childhood maltreatment measure was retrospective, recall bias may have influenced reports. However, the influence of recall bias on associations between maltreatment and mental health problems was previously found to be small (Fergusson, Horwood, & Boden, 2011). Second, we relied on self-report only, which is notoriously sensitive to underreporting (e.g., Berger, Knutson, Mehm, & Perkins, 1988; Morgan, Steffan, Shaw, & Wilson, 2007); but overreporting is also a risk in offender populations (e.g., McDermott et al., 2013). We found rather low maltreatment prevalence rates compared to previous research in young detainees (e.g., Moore et al., 2013), which points to a tendency to underreporting rather than overreporting in our population. Another disadvantage of self-report is that we did not have information on very early maltreatment (i.e. before the age when a youth can remember experiences), while very early maltreatment has been shown to have a large impact on later aggression and mental health problems (Kotch et al., 2008). However, the majority of children that experience very early maltreatment, are maltreated again when they get older (and so at an adolescent age can have recollections of this) (Proctor et al., 2012). Third, it cannot be excluded that maltreatment experiences occurred after the onset of mental health problems, so our findings should not be interpreted in terms of causality.

Conclusions and implications

Detained boys with a history of emotional maltreatment are at an increased risk for reactive aggression and both internalizing and externalizing mental health problems, especially when they also report having experienced other types of maltreatment. Based on our results there is no ground for applying in male juvenile detainees the often used hierarchical scheme (Lau et al., 2005) which sees physical maltreatment as more damaging than emotional maltreatment. In addition, clinicians working with young detainees should be attentive to the possible impact maladaptive parenting practices have had. Failing to screen for emotional maltreatment is disregarding a significant risk factor for mental health problems and aggression. In the development of treatment programs, the specific effects of emotional maltreatment should be integrated. Treatment could prevent the intergenerational transmission of maladaptive parenting practices (De Bellis, 2001; van der Molen, Hipwell, Vermeiren, & Loeber, 2012) by which a victimized youth becomes a perpetrating parent. Concluding, the current study clearly indicates that increased attention to the detrimental impact of emotional maltreatment experiences on delinquent adolescents is warranted.

Chapter 3

The unique relation of childhood emotional maltreatment with mental health problems among detained male and female adolescents



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Abstract

Mounting evidence indicates that emotional maltreatment is at least as harmful as physical and sexual abuse. Notwithstanding their high occurrence among detained adolescents, the link between emotional maltreatment and mental health problems in these youths is not well researched. This study, therefore, was designed to examine the unique link between emotional maltreatment and mental health problems, with particular attention to gender differences. Well validated self-report measures of maltreatment experiences (Childhood Trauma Questionnaire) and mental health problems (Youth Self Report) were completed by 341 detained adolescents (156 boys, 185 girls) aged 12 to18 years. As expected, girls reported higher levels of maltreatment experiences and internalizing and externalizing mental health problems than boys. Blockwise multiple linear regression analyses indicated that in both genders emotional abuse was uniquely and positively associated with internalizing and externalizing mental health problems, over and above the influence of other types of maltreatment. Furthermore, sexual abuse was uniquely related with internalizing problems in girls only, whereas only in boys this type of abuse was uniquely related with externalizing problems. Detained adolescents who have been the victim of emotional abuse in combination with another type of maltreatment may be the worst subgroup in terms of mental health problems. Therefore, emotional maltreatment experiences in adolescents who offend should receive more research and clinical attention.

The majority of detained adolescents have mental health problems (e.g., Colins et al., 2010; Fazel, Doll, & Langstrom, 2008; Vermeiren, Jespers, & Moffitt, 2006) and maltreatment experiences (e.g., Aebi et al., 2015; King et al., 2011; Moore, Gaskin, & Indig, 2013). While mounting evidence indicates that emotional maltreatment is at least as harmful as physical and sexual abuse (Mills et al., 2013; Paradis et al., 2009; Teicher, Samson, Polcari, & McGreenery, 2006) the link between emotional maltreatment and mental health problems in criminal-justice involved youths remains understudied. For example, one recent study on correlates of maltreatment in male detained adolescents did not examine the unique contribution of emotional maltreatment (Aebi et al., 2015). The present study was designed to fill this void.

Emotional maltreatment, also known as psychological maltreatment, refers to a pattern of non-physical interactions, which potentially harm the victim's health and development. Two forms of emotional maltreatment exist: emotional neglect and emotional abuse (Glaser, 2002). Emotional neglect concerns parental/caretaker's failure to provide significant warmth, support, emotional stimulation, and/or attunement to the child, whereas emotional abuse refers to parental/caretaker's criticism, rejection, devaluation, or humiliation (Briere & Jordan, 2009). In the UK and the US, about 8% of adult women and 4% of men, reported exposure to severe emotional maltreatment (Gilbert et al. 2009). In adolescent detainees, the few studies on the topic showed that between 33% and 69% experienced emotional maltreatment (Haapasalo & Hamalainen, 1996; Kimonis, Cross, Howard, & Donoghue, 2013; Moore et al., 2013, Aebi et al., 2015). Parental warmth and emotional availability are essential for children's psychological development, and a lack thereof is likely to negatively impact mental health (Hildyard & Wolfe, 2002; Yap, Pilkington, Ryan, & Jorm, 2014). General and clinical population studies further showed that emotional maltreatment is associated with specific mental health problems (English et al., 2005). Internalizing problems, including anxious and depressed feelings, are more prevalent among emotionally maltreated children than among physically maltreated children (Gibb, Chelminski, & Zimmerman, 2007; Litrownik, Newton, Hunter, English, & Everson, 2003; Mills et al., 2013; Yap et al., 2014). In reverse, among physically maltreated compared with emotionally maltreated children, higher rates were reported of externalizing problems, such as attention deficit and hyperactivity problems, substance abuse and rule-breaking behavior (Dodge, Lochman, Harnish, Bates, & Pettit, 1997; Litrownik et al., 2003; Mills et al., 2013; van der Put, Lanctôt, de Ruiter, & van Vugt, 2015). A warm, nurturing parental relationship has been postulated to protect against negative mental health outcomes of traumatic experiences such as physical and sexual abuse (S. Cohen & Wills, 1985; Tyler, 2002). In victims of physical and sexual abuse, more mental health problems were seen when they also experienced emotional maltreatment (Aebi et al., 2015; Mills et al., 2013; Teicher et al., 2006). This suggests that having experienced emotional maltreatment has a unique, incremental negative effect on mental health. However, the relation between emotional maltreatment and mental health problems after controlling for its overlap with other types of maltreatment, has to date not been studied in detained adolescents.

Prior work in detained youths showed that in girls, compared to boys, the occurrence and comorbidity of in- and externalizing problems was higher (Van Damme, Vanderplasschen, & Colins, 2014), while girls also more often reported experiencing multiple types of maltreatment (Abrantes, Hoffmann, & Anton, 2005). These gender differences can be explained by the so-called gender paradox (Loeber & Keenan, 1994). According to this paradox, fewer girls than boys offend seriously, while those that do, constitute a more serious group in terms of (comorbid) mental health problems. For instance, in a large US study on youth in juvenile detention, nearly 60% of boys and more than two thirds of girls fulfilled criteria for any psychiatric disorder other than conduct disorder (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002). Furthermore, detained girls were shown to differ substantially from boys in the rates of certain types of maltreatment: while sexual abuse is more prevalent in detained girls, boys more often report experiences with physical abuse (Coleman & Stewart, 2010; King et al., 2011). In addition, general and clinical population studies indicate that females are more sensitive than males to developing internalizing problems as a result of adversity, whereas males more often develop externalizing problems (Edwards, Holden, Felitti, & Anda, 2003; Keyes et al., 2012; King et al., 2011; MacMillan & Munn, 2001; Maschi, Hatcher, Schwalbe, & Rosato, 2008). Given these gender differences in mental health problems, maltreatment and their interrelatedness, the current study was also designed to compare detained girls and boys. Such studies are required in order to be able to develop gender sensitive interventions (Ford, Chapman, Connor, & Cruise, 2012).

The overall aim of the present study was to examine gender differences in emotional maltreatment and related mental health problems among detained boys and girls. Specifically, we aimed to study the incremental contribution of emotional maltreatment to in- and externalizing mental health problems, over and above physical and sexual abuse and physical neglect. It was hypothesized that girls would report more maltreatment experiences and mental health problems than boys. Next, it was expected that maltreatment types would be more strongly connected with internalizing problems than with externalizing problems in girls, whereas the reverse would be true for boys (i.e., their maltreatment levels would be more strongly connected with externalizing than internalizing problems) (Edwards et al., 2003; Keyes et al., 2012; King et al., 2011; MacMillan & Munn, 2001; Maschi et al., 2008). In addition, we expected emotional maltreatment to have an incremental contribution over and above the influence of physical and sexual abuse and physical neglect, to internalizing and externalizing mental health problems.

Methods

Sample

In two consecutive studies between 2005 and 2007 (boy study) and between 2008 and 2011 (girl study), 304 boys and 240 girls were respectively recruited from Juvenile Detention Centers (JDCs) in Flanders, Belgium. A detailed description of both samples can be retrieved from prior publications (Colins, Bijttebier, Broekaert, & Andershed, 2014; Colins, Vermeiren, Schuyten, & Broekaert, 2009). Youngsters are referred to a JDC by a juvenile judge when charged with a criminal offense or because of an urgent problematic educational situation (e.g., truancy, running away, aggression, prostitution). Placement in a JDC is considered to be the most severe measure a juvenile judge can impose. Of the 544 recruited adolescents, 48 could not be assessed due to practical circumstances (e.g., schooling obligations, appointments at court, solitary confinement) and 56 adolescents declined to participate, resulting in a participation rate of 80.9% ($N = 440$). For about 23% of the cases information on mental health problems was missing, since the Youth Self Report (YSR) was added to the study in a later phase. For the aims of the current study we included boys and girls with complete information on both maltreatment experiences and mental health problems, resulting in a final sample size of $N = 341$ (156 boys, 185 girls). These 341 adolescents were not significantly different from the adolescents who were not included in the present study ($N = 99$, 10 girls) regarding age, origin, detention history and amount of maltreatment experiences (details available upon request from the first author).

Boys were included if they met the following criteria: (i) placed in the JDC for at least 1 month; (ii) sufficient knowledge of Dutch; and (iii) of Belgian or Moroccan ethnic origin (with the latter being the largest 'non-Belgian' subgroup in JDCs; for more information: Colins et al., 2009). Because of the low number of detained girls in Flanders, girls from all ethnic origins (e.g., Albanian, Congolese, Turkish) were included if they met the other two inclusion criteria. These girls with various ethnic backgrounds ($N = 29$) did not differ significantly from girls of Moroccan origin ($N = 12$) regarding childhood maltreatment experiences and mental health problems (details available upon request from the first author).

The final sample consisted of 54.3% girls and 45.7% boys, ages ranging from 12 to 17 years ($M = 15.9$; $SD = 1.1$). One quarter of the total sample was of non-Belgian ethnic origin and 34.9% had been detained in the past. More boys than girls had past detention episodes (48.7% vs. 23.2%, $X^2 = 31.40(3)$, $p < .001$). There were no significant gender differences regarding age (boys: $M = 15.9$, $SD = 1.2$; girls: $M = 15.8$, $SD = 1.0$) or ethnic origin (non-Belgian boys: $N = 33$, 21.1%; non-Belgian girls: $N = 51$, 27.6%).

Measures

Childhood maltreatment. Juveniles' history of childhood maltreatment was based on the Dutch version (Thombs, Bernstein, Lobbestael, & Arntz, 2009) of the *Childhood Trauma Questionnaire – Short Form (CTQ-SF; (Bernstein et al., 2003)*. Youths reported experiences with five types of maltreatment: *Physical Abuse* (α in the present study = .90), *Physical Neglect* (α = .47), *Sexual Abuse* (α = .86), *Emotional Abuse* (α = .86), and *Emotional Neglect* (α = .85). Items were scored on a Likert-type response scale to reflect the frequency of maltreatment experiences: 1 = 'never true'; 2 = 'rarely true', 3 = 'sometimes true', 4 = 'often true', 5 = 'very often true'. In the present study, each scale contains four items which are summed up to generate scale scores. Cut-off scores were used to determine the seriousness of the experiences with the five types of maltreatment: 'none (or minimal)', 'low (to moderate)', 'moderate (to severe)' or 'severe (to extreme)'. In line with prior work (Bernstein & Fink, 1998), participants scoring in the low, moderate, severe or extreme ranges were considered maltreated. Intercorrelations of the scales reached from -.01 to .71, indicating there was no multicollinearity between these CTQ scales. The lowest intercorrelations were found between the CTQ Sexual Abuse scale and the other four CTQ scales in boys (r .01 – .09; in girls r .17 – .32, whereas the intercorrelations between the four remaining CTQ scales (i.e. physical abuse, physical neglect, emotional abuse, emotional neglect) ranged from .32 to .84 in boys and from .23 to .88 in girls (see Supplementary Material).

Mental health problems. Internalizing and externalizing mental health problems were assessed by means of the *Youth Self Report (YSR)* (Achenbach, 1991), Dutch version (Verhulst & Van der Ende, 2001). In line with the YSR manual, the *Internalizing Problems* score (31 items; α = .90) is the sum of scores on the three YSR scales *Withdrawn/Depressed*, *Somatic Complaints* and *Anxious/Depressed*. The *Externalizing Problems* score (41 items; α = .91) is the sum of scores on the *Attention problems*, *Rule-breaking Behavior* and *Aggressive Behavior* YSR scales. Answers are 'not true', 'sometimes true' or 'often true' and are scored respectively with 0, 1 or 2 points.

Procedure

The current study was approved by the Institutional Review Board of the Faculty of Psychology and Educational Sciences of Ghent University. Since screening of emotional problems is a mandatory task in JDCs, the requirement for parental consent was waived. Participants were approached and assessed following a standardized protocol. Each participant meeting the inclusion criteria received oral and written information on the aims, content, and duration of the study. They were told their information would be treated confidentially and refusal to participate would not influence their judicial status or stay in the JDC. The youngsters could consult their primary caregivers or other adults about participation. Participants had to give written informed consent before starting the assessment. They did not receive any financial compensation and were interviewed in a separate room in the JDC. The interview was conducted

by a DISC-trained author (OC) or a DISC-trained final year university student, none of whom were on the JDC staff.

Data analysis

First, boys' and girls' mean scores on all variables and occurrence rates of each type of maltreatment were calculated and compared, using independent samples t-tests and χ^2-tests respectively. Also, as an indication of the magnitude of the gender differences, effect sizes were calculated. According to Cohen (1988), an effect size *d* between .20 and .50 is considered small; between .50 and .80 medium; and above .80 large. Second, we examined relationships between maltreatment types and mental health problems by performing zero-order Pearson and partial correlations separately for girls and boys. The partial correlations were done to control for shared variance between the five CTQ-scales, regarding their relations with internalizing and externalizing mental health problems. A significant correlation of .70 or higher was considered a very strong relationship, .50 to .69 a strong, .30 to .49 a moderate, .10 to .29 a weak and .01 to .09 a negligible relationship (Kraemer et al., 2003). To test if correlation coefficients differed between girls and boys, the Fisher's z-Test was used. Third, multiple linear regression analyses were performed to examine the incremental contribution of emotional maltreatment to the statistical prediction of internalizing and externalizing mental health problems. Physical abuse, physical neglect and sexual abuse were simultaneously included as independent variables in a first block. Next, a second block was added to the model with both emotional abuse and emotional neglect as independent variables. Analyses were performed separately for girls and boys. For boys, these regression analyses were bootstrapped to correct for the inequal variance of some variables. In girls, variances were distributed equally. The adjusted R^2 was used to indicate the variation in the dependent variables (internalizing and externalizing mental health problems) that was accounted for by the selected types of maltreatment. A significant *F* change value would indicate that the change in explained variance between block 1 and 2 was significant, thus showing an incremental contribution of emotional abuse and emotional neglect to the statistical prediction of mental health problems. All analyses were conducted using SPSS 20 and $p < .05$ (two-tailed) as the threshold for statistical significance.

Results

Maltreatment and mental health: gender differences

Girls scored higher than boys on internalizing (girls $M = 21.5$, $SD = 11.9$ vs. boys $M = 12.4$, $SD = 8.4$, $\chi^2 = 37.21$, $p < .001$) and externalizing mental health problems (girls $M = 35.4$, $SD = 14.1$ vs. boys $M = 28.9$, $SD = 13.6$, $\chi^2 = 6.72$, $p < .05$). In addition, girls had significantly higher means and occurrence rates of all maltreatment types, except for the percentage reporting emotional neglect, which was comparable between genders (Table 1). Effect sizes of the differences between

girls and boys were mostly medium to large. Almost all detained girls and boys reported at least one type of maltreatment (92% and 81% respectively). For both girls and boys, emotional neglect was the most prevalent type of maltreatment, followed by emotional abuse, physical neglect, physical abuse and finally sexual abuse. Almost three quarters of girls and almost half of boys experienced two or more types of maltreatment. In both girls and boys, the two subtypes occurring together most often were emotional abuse and emotional neglect.

Table 1. Maltreatment by gender

Scale		Girls (*N* = 185)	Boys (*N* = 156)	Cohen's d	χ^2
Physical Abuse	*M (SD)*	9.4 (6.1)	6.6 (3.7)	.56***	
	N (%)	85 (46)	29 (19)		28.48***
Low		17 (9)	9 (6)		
Moderate		22 (12)	5 (3)		
Severe		46 (25)	15 (10)		
Physical Neglect	*M (SD)*	8.7 (3.7)	6.9 (3.2)	.54***	
	N (%)	110 (60)	45 (29)		31.48***
Low		41 (22)	20 (13)		
Moderate		38 (21)	14 (9)		
Severe		31 (17)	11 (7)		
Sexual Abuse	*M (SD)*	8.2 (5.1)	5.4 (1.2)	.75***	
	N (%)	76 (41)	16 (10)		40.43***
Low		6 (3)	3 (2)		
Moderate		33 (18)	13 (8)		
Severe		37 (20)	1 (1)		
Emotional Abuse	*M (SD)*	11.5 (6.1)	8.6 (4.7)	.54***	
	N (%)	110 (60)	60 (39)		14.53***
Low		33 (19)	30 (19)		
Moderate		29 (16)	13 (8)		
Severe		48 (26)	17 (11)		
Emotional Neglect	*M (SD)*	14.0 (6.1)	11.9 (5.0)	.39**	
	N (%)	133 (72)	103 (67)		1.18
Low		49 (27)	58 (37)		
Moderate		20 (11)	23 (15)		
Severe		64 (35)	23 (15)		
CTQ total	*M (SD)*	51.7 (19.9)	39.4 (13.0)	.72***	
					NA
Nr types Maltr	*M (SD)*	2.7 (1.6)	1.6 (1.3)	.75***	
≥ 1 type	*N (%)*	170 (92)	125 (81)		9.29**
≥ 2 types	*N (%)*	137 (74)	70 (45)		22.87**

Note. Nr types Maltr= Total number of types of Maltreatment experienced; *N*= number above cut-off; %= percentage above cut-off.
NA= Not Applicable because the CTQ manual only provides cut-off scores for the subscales and not for the CTQ total score
*$p < .05$; ** $p < .01$; *** $p < .001$

Correlations between mental health problems and maltreatment types

Internalizing problems. Zero-order correlations indicated moderately strong positive relations between emotional abuse and internalizing problems in both girls and boys (Table 2). Emotional neglect was weakly positively associated with internalizing problems in boys, whereas no significant relation was found in girls. Sexual abuse was moderately positively related with internalizing problems in girls (and not in boys), whereas in boys there was a moderately positive association with physical abuse. Next, partial correlations showed that in both boys and girls, emotional abuse was associated positively and uniquely with internalizing problems. Partial correlations also rendered the associations of the other types of maltreatment with internalizing problems non-significant, except for the positive association of sexual abuse with internalizing problems in girls. Correlation coefficients did not differ significantly between boys and girls, indicating that relationships between maltreatment types and internalizing problems were of similar strength across genders. As ethnicity, but not age, was associated with some of the maltreatment types and outcomes, we reran the analyses whilst controlling for ethnicity. These analyses showed that the aforementioned results remained similar (details available upon request from the first author).

Externalizing problems. Zero-order correlations indicated weakly (girls) and moderately (boys) strong relations of emotional abuse and emotional neglect with externalizing problems (Table 2). Other maltreatment types were weakly or not related with externalizing problems. Next, partial correlations revealed that emotional abuse was associated positively and uniquely with externalizing problems in both genders. Partial correlations also rendered associations of the other types of maltreatment with externalizing problems non-significant, except for the positive association of sexual abuse with externalizing in boys. Again, correlation coefficients did not differ significantly between girls and boys, indicating that relationships between maltreatment types and externalizing problems were of similar strength across genders. Controlling analyses for the effect of ethnicity did not substantially alter results (details available upon request from the first author).

Table 2. Zero-order and partial correlations of maltreatment and mental health

Maltreatment type	Type of correlation	Internalizing		*p*-value Δ *r*	Externalizing		*p*-value Δ *r*
		Girls	Boys		Girls	Boys	
Physical Abuse	Zero-order	.20*	.35***	.14	.15*	.16	.92
	Partial	-.05	.06	.31	-.06	-.15	.41
Physical Neglect	Zero-order	.10	.14	.71	.14	.27**	.21
	Partial	-.06	-.01	.65	-.01	.16	.12
Sexual Abuse	Zero-order	.30***	.11	.07	.16*	.17*	.93
	Partial	.23**	.09	.19	.08	.14*	.58
Emotional Abuse	Zero-order	.31***	.44***	.17	.28***	.36***	.42
	Partial	.22**	.25**	.77	.19**	.27**	.44
Emotional Neglect	Zero-order	.14	.24**	.34	.19*	.30***	.28
	Partial	-.04	.04	.47	.02	.06	.71

Note. Δ *r* : difference between correlation coefficients.
*$p < .05$; ** $p < .01$; *** $p < .001$

Incremental contribution of emotional abuse and neglect

Internalizing problems. The first block of the multiple regression analysis indicated that physical abuse and neglect and sexual abuse explained a significant part of the variance of internalizing problems in girls and boys (girls' F (3, 181) = 6.461, $p < .001$, adjusted $R^2 = .08$; boys' F (3, 144) = 7.530, $p < .001$, adjusted $R^2 = .12$). Adding emotional abuse and neglect to the analysis raised the explanatory power of our model significantly (girls' F (5, 179) = 5.950, $p < .001$, adjusted $R^2 = .12$; boys' F (5, 142) = 7.082, $p < .001$, adjusted $R^2 = .17$; significant F change $p < .05$ for girls and $p < .01$ for boys).

Externalizing problems. The first block of the multiple regression analysis indicated that physical abuse and neglect and sexual abuse explained a significant part of the variance of externalizing problems in boys (F (3, 144) = 5.776, $p < .01$, adjusted $R^2 = .09$), but not in girls (F (3, 181) = 2.487, $p = .06$, adjusted $R^2 = .02$). Adding emotional abuse and neglect to the analysis raised the explanatory power of our model significantly (girls' F (5, 179) = 3.491, $p < .01$, adjusted $R^2 = .06$; boys' F (5, 142) = 6.625, $p < .001$, adjusted $R^2 = .16$; significant F change $p < .01$ for girls and $p < .01$ for boys).

Discussion

To our knowledge, this is the first study in detained adolescents focusing specifically on gender differences in emotional maltreatment and its relationship with mental health problems. As expected, girls reported more emotional and other types of maltreatment than boys, as well as more mental health problems. While we found gender specific relations between sexual abuse

and mental health problems, associations between emotional abuse and mental health problems were remarkably similar between girls and boys. In both genders emotional abuse was uniquely associated with both internalizing and externalizing mental health problems, over and above the influence of other types of maltreatment.

The current results extend previous community and clinical findings in adolescents and adults to detained youths, showing detrimental effects of emotional maltreatment in both genders (Meyerson, Long, Miranda, & Marx, 2002; Teicher et al., 2006; Weich, Patterson, Shaw, & Stewart Brown, 2009). Consequently, our findings support concerns that youths who have been emotionally abused in addition to being the victim of physical and or sexual abuse, are the worst group in terms of mental health problems (Aebi et al., 2015). Children who were also emotionally maltreated may be less resilient than other children, and therefore more sensitive to the effects of traumatic events such as physical and sexual abuse (Tyler, 2002). The effects of multiple traumatization are sometimes described as complex trauma, disrupting many aspects of a child's development and for instance resulting in a child's problems to form secure attachment bonds (e.g., Ford et al., 2012). However, data on complex trauma and attachment problems in delinquent youths is scarce to date (e.g., Leenarts et al., 2013), and should be subject of future research. Detention in itself may be an overwhelming experience and juveniles may be exposed to additional traumatic events during the course of detention. Future research could study differences in resilience after traumatic events which occurred during detention, e.g. by including questions on violence exposure. For now, the current findings underline the importance of assessing emotional maltreatment in detained adolescents. Screening questionnaires such as the Child Trauma Questionnaire (Bernstein, 1998) can provide valuable information on maltreatment experiences (Bernstein, 2003). It is not unlikely that for some youngsters a screening questionnaire is the first time they disclose anything on their maltreatment history. Future research is needed into this disclosure process and appropriate therapeutic and legal approaches. As detention often is a result of long lasting conduct problems, it may be clinically relevant if youth care providers already screen for emotional maltreatment among conduct disordered children who have not yet been in contact with the criminal justice system. The American Academy of Paeditrics (AAP) Clinical Report even recommends that pediatricians use their routine contacts to observe and identify parent-child interactions that require targeted intervention (Hibbard, Barlow, MacMillan, Committee on Child Abuse and Neglect & American Academy of Child and Adolescent Psychiatry, Child Maltreatment and Violence Committee., 2012). The AAP provides useful guidance on early screening and treatment approaches, stating that pediatricians should be as confident in assessing emotional maltreatment as they are with more intrusive types of abuse.

With the results of this study in mind, clinicians working with young detainees may want to treat the problems associated with emotional maltreatment and prevent ongoing maltreatment (Coble et al., 1993). Investing in family therapy to reduce maladaptive interactions, has been found to be beneficial to those who return to their family's home after detention (Kerig &

Alexander, 2012). However, many young detainees have lost contact with their parents (Colins, Vermeiren, Schuyten, Broekaert, & Soyez, 2008). An alternative may lie in treatment programs aiming to engage young delinquents in a strong, supportive and long-term trust bond with a prosocial adult or peer, in order to promote overall resiliency (e.g.,Wainwright & Nee, 2014). Such long-term support could also be a way to prevent transmission of maladaptive parenting strategies to the next generation (van der Molen, Hipwell, Vermeiren, & Loeber, 2012). Interventions could also target other factors recently shown to promote good mental health after child abuse, including higher education and income, physical activity and good coping skills (Afifi et al., 2016). Keeping in mind that public agencies have the legal and moral responsibility to respond to the mental health needs of adolescents in their custody (Grisso, 2004), our study suggests the targeted interventions described above must be given priority in detained youths who report experiences of emotional maltreatment.

In addition to showing an incremental contribution of emotional maltreatment to mental health problems, this study's findings also converge very well with the gender paradox (Loeber & Keenan, 1994) and clearly illustrate that detained girls constitute an extremely worrisome group in terms of mental health problems and comorbidity. However, the substantial occurrence rates of maltreatment and mental health problems in both genders support increased attention to the mental health needs of detained adolescents. This attention is especially warranted since studies have shown that in detained juveniles, previous maltreatment has far-reaching consequences, including recidivism (Fox, Perez, Cass, Baglivio, & Epps, 2015; Kingree, Phan, & Thompson, 2003) and increased risk of suicide (Clements-Nolle, Wolden, & Bargmann-Losche, 2009).

Of note, girls reported four times more sexual abuse than boys, possibly due to girls' higher chances of being sexually abused within their family (Coble et al., 1993) or the higher reluctance of boys (versus girls) to report this type of abuse (Sorsoli, Kia-Keating, & Grossman, 2008). In addition to gender differences in the percentage reporting sexual abuse, and in line with prior work in general, clinical and forensic populations (King et al., 2011; Perepletchikova & Kaufman, 2010), our findings are suggestive of gender-specific associations of sexual abuse with internalizing and externalizing mental health problems. In support of the idea that females are more sensitive to developing internalizing problems as a result of adversity (Edwards et al., 2003; Keyes et al., 2012; MacMillan & Munn, 2001; Maschi et al., 2008), sexual abuse in girls was robustly associated with internalizing problems, while in boys it was significantly, though weakly related with externalizing problems (Garnefski & Arends, 1998; King et al., 2011). Possible explanations for these gender-specific relations are underlying neurobiological differences in the sensitivity to internalizing disorders (Pagliaccio et al., 2015), as well as gender stereotypes, with internalizing reactions being more generally accepted in females compared to males (Hankin & Abramson, 1999; Zahn-Waxler, Shirtcliff, & Marceau, 2008). Importantly, though, correlation coefficients between sexual abuse and ex- and internalizing problems were not significantly different across gender, a finding that was replicated for the other maltreatment scales as well. This not only implies that the gender specific finding for sexual abuse must be

interpreted with caution, it also suggests that boys and girls are much more similar than different in the association between maltreatment types and outcomes.

Strengths of the current study include the use of well-validated questionnaires, the recruitment of a relative large sample of detained girls, and the possibility to test for gender differences in relations between variables of interest. Notwithstanding these assets, our findings should be interpreted keeping in mind some limitations. First, our measure of childhood maltreatment was retrospective, so recall bias may have influenced reports. However, the influence of recall bias on associations between maltreatment and mental health problems has previously been found to be small (Fergusson, Horwood, & Boden, 2011). Second, all variables of interest were assessed through self-report, which may increase the strength of relations between maltreatment and mental health variables. Also, both over- and underreporting of maltreatment experiences and mental health issues are potential risks related to the sole reliance on self-report. Future studies should try to include alternative sources of information as well, including parents and official records. Yet, this is easier said than done as parents of young detainees are often difficult to reach, unavailable or have not seen their child in a long time (Colins et al., 2008), or may simply not acknowledge they maltreated their child. Also, using official report of maltreatment as an alternative source has disadvantages as well: it inherently suffers from a large 'dark' number of unreported cases (Afifi et al., 2015; Berger, Knutson, Mehm, & Perkins, 1988). Concerning emotional maltreatment in specific, the concordance of official registration with self-report has found to be low (Roller-White, English, Thompson, & Roberts, 2016). Third, the cross-sectional design of this study does not allow interpreting the findings in terms of causality. This implies that it cannot be excluded that maltreatment experiences occurred after the onset of mental health problems. Fourth, in line with prior studies (Bernstein et al., 2003; Thombs, Bernstein, Lobbestael, & Arntz, 2009), the physical neglect scale had poor reliability (α =.47), which implies that our results concerning this scale must be interpreted with caution. Because this type of maltreatment is amongst the most prevalent ones in the general population and is considered highly relevant when studying multiple maltreatment (Hildyard & Wolfe, 2002), we decided to keep this scale rather than to omit it from the analyses. Fifth, the youngsters' socio-economic status (SES) and current violence exposure could potentially mediate the relation between childhood (emotional) maltreatment and mental health problems. Since data on current levels of violence exposure and SES were not available or missing for a large amount of youngsters, these variables could not be accounted for. Future research should aim to include these variables as covariates.

Supplementary Table. Intercorrelations CTQ-scales, girls above the diagonal, boys below

Variable	1	2	3	4	5	6
1. Physical Abuse		.44**	.31**	.68**	.35**	.78**
2. Physical Neglect	.32**	_	.23**	.50**	.47**	.68**
3. Sexual Abuse	-.03[b]	-.04[a]	_	.32**	.17*	.55**
4. Emotional Abuse	.71**	.33**	.06[a]	_	.61**	.88**
5. Emotional Neglect	.36**	.55**	.01	.49**	_	.73**
6. CTQ total	.76**	.67**	.09	.84**	.80**	_

[a] correlation difference between boys and girls significant at $p < .05$, 2-tailed. [b] correlation difference between boys and girls significant at $p < .01$, 2-tailed. [c] correlation difference between boys and girls significant at $p < .001$, 2-tailed.
*$p < .05$; **$p < .01$

Chapter 4

Psychopathic traits and maltreatment: relations with aggression and mental health problems in detained boys

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Abstract

Psychopathic traits and a history of maltreatment are well-known risk factors for mental health problems and aggression. A better insight in the impact of such risk factors on juvenile delinquents is likely to help tailoring treatment. Therefore, this study aimed to examine mental health problems and aggression in detained delinquent youths with various levels of psychopathic traits and maltreatment. Standardized questionnaires were used to assign 439 detained male adolescents (N = 439; from 13 to 18 years of age) to one of six mutually exclusive groups: adolescents with (1) low psychopathic traits without maltreatment; (2) low psychopathic traits and one type of maltreatment; (3) low psychopathic traits and multiple types of maltreatment; (4) high psychopathic traits without maltreatment; (5) high psychopathic traits and one type of maltreatment and finally (6) high psychopathic traits and multiple types of maltreatment. Next, groups were compared on mental health problems, mental disorders and reactive and proactive aggression. Findings indicated that compared to the low psychopathic traits groups, high psychopathic traits groups had markedly higher levels of externalizing mental health problems (such as attention deficit/hyperactivity, substance abuse, rule-breaking), proactive and reactive aggression, but not of internalizing mental health problems (anxiety and depression). Mental health problems in boys with a low level of psychopathic traits increased with the number of types of maltreatment in their history. In boys with a high level of psychopathic traits, group differences did not reach significance. Levels of proactive and reactive aggression increased with the number of types of maltreatment in boys with low levels of psychopathic traits, but not in those with high psychopathic traits. Thus, in detained adolescents both psychopathic traits and the number of maltreatment types are related to the severity of mental health problems and types of aggression. When used in routine screening procedures, these risk factors may thus improve identification and support targeted treatment-allocation of detained adolescents with serious clinical problems.

Background

Detained adolescents constitute a complex group, characterized by serious conduct problems (Colins, Vermeiren, Schuyten, Broekaert, & Soyez, 2008), high rates of mental disorders (Abram, Teplin, McClelland, & Dulcan, 2003; Colins et al., 2010; Vermeiren, Jespers, & Moffitt, 2006) and marked psychosocial adversity (Kroll et al., 2002). Because Juvenile Detention Centers (JDCs) often have a limited number of mental health professionals available, they are unable to offer each youth an elaborate mental health assessment (Colins, Grisso, Mulder, & Vermeiren, 2014). These professionals therefore have to focus on individuals who present the largest threat for themselves (due to mental health problems) or the safety of others (due to aggression) (Grisso, Barnum, Fletcher, Cauffman, & Peuschold, 2001).

Recent studies have shown that detained youths with a history of maltreatment and those with high levels of psychopathic traits (e.g., manipulativeness, impulsivity, lack of remorse) are more likely to show mental health problems and aggression (Edens, Skopp, & Cahill, 2008; King et al., 2011; Lexcen, Vincent, & Grisso, 2004; Salekin, Leistico, Neumann, DiCicco, & Duros, 2004;Cima, Smeets, & Jelicic, 2008; Marsee, Silverthorn, & Frick, 2005; Muñoz & Frick, 2012). Although their problems may be similar, boys with consequences of maltreatment are likely to need a different treatment approach than those with problems related to their psychopathic traits (Caldwell, 2011; Caldwell, McCormick, Wolfe, & Umstead, 2012; Kerig & Alexander, 2012). Importantly, detained adolescents reporting a combination of maltreatment and psychopathic traits were shown to carry even higher rates of mental health problems and aggression (e.g. Kerig, Bennett, Thompson, & Becker, 2012; Kimonis, Skeem, Cauffman, & Dmitrieva, 2011; Vaughn, Edens, Howard, & Smith, 2009). An explanation for this phenomenon can be found with Karpman (1941), an early theorist who distinguished primary (hereditary) from secondary (acquired) psychopathy. Karpman theorized that secondary psychopathy was caused by early emotional rejection and maltreatment, which also explained the marked mental health problems he saw in some psychopaths. Primary psychopathy, in contrast, was characterized by a relative lack of mental health problems. Recent studies in detained adolescents provided support for the existence of a low-anxious and a high-anxious type of psychopathy, corresponding to respectively primary and secondary psychopathy. In these studies, high-anxious/secondary psychopathy was associated with depressive symptoms, attention problems, anger, posttraumatic stress, reactive aggression and also a history of maltreatment (Kimonis, Fanti, et al., 2013; Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012; Kimonis et al., 2011; Leist & Dadds, 2009; Tatar, Cauffman, Kimonis, & Skeem, 2012; Vaughn et al., 2009). Consequently, strong theoretical and empirical reasons exist to study the co-occurrence of maltreatment-victimization and psychopathic traits in relation to mental health problems and types of aggression in detained adolescents.

As detained boys with high psychopathic traits are a group with high levels of clinical problems (Salekin et al., 2004), it is of interest to examine whether having experienced multiple

types of maltreatment confers an extra risk. Detained adolescents report high levels of different types of maltreatment, such as physical and emotional abuse and neglect, and sexual abuse (Colins et al., 2009; King et al., 2011). Having experienced multiple types of maltreatment was described as having a cumulative negative effect on mental health, leading to increased posttraumatic stress, depression, anxiety, attention and hyperactivity problems, substance abuse, anger/hostility and psychotic symptoms and dissociation (Colins et al., 2009; Edwards, Holden, Felitti, & Anda, 2003; King et al., 2011; Teicher, Samson, Polcari, & McGreenery, 2006). Concerning aggression, a dose-response relationship between the number of types of maltreatment experiences and the level of violence has been described as well (Duke, Pettingell, McMorris, & Borowsky, 2010). For these reasons, in the current study the number of types of maltreatment youths endured has been taken into account.

In adolescent samples, high levels of psychopathic traits have consistently been associated with externalizing problems such as rule-breaking behavior, attention problems and substance abuse (Colins, Noom, & Vanderplasschen, 2012; Lynam & Gudonis, 2005; Salekin et al., 2004; Sevecke, Lehmkuhl, & Krischer, 2009). As regards aggression, high levels of psychopathic traits have predominantly been related with proactive aggression – the instrumental use of violence to attain certain goals (Kolla et al., 2013; Reidy, Shelley-Tremblay, & Lilienfeld, 2011). In contrast, offenders with low psychopathic traits are considered to be more likely to use reactive aggression – impulsive aggression in response to perceived provocation or threat (Cornell et al., 1996; Muñoz & Frick, 2012). As maltreatment is also known to be associated with reactive aggression (Steiner et al., 2011), the current study will specifically focus on subtypes of aggression. Particularly detainees with a combination of high psychopathic traits and maltreatment experiences may have high levels of both reactive (Kimonis et al., 2011), and proactive aggression (Kimonis, Fanti, Isoma, & Donoghue, 2013; Kolla et al., 2013).

The current study was designed to gain more knowledge on the 'profile of problems' of juvenile delinquents with different levels of psychopathic traits and maltreatment. When clinicians learn about these profiles and related risk factors at the start of detention, they will be able to better tailor treatment. In order to maximize clinical relevance, we used data derived from routine JDC screening procedures. To inform clinical practice, we employed a person-centered approach as recommended by some researchers (Bergman & Magnusson, 1997), by explicitly dividing adolescents into subgroups based on theoretically meaningful characteristics (i.e. psychopathic traits and maltreatment). Thus, the current study compared mental health problems and proactive and reactive aggression in six groups of detained adolescents with different, mutually exclusive combinations of risk factors: those with (1) a low level of psychopathic traits who did not report any maltreatment; (2) a low level of psychopathic traits reporting one type of maltreatment; (3) a low level of psychopathic traits reporting multiple types of maltreatment; (4) a high level of psychopathic traits who did not report any maltreatment; (5) a high level of psychopathic traits reporting one type of maltreatment and finally (6) a high level of psychopathic traits reporting multiple types of maltreatment. We studied mental health

problems both dimensionally (level of problems) and categorically (disorders). We hypothesized that:

(a) juveniles with a high level of psychopathic traits would have more externalizing mental health problems and higher proactive aggression levels than their counterparts with low levels of psychopathic traits;
(b) juveniles with multiple types of maltreatment in their histories would have more mental health problems and higher reactive aggression levels than their counterparts with no maltreatment;
(c) juveniles with both a high level of psychopathic traits and multiple maltreatment would have the worst levels of mental health problems, reactive and proactive aggression.

Methods

Participants

Between July 2008 and June 2011, 448 male adolescents (13.3-18.8 years, *M*: 16.5 years, SD: 1.0) completed a standardized mental health intake procedure in two Juvenile Detention Centers in the Netherlands. For the current study, nine boys were excluded due to missing data on psychopathic traits or maltreatment, resulting in a final sample size of 439. The majority (95%) of these youths were in pre-trial detention. The participants had been accused of offenses ranging from attempted homicide to drug offenses, shoplifting, fraud, etc. Three quarters of the sample had a migration background, meaning that they, or one of their parents, were born in a country or region outside of the Netherlands: this concerned Morocco in 25%, Surinam in 10%, Dutch Antilles in 10% and Turkey in 4%. A quarter of the population had other backgrounds, including various North-African, Middle-Eastern and European countries.

Measures

Psychopathic traits. In order to examine psychopathic traits the *Youth Psychopathic traits Inventory (YPI)* was used (Andershed, Hodgins, & Tengstrom, 2007; Andershed, Kerr, Stattin, & Levander, 2002). This self-report instrument contains 50 items and ten scales: *Dishonest charm, Grandiosity, Lying, Manipulation*, *Remorselessness, Callousness, Unemotionality*, *Impulsiveness, Irresponsibility* and *Thrill seeking*. These scales load on three factors: the *Grandiose-Manipulative dimension* (α = .89, all reported Cronbach's alphas based on current data), the *Callous-Unemotional dimension* (α = .75) and the *Impulsive-Irresponsible dimension* (α = .85). Each item in the YPI is scored on a 4-point Likert scale ranging from (1) "Does not apply at all" to (4) "Applies very well." Total score and factor scores are calculated by taking the mean score of the appropriate items. The YPI was found to be reliable and valid in previous studies in community as well as in detained samples (Andershed et al., 2007; Andershed et al., 2002; Colins, Bijttebier, Broekaert, & Andershed, 2014; Hillege, Das, & De Ruiter, 2010; Veen et al., 2011). There are

no established cut-off scores for the YPI, although one study reported a score with an optimal sensitivity-specificity balance for detecting PCL-YV established juvenile psychopathy (a value of 2.31; Cauffman, Kimonis, Dmitrieva, & Monahan, 2009). In the current data set, only 34 individuals scored this high. In order to allow sufficient group size for comparisons, and in agreement with previous studies (Dadds, El Masry, Wimalaweera, & Guastella, 2008; Dadds et al., 2009), in the current study adolescents were considered to have a high level of psychopathic traits when the total score was in the top 25% of the study population. Our high psychopathic traits group should thus be seen as scoring at the extreme end of a continuum, not as fulfilling criteria for psychopathy.

Childhood maltreatment. To examine childhood maltreatment the short form of the *Childhood Trauma Questionnaire (CTQ-SF)* was used (Bernstein et al., 2003). The CTQ-SF is a 28-item self-report inventory inquiring about five types of maltreatment – *Physical* (α = .82), *Sexual* (α = .86), and *Emotional abuse* (α = .78), and *Emotional* (α = .75) and *Physical neglect* (α = .37). Item response categories are structured to reflect the frequency of maltreatment experiences ('never true', 'rarely true', 'sometimes true', 'often true', 'very often true') and are scored 1-5. Cut-off scores indicate whether the level of maltreatment for each type is: 'none (or minimal)', 'low (to moderate)', 'moderate (to severe)' or 'severe (to extreme).' For the purpose of this study adolescents scoring in the low, moderate, severe or extreme ranges (on a specific type of maltreatment) were considered maltreated, as this cut score was previously found to have the optimal balance between sensitivity (79-89% correctly classified as maltreated) and specificity (82-86% correctly classified as non-maltreated) (Bernstein & Fink, 1998).

Reactive and proactive aggression. To examine reactive and proactive aggression the self-report version of the 23-item *Reactive Proactive Aggression Questionnaire (RPQ)* was used (Cima, Raine, Meesters, & Popma, 2013; Raine et al., 2006). The internal consistency and validity of RPQ scores in detained male adolescents in the Netherlands are good to excellent (Colins, 2015). Twelve items assess *Proactive* (α = .85) and 11 assess *Reactive aggression* (α = .86). Answers are 'never', 'sometimes' or 'often' and are scored respectively with 0, 1 or 2 points. Proactive and reactive aggression scores were calculated by summing the appropriate items.

Mental health problems. To examine mental health problems the *Youth Self-Report (YSR)* (Achenbach, 1991) was used. The YSR has 112 items screening for emotional and behavioral problems and is widely used in research and clinical settings. Answers are 'not true', 'sometimes true' or 'often true' and are scored respectively with 0, 1 or 2 points. In the current study we report on the *Internalizing* (α = .87), *Externalizing* (α = .91), *Social problems* (α = .64) and *Thought problems* (α = .75) scores. The *Internalizing* score is the sum of scores on three 'syndrome-scales': *Withdrawn/depressed, Somatic complaints* and *Anxious/depressed*. The *Externalizing* score is

the sum of scores on the *Attention problems, Rule-breaking behavior* and *Aggressive behavior* syndrome-scales.

Mental disorders. To examine mental disorders, modules of the *Development And Well-Being Assessment-Youth interview (DAWBA)* (Goodman, Ford, Richards, Gatward, & Meltzer, 2000; Widenfelt et al., 2007) and the *Diagnostic Interview Schedule for Children-4th version (DISC-IV)-Youth Interview* (Ferdinand & Ende, 1998; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) were used.

The *DAWBA youth version* was used to examine the presence of *Depressive Disorder, Posttraumatic Stress Disorder, Social Phobia, Panic Disorder, Agoraphobia* and *Generalized Anxiety Disorder* during the past four weeks. In the current study, these disorders were clustered to *Internalizing Disorders*. The *DAWBA* is a package of interviews, questionnaires and rating techniques generating DSM-IV psychiatric diagnoses. Teacher, parent and youth versions are available, which a trained clinician can use in combination with computer-generated possible diagnoses to assign a final diagnosis. The *DAWBA*-interview can be used web-based, but in the current study all items were read to the youth by a test assistant.

The *DISC-IV youth version* was used to examine the presence of *Attention Deficit/ Hyperactivity Disorder (ADHD, Oppositional Defiant Disorder (ODD), Conduct Disorder (CD)* and *Alcohol* and *Marijuana Abuse* and *-Dependence* during the past year. In the current study *ADHD, ODD* and *CD* were clustered to *Disruptive Behavior Disorders (DBD)*; *Alcohol* and *Marijuana Abuse* and *-Dependence* became *Substance Use Disorder (SUD);* and finally *DBD* and *SUD* were clustered into *Externalizing Disorders*. Also, the presence of *Psychotic Symptoms* was measured with an adaptation of the DISC-IV Schizophrenia module. This adaptation, in agreement with Colins et al. (2009), enquired whether or not the adolescent experienced any of 22 psychotic symptoms during the last year. The DISC-IV is designed to be administered by trained lay interviewers. The interviewers in this study were the first author, research assistants with a master's degree and graduate students. Interviewers were trained by the first and second author, who both followed a two day DISC-training. The interview covers diagnostic criteria as specified in DSM-IV.

Procedure

Before youths started with the questionnaires and interviews of the routine mental health screening, an assessment associate explained the procedure. This instruction included that assistance was available at request, e.g. if the youth did not understand items or words in the questionnaires. When reading abilities were insufficient, the questionnaires were read to the youth. Furthermore, youths were informed that information derived from the questionnaires and interviews would be evaluated by a mental health professional from the detention center. Adolescents who did not speak Dutch were not tested. Almost all adolescents (96%) were tested within seven working days after admission. When they refused to cooperate with mental health

screening, there were no consequences for their judicial status or stay in the juvenile detention center.

The Medical Ethical Review Board of the Leiden University Medical Center certified that the current study was conducted in agreement with Dutch laws and regulations for behavioral research. The involved institutional and scientific boards approved this study and the procedure. According to the applicable Dutch law, written informed consent is waived when institutions study aggregated, anonymized data, derived as part of their own clinical assessment.

Data analysis

First, we present descriptive statistics and Pearson correlations for all variables of interest. A significant association of .70 or higher was considered a very strong relationship and .50 to .69 strong, .30 to .49 moderate, .10 to .29 weak and .01 to .09 negligible relationships (Kraemer et al., 2003). Second, we created six subgroups based on two levels of psychopathic traits (high and low) and three maltreatment-levels. Within adolescents with high psychopathic traits, three groups were constructed: no maltreatment, one type of maltreatment (e.g., only sexual abuse) and multiple types of maltreatment (e.g., sexual abuse and emotional neglect). Within adolescents with a low level of psychopathic traits the same three groups were created. These six groups were compared to each other with regard to aggression and mental health problems using one-way analysis of variance with Tamhane's T2 corrected post-hoc tests. Tamhane's T2 corrects for multiple comparisons, and can be used for variables with non-homogeneous variance. Third, groups were compared with regard to mental disorders using χ^2-tests for categorical variables with Bonferroni correction for multiple comparisons. For all analyses SPSS 20.0 was used and $p < .05$ (corrected for multiple comparisons) was considered statistically significant.

Results

Descriptives

About half of the population (N = 214, 48.7%) did not report any maltreatment, 124 boys (28.2%) reported one type, 67 (15.3%) two types, 12 (2.7%) three types, 19 (4.3%) four types and 3 boys (0.7%) five types. Emotional neglect was the most prevalent type (N = 154; 35.1%), followed by physical neglect (N = 106; 24.1%), emotional abuse (N = 59; 13.4%) and physical abuse (N = 48; 10.9%). Sexual abuse was least prevalent (N = 14; 3.2%). Furthermore, half of all adolescents had a mental disorder (N = 213, 50.1%). Internalizing disorders were present in 25.0%, externalizing disorders in 38.9%. More than a third of the study population reported having experienced one or more psychotic symptoms (N = 152, 36.6%).

Correlations

Correlations between study variables are reported in Table 1. The relations of number of types of maltreatment with mental health and aggression variables were weak to moderately positive (*r*'s between .20-.33). The positive relations between psychopathic traits and proactive aggression, reactive aggression, social problems, thought problems and externalizing problems were moderately strong to very strong (*r:* .42-.75), while the strength of the relation of psychopathic traits with internalizing problems was moderate (*r:* .35). The number of types of maltreatment and psychopathic traits were weakly positive related with each other (r = .24). With regard to specific maltreatment types the correlation between psychopathic traits and emotional abuse was moderate (r = .31), while the correlations between psychopathic traits and the other maltreatment types were weak (*r*'s between .10-.16). With regard to psychopathic traits dimensions and the number of maltreatment types, relations were weak (r = .15-.23).

Table 1. Descriptive statistics (*M*, SD, min-max) and correlations (*r*)

Scale		M	SD	Min-max	Nr types (*r*)	YPI (*r*)
CTQ	Nr types	0.9	1.1	0-5	1	.24***
	Physical Abuse	5.8	2.5	5-24	.60***	.15**
	Sexual Abuse	5.1	1.1	5-25	.30***	.16**
	Emotional Abuse	6.3	2.7	5-21	.64***	.31***
	Emotional Neglect	8.9	4.2	5-25	.69***	.15**
	Physical Neglect	6.4	2.2	5-21	.66***	.10*
YPI	Total	1.7	0.4	1.1-3.3	.24***	1
	Grandiose-Manipulative	1.3	0.4	1.0-3.6	.20***	.83**
	Callous-Unemotional	1.9	0.4	1.1-3.6	.15**	.79**
	Impulsive-Irresponsible	1.9	0.5	1.0-3.9	.23***	.87**
RPQ	Proactive Aggression	2.5	3.3	0-18	.28**	.62***
	Reactive Aggression	7.2	4.5	0-21	.28***	.62***
	Total Aggression	9.7	7.2	0-37	.30***	.67***
YSR	Social Problems	2.2	2.4	0-14	.33***	.42***
	Thought Problems	2.6	2.9	0-18	.32***	.44***
	Internalizing	7.5	6.8	0-35	.30***	.35***
	Externalizing	14.4	10.4	0-51	.32***	.75***

Note. Nr types= number of types of maltreatment; CTQ= Child Trauma Questionnaire; YPI= Youth Psychopathic traits Inventory; RPQ= Reactive and Proactive aggression Questionnaire and YSR= Youth Self Report.
* $p < .05$; ** $p < .01$; *** $p < .001$

Group differences: mental health problems and mental disorders

Mean levels of psychopathic traits and maltreatment types for each of the six groups are presented in Supplementary Table A. In Table 2, levels of internalizing and externalizing mental health problems, thought problems and social problems across groups are presented. Internalizing and externalizing problems showed differential patterns across groups (Figure 1): in contrast with Internalizing scores, Externalizing scores were about twice as high in the three high psychopathic traits groups compared to the three low psychopathic traits groups. Also, in boys with low psychopathic traits, mental health problem scores increased from the groups with no maltreatment, over one type, to multiple types of maltreatment. The same pattern was found for boys with high psychopathic traits; although for them group differences did not reach statistical significance.

In boys with a low level of psychopathic traits, the prevalence of psychiatric disorders increased with the number of types of maltreatment, while in boys with high psychopathic traits, differences often did not reach statistical significance (Figure 2, for exact percentages see Supplementary Table B). Adolescents with low levels of psychopathic traits and no maltreatment had the lowest prevalence of any disorder (N = 51/169; 30.2%), and those with high psychopathic traits and multiple maltreatment the highest (N = 31/37; 83.8%). The number of psychotic symptoms was the lowest in adolescents with low levels of psychopathic traits and no maltreatment (N = 42/165; 25.5%) and the highest in youths with high psychopathic traits and multiple maltreatment experiences (N = 22/35; 62.9%). The prevalence of SUD in boys with low levels of psychopathic traits ranged from 15.8% (N=26/165) in those reporting no maltreatment to 45.9% (N = 28/61) in those with multiple types of maltreatment. In boys with high levels of psychopathic traits, SUD ranged from 35.3% (12/34) in those reporting no maltreatment to 65.7% (23/35) in those with multiple types of maltreatment.

Group differences: types of aggression

Levels of proactive and reactive aggression were higher in youths with a high level of psychopathic traits compared to those with a low level of psychopathic traits, and followed similar patterns across the six groups (Table 2). Figure 3 shows that in boys with low levels of psychopathic traits, the levels of reactive and proactive aggression increased with the number of types of maltreatment. In boys with high levels of psychopathic traits, maltreatment groups did not differ with regard to aggression types.

Table 2. Aggression and mental health problems across six maltreatment/ psychopathic traits groups

Scale		Low PT, no maltr (*N* = 177)	Low PT, 1 type maltr (*N* = 91)	Low PT, >1 types maltr (*N* = 64)	High PT, no maltr (*N* = 37)	High PT, 1 type maltr (*N* = 33)	High PT, >1 types maltr (*N* = 37)
YSR	Social Problems	1.5[a]	1.9[a,b]	2.9[b,c,d]	2.1[a,c]	3.6[b,c,d]	4.4[d]
	Thought Problems	1.4[a]	2.4[a,b]	3.1[b,c]	3.0[b,c]	4.7[c]	5.0[c]
	Internalizing	5.3[a]	6.9[a,b]	9.8[b,c]	8.3[a,c]	11.4[b,c]	11.8[c]
	Externalizing	9.4[a]	11.9[a,b]	14.8[b]	22.6[c]	25.4[c]	26.9[c]
RPQ	Proactive Aggression	1.1[a]	1.8[a,b]	2.3[b]	4.8[c]	5.0[c]	6.7[c]
	Reactive Aggression	5.1[a]	6.6[a,b]	7.3[b]	10.9[c]	11.2[c]	11.4[c]
	Total Aggression	6.2[a]	8.4[a,b]	9.5[b]	15.7[c]	16.2[c]	18.1[c]

Note. PT= Psychopathic Traits

[a,b,c,d]Same superscript letters indicate values that are ***not*** statistically significant different from each other at the .05 level.

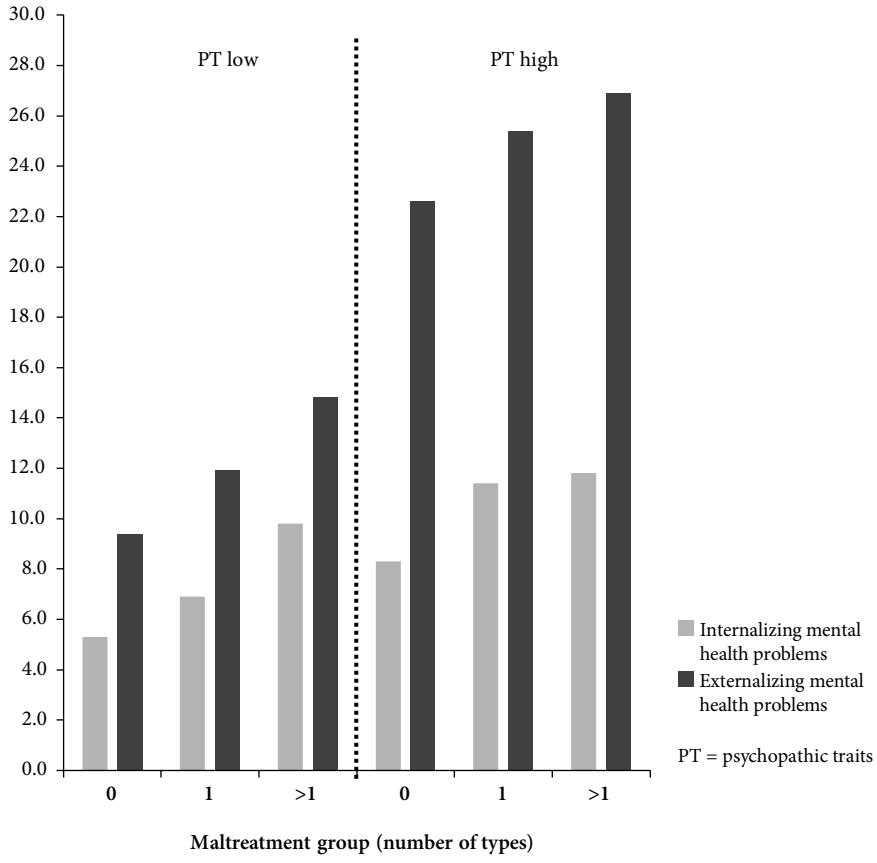

Figure 1. Mental health problems by group (YSR-scores)

Discussion

To better identify treatment needs in detained male adolescents, the current study examined the relations of psychopathic traits and maltreatment with mental health problems and types of aggression. Boys with a high (versus a low) level of psychopathic traits had higher levels of externalizing problems, proactive and reactive aggression, but similar levels of internalizing problems. In boys with a low level of psychopathic traits, the level of mental health problems and the prevalence of psychiatric disorders increased with the number of types of maltreatment, while this was less explicit in boys with high psychopathic traits, for whom most differences did not reach statistical significance. Furthermore, in boys with low levels of psychopathic traits, both proactive and reactive aggression increased with the number of types of maltreatment, while in those with high psychopathic traits, these types of aggression did not differ between maltreatment groups. Finally, the evidence was limited for our hypothesis that juveniles with both a high level of psychopathic traits and multiple maltreatment would have the highest levels of mental health problems, reactive and proactive aggression.

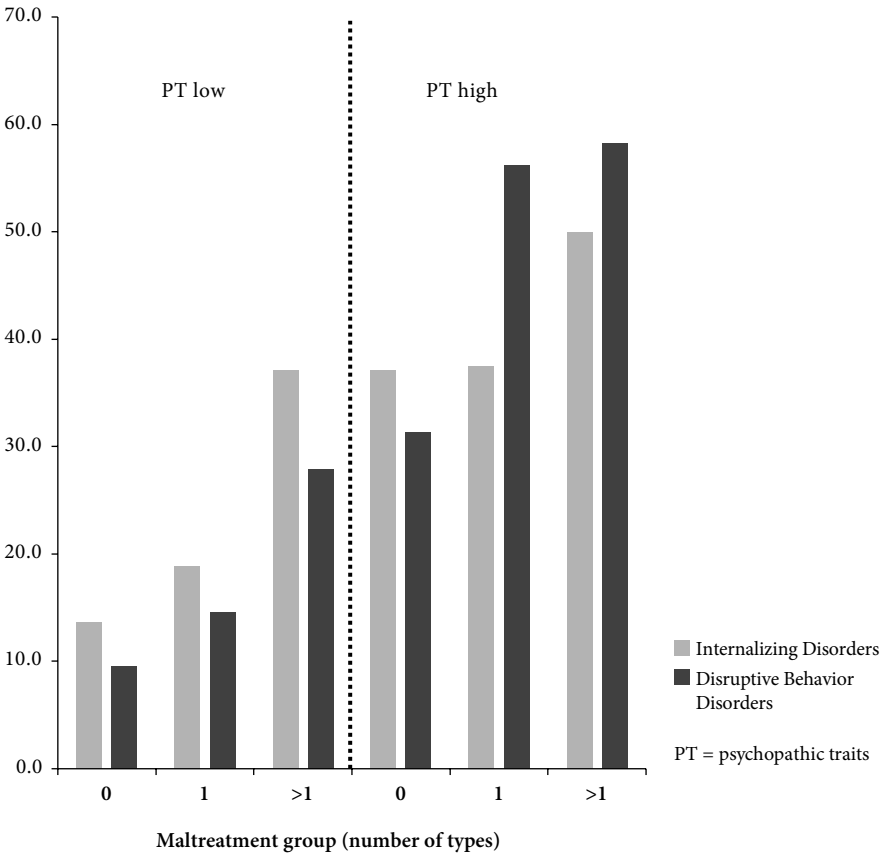

Figure 2. Disorders by group (%)

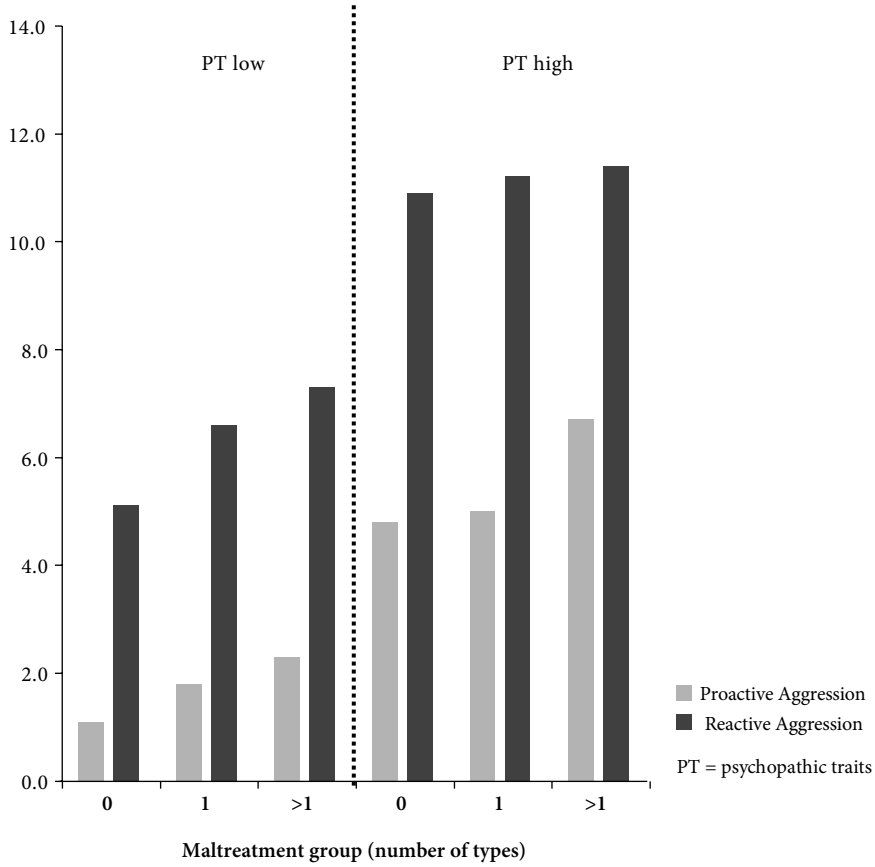

Figure 3. Aggression types by group

Unexpectedly, in boys with high psychopathic traits, mental health problems were only marginally different between those without and with maltreatment histories. An explanation may be that a number of boys with pre-existing high levels of psychopathic traits are less sensitive to the damaging effects of maltreatment – consistent with primary psychopathy. Boys with primary psychopathy – and relatively low levels of mental health problems – may be present in all our high psychopathic traits groups because children with primary/low-anxious psychopathic traits can of course also experience maltreatment (Hawes, Dadds, Frost, & Hasking, 2011; Kimonis, Fanti, et al., 2013; Tuvblad, Bezdjian, Raine, & Baker, 2013).

Our findings also indicate that a high level of psychopathic traits in male detained adolescents can be considered to be a relevant risk factor for externalizing mental health issues, as well as for proactive and reactive aggression. The elaboration of self-report based mental health screening with a psychopathic traits-questionnaire could therefore promote targeted mental health care for young detainees. Although treatment of youths with high psychopathic traits is complex,

they have been found to benefit from intensive treatment approaches with elements directed at interpersonal relations, treatment engagement and behavioral manifestations of psychopathic traits (Caldwell, 2011; Caldwell et al., 2012). Notwithstanding these promising results and possibilities for clinical use, caution is still needed. Although validated psychopathic traits-questionnaires such as the YPI exist and have been found reliable outside of research settings (Vahl et al., 2014), currently available psychopathic traits self-report questionnaires are often at best poorly to moderately correlated to each other (Colins, Bijttebier, et al., 2014; Falkenbach, Poythress, & Heide, 2003). Future research is therefore warranted to see if our findings can be replicated by means of other self-report questionnaires that tap psychopathic traits.

Both the number of types of maltreatment experienced by juveniles and psychopathic traits were found to be risk factors for reactive and proactive aggression. Screening for these risk factors during routine procedures and allocating appropriate treatment could therefore help with improving safety in detention settings. However, concerning these types of aggression there were three somewhat unexpected findings. First, in low psychopathic traits boys, proactive aggression increased with the number of types of maltreatment experiences, while this was primarily expected for reactive aggression (Steiner et al., 2011). This may be explained by a possible relation between physical abuse and proactive aggression, which has been postulated by some researchers (Dodge, Lochman, Harnish, Bates, & Pettit, 1997). The relation is theorized to originate in youths having violent role models, causing children to attribute a positive valence to the use of aggression to attain goals. Youths who experienced multiple types of maltreatment may have higher odds of having been the victim of physical abuse, and associated higher proactive aggression scores. Second, in boys with high psychopathic traits, no significant differences between maltreatment groups were found, while we expected at least reactive aggression to increase with the number of maltreatment types. The same explanation mentioned regarding mental health problems may apply here: a relative insensitivity to trauma in some youths with high psychopathic traits, and our subgroups not differentiating primary from secondary psychopathy. Third, both types of aggression showed the same pattern of differences across all six subgroups. Possibly, in groups with elevated levels of aggression such as juvenile offenders, these two types of aggression are difficult to differentiate (Kempes, Matthys, de Vries, & van Engeland, 2005).

The current study solely used youth self-report instruments and interviews, which has some inherent limitations. First, using the youth as the only informant carries the risk of inflating the strength of the relationships found. Unfortunately, using other sources of information like parents or teachers is often not feasible in JDCs (Colins, Vermeiren, et al., 2012). Second, underreporting may occur as youths in JDCs may have reasons to present themselves better than they actually are. Those high in psychopathic traits may even be more inclined to 'fake good', as lying and manipulation are characteristics of psychopathy. However, the same problem may arise with clinical assessment by well trained interviewers, who can also be misled, particularly when there is little or no file information available to confront juveniles with inconsistencies in

their stories. Self-report tools, indeed, may have the advantage that they can capture motivations for actions (e.g., using charm to con others), and features (e.g., guilt) that are best known to the individual and may be obscured to others (Colins et al., 2014; Raine et al., 2006). In fact, a meta-analysis including studies in adult, detained and general populations, indicated the influence of positive response bias ('faking good') on self-reported psychopathic traits is small (Ray et al., 2012). An increasing number of studies points out that psychopathic traits and also aggression can be reliably screened for by self-report (Cima et al., 2013; Falkenbach et al., 2003; Raine et al., 2006; Vahl et al., 2014). Importantly, one of the aforementioned studies used data that were gathered as part of a clinical protocol (Vahl et al., 2014), supporting the internal consistency and validity of self-report psychopathic traits-scores in clinical practice. With regard to maltreatment, the risk of underreporting also exists, due to e.g. loyalty to parents or guardians. However, studies have shown self-report is a valuable source of information and for instance welfare agencies' official registration also has limitations (Berger, Knutson, Mehm, & Perkins, 1988; McGee, Wolfe, Yuen, Wilson, & Carnochan, 1995). Notwithstanding the aforementioned inherent disadvantages, self-report questionnaires are easy to complete for the participants and require minimal training on the part of the test administrator (Lilienfeld et al., 2006), making them appealing for use in settings with limited resources such as JDCs.

The current findings must be interpreted in the context of several other limitations. First, although we were able to study a fairly large population of detained boys, some of the subgroups were quite small, with fewer than 40 boys in each of the three high psychopathic traits subgroups. This may have made it more difficult to find significant differences between these groups. Second, our measure of childhood maltreatment was retrospective, so recall bias may have influenced reports. However, the influence of recall bias on associations between maltreatment and mental health problems has previously been found to be small (Fergusson, 2011) and agreement between self-report and official report has been found to be excellent (Pinto, Correia, Maia, & Maia, 2014). Third, the physical neglect-scale had poor reliability (α =.37). We nonetheless included this scale in the study because it concerns the most prevalent type of maltreatment in the general population and is therefore largely relevant for studying multiple maltreatment (Hildyard & Wolfe, 2002). Previous studies also found a relatively low internal consistency for this scale (Bernstein et al., 2003; Thombs, Bernstein, Lobbestael, & Arntz, 2009). Finally, we did not study the role of intelligence or gender, so future studies should examine their influence.

Conclusion

Notwithstanding the aforementioned limitations, our study showed that for youths with a low level of psychopathic traits, the impact of maltreatment seems higher than for youths with a high level of psychopathic traits. Our findings support elaboration of standard screening procedures with questionnaires on (multiple) maltreatment and in the future also on psychopathic traits. A high-quality trajectory of screening and assessment, such as featured in the current study, can promote individualized allocation of treatment. Some ideas on how this could be done, can be formulated based on the current findings. Treatment of mental health problems in boys with a low level of psychopathic traits could consist of evidence based trauma-sensitive and family-directed treatment approaches (Kerig & Alexander, 2012). Youths with a high level of psychopathic traits could benefit more from treatments directed at their individual mental health problems and promising treatment forms like empathy-training (Caldwell et al., 2012). Treatment programs including elements directed at a person's specific risk factors, are an important area of future research as they may curb the persistence of mental health and aggression problems into the future (Hawes & Dadds, 2005; Kerig & Alexander, 2012; Salekin, Worley, & Grimes, 2010).

Supplementary Table A. YPI subscale and maltreatment type scores across six maltreatment/ psychopathic traits groups

Scale		Low PT, no maltr (*N* = 177)	Low PT, 1 type maltr (*N* = 91)	Low PT, >1 types maltr (*N* = 64)	High PT, no maltr (*N* = 37)	High PT, 1 type maltr (*N* = 33)	High PT, >1 types maltr (*N* = 37)
YPI	Grandiose-Manipulative	1.2[a]	1.2[a]	1.2[a]	1.8[b]	1.8[b]	1.8[b]
	Callous-Unemotional	1.7[a]	1.7[a]	1.7[a]	2.3[b]	2.4[b]	2.3[b]
	Impulsive-Irresponsible	1.6[a]	1.7[a,b]	1.8[b]	2.4[c]	2.6[c]	2.5[c]
	Total	1.5[a]	1.6[a,b]	1.6[b]	2.2[c]	2.2[c]	2.2[c]
CTQ	Physical Abuse	5.1[a]	5.4[b,c]	7.8[d]	5.3[a,b]	5.5[a,c]	8.0[c,d]
	Sexual Abuse	5.0[a]	5.0[a]	5.1[a]	5.0[a]	5.2[a]	6.3[a]
	Emotional Abuse	5.3[a]	5.5[a]	8.6[b]	5.7[a,c]	7.2[b,c]	9.3[b]
	Emotional Neglect	6.4[a]	9.9[b]	13.7[c]	6.4[a]	9.0[b]	12.8[c]
	Physical Neglect	5.1[a]	6.7[b]	9.0[c]	5.3[a,d]	5.9[b,d]	8.7[c]
	Total Maltreatment	26.9[a]	32.6[b]	44.2[c]	27.7[a]	32.7[b]	45.0[c]

Note. PT= Psychopathic Traits; maltr= maltreatment

[a,b,c,d] Same superscript letters indicate values that are ***not*** statistically significant different from each other at the .05 level.

Supplementary Table B. Percentages disorders across six maltreatment/psychopathic traits groups ($N_{with}/N_{total\ in\ group}$)

Disorder	Low PT, no maltr	Low PT, 1 type maltr	Low PT, >1 types maltr	High PT, no maltr	High PT, 1 type maltr	High PT, >1 types maltr	Overall \prevalence
ADHD	3.6a (6/166)	6.7^{a,b} (6/89)	11.5^{a,b,c} (7/61)	5.9^{a,b,c} (2/34)	18.8^{b,c} (6/32)	27.8^{c} (10/36)	8.9 (37/418)
ODD	1.8^{a} (3/165)	1.1^{a} (1/89)	4.9^{a} (3/61)	5.9^{a} (2/34)	0.0 (0/32)	2.8^{a} (1/36)	2.4 (10/419)
CD	7.3^{a} (12/165)	7.9^{a} (7/89)	19.7^{a,b} (12/61)	29.4^{b,c} (10/34)	46.9^{b,c} (15/32)	52.8^{c} (19/36)	18.0 (75/417)
DBD	9.6^{a} (16/166)	14.6^{a,b} (13/89)	27.9^{b,c} (17/61)	31.4^{b,c,d} (11/35)	56.2^{c,d} (18/32)	58.3^{d} (21/36)	22.9 (96/419)
Alcohol Abuse	9.1^{a} (15/164)	8.0^{a} (7/88)	18.0^{a,b} (11/61)	20.6^{a,b} (7/34)	25.8^{a,b} (8/31)	34.3^{b} (12/35)	14.5 (60/413)
Alcohol Dependence	0.0 (0/165)	2.2^{a} (2/89)	9.8^{a} (6/61)	5.9^{a} (2/34)	12.9^{a} (4/31)	11.4^{a} (4/35)	4.3 (18/415)
Marijuana Abuse	9.7^{a} (16/165)	20.2^{a,b} (18/89)	24.6^{a,b} (15/61)	17.6^{a,b} (6/34)	21.9^{a,b} (7/32)	38.2^{b} (13/34)	18.1 (75/415)
Marijuana Dependence	1.8^{a} (3/165)	6.7^{a,b} (6/89)	18.0^{b,c} (11/61)	17.6^{b,c} (6/34)	34.4^{c} (11/32)	30.3^{c} (10/33)	11.3 (47/417)
Substance Use Disorder	15.8^{a} (26/165)	29.2^{a,b} (26/89)	45.9^{b,c} (28/61)	35.3^{a,b,c} (12/34)	53.1^{b,c} (17/32)	65.7^{c} (23/35)	31.7 (132/416)
Externalizing Disorder (DBD + SUD)	20.5^{a} (34/166)	36.0^{a,b} (32/89)	54.1^{b,c} (33/61)	42.9^{a,b,c} (15/35)	68.8^{c} (22/32)	75.0^{c} (27/36)	38.9 (163/419)
Depressive Disorder	7.7^{a} (13/169)	7.9^{a,b} (7/89)	24.6^{b,c} (15/61)	20.0^{a,b,c} (7/35)	18.8^{a,b,c} (6/32)	30.6^{c} (11/36)	14.0 (59/422)
PTSD	3.0^{a} (5/169)	3.3^{a,b} (3/90)	6.5^{a,b} (4/62)	11.4^{a,b} (4/35)	9.4^{a,b} (3/32)	16.7^{b} (6/36)	5.9 (25/424)
Internalizing Disorder	13.6^{a} (23/169)	18.9^{a,b} (17/90)	37.1^{b,c} (23/62)	37.1^{b,c} (13/35)	37.5^{b,c} (12/32)	50.0^{c} (18/36)	25.0 (106/424)
Psychotic symptoms	25.5^{a} (42/165)	33.0^{a,b} (29/88)	39.3^{a,b,c} (24/61)	50.0^{a,b,c} (17/34)	56.2^{b,c} (18/32)	62.9^{c} (22/35)	36.6 (152/415)
Any Disorder	30.2^{a} (51/169)	48.9^{b} (44/90)	67.7^{b,c} (42/62)	57.1^{b,c} (20/35)	78.1^{b,c} (25/32)	83.8^{c} (31/37)	50.1 (213/425)
Any Disorder incl Psychotic symptoms	41.4^{a} (70/169)	58.9^{a,b} (53/90)	74.2^{b,c} (46/62)	74.3^{b,c} (26/35)	87.5^{c} (28/32)	91.9^{c} (34/37)	60.5 (257/425)

Note. PT= Psychopathic Traits; DBD= Disruptive Behavior Disorders

^{a,b,c,d} Same superscript letters indicate values that are ***not*** statistically significant different from each other (p = .05 Bonferroni corrected).

Chapter 5

Psychopathic-like traits in detained adolescents: clinical usefulness of self report

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Abstract

Studies have demonstrated that self-report tools can be used to reliably and validly examine psychopathic-like traits in adolescents. However, it is unclear if self-report instruments are still reliable and valid when confidentiality cannot be guaranteed, such as during routine assessments in juvenile detention centres. To address this issue, the current study used data from the routine mental health screening of 365 detained male adolescents (12-18 years) in two juvenile detention centres. With the intention of gaining insight in the clinical usefulness of self-reported psychopathic-like traits, we examined relations known from literature with emotional and behavioral features. Self-reported psychopathic-like traits, measured by the Youth Psychopathic Traits Inventory – Short version (YPI-S), were uniquely associated with substance abuse, anger/irritability, conduct problems and hyperactivity, but not with internalizing problems. YPI-S-dimensions showed several specific relationships with variables of interest. For example, only the callous unemotional dimension was negatively related with prosocial behavior and only the behavioral dimension was positively related with hyperactivity. In conclusion, self-reported psychopathic-like traits showed expected relations with relevant variables. These findings suggest that self-report can be used to identify detained youths with high levels of psychopathic-like traits outside a research context, thus, even when anonymity and confidentiality are not guaranteed.

Background

Adolescents with psychopathic-like traits show deficiencies in the interpersonal, affective, and behavioral domain, including grandiosity, egocentricity, deceptiveness, shallow emotions, lack of empathy or remorse, irresponsibility, impulsivity, and a tendency to violate social norms (Hare & Neumann, 2009). High levels of psychopathic-like traits are associated with severe and persistent antisocial behavior (Loeber, Burke, & Pardini, 2009; Salekin & Frick, 2005). For this reason, psychopathic-like traits in adolescents are receiving increasing attention in research concerning risk assessment (Edens, Skeem, Cruise, & Cauffman, 2001) and treatment (Haas et al., 2011; Hawes & Dadds, 2005, 2007). Therefore, when efficient ways of assessment become available, juvenile detention centres may be interested in assessing their detainees' level of psychopathic-like traits. Self-report is the most commonly used way of psychological assessment in incarcerated youths (Colins et al., 2012). Although studies have demonstrated that psychopathic-like traits can be reliably and validly examined by self-report, it has been debated if reliability can be maintained in settings where confidentiality and anonymity are not guaranteed, which is commonly the case in juvenile detention centres (Lilienfeld & Fowler, 2007; Vaughn & Howard, 2005). Lacking confidentiality may motivate young detainees to attempt to make a good impression. Also, people with high levels of psychopathic-like traits are inclined to lie and manipulate, which poses an extra risk for biased self-report.

Still, for several reasons self-report seems a likely method to examine psychopathic-like traits efficiently in forensic samples. First, currently the most widely accepted instrument for measuring psychopathic-like traits in forensic and mental health settings, the Psychopathy Checklist Youth Version (PCL-YV) (Forth, Kosson, & Hare, 2003; Hare & Neumann, 2009), requires a trained expert to review files and conduct an extensive interview. Administering the PCL-YV in the entire population of a juvenile detention centre would therefore be very time-consuming and expensive. Second, parent report is often less achievable than self-report: parents of detained adolescents are often difficult to locate, reluctant to cooperate or have not spent enough time with their child recently to be able to report on behavior (O. Colins et al., 2012). Third, as school careers of delinquent adolescents are often rudimentary (Kroll et al., 2002), teacher report is not likely to be a reliable source of information. Relying on youth self-report is often the first and only option for professionals working with detained adolescents. Therefore we need to study the clinical relevance of self-reported psychopathic-like traits.

For this purpose, it is of importance to examine, in detained adolescents, relations of self-reported psychopathic-like traits with emotional and behavioral variables known from literature to be associated with psychopathic-like traits. A large number of studies have focused on relationships of psychopathic-like traits with mental health problems (Sevecke & Kosson, 2010): the most consistent finding being a positive association with externalizing problems, such as conduct problems (Schmidt, McKinnon, Chattha, & Brownlee, 2006; Sevecke, Lehmkuhl, & Krischer, 2009), hyperactivity/inattention (Lynam & Gudonis, 2005; Salekin, Leistico, Neumann,

DiCicco, & Duros, 2004), anger (Lexcen, Vincent, & Grisso, 2004; Verschuere, Candel, Van Reenen, & Korebrits, 2012), and substance use related problems (Salekin & Frick, 2005; Walsh, Allen, & Kosson, 2007). Furthermore, adult psychopaths are known to break basic social norms, to have shallow emotions and low levels of anxiety (Cleckley, 1941, 1976). However, the relation between psychopathic-like traits and internalizing problems (such as depressed and anxious feelings, somatic complaints) in adolescence remains to date unclear (Sevecke & Kosson, 2010), with some studies reporting a negative relation (Lynam, 1997; Skeem & Cauffman, 2003), and others neutral or positive relations (Salekin et al., 2004).

Several researchers have argued that for the identification of adolescents at risk for becoming an adult psychopath, focus should be on traits from the affective domain rather than on behavioral traits. This may be especially applicable for delinquent adolescents, because they generally already show impulsive, irresponsible and antisocial behavior (P. Frick & Moffitt, 2010). Therefore, in the current study, separate dimensions of psychopathic-like traits were also examined: the interpersonal, affective and behavioral dimension. Interestingly, specific relationships of psychopathic-like traits-dimensions with emotional and behavioral constructs have been described. For example, the interpersonal and behavioral dimensions were found to be more strongly related to anxious and depressed feelings (Colins, Noom, & Vanderplasschen, 2012; P. J. Frick & White, 2008), suicidality (Douglas et al., 2008), hyperactivity/inattention (Colins et al., 2012; P. J. Frick, Bodin, & Barry, 2000), conduct problems (Colins et al., 2012; P. J. Frick & White, 2008) and substance abuse (Hemphälä & Tengström, 2010; Poythress, Dembo, Wareham, & Greenbaum, 2006; Walsh et al., 2007). Adolescents with conduct problems and with high rates of affective dimension-traits were shown to designate a group specifically impaired in prosocial behavior and in relations with peers (Colins et al., 2012; Viding, Simmonds, Petrides, & Frederickson, 2009).

In the current study psychopathic-like traits and variables of interest were assessed by means of self-report questionnaires, completed during the routine mental health screening in two juvenile detention centres. As this screening was meant for clinical use, this routine procedure did not include confidentiality and anonymity guarantees. The aim was to study the usefulness, outside a research context, of self-reported psychopathic-like traits and -dimensions. If associations with variables of interest conform to the literature reviewed above, this would provide support for the clinical usefulness of self-report to assess this important construct.

Method

Participants

In May 2008, two juvenile detention centres in the Netherlands started to use a standardized method for mental health screening and assessment for each youth entering the institution. The current study uses data collected until March 2010, from 365 male adolescents aged 12-18 years

(mean 16.5), who entered the juvenile detention centres either pre-trial or after conviction. Information on demographic variables and detention history was collected at the time of mental health screening.

Ethnic minorities were overrepresented as compared to the general population in the Netherlands, which is common in Dutch juvenile detention centres (Veen et al., 2011). Cultural background country was the Netherlands in 22.5% of cases; Morocco in 24.1%; Surinam in 13.4%; the Dutch Antilles in 12.9%; Turkey in 4.9% and various other countries in 22.2%. More than half of the sample had been detained in the past (54.0%), with a mean number of prior juvenile detention centre-placements of 1.2 (range 0-12). The adolescents were suspected or convicted of various crimes: in 53.2% a violent crime such as manslaughter or armed robbery; and most of the remainder less serious crimes such as dealing drugs or theft.

Measures

Cultural background. Cultural background country was determined in accordance with the definition for 'foreign background' of the Dutch Central Bureau of Statistics: based on country of birth of the youth, unless he was born in the Netherlands and one or both of the parents were not, in which case there are three options. (1) When both parents were born in the same foreign country, this is considered the youth's cultural background country. (2) When only one of the parents was born abroad, their country is considered the youth's cultural background. (3) When the parents are each born in different foreign countries, the country of the mother is registered to be the cultural background of the youth.
(http://www.cbs.nl/en-GB/menu/methoden/begrippen/default.htm?ConceptID=37)

Psychopathic-like traits (dependent variable). The Youth Psychopathic traits Inventory – Short version (YPI-S) (van Baardewijk et al., 2010) was used to assess *psychopathic-like traits*. The YPI-S is an 18-item self-report questionnaire designed to measure psychopathic-like traits in adolescents. The YPI-S is the short version of the original 50-item YPI (Andershed, Kerr, Stattin, & Levander, 2002; Hillege, Das, & de, 2010), and has good internal consistency and validity in normal population adolescents (Colins et al., 2012; van Baardewijk et al., 2010) and detained female adolescents (Colins, Bijttebier, Broekaert, & Andershed, 2014). The items of the YPI-S are worded in such a way that psychopathic-like traits seem positive qualities, specifically for individuals who endorse them (see appendix for items). In line with the three factor model of psychopathy (Cooke, Michie, & Skeem, 2007), the YPI-S items comprise three dimensions with six items each. The 'grandiose manipulative' dimension, from here on referred to as the 'interpersonal dimension', contains items for dishonest charm, manipulation/lying and grandiosity. The 'callous unemotional' dimension, from here on the 'affective dimension', covers the characteristics callousness, unemotionality, and remorselessness. 'Impulsive-irresponsible', from here on referred to as the 'behavioral dimension', includes impulsivity, irresponsible behavior, and thrill-seeking/proneness to boredom. Each item in the YPI-S is scored on a

4-point Likert scale: (1) "Does not apply at all"; (2) "Does not apply well"; (3) "Applies fairly well" and (4)"Applies very well". The total score and dimension scores are the means of the appropriate items and a higher score indicates a greater level of problem.

Confirmatory factor analyses (by means of LISREL 8.80) showed that our YPI-S data adequately fitted the proposed three-factor model (van Baardewijk et al., 2010) with a Comparative Fit Index of 0.92 and a Root Mean Square Error of Approximation of 0.062 (Hu & Bentler, 1999) (detailed information is available from the first author upon request). In addition, Cronbach's alphas were 0.80 for the YPI-S total score; 0.70 for the interpersonal dimension; 0.63 for the affective dimension; and 0.69 for the behavioral dimension, while mean item-to-total-correlations were above the recommended value of 0.30 for all scales. Finally, there was no multicollinearity between psychopathic-like traits total score and dimensions.

Variables of interest (independent variables). *Substance abuse, anger/irritability, depressed/anxious feelings*, *somatic complaints* and *suicidal ideation* were measured by means of the corresponding subscales of the Massachusetts Youth Screening Instrument second version (MAYSI-2) (Grisso, Barnum, Fletcher, Cauffman, & Peuschold, 2001). The MAYSI-2 is a self-report inventory on which youths report the presence or absence of symptoms or behaviors related to several areas of emotional, behavioral, and psychological disturbances experienced "within the past few months". The screening tool contains 52 items that must be answered with yes (1 point) or no (0 points) , enquiring about e.g. fighting as a result of substance use, feelings of hopelessness or anger. The instrument was designed to assist juvenile justice facilities in identifying youth who may have special mental health needs. The MAYSI-2 was developed and normed for administration by non-clinicians to youths ages 12 to 17 years when entering a juvenile justice setting. Factor analyses indicated that the items produce scores on six clinical scales: Alcohol-Drug Use, Angry-Irritable, Depressed-Anxious, Somatic Complaints, Suicide Ideation, and Thought Disturbance (for boys only) and one non-clinical scale (Traumatic Experiences) that screens for reported exposure to potentially traumatic events. A few items on the MAYSI-2 questionnaire do not contribute to any of the scales but were retained for research and/or clinical purposes (Grisso & Barnum, 2000). Of the seven subscales, *thought disturbance* and *traumatic experiences* were not included in the current study. Having good psychometric properties, the MAYSI-2 is used extensively as a mental health screening instrument in juvenile detention centres in the U.S. (Grisso et al., 2001).

Hyperactivity, conduct problems, prosocial behavior, emotional symptoms and *peer problems* were measured by means of the corresponding subscales of the self-report version of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997; Widenfelt, Goedhart, Treffers, & Goodman, 2003). The SDQ is a 25 item screening instrument for psychosocial functioning in children and adolescents, enquiring on e.g. difficulties with concentrating, fighting and worrying a lot. Each of the SDQ's 5 subscales consists of 5 items with three response categories (not true = 0 points, somewhat true = 1 point, certainly true = 2 points). A higher scale-score

means that the adolescent experiences more difficulties, with the exception of a higher *prosocial behavior* score, which indicates less problems. Psychometric properties of the SDQ have been found to be acceptable to good in previous studies, with acceptable internal consistencies and substantial associations between the SDQ and independently diagnosed disorders (Goodman, 1997, 2001; Goodman & Scott, 1999; Widenfelt et al., 2003).

Procedure

Before youths started filling out the questionnaires, a juvenile detention centre employee explained the procedure. This instruction included that the youth should tell the employee if he did not understand items or words in the questionnaires. When an adolescent could not read well enough, the questionnaires were read to him. Furthermore, youths were informed that information derived from the questionnaires would be evaluated by a mental health professional from the detention centre. Adolescents who did not speak Dutch were not tested ($N = 11$). The youths completed the instruments on a computer. The mean time from admission to screening was 2.5 working days. Almost all adolescents (96%) were tested within 7 working days after admission. When they refused to cooperate with mental health screening ($N = 22$), there were no consequences for their judicial status or stay in the juvenile detention centre.

According to the applicable Dutch law, informed consent is not required when institutions study aggregated, anonymized data, derived as part of their own clinical assessment. Therefore, informed consent from youths and – for youths younger than 18 – parent(s)/caretakers was not obtained. The involved institutional and scientific boards approved this study and the procedure. Furthermore, the Medical Ethical Review Board of the Leiden University Medical Centre certified that the current study was conducted in agreement with Dutch laws and regulations for behavioral research.

Statistical Analyses

Descriptive statistics of psychopathic-like traits (YPI-S total and dimension scores) and variables of interest were determined and to rule out any differences based on cultural background, means were compared using ANOVA. Next, analyses were conducted in two steps. First, a series of Pearson correlations was conducted to examine associations between variables of interest and psychopathic-like traits (YPI-S total and YPI-S dimension scores). For each YPI-S dimension score also partial correlations were performed, to correct for the influence of the scores on the other two dimensions. Second, to study unique relations and correct for the fact that many boys have multiple mental health issues, multivariate linear regression procedures were performed, using the backward elimination procedure. The YPI-S total and dimension scores were used as dependent variables, with the variables of interest as independents. In this variable selection procedure all variables are entered into the equation and then the variables with the smallest partial correlation are sequentially removed. The procedure continues until only variables with a significance level of $p < .05$ remain. The SDQ subscale *emotional symptoms* was not

included in this analyses, because of conceptual overlap with MAYSI-2 subscale *depressed/anxious feelings,* which was specifically developed for detained youths. Finally, to rule out that cultural background influenced associations, we reran the multivariate regression analyses, this time including a dummy variable for each background group as extra independents. Statistical analyses were performed using SPSS 20.0.

Results

Descriptives

Psychopathic-like traits were comparable across cultural background groups, except that Moroccan-Dutch boys scored lower on the behavioral dimension than Dutch boys. Moroccan-Dutch boys also scored lower than Dutch boys and some other groups on substance abuse, hyperactivity, anger/irritability, depressed-anxious feelings and higher on prosocial behavior (Table 1).

Psychopathic-like traits and dimensions: correlations with variables of interest

The YPI-S total score was positively related with substance abuse, conduct problems, hyperactivity, anger/irritability, depressed/anxious feelings and emotional symptoms, and showed a negative association with prosocial behavior (Table 2). Each of the three YPI-S dimensions – interpersonal, affective and behavioral – was significantly positive related with anger/irritability and conduct problems (corrected for the other two dimensions). The interpersonal dimension was positively related with substance abuse and depressed/anxious feelings, but not with any of the other variables of interest. The affective dimension was positively related with suicidal ideation and peer problems, and negatively with prosocial behavior. The behavioral dimension was the only dimension that was positively related with all externalizing problems (substance abuse, conduct problems, hyperactivity and anger/irritability). In addition, the behavioral dimension was positively related with depressed/anxious feelings, emotional symptoms, somatic complaints and negatively with prosocial behavior.

Psychopathic-like traits and dimensions: unique relations with variables of interest

Results of the multivariate analyses with backward selection of variables are presented in table 3. Results of the analyses controlled for cultural background are not presented, as they yielded substantially similar results (available on request from first author). The YPI-S total score was positively related with substance abuse, conduct problems, hyperactivity and anger/irritability, and unrelated with depressed/anxious feelings, somatic complaints, suicidal ideation, peer problems and prosocial behavior. The dimensions differed in their relations with the variables of interest: not one variable of interest was related with all three YPI-S dimensions. Notably, the affective dimension was the only dimension that was related negatively with prosocial behavior,

positively with anger/irritability, and unrelated with substance abuse and conduct problems. Furthermore, the interpersonal dimension was the only dimension with a positive relation with depressed/anxious feelings and a negative relation with suicidal ideation. Finally, the behavioral dimension was the only dimension related positively with hyperactivity.

Table 1. Means (SDs) by cultural background

	Total (*N* = 365)	**Dutch (*N* = 82)**	**Moroccan (*N* = 88)**	**Antillean (*N* = 47)**	**Turkish (*N* = 18)**	**Surinamese (*N* = 49)**	**Other (*N* = 81)**	**Differences**
YPI-S total score (Y)	1.7 (0.4)	1.7 (0.4)	1.6 (0.4)	1.7 (0.4)	1.6 (0.4)	1.7 (0.4)	1.7 (0.4)	–
Interpersonal Dimension (Y)	1.5 (0.5)	1.5 (0.5)	1.5 (0.5)	1.5 (0.5)	1.5 (0.6)	1.5 (0.5)	1.6 (0.5)	–
Affective Dimension (Y)	1.6 (0.5)	1.6 (0.5)	1.6 (0.5)	1.7 (0.6)	1.6 (0.5)	1.7 (0.5)	1.6 (0.5)	–
Behavioral Dimension (Y)	1.9 (0.5)	2.1 (0.5)	1.7 (0.5)	1.8 (0.6)	1.8 (0.5)	2.0 (0.6)	1.9 (0.5)	M<D,S
Substance abuse (M)	1.4 (2.1)	2.4 (2.6)	0.5 (1.3)	1.5 (2.1)	1.2 (2.2)	1.5 (2.1)	1.2 (1.9)	D>M,O
Conduct Problems (S)	2.2 (1.7)	2.1 (1.6)	2.0 (1.6)	2.3 (1.7)	2.1 (1.5)	2.3 (1.9)	2.2 (1.7)	–
Hyperactivity (S)	3.1 (2.4)	4.3 (2.4)	2.1 (2.2)	3.0 (2.1)	3.3 (2.6)	3.1 (2.2)	3.2 (2.4)	D>M,A,O M<O
Anger/ irritability (M)	2.1 (2.1)	2.7 (2.4)	1.2 (1.6)	2.4 (1.7)	1.9 (2.3)	1.9 (2.1)	2.4 (2.2)	M<D,A,O
Depressed/ Anxious (M)	1.2 (1.5)	1.4 (1.4)	0.6 (1.0)	1.2 (1.4)	1.4 (2.1)	1.4 (1.5)	1.5 (2.0)	M<D,O
Somatic Complaints (M)	1.7 (1.5)	1.9 (1.4)	1.5 (1.5)	1.4 (1.3)	1.4 (1.7)	1.7 (1.4)	2.0 (1.6)	–
Suicidal Ideation (M)	0.2 (0.8)	0.3 (0.9)	0.1 (0.3)	0.2 (0.9)	0.2 (0.4)	0.2 (0.8)	0.3 (0.9)	–
Peer Problems (S)	2.3 (1.5)	2.2 (1.7)	2.2 (1.3)	2.7 (1.6)	2.3 (1.7)	2.3 (1.5)	2.2 (1.3)	–
Prosocial Behavior (S)	8.0 (1.8)	7.8 (1.8)	8.6 (1.6)	7.4 (2.1)	7.6 (1.9)	7.9 (1.5)	8.0 (1.7)	M>D,A

Note. Y= Youth Psychopathic traits Inventory – Short version; M= Massachusetts Youth Screening Instrument Second Version; S= Strengths and Difficulties Questionnaire.

Table 2. Psychopathic-like Traits and Dimensions: Correlations With Variables of Interest

	Total score (Y)	Interpersonal Dimension (Y)		Affective Dimension (Y)		Behavioral Dimension (Y)	
		Zero order	Partial[a]	Zero order	Partial[a]	Zero order	Partial[a]
Interpersonal Dimension (Y)	0.78**	1	1	0.44***	0.36**	0.39***	0.29**
Affective Dimension (Y)	0.76**	_	_	1	1	0.33***	0.19**
Behavioral Dimension (Y)	0.76**	_	_	_	_	1	1
Substance abuse (M)	0.36***	0.29***	0.16**	0.17**	0.00	0.37***	0.28***
Conduct problems (S)	0.49***	0.39***	0.20***	0.33***	0.15**	0.41***	0.28***
Hyperactivity (S)	0.50***	0.25***	-0.02	0.27***	0.10	0.60***	0.55***
Anger/irritability (M)	0.52***	0.39***	0.19***	0.36***	0.18**	0.44***	0.31***
Depressed/anxious feelings (M)	0.28***	0.24***	0.13*	0.20***	0.08	0.21***	0.12*
Emotional symptoms (S)	0.27***	0.19***	0.06	0.20***	0.10	0.24***	0.16**
Somatic complaints (M)	0.11*	0.05	-0.02	0.04	-0.01	0.17**	0.16**
Suicidal ideation (M)	0.09	0.01	-0.06	0.13*	0.13*	0.07	0.04
Peer problems (S)	0.12*	0.08	0.01	0.14**	0.12*	0.03	0.01
Prosocial behavior (S)	-0.22***	-0.13*	-0.02	-0.19***	-0.13*	-0.19***	-0.12*

Note. Y= Youth Psychopathic traits Inventory – Short version; M= Massachusetts Youth Screening Instrument Second Version ; S= Strengths and Difficulties Questionnaire.

[a] For each YPI-S dimension score partial correlations were performed to correct for the influence of the scores on the other two dimensions.

*** $p < .001$; ** $p < .01$; * $p < .05$ (all two-tailed).

Table 3. Unique Relations of YPI-S Total Score and Dimension Scores with Variables of Interest[a]

	Psychopathic-like traits total score (Y)	Interpersonal Dimension (Y)	Affective Dimension (Y)	Behavioral Dimension (Y)
Substance abuse (M)	0.13**	0.10*	–	0.17***
Conduct problems (S)	0.24***	0.18***	–	0.11*
Hyperactivity (S)	0.28***	–	–	0.47***
Anger/irritability (M)	0.21***	–	0.14*	–
Depressed/anxious feelings (M)	–	0.15**	–	–
Somatic complaints (M)	–	–	–	–
Suicidal ideation (M)	–	–0.14**	–	–
Peer problems (S)	–	–	–	–
Prosocial behavior (S)	–	–	–0.11*	–
Interpersonal Dimension (Y)	NA	NA	0.32***	0.18***
Affective Dimension (Y)	NA	0.30***	NA	–
Behavioral Dimension (Y)	NA	0.16**	0.11*	NA

Note. NA: Not Applicable; Y= Youth Psychopathic traits Inventory – Short version; M= Massachusetts Youth Screening Instrument Second Version ; S= Strengths and Difficulties Questionnaire.

[a] Standardized coefficients ß after multivariate linear regression analyses with backward elimination of variables.

*** $p < .001$; ** $p < .01$; * $p < .05$ (all two-tailed).

Discussion

While self-report is often used in detained adolescents, the usefulness in clinical practice of self-report measures that tap psychopathic-like traits is uncertain (Lilienfeld & Fowler, 2007; Vaughn & Howard, 2005). One of the grounds for this doubt is that detainees have reasons to give a good impression, especially when confidentiality is not guaranteed (Rogers et al., 2002). Therefore, using data from a large group of detained male adolescents, we studied the usefulness of psychopathic-like traits self-report outside a research context. We did this by comparing relations with variables of interest to associations reported in literature. By doing so, we addressed an important issue that has been raised by several researchers (Edens et al., 2001; Ray et al., 2012; Vaughn & Howard, 2005). In accordance with other studies (P. J. Frick et al., 2000; Poythress et al., 2006; Salekin et al., 2004) that did guarantee confidentiality to participants, self-reported psychopathic-like traits were associated with conduct problems, but also with related constructs such as substance abuse, anger/irritability and hyperactivity. In addition we found that specific dimensions of psychopathic-like traits showed unique relations to variables of interest, a finding that also converges with previous studies (Colins et al., 2012; Poythress et al., 2006). Conforming to previous research, Moroccan-Dutch boys scored lower on mental health issues, and this did not influence associations (Veen et al., 2011). Future research on data

gathered in the context of clinical care is warranted to see whether these results can be replicated in other samples. Given that limited support was found for using the Child Psychopathy Scale (Lynam, 1997) outside a research context (Verschuere et al., 2012) and because various self-report measures of psychopathic traits often poorly overlap (Cauffman, Kimonis, Dmitrieva, & Monahan, 2009), studies using different measures are necessary as well.

These findings embody the first evidence for the clinical usefulness of self-reported psychopathic-like traits in detained male adolescents. Developed and validated in general population samples (Colins et al., 2012; van Baardewijk et al., 2010) and recently validated in female detainees (Colinset al., 2014), the current study indicates that the YPI-S can be used as a screening instrument in male detainees. Short instruments such as the YPI-S (18 items) increase the possibility for clinical utilization of psychopathic-like traits self-report, as they make large scale administration feasible. Future research may wish to examine the extent to which a high total YPI-S score predicts a high score on an expert-rater based measure that is often used in forensic research and settings, i.e. the PCL:YV. An acceptable correspondence between both measures would support the implementation of an efficient stepped assessment procedure. In such a procedure high self-reported psychopathic-like traits can be an indicator for who should be assessed more elaborately with the PCL-YV. Yet, as has been demonstrated in previous studies, self-report measures often are poorly correlated to the PCL:YV (Cauffman et al., 2009), suggesting that enthusiasm for such a stepped assessment procedure must be tempered.

A striking finding was that each dimension of psychopathic-like traits showed unique associations with psychopathic-like traits-related concepts. An interesting example of these unique associations are the interpersonal dimension's positive relation with depressed/anxious feelings and negative relation with suicidal ideation. Although a positive relation between interpersonal traits and depression/anxiety has been found before (Poythress et al., 2006; Veen et al., 2011), the diverging relation with suicidal ideation is a novel finding that warrants replication. The one study we know of that investigated both these associations, using the PCL-YV in detained adolescents (Sevecke et al., 2009), did not find any of these relations. A possible explanation may be that interpersonal traits imply an extra vulnerability to – narcissistic – emotional injury as a reaction to detention, causing elevated anxiety and depression. At the same time interpersonal traits have been found earlier to buffer adult offenders to suicidal ideation (Douglas et al., 2008). Another unique association we found, was the behavioral dimension's strong relatedness with hyperactivity, which is in line with what this dimension is intended to measure: impulsive-irresponsible traits (Andershed et al., 2002).

In contrast with the interpersonal and the behavioral dimension, the affective dimension was unrelated to variables tapping behavioral deviance, like conduct problems, substance abuse and hyperactivity. This unrelatedness of the affective dimension with externalizing behavior is a well-known finding, although a high level of affective traits does seem to characterize a group with a more severe and stable pattern of antisocial behavior (P. J. Frick & White, 2008).

In addition, the affective dimension was the only dimension uniquely related with prosocial behavior, which indicates that this dimension specifically captures the social interaction deficits associated with psychopathic-like traits. An interesting topic for research will be to what extent YPI-S dimension scores predict future psychopathy and recidivism over and above past criminal behavior. In addition it should be studied whether the YPI-S affective dimension can help to identify adolescents fulfilling the criteria of the Diagnostical and Statiscal Manual-V specifier for conduct disorder with callous-unemotional traits. Three of the four specifier-criteria are covered by the YPI-S, but the lack of an item on the criterion 'unconcerned about performance' may form a limitation (Colins et al., 2014).

The current findings should be interpreted in the context of some limitations. First, the sole reliance on self-report measures may have inflated the strength of the relations that were found. Future studies should consider including expert- or other informant-based measures as well in the assessment of psychopathic-like traits and mental health. However, a recent study comparing informant and self-rated psychopathic-like traits found little influence of shared method variance on the size of relations of psychopathic-like traits scores with variables of interest (Jones & Miller, 2012). Second, although the current findings indicate that psychopathic-like traits self-report is reliable, we cannot exclude the possibility that some youths have underreported. Unfortunately, we could not control for social desirability, as this was not part of the routine assessment in the participating juvenile detention centres. Encouragingly, a meta-analysis including studies in adult, detained and general populations, indicated that the influence of positive response bias on self-reported psychopathic-like traits is small (Ray et al., 2012). Third, the current study was cross-sectional, and therefore did not allow to establish causal relations between psychopathic-like traits and variables of interest. Longitudinal studies with repeated measurements of psychopathic-like traits and variables of interest are needed (Sevecke & Kosson, 2010). Fourth, the participating juvenile detention centres admitted males only. Consequently, results cannot be generalized to detained female adolescents. Fifth, to tease out the exact influence of (lacking) confidentiality, half of participants should be offered confidentiality and the other half not. However this was not possible because we used data generated as part of routine intake procedures. We were only able to test whether relations of psychopathic-like traits with other variables conform to expectations, *given* a lack of confidentiality.

Notwithstanding these limitations, the current study showed that self-reported psychopathic-like traits show expected relations with relevant variables, even when confidentiality is not guaranteed. Further confirming the reliability, validity and predictive utility of psychopathic-like traits self-report instruments in clinical practice, will promote research into an efficient psychopathic-like traits assessment procedure. Ultimately, this can help clinicians use the little time they have to focus their preventative efforts on those who pose the largest risk of becoming an adult psychopath.

Appendix. YPI-S-items

1. I have probably skipped school or work more than most other people.
2. I consider myself as a pretty impulsive person.
3. I think that crying is a sign of weakness, even if no one sees you.
4. I have the ability to con people by using my charm and smile.
5. I am good at getting people to believe in me when I make something up.
6. When other people have problems, it is often their own fault, therefore, one should not help them.
7. It often happens that I talk first and think later.
8. I have talents that go far beyond other people's.
9. It's easy for me to manipulate people.
10. To be nervous and worried is a sign of weakness.
11. I get bored quickly by doing the same thing over and over.
12. It often happens that I do things without thinking ahead.
13. It has happened several times that I've borrowed something and then lost it.
14. When I need to, I use my smile and my charm to use others.
15. I don't understand how people can be touched enough to cry by looking at things on TV or movie.
16. I am destined to become a well-known, important and influential person.
17. To feel guilty and remorseful about things you have done that have hurt other people is a sign of weakness.
18. I don't let my feelings affect me as much as other people's feelings seem to affect them.

Chapter 6

Neural correlates of social decision-making in severely antisocial adolescents

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Abstract

Neurobiological and behavioral findings suggest that the development of delinquent behavior is associated with atypical social-affective processing. However, to date, no study has examined neural processes associated with social interactions in severely antisocial adolescents. In this study we investigated the behavioral and neural processes underlying social interactions of juvenile delinquents and a matched control group. Participants played the mini-Ultimatum Game as a responder while in the MRI scanner. Participants rejected unfair offers significantly less when the other player had "no alternative" compared to a "fair" alternative, suggesting that they took the intentions of the other player into account. However, this effect was reduced in the juvenile delinquents. The neuroimaging results revealed that juvenile delinquents showed less activation in the temporal parietal junction (TPJ) and inferior frontal gyrus (IFG). However, the groups showed similar activation levels in the dorsal anterior cingulate cortex (dACC) and the right anterior insula (AI) when norms were violated. These results indicate that juvenile delinquents with severe antisocial behavior process norm violations adequately, but may have difficulties with attending spontaneously to all relevant features of the social context during interactions.

Background

During adolescence there is a steep increase in antisocial behavior, some studies reporting a peak of 10 fold the base rate of delinquent behavior in children, followed by a decline that starts around emerging adulthood (Moffit, 1993; Moffit & Scott, 2009). Adolescent antisocial behavior generates large costs to society: juvenile delinquents not only inflict serious physical and psychological harm on others, but also greatly increase the risk for negative outcomes for themselves (Loeber et al., 2000, 2009). Furthermore, severely antisocial behavior in adolescence is associated with increases in risk for negative outcomes later in life, such as academic failure, peer rejection and career criminality (Patterson et al., 1989; Maughan & Rutter, 2001).

A number of studies have suggested that severely antisocial behavior is the result of atypical social information processing (Crick & Dodge, 1994; Happe & Frith, 1996). The social information processing (SIP) model suggests that atypical processing of social information, either during encoding or action selection, may lead to aberrant behavior. One example is the tendency to attribute hostile intentions to ambiguous social cues, which may lead to inappropriately aggressive responses (Dodge & Frame, 1982; Graham et al., 1992). Another set of studies has reported a relation between severely antisocial behavior in adolescence and inferring the affective state of others (Fairchild et al., 2009; Sharp, 2008; Sebastian et al., 2012, 2013; Jones et al., 2010; Schwenck et al., 2011). In addition, several brain imaging studies on clinical and non-clinical adolescent populations suggest that juvenile antisocial behavior may be related to reduced affective sensitivity or problems with emotion regulation (Sterzer et al., 2005, 2007; Herpetz et al., 2008; Marsh & Blair, 2008; Passamonti et al., 2010).

A major limitation of most current studies on antisocial behavior is that they are mainly based on passive (viewing) tasks, and explicit self-report of cognitive processes (Dodge, 2010; but see White et al., 2013). It is possible that different cognitive processes are involved in real social interactions. For instance, it is well known that adolescents do not differ from adults in explicit risk perception, but take more risks in real life situations (Steinberg, 2010). In addition, the relation between atypical social-affective processes and both antisocial behavior and callous and unemotional (CU) traits has largely been investigated in community samples. This relationship may be different for participants displaying antisocial behavior at the extremely severe end of the spectrum, such as juvenile delinquents. Thus, the aim of the current study is to further elucidate the neural processes underlying social interactions of severely antisocial adolescents using an ecologically valid social interaction paradigm.

In the past decade the use of economic games in combination with neuroimaging emerged as fruitful method for investigating the neural correlates of social cognitive processes underlying real social interactions in both normative (Graham et al., 1992) and clinical populations (Kishida et al., 2010). The advantage of these games is that their structural simplicity yields precise characterizations of complex social behavior, which enables researchers to delineate specific steps in social information processing. Previous fMRI studies with healthy adults suggest that,

in social interactions, the affective response related to the detection of violations of social norms is associated with activation in the anterior insula (AI) and the dorsal anterior cingulate cortex (dACC) (Montague & Lohrenz, 2007; Sanfey et al., 2003; Sanfey 2007). Furthermore, the understanding of intentions and thinking about others has been associated with temporo-parietal junction (TPJ) and the medial prefrontal cortex (mPFC) (Decety et al., 2009; Güroğlu et al., 2010). Finally, the regulation of behavior and selection of appropriate responses has been associated with the lateral prefrontal cortex (LPFC; Sanfey et al., 2003; Knoch et al., 2006).

For the current study, we recruited male adolescents showing severely antisocial behavior from forensic institutions, and age, gender and IQ matched control participants. The participants played the mini-Ultimatum Game (see Figure 1) while being scanned in a magnetic resonance imaging (MRI) scanner. The mini-Ultimatum Game is a two-choice modified version of the Ultimatum Game (Güth et al., 1982) aimed at elucidating the role of intentions in fairness considerations. It has been shown that assessment of fairness is strongly modulated by the ascription of intentions: people react less negatively to unfair offers when they feel the inequity was unintentional (Blount, 1995; Güroğlu et al., 2009; 2010; 2011).

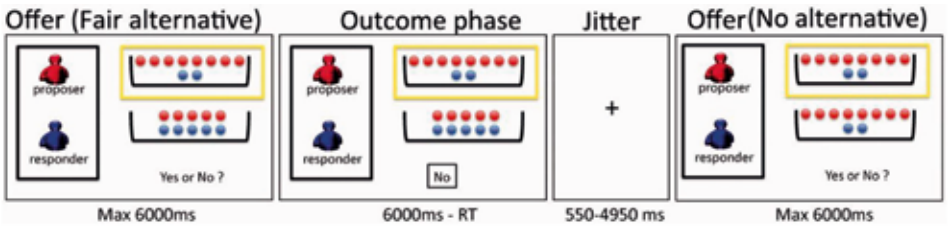

Figure 1. Visual display of events presented in the mini Ultimatum Game. Trials started with a jittered fixation screen lasting 550-4950 ms. The left panel in the decision screen displayed the name of the proposer in red (here 'proposer') and the name of the responder (here 'responder'). Two offers each containing red and blue coins indicate the share for the proposer (red coins) and the responder (blue coins), the offer made by the proposer was encircled in yellow (here 8/2). The responder was given a maximum response time of 5000ms to select Yes or No to accept or reject the offer. If they failed to respond within 5000 ms, a screen displaying 'Too late!' was presented for 1000 ms. Upon response, the feedback screen displayed the given response (here 'No') until 6000ms after the start of the trial. Trials were randomized and presented with a jittered interstimulus interval (mean = 1530 s, min = 550 ms, max = 4950 ms; optimized with OptSeq2, (surfer.nmr.mgh.harvard.edu/optseq/). Both the "fair alternative" and "no alternative" condition are displayed.

During the scanning session we set out to investigate the behavioral and neural responses to unfair offers. Based on previous studies we expected that participants would reject unfair offers

more often when the alternative was fair, compared to when the alternative was also unfair (i.e., "no alternative"), indicating they take the intentions of the proposer into account (Falk et al., 2008; Güroğlu et al., 2009; 2010; 2011). We expected that juvenile delinquents deviate in behavior particularly in the "no alternative" condition, when the intentions of the proposer are ambiguous. Our imaging analyses were aimed at exploring group differences in neural activity in the brain regions associated with the processes underlying fairness considerations.

Finally, recent studies have also highlighted that antisocial youth represents a very heterogeneous group (Sebastian et al., 2012; Viding et al., 2012). One approach to capture the heterogeneity associated with antisocial behavior has been to map callous and unemotional (CU) traits (for review see Viding et al., 2012). Thus, to take into account the heterogeneity of the delinquent group we explored the relation between brain activity, behavior and CU traits in the delinquent group.

Methods

Participants

Thirty-four male participants aged 15 to 21 years took part in the study, consisting of a group of juvenile delinquents showing severely antisocial behavior ($N = 17$) and an age and IQ matched control group ($N = 17$). The juvenile delinquents were selected from a juvenile detention center ($N = 7$), and a forensic treatment center ($N = 10$).

Criteria for inclusion for the juvenile delinquents were at least one account of violent behavior and/or multiple accounts of non-violent behavior (see supplement for full description on assessment of antisocial behavior of both groups). Further, participants had to be right-handed, were required to have a full IQ of 80 or higher and the ability to speak Dutch at primary school level. Reason for exclusion was current use of psychotropic medications that could not be stopped for the scanning session. All participants from the control group were healthy and right-handed volunteers who reported no neurological or psychiatric impairments. The control group was matched for mean age and IQ (for more details on assessment and matching procedures see supplement).

All participants provided informed consent (parents provided consent for participants younger than 18 years), and all procedures were approved by the medical ethical committee of the Leiden University Medical Center. A radiologist reviewed all anatomical scans; no anomalies were found.

Task description

Participants played the role of the responder in the mini-Ultimatum Game. This is a two-choice Ultimatum Game where one unfair offer is presented together with an alternative offer. This modification of the Ultimatum Game includes experimental manipulations that enable us to

study intention considerations. There were three conditions that were labeled depending on the alternative offer pitted against a fixed unfair 8/2 offer: 1) 5/5 offer (fair alternative), 2) 8/2 offer (no alternative), and 3) 2/8 offer (hyperfair alternative).

Before the scanning session participants practiced the task on a computer until they fully understood it and subsequently they played 168 trials in the scanner. In these 168 trials participants received 126 unfair offers and 42 fair offers (filler trials). The unfair offers were divided over the three conditions (42 fair alternative, 42 no alternative and 42 hyperfair alternative).

The trials were presented in three blocks of 56 trials lasting 8.3 minutes each. For the purposes of our study the analyses are focused on unfair offers, where we made the comparison of unfair offers in the context of fair alternatives and no alternatives. The hyperfair alternatives were not included in the analyses.

Each trial was played with a different age and gender matched anonymous proposer to avoid reputation effects. Participants were explained that the offers of the proposers had been obtained in an earlier part of the study. They were also explained that at the end of the session the computer would randomly select ten trials to determine their total earnings, which would be added to the standard compensation for their participation (cf. Güroğlu et al., 2011). Furthermore, participants were told that the proposers' earnings would be contingent upon their decisions. In reality, the offers presented to the participants were computer simulated, but were based on behavior reported in prior experiments (Güroğlu et al., 2010). None of the participants expressed doubt about the set up of the task. The control group was debriefed directly after the experiment. In order to prevent participants recruited from the detention and treatment centers from informing each other about the true set up, they were not immediately debriefed.

Participants were given a variable reward between 3.50 and 5.50 euros. The standard compensation for participating was 20 euros, except for detainees, for whom payment was limited by government regulations. Detained participants were provided with 10 euros in telephone cards, which was considered a fitting and attractive incentive by the institution psychologists. The reason for using different pay offs was practical, but prior results showed that rejection rates on the Ultimatum Game are relatively robust against variations in magnitude of payment (Falk et al., 2008; Amir et al., 2012).

MRI data acquisition

The scanning session was carried out at the Leiden University Medical Center using a 3.0T Philips Achieva. The scanning sessions consisted of three types of scans in the following order: (i) localizer scan, (ii) T2*-weighted echo-planar imaging (EPI) sequence measuring the bold-oxygen-level-dependent (BOLD) signal (TR= 2.2 sec, TE= 30ms, slice-matrix= 80 x 80, slice-thickness= 2.75mm, slice gap= 0.28mm gap, field of view (FOV)= 220 mm), (iii) high-resolution T1-weighted anatomical scan. The groups did not show difference in mean head displacement

during the scanning session (F (1, 32) < 1, p = .82), and none of the participants showed a displacement that was larger than the maximum allowed threshold of 3mm.

MRI data analysis

SPM5 software (www.fil.ion.ucl.ac.uk/spm/) was used for image preprocessing and analyses. Slice-time correction, realignment, spatial normalization to EPI templates, and spatial smoothing using a 6mm full-width half-maximum 3D Gaussian kernel were carried out. The functional time series were modeled by a series of events convolved with a canonical haemodynamic response function (HRF). The moment of stimulus presentation with null duration was used to model the data. The unfair offers (8/2 offers) were modeled separately based on context (2 levels: fair- or no alternative) and response (2 levels: accept or reject). For the purposes of the current experiment the unfair trials with a hyperfair alternative and the fair offer trials (filler trials) were modeled as events of no interest. Contrast images for each individual were used in the second-level random effects model to run full-factorial analysis of variance and one-tailed post hoc t-tests. We conducted regression analyses to test for brain-behavior relations. For whole brain analyses a significance threshold of $p < 0.05$ FWE corrected for multiple comparisons was calculated with AlphaSim, resulting in an uncorrected threshold of $p < 0.001$, requiring a minimum of 24 voxels in a cluster (Forman et al., 1995). By iterating the process of random image generation, spatial correlation of voxels, thresholding and cluster identification, the program provides an estimate of the overall significance level achieved for various combinations of individual voxel probability threshold and cluster size threshold that is equal to a FWE corrected threshold of $p < .05$ (Forman et al., 1995; Poline et al., 1997 and see Bennet et al., 2009 for comparison other methods).

ROIs analyses were based on functional masks of the group level whole brain choice contrast, based on all participants. For these analyses mean parameter estimates were extracted for each ROI for each individual. Effects were considered significant at an α of 0.0083, based on Bonferroni correction for multiple comparisons. The multiple comparisons were based on 6 ROIs which were based on the general contrast 'accept unfair offer' versus 'reject unfair offer', p = 0.05/6 ROIs (rTPJ, rIFG, dACC, Posterior Cingulate Cortex (PCC), anterior insula & ventral striatum). For the ROI analyses we performed additional robust regression analyses with the Huber weighting function to account for possible effects driven by outliers. Given that these analyses did not change the results (all significant results meet $p < .0083$ threshold) we have decided to report the results of the linear correlation analyses. Results are reported in the MNI305 stereotaxic space.

Results

Rejection Rates

Given that free choice patterns are not normally distributed, non-parametric tests were used. The analysis of behavioral responses to unfair offers revealed that participants rejected unfair offers more often in the "fair alternative" condition (Median= 88%) compared to the "no alternative" condition (Median= 52%, Wilcoxon signed rank test, $p < .0001$, see Figure 2A; left panel). To test for group differences we computed difference scores in rejection rates between the "fair alternative" and "no alternative" condition. As can be seen in Figure 2A (right panel), the juvenile delinquents showed a smaller difference between the "fair alternative" and "no alternative" condition than the control group (Kruskal–Wallis test non-normality of the data, $H_{(1)}= 6.13$, $p < .04$). Post-hoc test revealed that the behavioral difference was driven by significantly higher rejection rates in the "no alternative" condition in juvenile delinquents (Kruskal–Wallis test, $H_{(1)}= 7.41$, $p < .02$), whereas there was no group difference in the "fair alternative" condition (Kruskal–Wallis test, $H_{(1)}= 3.6$, $p = .24$).

fMRI results

To identify the brain regions involved in deciding to accept or reject unfair offers we performed whole brain contrasts [$accept_{unfair}$ vs. $reject_{unfair}$] across both experimental conditions. For all participants, accepting unfair offers was associated with increased activity in the right IFG, right TPJ, bilateral ventral striatum, posterior cingulate cortex (PCC) and the network comprising the dACC and anterior insula (see Table 1 and Figure 2B). No areas were more active when rejecting compared to accepting unfair offers. The areas that showed increased activity were used as ROIs in subsequent analyses. Finally, we have compared the results of the whole brain contrast [accept>reject] between groups to investigate whether there were brain areas that were engaged in one group but not the other. None of these contrasts ($Delinquent_{[accept>reject]}$ - $Control_{[accept>reject]}$ and $Delinquent_{[reject>accept]}$- $Control_{[reject>accept]}$) revealed any significant activation differences, even at the more liberal threshold of $p < .005$ uncorrected. This result suggests that both groups rely on the same general network of brain areas when deciding whether to accept or reject the ultimatum game offers.

Region of Interest analyses

To further investigate the effect of the experimental conditions and groups on activity in the ROIs identified in the whole brain contrast, we conducted 2 x 2 x 2 ANOVAs with response (accept and reject) and condition ("fair alternative" and "no alternative") as the within subject factors, and group (juvenile delinquents and controls) as the between subjects factor. These analyses did not yield a three-way interaction for any ROI, but there were group x condition interactions in the rTPJ ($F_{(1, 24)}= 6.72$, $p < 0.006$) and the rIFG ($F_{(1, 26)}= 7.73$, $p < 0.005$), and condition x response interactions in the dACC ($F_{(1, 26)}= 6.18$, $p < 0.002$) and anterior insula

($F_{(1, 26)}$= 3.83, p < 0.007). No interactions with group or condition were found in the PCC and bilateral ventral striatum.

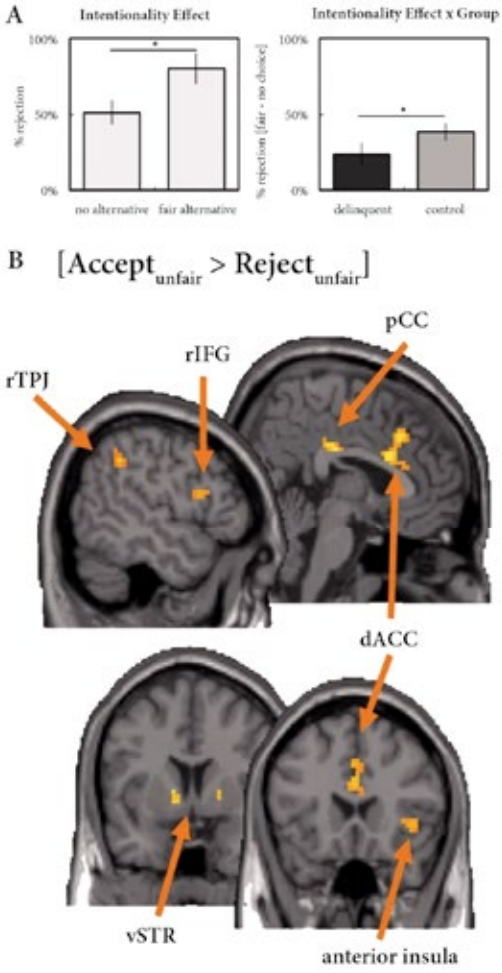

Figure 2. (A) Display of means and standard errors of rejection rates of unfair offers in the 'fair alternative' and 'no alternative' conditions collapsed over groups, and difference scores (fair alternative–no alternative) in rejection rates for each group separately. (B) Network of brain regions that was more active for accepting than rejecting unfair offers: (rTPJ: right temporal parietal junction [54, -45, 41], rIFG: right inferior frontal gyrus [54, 12, 18], dACC: dorsal anterior cingulate cortex [3, 18, 27], PCC [0, -33, 30], anterior insula: anterior insula [36, 15, 19], Vstr: bilateral ventral striatum [14, 9, -4] and [-12, 9, -4]. Cluster corrected threshold: P < 0.001 and k > 24 voxels.

Table 1. Brain Regions revealed by whole brain contrast Accept Unfair offer – Reject Unfair offer

Anatomical region	L/R	Z	MNI coordinates		
			x	y	z
Acceptunfair > Rejectunfair					
TPJ	R	5.61	54	-45	41
IFG	R	4.88	54	12	18
anterior insula	R	4.51	45	37	21
dACC	R	4.60	57	-48	27
PCC	R	4.55	54	-57	39
Ventral Striatum*					
	R	4.36	12	7	-5
	L	4.36	-17	9	-2

MNI coordinators for main effects, peak voxels reported at $p < .001$, at least 24 contiguous voxels. *Striatal ROIs < 16 voxels, collapsed to one ROI in analyses.

To further explore the group x condition interactions in brain activity, we performed post-hoc analyses of activity patterns in the rTPJ and rIFG ROIs. These analyses revealed that the control group showed increased rTPJ activity in the "no alternative" condition relative to the juvenile delinquents ($F_{(1, 24)}$= 11.01, $p < 0.002$, Figure 3A), whereas the groups did not differ in activation in the "fair alternative" condition ($F_{(1, 24)}< 1$, $p = 0.53$).

In contrast, there was increased activity in the rIFG in the "fair alternative" condition for the control group compared to the juvenile delinquents ($F_{(1, 26)}$= 6.15, $p < 0.001$, Figure 3B), whereas there was no difference in activity in the "no alternative" condition ($F_{(1, 26)}< 1$, $p = 0.63$). Taken together, these results suggest that the rIFG and rTPJ are both more active for control participants than for the juvenile delinquents, but this difference was dependent on the context of the unfair offer (intention consideration vs. fairness judgments). These separate patterns were confirmed statistically by a significant three-way interaction between condition × group × region ($F_{(1, 32)}$= 29.19, $p < 0.001$).

Finally, we examined the condition x response interaction in the dACC and anterior insula. These post hoc analyses showed that the activation in both the dACC and right anterior insula were higher for accepting than rejecting unfair offers in the "fair alternative" condition (dACC: $t_{(1,33)}$= 2.89, $p < 0.008$; anterior insula: $t_{(1,33)}$= 3.43, $p < 0.002$; see Figure 4). In contrast, activation in the anterior insula was higher for rejecting than accepting unfair offers in the "no alternative" condition ($t_{(1,26)}$= -2.71, $p < 0.01$). Consistent with previous studies these results suggest that, in the context of the mini Ultimatum Game, the dACC and anterior insula are associated with the detection of personal norm violations (e.g. accepting an unfair offer when the proposer had a fair alternative (Montague & Lohrenz, 2007; van den Bos et al., 2009; Guroglu et al., 2010).

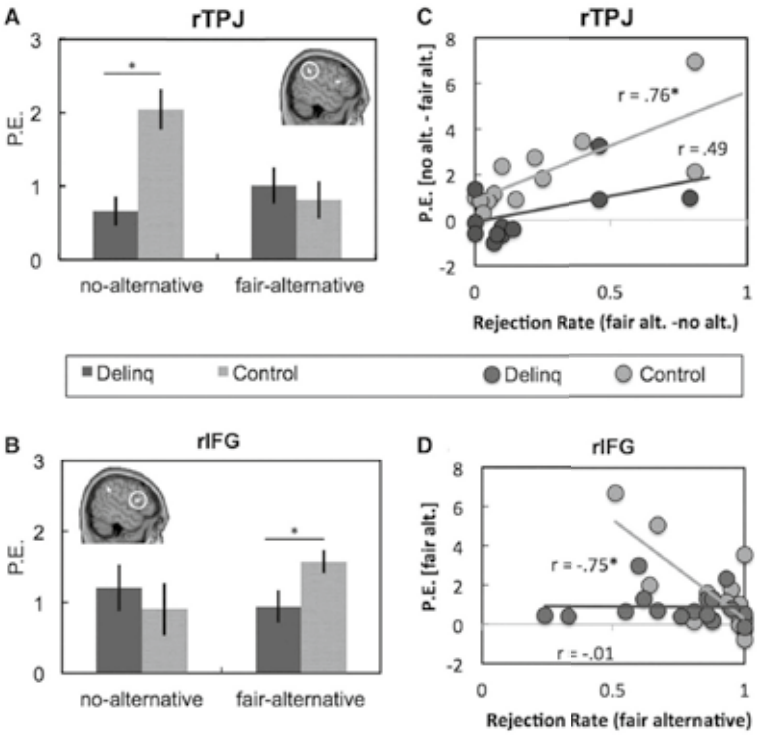

Figure 3. Contrast values in (A) right TPJ and (B) right IFG for juvenile delinquent and control participants in the "fair alternative" and "no alternative" conditions. (C) Activation in the right TPJ for the [no alternative – fair alternative] contrast correlated positively with the difference scores [fair alternative – no alternative] in rejection rates for the control group, but not for the juvenile delinquents. (D) Activation in the right IFG in the [fair alternative-fixation] condition correlated positively with the rejection rates in the fair condition for the control group, but not significantly for the juvenile delinquents. ROI results are considered significant at a Bonferroni corrected α of $p < .008$.

Brain-Behavior correlations

Given that the rTPJ and rIFG were previously suggested to be instrumental in accepting or rejecting unfair offers, we performed exploratory analyses on the relation between rejection rates and brain activity in these areas. In addition, we conducted exploratory analyses focusing on the individual differences in CU traits within the delinquent group.

Based on our initial ROI analyses we hypothesized that rTPJ activity would be related to the relative decrease in rejection rates in the "no alternative" condition, whereas rIFG activity was expected to be related to rejection rates in the "fair alternative" condition. First, we explored the relation between difference scores in rejection rates ["fair alternative" – "no alternative" condition] and the activity in the rTPJ for the ["no alternative" vs. "fair alternative"] contrast.

These analyses revealed a significant positive correlation between difference scores and rTPJ activity for the control group ($r = 0.76$, $p < 0.004$), and a significant positive correlation for the juvenile delinquents, although the latter did not survive Bonferroni correction ($r = 0.49$, $p = 0.04$; see Figure 3C). Post hoc comparison of differences in regression slopes between difference scores and rTPJ activity was significantly greater for the control group than for the juvenile delinquents ($t = 2.41$, $p < 0.02$). Thus the more control participants showed increased rTPJ activity in the no alternative condition relative to the fair alternative condition, the more they accepted unfair offers in the no alternative condition relative to the fair alternative condition.

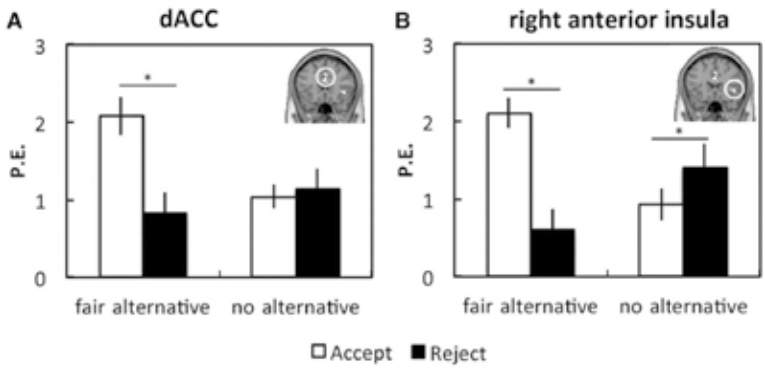

Figure 4. Contrast values in (A) dACC and (B) right anterior insula for accepting and rejecting unfair offers in the "fair alternative" and "no alternative" conditions collapsed across all participants. ROI results are considered significant at a Bonferroni corrected α of $p < .008$.

Second, we investigated the relation between rejection rates in the "fair alternative" condition and the activity in the rIFG for the ["fair alternative" vs. "fixation"] contrast. This analysis revealed a significant negative correlation between rejection rates and rIFG activity for the control group ($r = -0.75$, $p < 0.001$), but not for the juvenile delinquents ($r = -0.01$, $p = 0.94$, see Figure 3D). Again, post hoc comparison of differences in regression slopes revealed that the correlation between rejection rates and rIFG activity was significantly greater for the control group than for the juvenile delinquents ($t = 6.47$, $p < 0.001$).

Individual differences within the delinquent population

To take into account the heterogeneity of the severely antisocial group we investigated the relation between behavior and brain activity with the scores on the callous-unemotional (CU) dimension, and its underlying constructs. We have also explored whether drug and alcohol use

had any relation to the behavior or brain activity within the delinquent population, but this did not yield any significant result (see Supplement Table S1 for more detail).

Based on several studies that have suggested the factors that underlie CU may be independent and differentially associated with aggression, delinquency, and emotional reactivity (see Kimonis et al., 2008 for a large adolescent sample) we investigated the individual factors as well as the usual composite score of the three CU dimensions. First, we found that the higher the score on callousness the smaller the intentionality effect was in terms of rejection rates (r = -.47, p < .05, see Figure 5). Thus, those with a low callousness score rejected less when the other had no choice compared to when the other had a fair alternative, whereas those with a high callousness score did not show a difference between the conditions. We did not find a significant correlation with rejection rates and unemotionality (r = -.21, p = .51) or remorselessness (r = -.41, p = .08).

The neuroimaging data showed that in the TPJ and the IFG there was a decrease in activity related to increased callousness, but these effects failed to reach significance (r = -.42, p = .11 and r = -.37, p = .15, respectively). We did not find any significant correlation for unemotionality, remorselessness or with the composite score of the three CU dimensions (all p's >.2). Finally, further exploration of correlations with the CU dimension or factors in the affective ACC/Insula network did not reveal any significant results or trends (all p's >.3).

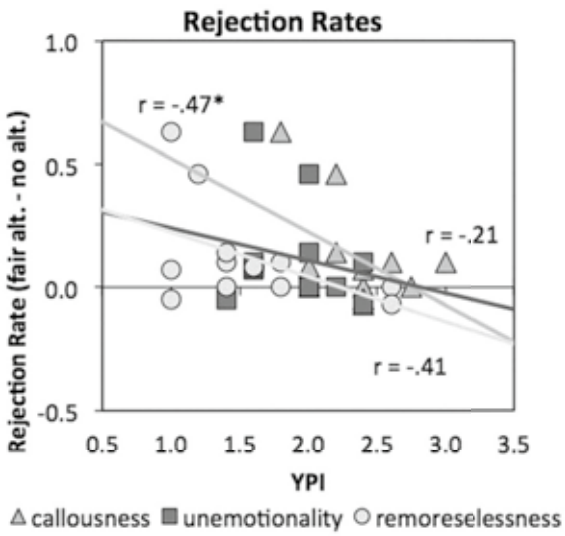

Figure 5. Correlation with callousness, unemotionality and remorselessness with difference scores (intentionality effect: fair alternative – no alternative) in rejection rates. Delinquent data only.

Discussion

The goal of this study was to gain a better understanding of the neural processes underlying social decision-making of juvenile delinquents who show severely antisocial behavior. Behavioral analyses indicated that all participants showed lower rejection rates in the "no alternative" than in the "fair alternative" condition, suggesting they take the social context of the proposals into account (Falk et al., 2008; Güroğlu et al., 2009; 2011). However, juvenile delinquents showed less acceptance of the no alternative condition compared to the control group. This suggests that they react more strongly to the unfairness of the offer, or are less concerned about the intentions behind the offer.

The imaging results revealed that these differences in behavior were accompanied by group differences in a specific subset of brain areas (rTPJ and rIFG). First, the severely antisocial adolescents showed reduced levels of rTPJ activity in the "no alternative" condition (i.e., the condition which required intention consideration) compared to the control group. This finding can be interpreted in the context of a recent meta-analysis (Carter & Huettel, 2013) that suggests that the TPJ is a convergence zone for different functions (memory, attention, social processing). This convergence enables the TPJ to have a higher order role in the creation of a social context for behavior. The locus of activation of the current study falls right in the area where activation is associated with both attention and social cognitive processes (ToM). This suggests that the delinquent group may be less focused on the social context of the ultimatum offer. This interpretation is supported by our exploratory analyses of individual differences within the delinquent group that showed that rejection rates were related with callousness. However, future studies should further investigate the relation between attention and social context of Ultimatum Game rejections by making the outcomes for the other even more salient or explicitly train the participants to focus on them (see for instance Sebastian et al., 2013).

Second, severely antisocial adolescents differed from the control group by showing decreased rIFG activity in the "fair alternative" condition, and not showing a correlation between rIFG activity and behavioral responses to unfair offers. These results are in line with previous studies that have suggested that juvenile antisocial behavior is related to difficulties to engage the regulatory processes associated with the frontal cortex (Fairchild et al., 2009b; Sterzer & Stadler, 2009). More specifically, the rIFG is often associated with both attention (selection/switching) and response inhibition (Aron et al., 2004; Hampshire et al., 2010). In context of the mini-Ultimatum Game reduced activity can thus be interpreted as reduced attentional processing or reduced inhibition of prepotent responses. Based on our current design we cannot conclude whether reduced activation was associated with less attention to the social context of the unfair offer, or failure of the inhibition of the prepotent response (reject unfair offers).

Finally, there where no group differences in how norm violations were processed in the dACC and right anterior insula. A recent study used resting state connectivity patterns to define three functionally distinct networks in the insula (posterior, ventral anterior and dorsal anterior;

Chang et al., 2012). The function of these networks was further specified by large-scale reverse inference based on the Neurosynth database (Yarkoni et al., 2011). The dorsal anterior network, which overlaps with our functional activation, showed high connectivity with the dACC and is thought to be involved in processing conflict and errors in a diverse set of tasks, whereas the ventral posterior network is thought to be associated with emotion processing and anxiety. These findings suggest that severely antisocial adolescents and control participants may both be equally aware of behaving against their personal norms.

The findings of this study suggest that there are disturbances of processes associated with rTPJ and rIFG activity underlying aberrant social behavior in juvenile delinquents. Earlier studies have shown reduced LPFC engagement in antisocial groups (Fairchild et al., 2009b; Sterzer & Stadler, 2009); the current results extend these findings by showing that also the TPJ, an area associated with social cognition, shows reduced levels of activation in juvenile delinquents with severely antisocial behavior. These results support the hypothesis that in social interactions, severely antisocial adolescents do not have the tendency to take the social context fully into account. However, the correlation between TPJ activity and rejection rates suggests that when the severely antisocial adolescents take the perspective of the other they are more willing to accept an unfair offer, just as the control participants. This finding is in line with studies that suggest that cognitive perspective taking skills are not necessarily deficient in antisocial populations, but they may not spontaneously engage them (Jones et al., 2010, Schwenck et al., 2011; Sebastian et al., 2013).

Finally, the results of this study should be interpreted in the light of several important limitations. First, the results of the current study do not reveal the causes of atypical processing in rIFG and rTPJ. Recent work has demonstrated that both environmental (Dodge et al., 2006) and genetic factors are related to the development of antisocial behavior (Cesarini et al., 2008; Wallace et al., 2007). In the current study we did not have any explicit measures of environmental variables, such as socioeconomic status, or genetic make-up. Longitudinal neuroimaging studies are needed to elucidate how environmental and genetic factors interact to give rise to the changes in the brain that are related to antisocial behavior. With a larger sample the current design is promising in providing a better understanding of such developmental trajectories across adolescence. Second, our sample contained boys only, so we do not know whether our results are generalizable to the less studied group of girls who show severely antisocial behavior. In sum, the current results offer empirical support for aberrant social decision-making in severely antisocial adolescents, and provide a template for the development of quantitative measures that may be useful for the understanding of the development and prognosis of antisocial behavior. The results emphasize the importance of understanding the social aspects of antisocial behavior. Adolescence is a period that is characterized by a unique set of physical, social and neurological changes (Casey et al., 2008; Spitzer et al., 2007). It is hypothesized that these changes contribute to both typical adolescent aberrant behavior, but also provide a unique window of opportunity for re-directing behavior in case development goes astray (for review

see Crone & Dahl, 2012). In the future, neuroimaging may provide useful additional prognostic information, or biomarkers, for treatment (Popma et al., 2006).

Supplement to Chapter 6

Neural correlates of social decision-making in severely antisocial adolescents

Supplemental Methods

Assessment and Matching

The juvenile delinquents with severely antisocial behavior had shown at least one violent (e.g. fighting, armed robbery) and/or multiple non-violent behaviors (e.g. shoplifting, possession of drugs) according to official registration or self-report (Table S1). Self-reported antisocial behavior was recorded from the Conduct Disorder (CD) section of the Diagnostic Interview Schedule for Children (DISC-IV) (Schaffer et al., 2000). In addition to CD, the DISC-IV was used to test whether delinquent adolescents met criteria for Oppositional Defiant Disorder and Substance dependence. Five adolescents fulfilled the criteria for past year CD and three for ODD (Table S2). Information on antisocial behavior from one participant in the juvenile delinquent group was lacking, but he was being treated for severe conduct disorder when he was included in this study. Psychopathic traits were assessed with the Youth Psychopathic traits Inventory (Andershed), mental health was assessed with the Diagnostic Interview Schedule for Children, Youth Version (Schaffer et al., 2000) and the Youth Self Report (Achenbach, see Table S2 for descriptive data). None of the participants used medication for a psychiatric disorder. However one participant used a beta-blocker (propanolole). Removing this participant from the analyses did not change the results.

In the control group caregivers completed the child behavior checklist (CBCL) (Achenbach, 1991) for all under aged participants (15 to 17 years). None of the participants in the control group had clinical scores on the CBCL. Control participants aged 18-21 years were verbally screened for behavioral problems by the experimenters and all participants were screened for any occurrence of mental illness and use of medication as part of the regular MRI screening procedure. None of the participants in the control group reported abnormalities.

In order to obtain an estimate of intelligence, the participants completed two subscales (Block design and Similarities) of the Wechsler Adult Intelligence Scale (WAIS-R; Wechsler, 1997). The scores were converted to Intelligence Quotient (IQ) estimates and participants had average IQ (M= 94.78, SD= 13.02). Consistent with the goals of the matching procedure, there were no significant group differences in IQ (Delinquents_IQ= 93.81, SD= 11.55; Control_IQ= 95.70, SD= 13.01; F (1, 31) < 1, p = .68).

We assessed drug and alcohol use based on the DISC. This resulted in quantification of use for 16 participants (see Table S3). For each individual we constructed an average score in order to assess the relation between drug & alcohol use with behavior and brain activity. None of these analyses yielded significant results.

Table S1. Details of antisocial behavior delinquents

Recruitment setting	Detention status at time of scan	Registered Index offenses	Registered past offenses	Past year self-reported antisocial behavior	Lifetime self-reported antisocial behavior	No. of self-reported arrests	Diagnosis CD/ODD
JDC	Mandatory treatment (civil)	NA	violent robbery	Fighting, threat, burglary, injuring with weapon	Theft, shoplifting, violent robbery, threat, burglary, fighting, drug dealing	5	CD
JDC	Mandatory treatment (civil)	NA	theft; violation of compulsory school attendance	(detained)	assault, vandalism, shoplifting, fighting, injuring with weapon	12	ODD
JDC	Finished detention	NA	threatening with terrorism; assault; theft; theft under threat of violence (in union)	fighting	Theft, shoplifting, vandalism, animal violence, fighting, robbery, violence against police, forgery	6	0
JDC	Mandatory treatment (penal)	theft under threat of violence (in union); theft	theft	(detained)	Shoplifting, theft, violent robbery, vandalism, threat, fighting, injuring with weapon, attempted manslaughter	20	0
Outpatient	–	NA	NA	0	Shoplifting, vandalism, threat, fighting, drug dealing, theft	8	0
Day treatment	–	NA	NA	Vandalism, threat, fighting, injuring with weapons, threatening with injuring	Vandalism, threat, fighting, injuring with weapons, threatening with injuring	0	CD

Table S1. Details of antisocial behavior delinquents *(Continued)*

Recruitment setting	Detention status at time of scan	Registered Index offenses	Registered past offenses	Past year self-reported antisocial behavior	Lifetime self-reported antisocial behavior	No. of self-reported arrests	Diagnosis CD/ODD
Outpatient	–	NA	NA	Shoplifting, theft, robbery, threat, fighting, injuring with weapons	Shoplifting, theft, robbery, threat, vandalism, arson, violence against animal, fighting, injuring with weapons, armed robbery, burglary	5	CD
Day treatment	–	NA	NA	Threat, fighting, threatening with weapon	Theft, shoplifting, robbery, threat, vandalism, fighting, injuring with weapon, burglary	3	CD
Outpatient	–	NA	NA	Threat, shoplifting, theft	Threat, animal violence, Fighting, attacking police, vandalism, arson, robbery, shoplifting, theft	4	CD
Outpatient	–	NA	NA		Theft, threat, fighting, injuring with weapon	3	ODD
JDC	Detention	NA	(accomplice to) attempted manslaughter; violent theft; theft	(detained)	Theft, fighting	0	ODD

Table S1. Details of antisocial behavior delinquents *(Continued)*

Recruitment setting	Detention status at time of scan	Registered Index offenses	Registered past offenses	Past year self-reported antisocial behavior	Lifetime self-reported antisocial behavior	No. of self-reported arrests	Diagnosis CD/ODD
JDC	Mandatory treatment (penal)	theft with violence; theft; possession of drugs	theft; burglary; extortion; theft under threat of violence (in union); theft with violence; attempted; theft with violence	(detained)	Shoplifting, theft, forgery, burglary, vandalism, fighting, threatening with weapon, drugs poss, car theft, robbery, not meeting probation c	20	0
Outpatient	–	NA	NA	Shoplifting, vandalism, fighting	Shoplifting, vandalism, fighting, injuring with weapons, threat	> 66	0
JDC	Mandatory treatment (penal)	Attempted destruction of property; theft under threat of violence (in union);drug dealing; accomplice to theft; burglary	attempted theft with violence; theft	Injuring with weapon, threat (with weapon)	Stabbing, robbery, burglary, drugs possession, firearm possession, theft, threat (with weapon), vandalism, injuring with weapon	3	0
Outpatient	–	NA	NA	Shoplifting, theft, robbery, threat, fighting, threatening with weapon	Shoplifting, theft, robbery, vandalism, threat, fighting, threatening with weapon	1	0
JDC	Detention	theft; theft with violence	theft; assault	Shoplifting, theft, fighting, selling stolen goods	Shoplifting, theft, fighting, selling stolen goods, illegal fireworks lighting	10	0

Note. JDC=Juvenile Detention Center; NA Not Available. * Information on antisocial behavior from one participant in the SAB group is lacking, but as he was being treated for severe conduct disorder he was included
in this study.

Table S2. Psychopathological data (juvenile delinquents, *N* = 17)

YSR	**borderline N (%)**	**clinical N (%)**
Anxious/Depressed	1 (5.9)	0 (0)
Withdrawn/Depressed	2 (11.8)	1 (5.9)
Somatic Complaints	1 (5.9)	1 (5.9)
Social Problems	1 (5.9)	0 (0)
Thought Problems	0 (0)	1 (5.9)
Attention Problems	0 (0)	1 (5.9)
Rule-breaking Behavior	5 (29.4)	3 (17.6)
Aggressive Behavior	1 (5.9)	1 (5.9)
DISC-diagnosis		
ODD		3 (17.6)
CD		5 (29.4)
Alcohol dependence		5 (29.4)
Marihuana dependence		6 (35.3)
YPI		**Mean(SD)**
dishonest charm		1.70(.65)
grandiosity		1.45(.40)
lying		1.40(.51)
manipulation		1.63(.59)
remorselessness		1.65(.54)
unemotionality		1.96(.34)
callousness		2.33(.31)
thrill-seeking		2.70(.66)
irresponsibility		2.23(.73)

Table S3. Drug & Alcohol Use in Delinquent group

	Alcohol	Drugs	Combined
	1	4	2.5
	1	4	2.5
	3	4	3.5
	0	0	0
	5	0	2.5
	1	4	2.5
	5	1	3
	2	4	3
	5	4	4.5
	3	4	3.5
	3	4	3.5
	0	2	1
	5	4	4.5
	0	4	2
	5	0	2.5
	0	4	2
Mean	**2.44 (.52)**	**2.94**	**2.69**

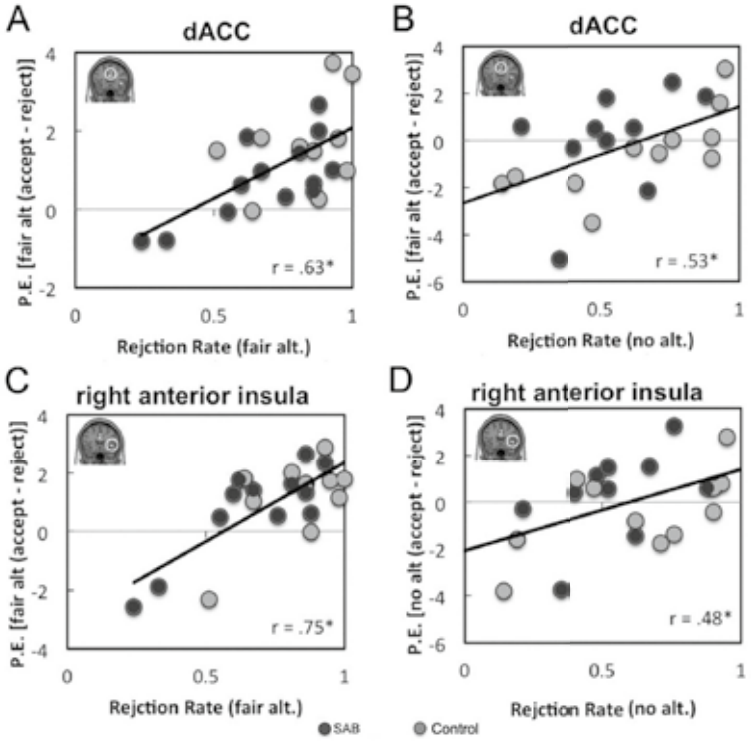

Figure S1. Activation in the dACC for the [accept – reject] contrast in the (A) the "fair alternative" and (B) the "no alternative" condition correlated positively with the rejection rates in the respective conditions. Activation in the dACC for the [accept – reject] contrast in the (C) the "fair alternative" and (D) the "no alternative" condition correlated positively with the rejection rates in the respective conditions. These results indicate that for participants who rejected often there was more activity in these areas when they chose to accept than for those who rejected less often, and vice versa. ROI results are considered significant at a Bonferroni corrected alpha of $p < .008$.

Chapter 7

Summary and General Discussion

This dissertation aimed at increasing knowledge on childhood maltreatment and social-emotional functioning in delinquent adolescents. For the purposes of this dissertation, *social-emotional functioning* was used as an overarching term for psychopathic traits, mental health problems, aggression and defective social decision making. Although each of these issues has received research attention in forensic psychiatry (e.g., Koenigs et al., 2010; Kolla et al., 2013; Sevecke et al., 2009), there are gaps in literature on their interrelation and neural correlates, especially in detained adolescents. As in most previous studies participants were guaranteed that their data were used for research purposes only, another limitation of existing research relates to the generalizability to clinical practice of professionals working with young detainees. When young detainees know their answers are viewed and filed by a clinician, they may report differently on questionnaires, in an attempt to present themselves better or worse than they are (e.g., McDermott et al., 2013; Morgan et al., 2007). The current dissertation bridges this gap between research and clinical practice, by using data from routine mental health screening.

As Juvenile Detention Centers (JDCs) generally have a limited number of mental health professionals available, they are unable to offer each youth an elaborate mental health assessment (Colins, Grisso, et al., 2014). High quality routine mental health screening at the time of juveniles' JDC entry can help clinicians to focus their attention on those who need it most (Grisso et al., 2005). This dissertation used mental health screening data to examine specific risk factors such as childhood maltreatment and psychopathic traits, and how these were related to aggression and mental health problems. Although JDC clinicians usually have no other option than to rely on self-report questionnaires for mental health screening (Colins et al., 2008), scholars debate whether constructs such as psychopathic traits can actually be tapped by self-report (Lilienfeld & Fowler, 2007). Therefore, the clinical usefulness and value of a psychopathic traits self-report instrument was studied.

Summary of main findings

In 2008, the development of a routine mental health screening procedure was started in two Dutch JDCs for boys. Several studies described in this book (Chapters 2, 4 and 5) used data derived from this project. Examining similar questions in a different context, the study described in Chapter 3 used data from Belgian JDCs admitting both boys and girls. Different from the Dutch situation, in this study, participants consented to fill out questionnaires for research purposes only. Finally, in the functional MRI study described in Chapter 6, 17 typically developing and 17 juvenile delinquents participated, who all followed an active informed consent procedure involving both youths and parents (Borst-Eilers & Sorgdrager, 1998).

In Chapter 2, the aim was to investigate emotional maltreatment in relation to mental health problems and aggression. Groups of detained boys who experienced various types of maltreatment were compared with those who did not report any maltreatment. We found that

detained boys with a history of emotional maltreatment were at an increased risk for reactive aggression and mental health problems, especially when they also reported having experienced physical and/or sexual maltreatment. In addition, we found that those who had experienced any type of maltreatment had increased levels of proactive aggression compared to non-maltreated boys.

Next, Chapter 3 investigated gender differences with regard to emotional maltreatment as a risk factor for internalizing and externalizing mental health problems, over and above the influence of other types of maltreatment (sexual abuse, physical abuse and neglect). As expected, girls reported higher levels of various maltreatment experiences and internalizing and externalizing mental health problems than boys. In both genders, emotional abuse was uniquely related with internalizing and externalizing mental health problems, over and above other types of maltreatment (emotional neglect, physical abuse, physical neglect, sexual abuse). Based on these results, detained adolescents who have been the victim of emotional maltreatment in combination with other types of maltreatment are likely to be the worst group in terms of mental health problems.

The aim of Chapter 4 was to study whether detained boys with various combinations of maltreatment experiences and psychopathic traits differ from each other in their levels of mental health problems and aggression. Findings indicated that compared to boys with low psychopathic traits, those with high psychopathic traits had markedly higher levels of externalizing mental health problems (such as attention deficit/hyperactivity, substance abuse, rule-breaking), proactive and reactive aggression, but not of internalizing mental health problems (anxiety and depression). In boys with a low level of psychopathic traits, as they had experienced more types of maltreatment, mental health problems increased. In boys with a high level of psychopathic traits, differences between maltreatment groups did not reach significance. Levels of proactive and reactive aggression increased in boys with low levels of psychopathic traits as they had experienced more types of maltreatment, whereas this was not so in those with high levels of psychopathic traits.

The aim of the study in Chapter 5 was to investigate the clinical usefulness of a psychopathic traits self-report instrument in the setting of a JDC routine mental health screening procedure. In this naturalistic setting, we were able to confirm relationships with emotional and behavioral problems known from literature. Therefore, findings indicated that psychopathic traits self-report show expected relations with variables of interest, outside of a research context.

The aim of Chapter 6 was to study neural correlates of social-decision making in delinquent male adolescents. We found that delinquent male adolescents, more than typically developing peers, were inclined to reject an unfair offer, in a context where there was no alternative offer possible (i.e. an unintentional unfair offer). These differences were related to altered functioning in brain areas implicated in attention selection, response inhibition (right inferior frontal gyrus, rIFG) and judging another individual's intention (right temporo-parietal junction, rTPJ). In addition, a correlation was found between rTPJ-activity and acceptance of unfair offers in

both delinquents and controls. Also, we explored how self-reported psychopathic traits relate to behavior and activity in the involved brain areas. We found a relation between callousness scores and more rejection of unintentionally unfair offers. Correlations of psychopathic traits with activity in the rTPJ and rIFG were not significant.

Overall discussion

Four main findings resulted from the studies described in this dissertation. First, in detained adolescents emotional maltreatment experiences were associated with internalizing and externalizing mental health problems, as well as reactive and proactive aggression. Juveniles who, in addition to emotional maltreatment, had been a victim of physical abuse, neglect and/or sexual abuse were even more affected. The generalizability seems considerable, as we found comparable results in both a naturalistic setting and in a research setting, in both boys and girls, in person-oriented (Chapter 2) and variable-oriented analyses (Chapter 3), and in two countries. Second, boys with high levels of psychopathic traits evinced higher levels of externalizing problems, proactive and reactive aggression than those with low levels of psychopathic traits, which is in line with previous research (Frick, Cornell, Barry, Bodin, & Dane, 2003; Salekin et al., 2004). This elevated amount of problems in boys with high levels of psychopathic traits was unrelated with the number of maltreatment experiences in their past, whereas in boys who score low on psychopathic traits this relation was clearly present. Third, relations of psychopathic traits self-report with emotional and behavioral problems known from literature were confirmed outside of a research context. Fourth, severely antisocial boys compared to typically developing peers were found to have altered functioning in brain areas related with attention to and judging of other individuals' intentions.

The results regarding the detrimental impact of emotional maltreatment (Chapters 2 and 3) extend findings in the general population and in maltreated populations to juvenile detainees (e.g., Keyes et al., 2012; Litrownik et al., 2003; Mills et al., 2013). Based on these findings, there is no rationale for considering sexual or physical abuse to be more damaging than emotional abuse (in contrast with e.g. Lau et al., 2005). Notwithstanding these findings, emotional maltreatment remains relatively understudied and also underidentified by the relevant services (e.g. child protection services, school health services, health care in general). Increased clinical attention to the detrimental impact of emotional maltreatment experiences on youth, and specifically on delinquent adolescents, is therefore warranted.

For the finding that maltreatment impacted mental health problems and aggression in youths with a low level of psychopathic traits, but not in their peers with high levels of psychopathic traits (Chapter 4) an explanation may be found with Karpman (1941, 1947). He described two types of psychopathy: a primary and a secondary type. According to this theory, the secondary type is a result of maltreatment negatively affecting emotion regulation skills, and this type is

therefore comorbid with high levels of anxiety and distress. In contrast, primary psychopathy is primarily related to genetic factors, and is thus not necessarily preceded by maltreatment. This type is associated with low levels of anxiety and distress. Consistent with prior research (Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012), both subtypes may be present in the Chapter 4 boys with a high level of psychopathic traits, explaining the lack of differences between those who experienced no maltreatment compared to those who did. Primary and secondary psychopathy types may also explain why findings did not show a negative association between psychopathic traits and internalizing problems (Chapters 4 and 5), an association that other scholars have postulated to be likely, based on descriptions of cold, emotion- and fearless psychopaths (e.g., Frick & White, 2008; McCord & McCord, 1964).

The finding that relations of self-reported psychopathic traits with emotional and behavioral problems known from literature were confirmed in a group of young detainees assessed for clinical purposes (Chapter 5), suggests that self-report could be of aid in screening for psychopathic traits. However, clinical implementation is still premature. There are questions which questionnaire would be best suited to tap the construct; available self-report questionnaires are often at best moderately correlated to each other (e.g., Colins, Bijttebier, Broekaert, & Andershed, 2014; Falkenbach, Poythress, & Heide, 2003; Pechorro, Andershed, Ray, Maroco, & Gonçalves, 2015). In addition, there are no generally accepted cut-off scores (Cauffman, Kimonis, Dmitrieva, & Monahan, 2009). Also, the Youth Psychopathic traits Inventory (YPI), which was used in the current dissertation, seems unable to differentiate delinquents (assessed clinically) from typically developing peer (Boonmann et al., 2015). However, as the YPI and its short version, the YPI-S, appear to differentiate adequately within detained youths (Chapter 4, 5), while being related with emotional and behavioral problems (Chapter 5 and Pechorro et al., 2015) they are promising instruments for further research into screening in a clinical context.

This dissertation provides interesting information about the influence of the context of assessment (research vs. clinical) on the way detained juveniles answer on questionnaires administered during mental health screening. Similar associations were found both inside and outside of a research context between (i) maltreatment and mental health problems (Chapters 2 and 3), and (ii) self-reported psychopathic traits and emotional/behavioral problems (Chapter 5). However, in the Belgian sample (Chapter 3), the overall maltreatment prevalence was 32-35% higher than in the Dutch sample (Chapter 2, 4). This may have to do with real differences between Dutch and Belgian male detained adolescents, but it may also indicate a context effect: the Dutch group was assessed mainly for clinical, whereas the Belgians were examined for research purposes only. This context effect may also be present in the self-reporting of psychopathic traits: unexpectedly and counterintuitively, detained boys assessed outside of a research context have been found to score lower on the YPI than community adolescents (Boonmann et al., 2015). Also, prevalence rates of mental disorders in Chapter 4 lie below what was reported previously (Vreugdenhil et al., 2004). These findings point to a tendency to underreporting when detained adolescents answer routine screening questionnaires in a non-research context. In reverse, we

did not find reason for concern that detained adolescents exaggerate answers on questionnaires because they think this has potential benefits, as reported by others (McDermott et al., 2013). Reasons for underreporting may lie in minimization (Bernstein et al., 2003; Morgan et al., 2007) and fear for potential judicial consequences (Rogers et al., 2002).

The findings of Chapter 6 suggest that reduced rTPJ and rIFG activity underlies aberrant social behavior in juvenile delinquents. Reduced rTPJ activity indicates that in social interactions, severely antisocial adolescents do not take the social context fully into account. However, the brain-behavior correlation between rTPJ-activity and acceptance of unfair offers pointed out that when severely antisocial adolescents do consider the perspective of the other they are more willing to cooperate, just as the control participants. This finding is in line with studies that suggest that cognitive perspective taking skills are not necessarily deficient in antisocial populations, but they may not spontaneously engage them (Jones, Happe, Gilbert, Burnett, & Viding, 2010; Schwenck et al., 2012; Sebastian et al., 2014).

The mental health and aggression differences between delinquents high and low in psychopathic traits (chapters 4 and 5) may be related with differences on a neural level, as some recent studies have suggested (e.g., Cohn et al., 2015; Gregory et al., 2015). However, in Chapter 6 explorative analyses did not support such a relationship: psychopathic traits (measured with the YPI) were unrelated with altered activity in brain areas associated with taking another person's perspective (rTPJ) and cognitive control (rIFG). This finding may not be very surprising, as our task probably primarily tapped cognitive empathy, the ability to cognitively understand another person's intentions. Studies in adolescents with high levels of psychopathic traits suggest they have intact cognitive empathy but deficient affective empathy (the ability to recognize, on a neural level, another person's emotions) (e.g., Blair, 2008; Marsh & Blair, 2008; Marsh et al., 2013; Sterzer, Stadler, Krebs, Kleinschmidt, & Poustka, 2005).

Strengths and limitations

Several studies in the current dissertation were conducted with data from routine JDC mental health screening, enhancing the external validity of our findings. Also, a fairly large number of detained adolescents was studied. Furthermore, findings on emotional maltreatment were replicated internationally (Netherlands, Belgium), across settings (clinical and research setting), with different types of analyses (person-oriented and variable-oriented) and across gender. In addition, our neuroimaging findings were done in a well-characterized sample from a JDC and a forensic outpatient setting, which was carefully age and intelligence – matched with a group of typically developing peers.

Nevertheless, our results must be interpreted in the light of several limitations. First, all questionnaires and interviews are self-report. This may inflate the strength of relations. Unfortunately, using other sources of information like parents or teachers is often not possible

in JDCs (Colins et al., 2008). Second, information on maltreatment was reported retrospectively and may thus be affected by recall bias. However, the alternative, official registration has limitations as well, especially concerning less visible forms of maltreatment like emotional abuse, neglect and sexual abuse (Afifi et al., 2015). Third, the studies were cross-sectional, so no inferences can be made about the directionality of the observed relations. Fourth, the sample size of our fMRI-study is fairly small and we did not have information on psychopathic traits in the control group. The absence of a brain-psychopathic traits relation in the delinquent group may therefore be merely due to lack of power.

Clinical implications

Even considering possible underreporting, detained youths reported substantial amounts of childhood maltreatment, internalizing and externalizing mental health problems. So, the findings of the current dissertation emphasize the need for screening and assessment in detained adolescents. A high-quality routine mental health screening trajectory can help clinicians decide who has the most urgent mental health needs (Grisso et al., 2005). To minimize the likelihood that young detainees underreport, it needs to be emphasized before screening that their answers are used for their mental health care. As underreporting is likely, it is good clinical practice to strive to use more information sources than the youth himself. In the context of JDCs, group-workers' observations may be the most feasible option.

This dissertation specifically underlines the importance of assessing emotional maltreatment. Of course, ideally, detection of emotional maltreatment should take place much earlier, a long time before youngsters behave so badly that they are placed in a JDC. However, once there, screening questionnaires such as the Child Trauma Questionnaire (Bernstein & Fink, 1998) can provide valuable information on maltreatment experiences (Bernstein et al., 2003). Treatment directed at improving family interaction, could help ameliorating an abusive environment and potentially prevent further damage (Kerig & Alexander, 2012) and intergenerational transmission (van der Molen et al., 2012). However, many young detainees are distanced from their families and do not return to them after detention (Barendrecht, Van der Laan, Bongers, & Van Nieuwenhuizen, Submitted; Colins et al., 2008). Alternatively, a strong, supportive and long-term trust bond with a prosocial adult could contribute to overall wellbeing and potentially prevent a downwards spiral to a criminal career (Wainwright & Nee, 2014). Therefore, therapy programs stimulating such relationships, such as those based on the Good Lives Model (e.g., Wainwright & Nee, 2014), should be supported by policy makers.

Directions for future research

While this dissertation sheds light on several relevant topics in forensic adolescent psychiatry research, a number of related issues were beyond the scope of the studies described. Treatment programs focusing on emotional maltreatment and it's sequelae should be examined for effectiveness for the individual youth as well as on recidivism rates. Also, the exact interrelation between maltreatment and psychopathic traits remains unclear, although one study has found a possible relation with emotional maltreatment (Kimonis, Cross, et al., 2013). Future research should elucidate this relation and further investigate the role of gene-environment interactions in the development of psychopathic traits (e.g., Viding & McCrory, 2012). Regarding the assessment of psychopathic traits by self-report, future research should establish what instrument best taps the construct (Cauffman et al., 2009). Although the YPI and the YPI-S hold promise for screening purposes, they seem sensitive to the context of assessment. Future research should further study their clinical usefulness for screening in detained populations.

Our explorative findings on the absence of a psychopathic traits' relation with neural activity during perspective taking, kindles further research into differences regarding cognitive and affective empathy in delinquent adolescents with high and low psychopathic traits (such as currently carried out by our group). In addition, we did not include girls in our neuro-imaging study, so future research should examine whether our fMRI-results can be replicated in girls. In the future, a better understanding of neurocognitive differences within juveniles showing severely antisocial behavior could open new roads of screening, assessment and treatment (Popma & Raine, 2006).

Finally, longitudinal studies are essential, to find out how the risk factors and problems of detained adolescents studied in this dissertation, are associated with long-term consequences, such as recidivism, personality problems and mental disorders. This information could help directing available resources to juveniles who need them the most.

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Nederlandse samenvatting

Kindermishandeling en sociaal-emotioneel functioneren bij delinquente adolescenten

Introductie

De meeste jongeren in Justitiele Jeugdinrichtingen (JJI's) tonen complexe problematiek. Vaak betreft het combinaties van problemen met het gedrag, psychisch welbevinden, de persoonlijkheidsontwikkeling en het opvoedkundig milieu. Clinici die werkzaam zijn in een JJI willen daarom een goed beeld over de specifieke problemen van een gedetineerde jongere, zodat ze een op het individu toegesneden behandeling kunnen aanbieden. Echter ontbreekt het hen aan tijd en mankracht om iedereen uitgebreid te onderzoeken op alle belangrijke diagnostiekvragen. Wat zijn de problemen op emotioneel gebied? Zijn er psychiatrische problemen? Is de jongere agressief? En zo ja, gebruikt hij of zij de agressie instrumenteel (om een doel te bereiken) of is het alleen reactief (als hij ergens heel boos over is)? Vertoont de jongere psychopate trekken - een combinatie van narcisme, gewetenloosheid en impulsiviteit die voorkomt bij een bijzonder ernstige, persistente groep delinquente jongeren – waar de clinicus rekening mee moet houden? Heeft de jongere te maken gehad met kindermishandeling? En hoe staan al deze problemen onderling in relatie?

In kader van de behandeling van jongeren in JJI's is het relevant te weten of er traumatische ervaringen zijn in de voorgeschiedenis. Van alle vormen van kindermishandeling is bekend dat ze een relatie hebben met emotionele- en gedragsproblemen en psychiatrische stoornissen. Gedetineerde jongeren rapporteren bovenmatig veel ervaringen met kindermishandeling. Bij gedetineerde meisjes geldt dit nog meer dan bij jongens. Traditioneel krijgen seksueel misbruik en lichamelijke mishandeling meer aandacht van zowel clinici als onderzoekers, dan minder zichtbare of minder lichamelijk ingrijpende types mishandeling. De laatste jaren groeit de aandacht voor de negatieve effecten van emotionele mishandeling (schelden, vernederen) en -verwaarlozing (een gebrek aan ouderlijke warmte en beschikbaarheid). Recent onderzoek in de algemene bevolking en in hoog-risicogroepen (kinderen die bekend zijn bij de kinderbescherming) toont dat emotionele mishandeling en -verwaarlozing minstens zo schadelijk zijn als lichamelijke mishandeling of zelfs seksueel misbruik. Met name wanneer emotionele mishandeling samengaat met andere vormen van mishandeling, dan zijn de gevolgen aanzienlijk. Welke rol emotionele mishandeling en -verwaarlozing spelen in de voorgeschiedenis van jongeren in JJI's is weinig onderzocht.

Voor actuele, snelle en gestructureerde informatie over de problemen van de gedetineerde jongere kunnen clinici weinig gebruik maken van belangrijke informanten. Ouders zijn moeilijk bereikbaar, of hebben hun kind al een tijd niet gezien. Jongeren hebben vaak onderbroken schoolcarrières, waardoor informatie van leraren ook niet beschikbaar is. Niet alleen voor clinici, maar ook voor onderzoekers zijn andere informanten dan de jongere zelf nauwelijks beschikbaar. Bijna al het wetenschappelijk onderzoek naar gedetineerde jongeren is dan ook verricht met zelfrapportagevragenlijsten. Een knelpunt bij de vertaling van wetenschappelijke bevindingen naar de klinische praktijk, is het feit dat aan onderzoek deelnemende jongeren een garantie krijgen dat informatie die ze geven alleen wordt gebruikt voor wetenschappelijke

doeleinden. In de klinische praktijk ontbreekt deze garantie. Vaak zullen gedetineerde jongeren een zo gunstig mogelijk beeld van zichzelf willen schetsen, en dan zijn ze wellicht minder open en eerlijk dan tijdens anonieme deelname aan wetenschappelijk onderzoek. Mede daarom bestaan er vragen over de waarde van zelfrapportage vragenlijsten in deze groep.

Sommigen zien neurobiologische maten als een toekomstig alternatief voor zelfrapportage: neurobiologie zou minder makkelijk te manipuleren en dus betrouwbaarder zijn. Bijvoorbeeld is eerder aangetoond dat de hersenen bij jongeren die antisociaal gedrag vertonen anders functioneren dan die van normaal ontwikkelende jongeren. Eerder onderzoek op dit gebied is vooral gedaan naar emotieherkenning. Hierbij werd middels functional Magnetic Resonance Imaging (fMRI) gevonden dat hersengebieden die betrokken zijn bij het meevoelen met emoties anders geactiveerd worden bij gedragsgestoorde jongeren in vergelijking met zich normaal ontwikkelende jongeren. Waarschijnlijk zorgt het minder goed meevoelen met anderen ervoor dat voor anderen schadelijk gedrag makkelijker optreedt. Een beperking van eerder onderzoek op dit gebied is dat het vooral gebaseerd is op passief kijken naar plaatjes terwijl de proefpersoon in een MRI-scanner ligt, dus niet op daadwerkelijk gedrag in een sociale interactie. Een andere beperking is dat veel onderzoek niet verricht is bij jongeren die heel ernstig antisociaal gedrag vertonen, zoals jongeren in JJI's. Deze twee beperkingen kunnen worden ondervangen door delinquente jongeren een bepaalde taak te laten doen terwijl ze in een MRI-scanner liggen, een soort spel. Specifiek ontworpen economische spellen (over geld wel of niet delen met een tegenstander) geven gedetailleerde informatie over complex sociaal gedrag. Het combineren van een dergelijke taak met neuro-imaging (MRI), maakt het mogelijk om het functioneren van de hersenen tijdens verschillende stappen in de sociale interactie precies in kaart te brengen. Op dit moment is fMRI nog lang geen alternatief voor zelfrapportage, daarvoor is nog veel technische ontwikkeling en wetenschappelijk onderzoek nodig. Wel kan neuro-imaging onderzoek helpen de ontwikkeling van antisociaal gedrag beter te begrijpen.

Dit onderzoek

Dit proefschrift heeft als doel om de kennis te vergroten over kindermishandeling en sociaal-emotioneel functioneren bij delinquente adolescenten. In dit proefschrift wordt het begrip *sociaal-emotioneel functioneren* gebruikt als overkoepelende term voor psychopate trekken, geestelijke gezondheidsproblemen, agressie en afwijkend gedrag in de sociale omgang.

Voor de onderzoeken beschreven dit proefschrift werden de groepen bestudeerd die in Tabel 1 staan. In mei 2008 begonnen twee Nederlandse Justitiële Jeugdinrichtingen (JJI's) een gestandaardiseerde methode te gebruiken voor screening in diagnostiek op psychische problemen. Deze methode werd ontwikkeld in samenwerking met onderzoekers van de Academische centra voor kinder- en jeugdpsychiatrie van Curium-LUMC en VUmc. Drie artikelen in dit proefschrift (Hoofdstuk 2, 4 en 5) maakten gebruik van geanonimiseerde data

van jongeren die deze screening en diagnostiek bij hun binnenkomst in de JJI hadden ondergaan. Een manuscript in dit proefschrift (Hoofdstuk 3) beschrijft onderzoek bij jongens en meisjes in Vlaamse Gemeenschapsinstellingen voor Bijzondere Jeugdbijstand (een soort equivalent van de Nederlandse JJI's). Door deze Vlaamse jongeren te betrekken konden we internationaal vergelijken en verschillen tussen jongens en meisjes onderzoeken (de twee Nederlandse JJI's namen alleen jongens op). Anders dan in de Nederlandse JJI's, vulden de Vlaamse jongeren de vragenlijsten puur in voor onderzoeksdoeleinden, waar ze actief en geïnformeerd toestemming voor gaven. Aan het neuro-imaging onderzoek in Hoofdstuk 6 tenslotte, nam een subgroep deel van jongens uit JJI Teylingereind, aangevuld met jongens uit een forensische behandelsetting (De Jutters), en een controlegroep van schoolgaande jongens. Voor deelname aan dit onderzoek werd actieve en geïnformeerde toestemming van zowel de jongens als hun ouders verkregen. De Commissie Medische Ethiek van het Leids Universitair Medisch Centrum (Hoofdstuk 2, 4, 5 en 6) en de ethische commissie van de Universiteit Gent (Hoofdstuk 3) bevestigden dat de gebruikte onderzoeksmethoden en toestemmingsprocedures correct en in lijn met de van toepassing zijnde wetgeving waren.

Tabel 1. Onderzoeksgroepen in dit proefschrift

Jongeren uit	Hoofdstuk	Gemiddelde leeftijd (van-tot)
JJI's Teylingereind en Rentray Lelystad	2, 4, 5	16.5 (12-18)
Gemeenschapsinstellingen De Kempen en De Zande, België	3	15.9 (12-17)
Scholen JJI Teylingereind De Jutters, forensisch behandelcentrum	6	18.3 (15-21)

Resultaten

Hoofdstuk 2 onderzocht of emotionele mishandeling en -verwaarlozing een risicofactor is voor psychische problemen en agressie bij jongens in JJI's. Jongens die emotionele mishandeling en/of -verwaarlozing hadden meegemaakt scoorden relatief hoog op psychische problemen, met name als ze ook nog lichamelijke mishandeling/verwaarlozing of seksueel misbruik hadden meegemaakt. Verder was proactieve en reactieve agressie hoger bij jongens die enige vorm van kindermishandeling of -verwaarlozing hadden meegemaakt in vergelijking met jongens zonder deze ervaringen. Het type mishandeling maakte hiervoor niet uit.

In Hoofdstuk 3 werden verschillen onderzocht tussen jongens en meisjes in Vlaamse gemeenschapsinstellingen, op het gebied van emotionele mishandeling en -verwaarlozing als

risicofactor voor psychische problemen. In vergelijking met jongens rapporteerden meisjes meer en ernstiger ervaringen met mishandeling en verwaarlozing, en meer psychische problemen zoals angst, depressie en concentratieproblemen. Bij zowel jongens als meisjes hing de emotionele mishandeling samen met meer psychische problemen, zelfs bovenop de invloed van lichamelijke mishandeling/verwaarlozing en seksueel misbruik.

Hoofdstuk 4 beschreef op welke manier combinaties van risicofactoren (psychopate trekken en mishandeling/verwaarlozing) verband houden met de ernst van psychische problemen en agressie. Jongens met een hoog niveau van psychopate trekken hadden in vergelijking met jongens met een laag niveau van psychopate trekken significant hogere scores op externaliserende problemen (zoals aandachtstekort/hyperactiviteit, middelenmisbruik, normoverschrijdend gedrag), en proactieve en reactieve agressie. Op het gebied van internaliserende problemen (angst en depressie) was er geen verschil tussen deze groepen. Daarnaast vonden we bij jongens met een laag niveau van psychopate trekken, dat zowel de psychische problemen als ook de proactieve en reactieve agressie toenamen naarmate ze meer types mishandeling hadden meegemaakt. Bij jongens met een hoog niveau van psychopate trekken maakte het aantal verschillende ervaringen met mishandeling niet uit voor de ernst van de psychische problemen en agressie.

In hoofdstuk 5 werd de klinische bruikbaarheid van een zelfrapportage instrument voor psychopate trekken als onderdeel van een screeningsprocedure in de JJI beschreven. Met data uit een klinische context bevestigden we relaties met emotionele en gedragsproblemen die uit de literatuur bekend zijn, bijvoorbeeld dat de mate van psychopate trekken samenhangt met meer gedragsproblemen. Buiten een onderzoekscontext vonden we dus dat zelfgerapporteerde psychopate trekken de verwachte relaties vertonen. Deze bevinding kan een indicatie zijn voor klinische bruikbaarheid.

Hoofdstuk 6 beschreef of ernstig antisociale jongens zich anders gedroegen dan schoolgaande jongens tijdens het spelen van een economisch spel, en of er verschillen waren in de activiteit van betrokken hersengebieden. Tijdens een functionele MRI-scan voerden deelnemers een taak uit rondom het met een tegenspeler verdelen van geld. Delinquente jongens wezen tijdens deze taak vaker dan schoolgaande jongens een onbedoeld oneerlijke geldverdeling af. Dit verschil hing samen met minder hersenactiviteit in gebieden die betrokken zijn bij aandachtsselectie, respons inhibitie (right inferior frontal gyrus, rIFG) en het beoordelen van de intentie van iemand anders (right temporo-parietal junction, rTPJ). Hoe meer activiteit er was in de rTPJ, hoe meer zowel delinquenten als schoolgaande jongens geneigd waren het onbedoeld oneerlijke aanbod te accepteren. Er was een indicatie dat bij delinquente jongens de mate van *callousness* (gevoelloosheid, één van de psychopate trekken) samenhing met meer afwijzen van een onbedoeld oneerlijk aanbod. Er was echter binnen de groep delinquenten geen relatie van zelfgerapporteerde psychopate trekken met activiteit in de genoemde betrokken hersengebieden.

Discussie en implicaties voor de klinische praktijk

Dit proefschrift beschrijft vier belangrijke bevindingen.

Ten eerste, bij jongeren in Nederlandse JJI's en Vlaamse gemeenschapsinstellingen is emotionele mishandeling en verwaarlozing in hun kindertijd geassocieerd met internaliserende en externaliserende problemen, en met proactieve en reactieve agressie. Jongeren die naast emotionele mishandeling/verwaarlozing ook nog het slachtoffer zijn geweest van lichamelijke mishandeling/verwaarlozing of seksueel misbruik hebben de meest ernstige problemen. Wat deze bevinding bekrachtigt is dat we vergelijkbare resultaten vinden in twee landen; bij jongens en meisjes; in een klinische en in een research context; en in verschillende soorten analyses.

Ten tweede hebben jongens in JJI's met een hoog niveau van zelfgerapporteerde psychopate trekken meer externaliserende problemen, proactieve en reactieve agressie dan jongens met een laag niveau van psychopate trekken; wat overeen komt met bestaande onderzoeksliteratuur. Bij jongens met een laag niveau van psychopate trekken is er een relatie tussen enerzijds het aantal types mishandeling/verwaarlozing dat ze hebben meegemaakt en anderzijds psychische problemen en agressie, terwijl deze relatie afwezig is bij jongens met een hoog niveau van psychopate trekken.

Ten derde vinden we buiten een wetenschappelijke onderzoekscontext dat zelfgerapporteerde psychopate trekken dezelfde relaties vertonen met emotionele en gedragsproblemen als in eerdere onderzoeken. In deze eerdere onderzoeken kregen deelnemers de garantie op anoniem gebruik van hun vragenlijstgegevens voor uitsluitend wetenschappelijke doeleinden, zo'n garantie kregen de jongeren in ons onderzoek niet. Jongeren wisten dat hun antwoorden gezien konden worden door een behandelaar. Dat we toch de verwachte relaties vonden, kan een indicatie zijn voor de klinische bruikbaarheid van zelfgerapporteerde psychopate trekken.

Ten vierde vertonen ernstig antisociale jongens minder hersenactiviteit in gebieden die te maken hebben met aandacht voor en beoordelen van de intenties van anderen dan leeftijdgenoten uit de algemene bevolking. Er zijn wel individuele verschillen: hoe meer activatie de jongere vertoont in de rTPJ, hoe meer hij geneigd is tot samenwerking met zijn tegenstander.

De bevindingen over de impact van emotionele mishandeling (Hoofdstuk 2 en 3) bevestigen eerdere bevindingen in de algemene bevolking en in hoog-risico populaties (zoals kinderen die onder toezicht staan van de kinderbescherming), en worden met het onderzoek beschreven in dit proefschrift uitgebreid naar jongeren in Nederlandse JJI's en Vlaamse gemeenschapsinstellingen. Op basis van deze bevindingen is er geen reden om te denken dat emotionele mishandeling minder schadelijk is dan seksueel misbruik of lichamelijke mishandeling. Toch wordt emotionele mishandeling relatief weinig wetenschappelijk onderzocht en is er ook weinig aandacht voor bij zorgverleners en preventiewerkers (zoals bij de Jeugdgezondheidszorg, Ouder-Kindcentra, Raad voor de Kinderbescherming, Jeugdzorg). Het is noodzakelijk dat clinici meer opmerkzaam zijn met betrekking tot de gevolgen van deze vorm van mishandeling. Dit geldt zowel voor zorgverleners in de preventieve gezondheidszorg, als ook voor degenen

die werken met delinquente jongeren. Screenen op ervaringen van emotionele mishandeling en -verwaarlozing kan een goed begin zijn. Het stimuleren van positieve opvoedingsstrategieën kan mogelijk latere psychische problemen en antisociaal gedrag voorkómen.

Bij jongens met een hoog niveau van psychopate trekken maakte het aantal verschillende ervaringen van mishandeling en/of verwaarlozing niet uit voor de ernst van de (toch al in relatief hoge mate aanwezige) psychische problemen (Hoofdstuk 4). Bij deze jongens lijkt een intensieve behandelstrategie aangewezen, wegens de veelheid aan gedrags- en emotionele problemen die met psychopate trekken samen gaan. Bij jongens met een laag niveau van psychopate trekken -het overgrote deel van de jongens in JJI's- is het in het licht van de bevindingen in Hoofdstuk 4 in elk geval van belang bij diagnostiek en behandeling rekening te houden met traumatische ervaringen in de kindertijd. De onderlinge relatie tussen psychopate trekken en mishandeling/verwaarlozing wordt uit de resultaten niet duidelijk. Mogelijk speelt mishandeling een rol in het ontstaan van psychopate trekken, een andere mogelijkheid is dat kinderen met een (aangeboren) hoog niveau van psychopate trekken meer kans hebben op negatieve interacties met hun omgeving (en dus ook mishandeling). In elk geval blijkt uit de bevindingen in dit proefschrift dat zowel psychopate trekken als ervaringen met mishandeling/verwaarlozing bij jongens in JJI's belangrijke risicofactoren zijn voor emotionele- en gedragsproblemen.
Zelfrapportage kan mogelijk behulpzaam zijn bij het screenen op psychopate trekken, omdat buiten een strikte onderzoekssetting dezelfde relaties met gedrags- en emotionele problemen worden gevonden als in bestaande onderzoeksliteratuur (Hoofdstuk 5). Hoewel het voor de hand ligt om deze bevinding onmiddellijk klinisch toe te passen, is dit nog niet mogelijk voordat een aantal vragen beantwoord zijn. Om te beginnen is onduidelijk welke vragenlijst men zou moeten kiezen. Er bestaan verschillende zelfrapportagelijsten voor screening van psychopate trekken, waarvan uit onderzoek is gebleken dat dezelfde persoon op de ene lijst wel hoog scoort en de andere lijst niet. Verder bestaan er geen algemeen geaccepteerde afkapwaarden om een bovenmatig niveau van psychopate trekken vast te stellen. Een ander aandachtspunt is dat tegen de verwachtingen in schoolgaande jongeren vergelijkbaar scoren met delinquente jongeren op de in dit proefschrift gebruikte Youth Psychopathic traits Inventory (YPI). Desondanks maken de YPI en zijn verkorte versie (YPI-S) wel degelijk adequaat onderscheid tussen jongens in JJI's (Hoofdstuk 4 en 5) en hangen ze ook samen met emotionele en gedragsproblemen zoals verwacht mag worden (o.a. Hoofdstuk 5). Vandaar dat dit veelbelovende instrumenten blijven om verder te onderzoeken op klinische toepasbaarheid.

Dit proefschrift heeft interessante informatie opgeleverd over de invloed van een onderzoeks- versus een klinische context op de manier waarop jongeren in JJI's vragenlijsten invullen. Het is de vraag of mensen in het algemeen, en jongeren in JJI's in het bijzonder, wel hetzelfde invullen op vragenlijsten die voor klinische doeleinden worden afgenomen ten opzichte van wanneer ze weten dat de antwoorden alleen anoniem door wetenschappers worden gezien. De bevindingen in dit proefschrift suggereren deels dat jongeren vergelijkbaar antwoorden in verschillende contexten. Zowel binnen als buiten een onderzoekscontext vonden we namelijk gelijksoortige

relaties tussen (i) mishandeling/verwaarlozing en psychische problemen (Hoofdstuk 2 en 3) en (ii) zelfgerapporteerde psychopate trekken en emotionele en gedragsproblemen (Hoofdstuk 5). Echter, bij jongens in Vlaamse gemeenschapsinstellingen (Hoofdstuk 3) was de prevalentie van mishandeling/verwaarlozing ongeveer 33% hoger dan bij Nederlandse JJI-jongens (Hoofdstuk 2, 4). Dit kan natuurlijk berusten op verschillen tussen de Vlaamse en Nederlandse situatie, maar er kan ook een effect van de context op het invullen van vragenlijsten zijn. De Nederlandse groep werd voor klinische doeleinden onderzocht, terwijl de Vlaamse groep puur voor onderzoeksdoeleinden vragenlijsten beantwoordde. Bij zelfrapportage van psychopate trekken is een context effect waarschijnlijk: JJI-jongens die de YPI als onderdeel van een algemene screening invulden scoorden zoals gezegd onverwacht lager dan schoolgaande jongens (onderzoek dr. Boonmann en collega's, uit 2015, niet beschreven in dit proefschrift). Een andere aanwijzing voor een context-effect is dat de prevalentie van psychiatrische stoornissen in dit proefschrift (Hoofdstuk 4) lager ligt dan de prevalentie die bekend is uit eerder Nederlands onderzoek (door dr. Vreugenhil en anderen, uit 2004). Deze verschillen wijzen op een neiging tot onderrapporteren wanneer jongens in JJI's vragenlijsten invullen als onderdeel van een klinische gestandaardiseerde screening en diagnostiek procedure. Redenen voor onderrapportage kunnen minimalisatie of ontkenning van problemen zijn, wellicht met het doel een gunstig beeld te schetsen, of uit angst voor potentiële consequenties.

Afwijkend gedrag in sociale situaties lijkt bij delinquente jongens samen te hangen met verminderde activiteit in specifieke hersengebieden, de rTPJ en de rIFG (Hoofdstuk 6). De verminderde rTPJ activiteit ten opzichte van die van typisch ontwikkelende jongens zou kunnen betekenen dat delinquente jongens tijdens sociale interacties niet volledig rekening houden met de sociale context. Interessant is de bevinding dat hoe meer rTPJ-activiteit er is, hoe vaker een onbedoeld oneerlijke geldverdeling wordt geaccepteerd, ook bij delinquente jongens. Met andere woorden, wanneer deze jongens wel de intentie van de ander in overweging nemen, dan zijn ze meer bereid tot medewerking, net als zich typisch ontwikkelende jongens. Dit is in lijn met eerdere onderzoeken die suggereren dat de cognitieve vaardigheid om zich te verplaatsen in de positie van anderen niet per se afwezig is bij antisociale personen, maar dat ze deze vaardigheid niet spontaan toepassen.

De verschillen die we in dit proefschrift vinden tussen jongens met hoge en lage niveaus van psychopate trekken op het gebied van agressie en psychische problemen (Hoofdstuk 4 en 5), zouden volgens recente onderzoeksliteratuur te maken kunnen hebben met verschillen in het functioneren van bepaalde hersengebieden. Dit vinden wij niet terug in de beperkte analyse die wij konden uitvoeren: psychopate trekken hadden geen relatie met activiteit in de hersengebieden betrokken bij het zich verplaatsen in de positie van een ander (rTPJ) en cognitieve controle (rIFG). Deze negatieve bevinding zou ermee te maken kunnen hebben dat de taak rondom geldverdeling met name cognitieve empathie meet, de vaardigheid om de intentie van iemand anders te begrijpen. Eerder onderzoek laat zien dat bij psychopate trekken

niet de cognitieve, maar juist de affectieve empathie functies zijn aangedaan, de vaardigheid om de emoties van iemand anders te kunnen meevoelen.

De beperkingen van de onderzoeken die we beschrijven in dit proefschrift zijn het uitsluitend gebruik van zelfrapportage instrumenten, het retrospectief meten van ervaringen met mishandeling en verwaarlozing en ten slotte het op één moment meten, waardoor we geen zicht hebben op de oorzakelijke richting van gevonden relaties (wat kwam er eerst). Wat kracht verleent aan de bevindingen is allereerst het gebruik van praktijkdata, waardoor vertaling naar de klinische praktijk eenduidiger is. Daarnaast is een sterkte dat we de resultaten op het gebied van emotionele mishandeling hebben kunnen repliceren in twee landen, in een onderzoeks- en klinische setting, met verschillende soorten analyses en dat we jongens en meisjes hebben kunnen onderzoeken. Tenslotte is het fMRI-onderzoek verricht in een goed gekarakteriseerde groep van delinquente jongens, die secuur is gematcht met een groep zich typisch ontwikkelende jongens.

Slotwoord

Het op een gestandaardiseerde manier uitvoeren van screening en diagnostiek bij elke jongere die in een JJI geplaatst is, helpt clinici beslissen wie de meest urgente zorgbehoefte heeft. Ondanks waarschijnlijke onderrapportage, vermelden jongeren bij binnenkomst in een JJI een aanzienlijke hoeveelheid ervaringen met kindermishandeling en -verwaarlozing, internaliserende en externaliserende psychische problemen. Dit benadrukt het belang van screening en diagnostiek bij deze jongeren. Om het risico van onderrapportage te verkleinen moet bij de jongere benadrukt worden dat zijn of haar gegevens worden gebruikt voor de zorg. Gezien het dan nog steeds aanwezige risico van onderrapportage verdient het aanbeveling ook andere informatiebronnen te gebruiken. Hierbij lijkt gestructureerde observatie door groepsleiding de meest haalbare optie.

Dit proefschrift onderstreept het belang van het uitvragen van ervaringen met emotionele mishandeling. Uiteraard is het beter om deze en andere vormen van mishandeling in een eerder stadium dan bij binnenkomst in een JJI op te sporen, bijvoorbeeld door het vergroten van de kennis over emotionele mishandeling bij preventiewerkers (GGD, Ouder-Kindcentra, Jeugd- en Gezinsteams). Eenmaal in de JJI kunnen screeningslijsten zoals de in dit proefschrift gebruikte Child Trauma Questionnaire van nut zijn om ervaringen met mishandeling in kaart te brengen. Behandeling die gericht is op het verbeteren van de interactie binnen de familie kan de opvoedingssituatie verbeteren en verdere schade voorkómen. Vaak echter, gaat een jongere na zijn verblijf in de JJI niet meer terug naar zijn gezin van herkomst. Een alternatieve strategie is het zorgen voor een sterke, steunende, langdurige hechtingsband met een prosociale volwassene, zoals wordt voorgesteld door het Good Lives Model. Het Good Lives Model richt zich op het versterken van beschermende factoren, die zorgen voor veerkracht bij jongeren (bijvoorbeeld

een sterk sociaal netwerk, een opleiding afmaken, zinvolle dagbesteding). Het is aangetoond dat dit zorgt voor een verbeterd welzijn. Mogelijk wordt op die manier de neerwaartse spiraal naar een criminele carrière tegengegaan.

Voor toekomstig wetenschappelijk onderzoek is het van belang om uit te vinden op welke manier de risicofactoren en problemen die in dit proefschrift zijn onderzocht bij jongeren in JJI's invloed uitoefenen op de lange termijn. Daarbij is aandacht voor beschermende factoren ook essentieel. Longitudinaal onderzoek is van het grootste belang om beter te weten op welke manier de beschikbare middelen het best besteed kunnen worden. Uiteindelijk door toepassen van deze wetenschappelijke kennis in de praktijk, zorgen we dat een verblijf in de JJI bijdraagt aan een verbeterd welzijn en maatschappelijk functioneren van jongeren met ernstige gedragsproblemen.

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Hauk, mijn lieve zoontje. Je bent mijn zonneschijn.

Curriculum Vitae

Pauline Váhl was born in Alphen aan den Rijn, the Netherlands, on February 2nd 1980 and grew up in Heeze. After graduating the Lorentz Casimir Lyceum, Eindhoven in 1998 she studied Medicine at the VUmc in Amsterdam. During her studies she followed extra lectures on Child and Adolescent Psychiatry. For her Master thesis, she examined the psychosocial health of school children in Suriname together with two other medical students. In her final year, she followed an elective clinical rotation at the Yale University Department of Child and Adolescent Psychiatry, in New Haven, United States. She got her degree in 2006 and started working as physician at the pediatrics department of the Rijnland hospital in Leiderdorp. In 2007 she was contracted as physician/researcher with Curium-LUMC, academic center for Child and Adolescent psychiatry. In this function, she was also affiliated with the Teylingereind and Rentray Juvenile Justice Institutions. In a collaboration project with the VUmc department of Child and Adolescent psychiatry, she worked on developing a trajectory for screening and diagnosis of psychiatric problems in juveniles entering Juvenile Justice Institutions. This trajectory is currently used nationwide in the Netherlands. In 2010, she was selected for a Donald Cohen Fellowship program at the Beijing conference of the International Association for Child and Adolescent Psychiatry and Allied Professions. From 2013, Pauline combined the writing of her PhD-thesis with working as a physician at several institutions in Amsterdam: Novarum, treatment center for Eating Disorders and Obesity; Jellinek, center for addiction treatment; Mentrum Vlaardingenlaan, clinic for addiction and psychiatry and Academic Medical Center, psychiatry department. In October 2015 she started training as a psychiatrist at Arkin in Amsterdam.

Pauline lives in Amsterdam, together with Matthijs Honders and their son Hauk (4).

List of Publications

In this dissertation

Psychopathic-like traits in detained adolescents: clinical usefulness of self-report
P. Váhl, O. Colins, H. Lodewijks, M. Markus, Th. Doreleijers, R. Vermeiren
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Neural correlates of social information processing in severely antisocial adolescents
W. van den Bos, P. Váhl, B. Güroglu, F. van Nunspeet, O. Colins, M. Markus, S. Rombouts, N. van der Wee, R. Vermeiren, E. Crone
Social Cognitive and Affective Neuroscience, December 2014

Psychopathic-like traits and maltreatment: relations with aggression and mental health problems in detained boys
P. Váhl, O. Colins, R. Lindauer, H. Lodewijks, T. Doreleijers, R. Vermeiren
International Journal of Law and Psychiatry, May-June 2016

Emotional maltreatment among detained male adolescents: relations with aggression and mental health problems
P. Váhl, O. Colins, T. Doreleijers, R. Vermeiren
International Journal of Forensic Mental Health, Accepted pending revision

The relation of maltreatment with aggression and mental health problems in detained adolescents: gender differences
P. Váhl, L. van Damme, O. Colins, T. Doreleijers, R. Vermeiren
Child Abuse & Neglect, Accepted pending revision

Other publications

Book Review: *C.E. Coffey, R.A. Brumback. Pediatric Neuropsychiatry*
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C. Boonmann, L. Jansen, L. 't Hart-Kerkhoffs, P. Váhl, S. Hillege, Th. Doreleijers, R. Vermeiren
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C. Boonmann, L. Jansen, T. Grisso, L. Guy, O. Colins, P. Váhl, E. Mulder, Th. Doreleijers, R. Vermeiren
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O. Colins, P. Váhl & B. Wolf
Professional Resource Press, 2012.

Screening en diagnostiek in Justitiële Jeugdinrichtingen, implementatie en evaluatie
N. Hornby, E. Mulder, O. Colins, C. Pronk, P. Váhl, H. Lodewijks, Th. Doreleijers, M. Markus, L. van Domburgh, R. Vermeiren
Onderzoeksrapport t.b.v. opdrachtgever
Academische Werkplaats Forensische Zorg voor Jeugd, 2012

Blog, Landelijk Kenniscentrum Kinder- en Jeugdpsychiatrie
blogs.kenniscentrum-kjp.nl