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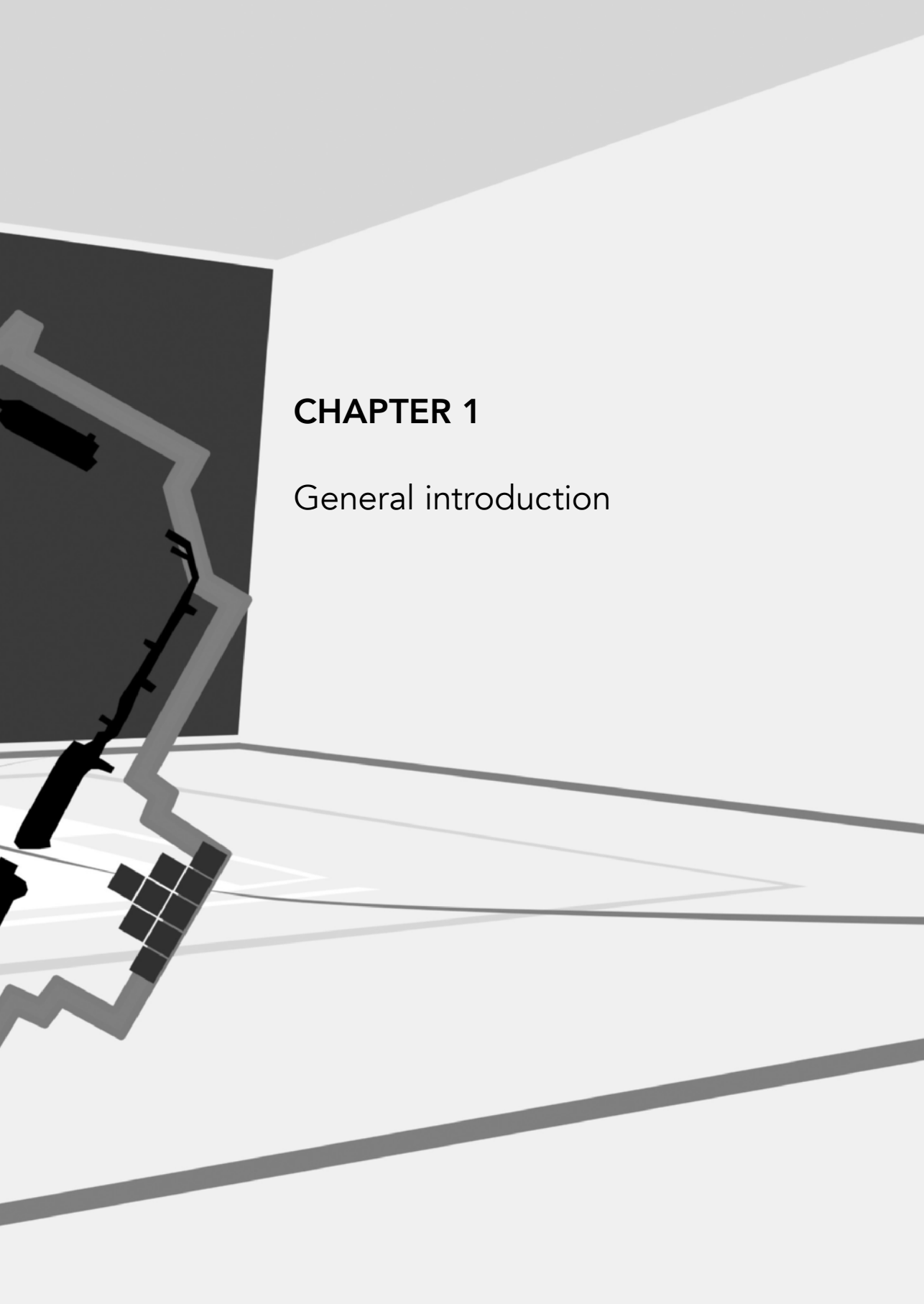

CHAPTER 1

General introduction

There is a great necessity to increase the knowledge on treatment outcome in adolescents with antisocial behavior, both for youths themselves as well as for society. It is shown that antisocial behavior in children and adolescents often persists into adulthood (Mordre, Groholt, Kjelsberg, Sandstad, & Myhre, 2011; Odgers et al., 2008). Also, unfavorable outcomes with respect to their psychiatric, social and general functioning later in life have been found (Abram, Choe, Washburn, Romero, & Teplin, 2009; Abram et al., 2015; Knapp, King, Healey, & Thomass, 2011). As a result, the financial burden of juvenile antisocial behavior is significant and warrants special attention (Romeo, Knapp, & Scott, 2006). Consequently, effective interventions can have considerable benefits (Scott, Knapp, Henderson, & Maughan, 2001), specifically for those children with the highest risk (Foster & Jones, 2006). Unfortunately, current treatment programs have shown only small to moderate effect sizes (Bakker, Greven, Buitelaar, & Glennon, 2017; McCart, Priester, Davies, & Azen, 2006; Wilson & Lipsey, 2007). Moreover, a subgroup of adolescents with severe antisocial behavior seems unresponsive to generally used interventions (McCart et al., 2006). This subgroup specifically often suffers from disruptive behavior disorders (DBD), which is differentiated in oppositional defiant disorders (ODD) and conduct disorders (CD) according to the DSM 5 (American Psychiatric Association, 2013). Various treatment programs have been developed for DBD adolescents, of which the most intensive forms are often provided in closed youth care institutions. Closed placement is usually ordered by either civil or criminal law measures and is seen as a final opportunity to intervene. However, even the most thorough and far-reaching interventions in closed treatment settings did not prove to be effective for all adolescents (Boendermaker, Van Rooijen, Berg, & Bartelink, 2013; Dam, Nijhof, Scholte, & Veerman, 2010; De Swart et al., 2012). Therefore, it is important to gain more knowledge as to which individual characteristics predict effectiveness of treatment (Bakker et al., 2017). Herewith, interventions may be tailored to specific needs of this subgroup to increase treatment response and subsequently reduce future negative outcomes for the youths as well as society.

Antisocial behavior

Antisocial behavior in youths can be described as conduct that violates the basic rights of others and is considered to be disruptive to society. An important aspect in characterizing this behavior is the broad variety in which the conduct is expressed, such as delinquency, aggression or rule-breaking behavior. In

psychological research this behavior is generally described as externalizing behavior (Achenbach & Rescorla, 2001). As opposed to internalizing behavior, in which individuals keep their maladaptive emotions and cognitions inside, in individuals with externalizing behavior these emotions are directed towards the environment, i.e. manifested outwards. A more specific distinction is frequently made between proactive and reactive aggression. Proactive aggression concerns intentional, goal directed aggression and can be motivated by external rewards, resulting in disrespect of people's feelings and rights (Dodge & Coie, 1987; Flight & Forth, 2007). Reactive aggression, on the other hand, is described as an impulsive, defensive reaction to frustration or provocation, accompanied by anger and loss of control (Berkowitz, 1989; Dodge & Coie, 1987). DBD adolescents are thought to show the most antisocial behavior. However, even within these adolescents distinctions in severity and persistence of antisocial behavior can be recognized (American Psychiatric Association, 2013; Fairchild, Van Goozen, Calder, & Goodyer, 2013; Frick & Moffitt, 2010).

Subgroups of adolescents with persistent antisocial behavior

Previously, the age of onset of delinquent behavior showed to be useful in differentiating children and adolescents into those with self-limiting, and those with life-course-persistent, conduct problems (Moffitt, 1993). In this *age-of-onset* taxonomy, the early-onset of antisocial behavior is thought to designate a life-course-persistent antisocial behavior, while when this behavior starts in adolescence, the course is described as self-limiting (Moffitt, 1993). However, more recent studies challenged this taxonomy. Subgroups of children with childhood-onset conduct problems that desisted from serious antisocial behavior by adolescence were described, as well as individuals with adolescence-onset CD that continued to show severe antisocial behavior and experienced poor mental and physical health adulthood outcomes (Fairchild et al., 2013). Consequently, other factors that relate with the persistence of antisocial behavior are thought to be present (Fairchild et al., 2013; Moffitt et al., 2008; Vermeiren, Schwab-Stone, Ruchkin, De Clippele, & Deboutte, 2002).

Research into psychopathic features in adults has shown a strong association with violent behavior, criminal recidivism and treatment nonresponse (Hildebrand, De Ruiter, & Nijman, 2004; Hobson, Shine, & Roberts, 2000; Salekin, Rogers, & Sewell, 1996). Psychopathy can be best defined by four factors: interpersonal, affective, lifestyle and antisocial behavioral characteristics (Wong & Hare, 2006).

As adult psychopathy was associated with an early onset of antisocial behavior (Hare, McPherson, & Forth, 1988), the concept of psychopathy became relevant to research into persistent aggressive and antisocial behavior in children and adolescents. However, as in adults the four factor model is specifically advocated (Hill, Neumann, & Rogers, 2004; Neumann, Vitacco, Hare, & Wupperman, 2005; Vitacco, Neumann, & Jackson, 2005), in child's and adolescents' psychopathy a three dimension model is prevailing: Grandiose-Manipulative (GM); Callous-Unemotional (CU); Impulsive-Irresponsible (II) (Andershed, Hodgins, & Tengström, 2007; Andershed, Kerr, Stattin, & Levander, 2002; Frick, Bodin, & Barry, 2000; Frick & Hare, 2001). Specifically the CU-dimension seems to define a more severe subgroup of youths with persistent antisocial behavior (Frick, Ray, Thornton, & Kahn, 2014b). CU-traits typically reflect a lack of empathy and guilt, shallow emotions and callousness. Previous research has linked CU-traits to a severe, violent and persistent pattern of antisocial behavior and delinquency (Frick et al., 2014b). Moreover, CU-traits are relatively stable from childhood into early adolescence and adulthood (Loney, Taylor, Butler, & Iacono, 2007; Obradovic, Pardini, Long, & Loeber, 2007). The research on CU-traits and their role in the development trajectories of conduct disorder (CD) has led to the inclusion of the new Limited Prosocial Emotions (LPE) specifier in the DSM 5 CD-classifications (Frick & Moffitt, 2010). The presence of the LPE-specifier is thought to designate a more severe and persistent subgroup of CD disordered youth. However, the debate on the potential influence of CU-traits on treatment outcome is ongoing. Different results are reported, showing CU-traits as having a negative effect, no effect, or even a favorable effect on treatment outcome (see Frick et al. (2014) for a comprehensive review). Therefore, there is a need to further unravel their role in nonresponse of adolescents with antisocial behavior.

In this respect, a question that needs to be answered is whether additional factors may influence the relation between dimensions of psychopathy, i.e. CU-traits, and aggression (Blais, Solodukhin, & Forth, 2014). One such factor is intelligence as it has frequently been associated with different dimensions of psychopathy and aggression (Ttofi et al., 2016; Vermeiren et al., 2002; Vitacco, Neumann, & Wodushek, 2007). Moreover, treatment effect in children with intellectual disabilities has been shown to be limited (Ali, Hall, Blickwedel, & Hassiotis, 2015). As such, there is a need to replicate studies on the relationship between psychopathy and different forms of aggression, and integrate intelligence as a potential moderating factor. Knowledge of the role of intelligence on this relation

may help to better understand reduced treatment effect in adolescents with antisocial behavior.

Hypothalamus-pituitary-adrenal axis and persistent antisocial behavior

Antisocial behavior is generally thought to be the result of an interplay between neurobiological and psychosocial risk factors (Popma & Raine, 2006; Van Goozen, Fairchild, Snoek, & Harold, 2007). One of the neurobiological factors thought to play an important role in the development of antisocial behavior is low arousal. The low arousal theory states that low arousal may lead to antisocial behavior via two possible mechanisms. First, the *sensation seeking theory* (Zuckerman, 1994) states that individuals with low basal arousal tend to seek out stimulating and risky situations (e.g. criminal activities) in an attempt to increase their arousal to an optimal level. Second, the *fearlessness theory* (Raine, 1993; Raine, 2002), argues that low arousal is associated with fearlessness, which indicates insensitivity to punishment, and thereby impaired learning from punishment. Results in favor of the *Low Arousal Theory* have been repeatedly replicated (for meta-analyses see Lorber, 2004; Ortiz & Raine, 2004; Portnoy & Farrington, 2015). One relevant neurobiological mechanism that is related to stress and arousal is the hypothalamic-pituitary-adrenal (HPA) axis (Susman, 2006). The HPA-axis is the main endocrine stress regulatory system. Previous studies have shown that the activity of the HPA-axis is indeed decreased in children and adolescents with antisocial behavior (Alink et al., 2008). Moreover, decreased HPA-axis activity has been related to reduced treatment response as well (Cornet, De Kogel, Nijman, Raine, & Van der Laan, 2013). Adolescents with fearless behavior are thought to be more likely to engage in aggressive and delinquent acts as they are not daunted by the negative consequences such as punishment. Since the usual interventions for youth with severe conduct problems, e.g. contingency management therapies, make use of rewarding prosocial behavior, and punish or disapprove antisocial behavior, low levels of fear may lead to a decreased responsiveness to interventions (Stadler et al., 2008). However, inconsistent results were reported as well (Van Bokhoven, Matthys, Van Goozen, & Van Engeland, 2005). An explanation for the different findings may be related to differences in the level of CU-traits (Dadds & Rhodes, 2008; Hawes, Price, & Dadds, 2014; Stadler, Poustka, & Sterzer, 2010). It has been found that a decreased HPA-axis (re)activity is specifically present in youth with a high level of CU-traits that also show fearlessness and insensitivity to punishment cues (Dadds & Rhodes, 2008;

Hawes, Brennan, & Dadds, 2009; O'Brien & Frick, 1996; Van Goozen et al., 2007). Consequently, it is hypothesized that specifically the interactive effect of high CU-traits and decreased HPA-axis functioning result in the most severe subgroup of adolescents with antisocial behavior, and that this group shows the least treatment response. In cross-sectional studies, the combined effect of high CU-traits and low HPA-axis functioning has been related to more antisocial behavior in various samples (e.g. Stadler et al., 2011; Vaillancourt & Sunderani, 2011; Von Polier et al., 2013). However, there are no longitudinal studies into the combined effect of high CU-traits and low HPA-axis functioning on treatment outcome.

Current aims and study design

The aim of the proposed study is to investigate the relevance of CU-traits and neurobiological characteristics, in identifying a severe subgroup of adolescents with antisocial behavior, and their combined influence on responsiveness to treatment in a closed care institution for youth. To do so, we investigated in which way CU-traits independently, and in combination with an altered HPA-axis functioning, affected treatment outcome.

Methods

In order to fulfill the aims of this study, participants were recruited from De Koppeling, a closed treatment facility in Amsterdam for adolescents with severe conduct problems. In the Netherlands, adolescents with severe behavioral problems can be send to compulsory treatment in a closed facility by means of civil law court measures. For the current study, all adolescents that were admitted to the facility between 2009 and 2013 were assessed. Within the first 6 weeks of admission, information regarding psychiatric problems was collected as part of the standard diagnostic process.

Subsequently, for the longitudinal part of this thesis, all adolescents who started a group training to reduce aggressive and antisocial behavior, the *Training Aggression Control* (TACt), were asked to participate, resulting in a total of 159 participants. The TACt is a 12 week standardized group training for adolescents to reduce aggressive and delinquent behavior based on the principals of the Aggression Control Training (ART), originally developed by (Glick & Goldstein, 1987). The TACt consists of three main components: social skills training, anger control training, and moral reasoning. The effective principles of TACt are based on the role of social learning in the acquisition of social and behavioral skills and

moral beliefs. Each week, the three components of the TACt are included in one-hour group sessions on separate days.
At three time points during the participants' stay; the week before the TACt, the week after the intervention and in the last week before leaving the facility, CU-traits were measured by self-report questionnaires, and saliva was gathered to assess the Cortisol Awakening Response (CAR), as a measure of HPA-axis (re) activity.

Outline

First, in chapter 2 we describe a cross-sectional study in which the relationship between dimensions of psychopathy and proactive and reactive aggression was moderated by intelligence. Then, the following three chapters describe studies concerning the treatment of antisocial youth, and elaborate on the relevance of CU-traits and HPA-axis activity for treatment outcome. In chapter 3 a meta-analysis on the relation between pretreatment CU-traits and treatment outcome of antisocial behavior in children and adolescents is described. In chapter 4 we reported on a study that tested the interactive effect of CU-traits and HPA-axis activity in predicting alterations in antisocial behavior during and after an intervention. Then, in chapter 5, a longitudinal study is presented in which we analyze the relation between CU-traits and HPA-axis functioning during the TACt intervention and after until release from the institution. The study presented in chapter 6 elaborates on the clinical relevance of CU-traits related LPE-specifier for the CD diagnosis in the DSM5. Finally, chapter 7 summarizes the main findings of this thesis, followed by a general discussion and conclusion.