Inside the psychopathic mind : social cognition, emotional experience, and affect regulation in psychopathy

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Social cognition, emotional experience, and affect regulation in psychopathy

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Chapter 1

General introduction

In essence, human beings are social creatures. Our survival is deeply rooted in a remarkable capacity to show love and compassion, to form attachment relationships with one another, and to display acts of altruism and self-sacrifice. Psychopathic individuals represent a relatively small number of people that deviate from this interpersonal norm. While displaying a callous lack of empathy towards others, psychopaths seem to have profound difficulties in showing loyalty to even their closest relatives, and engage in conduct that is driven primarily by self-benefiting, egocentric motives. Not surprisingly, psychopathy is associated with a considerable societal burden in terms of financial costs and emotional consequences for the people who are victimized by those who have this disorder.

The majority of theories that attempt to explain psychopathy put deficiencies in affective functioning at the core of its development. The current thesis describes a series of studies that was conducted to gain more insight into several emotional constructs in criminal psychopathy. This introductory chapter will first provide a theoretical overview of the main approaches that have been adopted to conceptualize psychopathy. Subsequently, the applicability of these perspectives in explaining the full range of emotional impairments that are clinically and theoretically relevant to this disorder will be discussed. A general contemporary perspective on emotional functioning will then be provided that outlines a number of components that are considered crucial to an integrative understanding of emotional function and dysfunction. For each of these components, this chapter will briefly describe its potential relevance to psychopathy and will give a description of what empirical research in psychopathic offenders can already tell us. Last, the aims of the current thesis on psychopathy are summarized in the light of this multi-componential view on emotion.

DEFINING PSYHOPATHY: BACKGROUND AN THEORETICAL ACCOUNTS

Psychopathy is a rare disorder, with a prevalence of less than 1 percent in the general population (Coid, Yang, Ullrich, Roberts, & Hare, 2009). Nonetheless, psychopathic individuals are responsible for a disproportionate amount of crime, which is illustrated in its relatively high prevalence rates in forensic settings (i.e., 15-25%, Blair, Mitchell, & Blair, 2005, pp. 18-19). This discrepancy coincides with a large body of research showing psychopathy to be related to a number of antisocial correlates. Psychopathic traits are, for example, robustly predictive of both violent and nonviolent criminal recidivism (Hemphill, Hare, & Wong, 1998; Olver, Neumann, Wong, & Hare, 2013) and institutional incidents (Guy, Edens, Anthony, & Douglas, 2005). Furthermore, a combination of psychopathy and sexual deviancy considerably increases offenders' risk on sexual recidivism (Rice & Harris, 1997). Individuals relatively high in psychopathy also tend to have longer and more diverse criminal careers (Kosson, Smith, & Newman, 1990), are more sadistic towards their victims (Holt, Meloy, & Strack, 1999), and tend to make more use of “cold-blooded,” premeditated forms of aggression than nonpsychopathic offenders (Reidy, Zeichner, Miller, & Martinez, 2007; Woodworth & Porter, 2002). Needless to say, it is of great importance to delineate the

mechanisms underlying psychopathy, in order to, for example, inform therapeutic interventions aimed at treating this disorder.

In his work "The Mask of Sanity," Cleckley (1941) was one of the first to give a theoretical description of psychopathy, accompanied by a list of diagnostic descriptors. In his account, psychopathic individuals are described as slick and deceitful individuals, whose life lacks long-term planning and whose antisocial behaviors seem reckless and poorly motivated. At the core of the disorder, Cleckley believed, lies a general poverty in affective responding (extending to moral emotions like guilt, shame, and empathy) and a profound deficiency to relate to others. He also postulated, though, that this severe emotional disturbance is hidden behind a facade of mental health, such that psychopathic individuals impress as charming, well-adjusted and at ease.

This theoretical framework still forms the basis of our current day conceptualization of psychopathy. Based on Cleckley's writings, Hare developed the Psychopathy Checklist (PCL; Hare, 1980), a clinical rating scale for the diagnosis of psychopathy in criminal offenders. While incorporating many of the criteria Cleckley used to describe psychopaths' shallow emotional and interpersonal life, Hare also included several items associated with criminal behavior. As of yet, the PCL and its successor the Psychopathy Checklist-Revised (PCL-R; Hare, 1991; 2003) have been the most widely used and validated psychopathy tools in clinical and scientific practice. Although psychopathy has been considered a unitary entity for decades, factor analytic research suggests that this disorder might be better explained by at least two moderately related, underlying dimensions (Hare et al., 1990; Harpur, Hakstian, & Hare, 1988): Factor 1 reflects interpersonal and affective personality traits, whereas Factor 2 is defined by a chronically unstable lifestyle and antisocial behavior.

Later research has also provided evidence for a model in which the two factors have been divided into four facets describing 1) interpersonal, 2) affective, 3) lifestyle, and 4) antisocial traits (Hare & Neumann, 2005). A three-factor model has also been suggested, in which the first three facets are retained, but from which the antisocial items are dropped (Cooke & Michie, 2001), giving rise to a debate of whether antisocial behavior should be considered central to psychopathy, or whether it constitutes a mere secondary correlate of this disorder (Hare & Neumann, 2010; Skeem & Cooke, 2010, see Table 1 for a full description of the PCL-R criteria in the different factor models). Regardless of the number and nature of the dimensions underlying psychopathy, there is broad agreement that it is the interpersonal and affective features that are at the heart of psychopathy, setting the disorder apart from other antisocial constructs such as Antisocial Personality Disorder (American Psychological Association, 2000; Hare, 1996a).

Table 1. *Different factor-models of psychopathy as assessed with the revised Psychopathy Checklist (PCL-R)*

Two-factor model	**Factor 1: Interpersonal/affective**	**Factor 2: Impulsive/antisocial lifestyle**
Hare et al. (1990)	1. Glibness/superficial charm 2. Grandiose sense of self-worth 4. Pathological lying 5. Conning/manipulative 6. Lack of remorse or guilt 7. Shallow affect 8. Callous/lack of empathy 16. Failure to accept responsibility	3. Need for stimulation/proneness to boredom 9. Parasitic lifestyle 10. Poor behavioral controls 12. Early behavioral problems 13. Lack of realistic, long-term goals 14. Impulsivity 15. Irresponsibility 18. Juvenile delinquency 19. Revocation of conditional release

Three-factor model	**Factor 1: Interpersonal**	**Factor 2: Affective**	**Factor 3: Lifestyle**
Cooke & Michie (2001)	1. Glibness/superficial charm 2. Grandiose sense of self-worth 4. Pathological lying 5. Conning/manipulative	6. Lack of remorse or guilt 7. Shallow affect 8. Callous/lack of empathy 16. Failure to accept responsibility	3. Need for stimulation/proneness to boredom 9. Parasitic lifestyle 13. Lack of realistic, long-term goals 14. Impulsivity 15. Irresponsibility

(Table 1 continues)

Table 1 (continued). *Different factor-models of psychopathy as assessed with the revised Psychopathy Checklist (PCL-R)*

Four-facet model	Facet 1: Interpersonal	Facet 2: Affective	Facet 3: Lifestyle	Facet 4: Antisocial
Hare & Neumann (2005)	1. Glibness/superficial charm 2. Grandiose sense of self-worth 4. Pathological lying 5. Conning/manipulative	6. Lack of remorse or guilt 7. Shallow affect 8. Callous/lack of empathy 16. Failure to accept responsibility	3. Need for stimulation/proneness to boredom 9. Parasitic lifestyle 13. Lack of realistic, long-term goals 14. Impulsivity 15. Irresponsibility	10. Poor behavioral controls 12. Early behavioral problems 18. Juvenile delinquency 19. Revocation of conditional release 20. Criminal versatility

Note. PCL-R items 11 (*Promiscuous sexual behavior*) and 17 (*Many short-term marital affairs*) do not load on any of the factors/ facets in these different models.

PSYCHOPATHY AS A DEVELOPMENTAL DISORDER

A growing body of research in children and adolescents supports the notion that psychopathy can be considered a developmental disorder. Frick, O'Brien, Wootton, and McBurnett (1994) have identified characteristics in conduct-disordered children that appear very similar to the interpersonal-affective features of adult psychopathy. These so-called callous-unemotional (CU) traits (e.g., lack of empathy and guilt, poverty in affective expressions) distinguish children with subsiding antisocial behavior from youth whose conduct is more severe, aggressive and chronic (Lynam & Gudonis, 2005). Children with CU traits present with similar impairments as adults who meet criteria for psychopathy, such as a reduced capacity for recognizing emotional facial expressions (Dawel, O'Kearney, McKone, & Palermo, 2012) and more displays of instrumental, pre-meditated aggression (Frick, Cornell, Barry, Bodin, & Dane, 2003; Woodworth, & Porter, 2002). Furthermore, psychopathic traits appear to be at least moderately stable from childhood to adolescence, as well as from adolescence to adulthood (Bezdjian, Raine, Baker, & Lynam, 2011; Taylor, Loney, Bobadilla, lacono, & McGue, 2003; Viding, Blair, Moffitt, & Plomin, 2005, for reviews, see Lynam & Gudonis, 2005 and Viding & McCrory, 2012). CU traits thus put children at risk of developing psychopathy in adulthood, although a substantial number of studies has also identified environmental factors that influence the development of CU traits. Harsh parenting and negative life experiences, for example, predict an increased level of CU traits (Barker, Oliver, Viding, Salekin, & Maughan, 2011; Kimonis, Centifanti, Allen, & Frick, 2014), whereas positive reinforcement and parental warmth decrease children's callous unemotionality (Hawes, Dadds, Frost, & Hasking, 2011; Waller et al., 2014, for a review, see Waller, Gardner, & Hyde, 2013). Psychopathy thus seems to find its roots in an interplay between genetic and environmental influences.

THEORIES OF ADULT PSYCHOPATHY

The low-fear hypothesis

The vast majority of theories that account for psychopathy in adults place heavy emphasis on a deeply rooted deficiency in affective functioning as the main cause of this disorder. For a long time, such accounts have predominantly traced back psychopathy to an innate deficit in the neurophysiological systems regulating fear. According to Lykken's low-fear hypothesis (1995), children with a fearless temperament are prone to developing psychopathy due to their weak responsiveness to punishment, impeding moral socialization when combined with inadequate parenting. Supportive of this theory, Lykken (1957) found psychopathic inmates to show reduced conditioning of electrodermal responses and poor passive avoidance of punishment when compared with controls. Further support for this low-fear account has accumulated over the years, extending these latter findings (e.g., Blair et al., 2004; Veit et al., 2013) and showing psychopathy to be related to, for example, a reduced generation of

anticipatory responses to threat (Ogloff & Wong, 1990) and reductions in the subjective physiological experience of fear (Marsh et al., 2010). The low-fear dysfunction hypothesis and research aimed at its empirical validation have contributed greatly to our understanding of psychopathy. However, Blair and colleagues (2005) have raised a number of problems with this theoretical framework, like not being compatible with more recent accounts indicating moral socialization to be achieved through empathy induction rather than through the use of fear-inducing strategies like punishment (Hoffman, 2000; see Blair et al., 2005, pp. 72-76). Furthermore, although this theory accounts for psychopathic individuals' increased levels of antisocial behavior, it does not explain the callous-unemotionality that characterizes psychopathy.

The violence inhibition mechanism model

In order to overcome these limitations, Blair developed the violence inhibition mechanism (VIM) model of psychopathy (Blair, 1995; Blair et al., 2005, pp. 76-79). According to this theory, most humans are biologically predisposed to experiencing others' distress as aversive. Signals of discomfort, such as expressions of fear or sadness, activate a VIM that gives rise to a “freeze” response (inhibiting ongoing behavior) and an increase in attention and arousal. This physiological arousal is subsequently experienced as aversive and results in moral affect (e.g., guilt, empathy) through cognitive interpretative processes. Through classical conditioning, transgressions (and eventually the mere thought of transgressing) become triggers for the VIM, thereby inhibiting future antisocial behavior. Blair posits that children prone to psychopathy show deficiencies in the VIM. This account complements the low fear-dysfunction hypothesis by explaining psychopathy-specific deficiencies in the experience of guilt and empathy (Hare, 1991; 2003). It also provides a framework for understanding psychopaths' reduced capacity to recognize sad and fearful expressions (Blair, Colledge, Murray, & Mitchell, 2001) and attenuated physiological responsiveness to others' pain and distress (Blair et al., 2005, pp. 76-79; Blair, Jones, Clark, & Smith, 1997; Decety, Skelly, & Kiehl, 2013). It does not, however, explain why psychopathic offenders' dysfunction extends to a wider range of emotions (e.g., positive emotion, e.g., Blair, Richell, Mitchell, et al., 2006; Verona, Curtin, Patrick, Bradley, & Lang, 2004).

The integrated emotion systems model

More recently, Blair extended and integrated the low-fear hypothesis and VIM model by formulating the integrated emotion systems (IES) model (Blair et al., 2005, pp. 110-140). According to this theoretical framework, a genetically based dysfunction in specific parts of the amygdala constitutes the major cause of the interpersonal/affective traits of psychopathy. Moreover, this amygdala deficiency is only believed to lead to the development of lifestyle/antisocial traits when combined with certain social environmental influences (e.g., an antisocial learning history). The IES model contrasts the low-fear hypothesis by stating that fearlessness is not necessarily a causal agent in the etiology of

psychopathy, but rather describes this temperamental predisposition to be the result of reduced amygdala functioning. In addition, it refines the low-fear account by suggesting that not all learning processes that involve punishment are affected in psychopathy. Instead, psychopaths' deficient moral socialization is explained only by those processes normally involving the amygdala, such as the formation of stimulus-affect associations (as in, for example, both aversive and appetitive conditioning), but not the formation of stimulus-response associations. Furthermore, Blair and colleagues (2005) suggest, although tentatively, that in the context of non-associative emotional responding, psychopathy might only be related to hyporeactivity when responses are dependent on the integrity of the amygdala (e.g., when reacting to others' pain; Decety et al., 2013), but not when this reactivity is more reliant on other brain structures (which might be the case when responding to, for example, visual threat; Blair et al., 1997; Blair et al., 2005, pp. 116-117). This possibility could account for the inconsistencies between studies reporting on physiological reactivity in psychopathy (Blair et al., 2005, pp. 110-140; see below).

The IES model also provides an elaboration on the VIM model by specifying the nature of the dysfunctions that are central in the latter theory. That is, the amygdala is thought to be involved in responding to others' distress cues, as well as in the formation of the association between such signals and antisocial transgressions, as described in the VIM. In addition, the IES model posits that psychopathy might also be related to a deficit in orbital frontal cortex functioning, reflected in poor response control and response reversal (i.e., the capacity to learn to withhold a response that was previously rewarded but that is now followed by punishment; Blair et al., 2005, pp. 110-140). In accordance with the IES account, psychopathy is related to a number of deficiencies in processes that rely on intact amygdala functioning (Blair et al., 2005, pp. 110-140), such as emotion-facilitated word processing (Reidy, Zeichner, Hunnicutt-Ferguson, & Lilienfeld, 2008), emotional memory (Christianson et al., 1996), and augmentation of the startle reflex in the context of aversive stimuli (Herpertz et al., 2001; Patrick, 1994). Research also shows psychopathic individuals to indeed present with dysfunction in the orbital frontal cortex (Kiehl, 2006). There are, however, also a number of psychopathic characteristics that fall outside the scope of the IES. Although this model recognizes that social influences contribute to the development of psychopathy, the nature of these environmental factors and the way in which they interact with genetic predispositions remains highly unspecified. Furthermore, it does not provide explanations for processes that are central to psychopaths' interpersonal behavior, such as the tendency to dominate and control others (Vitacco & Kosson, 2010) or their hostile and antagonistic interpersonal style (Hicks & Patrick, 2006). The IES also does not account for the wider range of brain abnormalities that has been empirically and theoretically linked to psychopathy (see, Kiehl [2006] for an overview and theoretical integration of this neuroscientific literature).

The response modulation hypothesis

The vast majority of theories explaining psychopathy focus on disturbances in affective functioning as its main cause. Newman and colleagues, however, claim that these emotional disturbances are the result of an attentional problem, rather than being reflective of psychopaths being fundamentally incapable of processing emotional material (Newman, 1998; Patterson & Newman, 1993). According to their response modulation (RM) hypothesis, psychopathic symptomatology arises from a deficit in the relatively automatic shift of attention from ongoing goal-directed behavior to the evaluation of this behavior. Normally, such re-allocation of attention enables an individual to use peripheral, yet goal-relevant information (e.g., negative feedback) to adjust behavior resulting in more adaptive choices. The RM hypothesis posits that psychopathic individuals, due to their lack of attentional responsivity to peripheral cues (including emotional information), have difficulty altering maladaptive behavior in the face of changing contingencies. This hypothesis explains a range of behavioral dysfunctions seen in psychopathic individuals, such as their difficulties in response reversal in the context of changing contingencies (Mitchell, Colledge, Leonard, & Blair, 2002) and decreased interference of emotion in semantic processing (Lorenz & Newman, 2002; Mitchell, Richell, Leonard, & Blair, 2006). The RM model, however, remains silent on many other dysfunctions in psychopathic offenders, such as their callousness and decreased moral emotion.

DIMENSIONAL APPROACHES IN EXPLAINING PSYCHOPATHY

Emerging insights into the underlying structure of psychopathy have given rise to the development of a new line of theories. Before moving on to these theories, two structural aspects of psychopathy are discussed, being a) the notion that psychopathy seems to be best represented by a continuum rather than a discrete diagnostic category, and b) the multi-factorial nature of this disorder.

Psychopathy as a continuum rather than categorical construct

Although psychopathy has long been considered a categorical entity, several studies suggest that its structure is more appropriately described in terms of a dimension (e.g., Edens, Marcus, Lilienfeld, & Poythress, 2006; Walters, 2014; Walters, Duncan, & Mitchell-Perez, 2007). These studies support the view that individuals differ in the degree to which they display psychopathic traits, rather than constituting distinct groups of individuals whose symptom presentation is quantitatively different from one another. Such a perspective on psychopathy is in line with other studies that, in general, provide more support for dimensional rather than categorical approaches in understanding normal personality and the vast majority of personality disorders (for a review, see Haslam, Holland, & Kuppens, 2012). In accordance with this dimensional view, some theorists argue that psychopathy can be understood as a maladaptive variant of normal personality, existing on a continuum with traits that are also found in healthy individuals. Psychopathy has, for example, been

explained as a pathological constellation of dimensions from the five-factor model, primarily involving traits associated with high antagonism and low conscientiousness (Miller & Lynam, 2003). These developments have led to a growing number of studies investigating psychopathy in normal populations.[1]

The multi-factorial nature of psychopathy

As aforementioned, psychopathy is best represented by at least two underlying dimensions. Research highlights the importance of distinguishing between these factors by showing the interpersonal/affective and lifestyle/antisocial factor to be divergently related to a range of external correlates (Fowles & Dindo, 2009; Patrick, Cuthbert, & Lang, 1994). The interpersonal/affective factor, for example, is associated with narcissistic personality disorder (Hildebrand & de Ruiter, 2004), social dominance (Verona, Patrick, & Joiner, 2001), and a reduced risk of developing internalizing symptoms (e.g., anxiety, depression; Blonigen et al., 2010). The lifestyle/antisocial factor, on the other hand, shows associations with borderline and antisocial personality disorder (Hildebrand & de Ruiter, 2004), negative emotionality and suicidal behavior (Verona et al., 2001), and externalizing problems (e.g., impulsivity, substance misuse; Blonigen et al., 2010).

The dual-process model of psychopathy

Fowles and Dindo (2009) have captured this multi-dimensional structure in their dual-process model of psychopathy. Based on reasoning by Patrick and colleagues (1994), this account posits that the factors underlying psychopathy develop through different etiological mechanisms. The interpersonal/affective factor is thought to find its origin in a low-fear temperament as described in Lykken's low-fear hypothesis, whereas the lifestyle/antisocial factor reflects a core difficulty in the regulatory control of emotions and behavior. The dual-process theory synthesizes the youth and adult psychopathy literature by pointing out that similar pathways to antisocial behavior exist in children, constituting potential temperamental precursors of adult psychopathy. Relating to the interpersonal/affective factor is the aforementioned CU dimension identified by Frick and colleagues (1994, 2003), while the lifestyle/antisocial factor resembles a broader externalizing dimension in children, including, for example attention deficit hyperactivity disorder (ADHD) and conduct disorder

[1] As the PCL-R can only be used with individuals that have a criminal background, these investigations have mainly used more recently constructed self-report measures to assess psychopathy (e.g., the Psychopathic Personality Inventory [PPI]; Lilienfeld & Andrews, 1996). Such research provides further support for continuities in psychopathic traits between noncriminal and forensic samples, by showing certain psychopathy-specific deficits (e.g., reduced affective startle modulation) to extend to normal populations (Justus & Finn, 2007). Despite providing valuable insight in psychopathy across normal populations, these instruments seem to miss part of the traits that are considered central to psychopathy. That is, most self-report psychopathy scales are preferentially related to the lifestyle/antisocial behavior factor of the PCL-R rather than to the interpersonal/affective factor (Lilienfeld & Fowler, 2006).

(CD). Importantly, Fowles and Dindo (2009) stress that these temperamental risk factors do not necessarily result in the development of adult psychopathy. Certain psychopathic features (e.g., a lack of moral emotions) seem to result from the interactive effects of innate child factors and environmental influences (e.g., parenting practices). This latter notion is indeed supported by a large developmental literature. Research shows, for example, that prosocial emotions such as guilt and empathy, typically develop in a supportive parent-child relationship that is characterized by cooperation, trust, reciprocity, and positive affectivity (for a review, see Kochanska & Aksan, 2006). The importance of parenting is also illustrated by research such as that by Lyons-Ruth and colleagues (2013), which showed strong associations between maternal withdrawal in childhood and the development of antisocial personality disorder.

The triarchic model of psychopathy

Similarly, Patrick, Fowles, and Krueger (2009) have proposed a triarchic model of psychopathy to describe the underlying multi-dimensional structure of psychopathy. This model describes the disorder to be a configuration of three separable, yet converging dispositions that reflect different neurobiological influences, i.e., disinhibition, meanness, and boldness. Disinhibition reflects a deficiency in impulse control and is associated with a propensity towards externalizing problems, including child and adult antisocial behavior and reactive aggression. The development of this dimension is thought to involve both child characteristics (e.g., a temperament characterized by irritability and low frustration tolerance), parenting practices, and their interaction (Patrick et al., 2009; Patrick, Drislane, & Strickland, 2012). On a neural level, disinhibition might reflect impairments in anterior brain structures associated with the control of emotional and behavioral impulses (Patrick et al., 2012). Boldness is theorized to originate from an innate fearless temperament (reflecting aberrances in the amygdala and affiliated brain areas) that results in traits such as interpersonal dominance, emotional resiliency, and venturesomeness.[2] Meanness is thought to be a more "malignant" result of dispositional fearlessness (or, of a more general emotional deficit) and might be associated with disturbances in the neural structures involved in the experience of empathic concern for others (Patrick et al., 2012). This component parallels the previously described CU traits (Frick et al., 2003) and entails traits associated with

[2] Boldness especially distinguishes the triarchic model of psychopathy from other theoretical accounts of the disorder, by taking into account some of the positive adjustment features that were described in Cleckley's theory (e.g., "absence of nervousness" and "suicide rarely carried out"; Cleckley, 1941) that were not included in, for example, Hare's conceptualization of psychopathy (Hare, 2003; Patrick et al., 2009). The development of this model, along with such adaptive characteristics being tapped by some self-report measures of psychopathy (such as the PPI; Lilienfeld & Andrews, 1996), have brought about a debate of whether these positive traits are integral to psychopathy or not (see, Venables, Hall, & Patrick, 2014). As this debate is far from being resolved, the current thesis focuses on PCL-R assessed psychopathy. As of yet, this instrument is still the most widely used and extensively validated psychopathy assessment method.

affective unresponsiveness and interpersonal exploitativeness (e.g., a lack of empathy, callous aggression, manipulation). As like disinhibition, meanness is hypothesized to develop in interaction with certain environmental influences (i.e., the lack of a positive child-parent relationship and secure attachment; Patrick et al., 2009).

EXPLAINING EMOTION IN PSYCHOPATHY: AN EVALUATION OF CURRENT THEORY

The theories outlined above have been of tremendous value in advancing our understanding of psychopathy. Notably, the latter two dimensional models of psychopathy have greatly added to this theoretical knowledge by integrating child and adult perspectives on psychopathy, as well as by specifying potential environmental factors that are important to understanding this disorder (Fowles & Dindo, 2009; Patrick et al., 2009). However, there are several problems faced by the existent body of theoretical accounts when considering emotional dysfunction in psychopathy. A first issue concerns the type of emotion that psychopaths' deficiencies might be related to. In the clinical descriptions that laid the conceptual foundations of the psychopathy field, psychopathic individuals are described as being generally impaired in their emotional functioning (Cleckley, 1941; Hare, 1991, 2003). This dysfunction is described to affect a range of different emotions and to express itself in, for example, emotional shallowness and an incapacity to differentiate between emotions (such as between sadness and frustration). A lack of guilt feelings and decreased empathy are also central to these seminal accounts of psychopathy. Cleckley (1941) even considered psychopathic individuals to be incapable of feeling love and emphasized their unresponsiveness in interpersonal relationships.

The majority of these characteristics still figure prominently in the most widely used set of diagnostic indicators for psychopathy (i.e., the PCL-R). However, a substantial number of the theoretical accounts described earlier has moved away from such a general emotion perspective and puts a disposition for fearlessness at the core of developing psychopathic traits. This is a logical development concerning the robust findings on, for example, psychopathic individuals' reduced anticipatory anxiety (Ogloff & Wong, 1990) and attenuated startle reflex (Patrick, 1994). There are, however, numerous studies that have revealed psychopathy-specific deficits for other (positive and negative) emotions (Mitchell et al., 2006; Verona et al., 2004). A recent meta-analysis by Dawel and colleagues (2012), for example, concluded that the affect recognition deficits associated with psychopathy do not only concern fear, but extend to happiness, surprise, and sadness. Such findings call for theories and research that differentiate between emotions, including more complex affective states such as empathy and guilt. Although Blair and colleagues (2005) give more detailed explanations of these latter two concepts in relation to psychopathy, there is a dearth of experimental research investigating moral emotions in psychopathic individuals. In one study Cima, Tonnaer, and Hauser (2010) demonstrated that psychopathic offenders have an intact cognitive understanding of right and wrong in the context of moral dilemmas, but

authors conclude that these individuals might lack emotions in order to guide morally appropriate behavior. However, this study did not specifically examine moral emotions.

A second issue within the current field regards the range of emotional deficiencies that theories focus on. Overall, existing accounts describe psychopathic features (especially those loading on the interpersonal/affective dimension) to result from an innate unresponsiveness to cues that would normally elicit emotional reactions. This assumption has logically been based on a variety of different studies that indeed demonstrate that psychopathic individuals show deficient physiological responses in the context of emotion (Lorber et al., 2004). Furthermore, a deficit in the recognition of others' emotional states has been theoretically linked to the empathic deficiencies that characterize psychopathy (Blair et al., 2005). However, these contemporary theories remain largely silent on the role of several other emotional functions, even though there are well-grounded theoretical and empirical reasons to assume that they are, in fact, very relevant to a full understanding of psychopathy. Cleckley (1941), for example, emphasized the relationship between psychopathy and the incapacity to experience emotions, and with the mere title of his work ("The mask of sanity") he stressed the importance of certain facial expressive behavior as one of the disorder's hallmark features.

Empirical research has also consistently related disturbances in a wider range of emotional components to the interpersonal and behavioral problems that seem characteristic of psychopathy: a reduced awareness of one's own emotions is associated with impulsivity and alcohol use (e.g., Shishido, Gaher, & Simons, 2013) and difficulties in the regulation of negative affect are considered to impede the development of prosocial emotions such as empathy and guilt (Eisenberg, 2000; Kochanska & Aksan, 2006). Even though emotion regulation difficulties are described as risk factors for the development of psychopathy in more recent theories (e.g., Fowles & Dindo, 2009; Patrick et al., 2009), there is a scarcity of studies that have actually experimentally investigated the association between psychopathy and the control of emotion. The same holds true for constructs such as facial displays of affect and the subjective experience of emotion.

In order to broaden this narrow theoretical focus and create a more integrative picture of emotion in psychopathy, it is necessary to take theories of normal affective functioning into account. The remainder of this chapter will therefore describe a more general theoretical framework on emotion, which is followed by a discussion of how psychopathy fits into this perspective considering our current evidence base.

THE NATURE OF EMOTION: A MULTI-COMPONENTIAL FRAMEWORK FOR STUDYING AFFECT

Emotions are generally defined as short-lived, affective responses (i.e., positive or negative) to internal or external instigating stimuli (Frijda, 2008). Giving more detailed accounts of emotion has proven to be exceptionally challenging though, which is reflected in the numerous theoretical perspectives that have been adopted in explaining affective processes. Somatic approaches, for example, mainly focus on patterns of bodily reactions as being

crucial to emotion (James, 1884; Larsen, Berntson, Poehlmann, Ito, & Cacioppo, 2008), with some theorists identifying emotion as the activation of largely innate physiological systems with different adaptive functions (Bradley, Codispoti, Cuthbert, & Lang, 2001; Damasio, 1996). Cognitively oriented accounts, on the other hand, stress the necessity of interpretative processes for the emergence of affect (e.g., Lazarus, 1991). The definition of emotion has further been complicated by different attempts to distinguish between emotions. Ekman, for example, considered affect to be best conceptualized in discrete terms, with distinct patterns of facial expression providing indications about the number of different emotional states that can be distinguished (Ekman, 1993). Other theorists, conversely, consider emotion to be more fluid in nature and describe affective states by mapping them onto a number of different dimensions (e.g., dominance, arousal, and valence; Bradley & Lang, 1994).

According to recent emotion theories, these different accounts are not necessarily mutually exclusive; each perspective merely emphasizes different affective aspects. Contemporary perspectives provide an integration of theoretical approaches by describing emotion as a complex response pattern involving the activation and interaction of various components (Frijda, 2008; Plutchik, 2001; Power & Dalgleish, 2008; Scherer, 2000). The components that are considered to constitute emotion vary slightly per theorist, but generally include appraisal (or perception), physiological arousal, action potential, subjective experience and expression of emotion. Furthermore, the control or inhibition of emotion is considered to play a central role in affective processes (Frijda, 2008; Power & Dalgleish, 2008). Despite their reciprocal relatedness, these elements may each have a different degree of activation and time course (Scherer, 2000). For emotion to occur, it might thus not be necessary that all different components are involved at the same time. Whether emotional constituents are activated and influence each other might also depend on secondary factors such as an individual's mood, self-concept, personality and (interpersonal) environment (Aquino & Reed, 2002; Frijda, 2008; Power & Dalgleish, 2008). Such a dynamic, pan-theoretical perspective reconciles disparities between more unidimensional emotion theories and explains why activation in different domains (e.g., bodily responses vs. facial expressions) do not always show identical patterns (Larsen et al., 2008; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005).

PSYCHOPATHY AND THE APPRAISAL OF EMOTION

Appraisal processes give meaning and affective value to incoming stimulus information in the light of an individuals' goals and well-being and provide a means to evaluate the personal relevance of an event (Frijda, 2008; Lazarus, 1991; Scherer, 2000). There is compelling evidence that it is the appraisal of a stimulus that gives rise to emotion, rather than an event itself. As a result, a similar situation can result in a range of different emotions across individuals (Scherer, 2000; Power & Dalgleish, 2008). The capacity to appraise the emotional meaning of interpersonal stimuli is considered crucial for the establishments of close,

nonhostile interactions (Frijda, 2008), stressing the importance of taking these evaluative processes into account when studying psychopathy.

The appraisal of emotional stimuli is believed to be modulated by dissociable neuro-cognitive pathways that differ in level and speed of information processing. On the one hand, a subcortical pathway (depending on limbic structures like the amygdala) provides an intuitive and reflexive impression, whereas a slower, cortical route that relies on higher-order processes results in a more fine-grained, complex interpretation of information (Adolphs, 2002; LeDoux, 1996). Research indicates that psychopathy seems to be associated with deficiencies in the processing of emotional information when this requires the integrity of the first, automatic pathway. Psychopathic individuals, for example, show difficulties in processing the affective value of words in priming paradigms (e.g., Blair, Richell, Mitchell, et al., 2006), as well as in the identification of vocal and facial expressions of emotion (Dawel et al., 2012).

Notably, psychopathic individuals show no deficiencies in the appraisal of other individuals' mental states (e.g., thoughts, intentions) by taking someone else's perspective, even if these mental states concern emotion (i.e., psychopathy is related to an intact cognitive empathy, or Theory of Mind [ToM]; Baron-Cohen, 2000; e.g., Dolan & Fullam, 2004). This latter observation seems to imply that psychopaths' cognitive appraisal of emotional stimuli might be intact. However, there are empirical indications that in some instances, psychopathy is in fact related to aberrances in the higher-order, interpretative processes that underlie the appraisal of emotional stimuli. For example, Vitale, Newman, Serin, and Bolt (2005) showed psychopathy to be related to an increased probability of attributing hostile intentions to story characters. As the tendency for such appraisals increases the likelihood of angry emotional and behavioral responses (Power & Dalgleish, 2008), these results illustrate the importance of further examining the potential biases in psychopaths' cognition in interpersonal contexts. As of yet, however, very little research has examined the cognitive, interpretational processes that underlie emotional appraisals in psychopathy.

PSYCHOPATHY AND PHYSIOLOGICAL RESPONSIVENESS TO EMOTIONAL STIMULI

An appreciably larger number of studies has investigated the physiological substrates of emotional reactivity in psychopathy. Psychophysiological assessments provide an indication of emotional arousal that is considered to be less susceptible to voluntary control. Moreover, individuals do not need insight into their own bodily responsiveness in order to yield reliable assessments, as is the case for self-reported affect (Larsen et al., 2008). Especially in forensic contexts, where concerns about truthful self-presentation and introspection are pertinent (e.g., Lobbestael, Arntz, Löbbes, & Cima, 2009), physiological research thus provides a valuable means of complementing research on psychopathy in other emotional domains.

The measures that have been most frequently used in psychophysiological research on psychopathy concern skin conductance (SC) and heart rate (HR) (for research on

psychopaths' startle responding and facial expressiveness, see below). Both SC and HR are both robustly associated with emotion-induced autonomic nervous system (ANS) activity (Larsen et al., 2008). Such research shows that psychopathy seems to be rather consistently related to a reduced autonomic responsiveness in the anticipation of otherwise anxiety-inducing events (i.e., a shock, or social stressor task; Brook, Brieman, & Kosson, 2013; Ogloff & Wong, 1990). However, psychopaths tend to show normal SC and HR responsivity during the actual aversive events themselves (Gao, Raine, & Schug, 2012; Ogloff & Wong, 1990).

Studies that have investigated the effect of emotional material (e.g., pictures or film clips) on HR and SC activity yield more complex results. In a recent review, Brook and colleagues (2013) concluded that in the majority of such studies, psychopathic individuals showed the same physiological responsivity as their nonpsychopathic counterparts for a range of different emotions (e.g., joy, fear, sadness, disgust; e.g., Pham, Philippot, & Rime, 2000). Brook et al. (2013) did reveal some emotion-specific effects, such as psychopaths showing increased SC reactivity in the context of anger and thrill scenes, but a reduced responsivity when looking at others in distress and during fearful imagery (e.g., Blair et al., 1997; Levenston, Patrick, Bradley, & Lang, 2000). Research by Verona and colleagues (2004) further complicates this picture by showing that offenders high in the interpersonal/affective features of psychopathy show reduced SC reactivity to both pleasant and unpleasant emotional sounds. Current research is thus far from conclusive about the physiological correlates of psychopaths' emotional functioning. Furthermore, these findings stress the importance of differentiating between psychopathy factors when studying emotion.

PSYCHOPATHY AND ACTION POTENTIAL

One of the most important functions of emotion is to prompt a state of physiological and mental readiness that enables an individual to carry out the behavior that is most adaptive in the context of a particular emotion-eliciting event (Bradley et al., 2001; Frijda, 2008; Lazarus, 1991; Power & Dalgleish, 2008; Scherer, 2000). According to some evolutionary oriented theorists, discrete emotions are characterized by more or less fixed patterns of physiology and action tendencies that result in specific behaviors (Plutchik, 2001). Disgust, for example, prevents us from consuming harmful substances, anger prepares us for confrontation, and fear facilitates flight in the face of danger. Although intuitively appealing, empirical studies have yielded very mixed results on this emotion-specific account, and seem to provide stronger support for the value of valence in predicting action tendencies (Larsen et al., 2008). That is, positive emotion states tends to be robustly associated with approach tendencies, whereas negative emotions more readily result in avoidance. One exception is the experience of anger, which is a negative emotion associated with approach tendencies (Krieglmeyer, Deutsch, de Houwer, & de Raedt, 2010).

Based on such findings, Lang and colleagues have formulated a theory that has been highly influential in psychopathy research. This account states that emotion is fundamentally organized around two primitive, motivational neural systems that regulate action tendencies:

an aversive, or defensive system that governs avoidance behaviors (e.g., escape, withdrawal) and an appetitive system that modulates approach tendencies (e.g., exploration; Bradley et al., 2001; Lang, Bradley, & Cuthbert, 1990). Startle reactivity (e.g., eye blink responsivity elicited by a loud noise) is believed to be an index of the activity of these two motivational systems. In healthy individuals, the startle reflex is reduced when being primed with positive material, whereas the presentation of negative material enhances the startle reflex. A number of studies have shown that psychopathic individuals fail to show enhancement of the startle reflex when looking at negative material (e.g., victim scenes, threatening material) when compared to neutral pictures (Levenston et al., 2000; Patrick, 1994). This finding seems especially linked to the interpersonal/affective features of psychopathy and is believed to reflect a diminished activation in the defensive system that governs avoidance potential (Levenston et al., 2000).

A recent study adds to this latter interpretation, by showing that psychopathic offenders do not have the behavioral avoidance tendencies that healthy controls show when being confronted with angry facial stimuli (von Borries et al., 2012). Interestingly, a reduced reflexive tendency to avoid angry faces has also been linked to interpersonal dominance (Terburg, Hooiveld, Aarts, Kenemans, & van Honk, 2011). The approach-related action tendencies that seem to characterize psychopathy might thus form an explanation for the dominant and controlling interpersonal behavior that is typical for this disorder.

PSYCHOPATHY AND THE SUBJECTIVE EXPERIENCE OF EMOTION

The experience of emotion has been described as the conscious awareness of the other components that constitute emotion (Frijda, 2008; Power & Dalgleish, 2008). Theories that attempt to give more detailed accounts of affective experience have mainly focused on the importance of bodily symptoms in the "feeling" component of emotion. Numerous theories posit that emotional experience results from the apperception of changes in visceral activity in the context of emotion-eliciting stimuli (Damasio, 1996; James, 1884; Larsen et al., 2008; Schachter & Singer, 1962). These theoretical accounts differ somewhat in the extent to which conscious awareness of bodily symptoms is deemed necessary for emotion experience, as well as in their emphasis on the integration of physiological changes with other emotion components. However, there is broad agreement on the notion that autonomic activity plays a central role in shaping emotional experience. A growing body of research provides support for this latter account, showing emotional experience to be at least partially mediated by the sensitivity for symptoms arising in the body (also called "interoceptive awareness"). Wiens, Mezzacappa, and Katkin (2000), for example, showed that the capacity to detect one's own heartbeat is positively related to the self-reported intensity of emotional experience. Furthermore, a recent study revealed extensive overlap in the neural mechanisms underlying subjective emotion experience and interoception (Terasawa, Fukushima, & Umeda, 2013).

Concerning psychopathy, research on emotional experience has unfortunately mainly depended on self-report measures. These studies did reveal an intriguing paradox: On the one hand, psychopathic individuals report normal subjective affective experience on self-report measures for a wide range of different emotions (e.g., Casey, Rogers, Burns, & Yiend, 2012; Pham et al., 2000; Verona, et al., 2004). On the other hand, psychopathy is related to a reduced intensity of self-reported bodily sensations in the context of emotion (Marsh et al., 2010; Pham et al., 2000). Psychopathic individuals' affective experience thus seems to be less "embodied," which resembles Cleckley's (1941) descriptions of psychopathic individuals being very well capable of giving verbal descriptions of emotion, while at the same time lacking the full appreciation of affective experience (so called "semantic aphasia").

PSYCHOPATHY AND THE EXPRESSION OF EMOTION

Besides mobilizing autonomic and mental resources for action, emotion also serves an important communicatory function (Ekman, 1993; Frijda, 2008; Matsumoto, Keltner, Shiota, O'Sullivan, & Frank, 2008; Scherer, 2000). The behavioral signs of emotion, or emotion expression, can become apparent in, for example, body language, tone of voice, and facial expressive behavior. Such overt affective displays almost always accompany emotion instances (Scherer, 2000) and show robust associations with other emotional components (such as, for example, the appraisal and subjective experience of emotion; Matsumoto et al., 2008). Psychological research on affective expressiveness has mostly focused on facial displays of emotion, drawing on studies like that of Ekman (1993) whose cross-cultural research indicates that certain basic emotional states (e.g., anger, happiness, fear) seem to be accompanied by a discrete pattern of facial musculature across a wide range of cultures.

Studies on emotional expressiveness in psychopathy have yielded mixed results. Herpertz et al. (2001), for example, showed psychopathic individuals to be characterized by reduced frowning (as indexed by the corrugator electromyographic [EMG] response) while watching both pleasant and unpleasant pictures when compared to neutral pictures. In a study by Levenston et al. (2000), on the other hand, no differences were observed between psychopathic and nonpsychopathic participants in modulation of EMG responsiveness from neutral to emotional pictures (both positive and negative). Results on facial expressiveness in psychopathy are thus far from conclusive. Furthermore, there are no studies in this domain that adopted more differentiated assessment methods of facial affect than EMG (based on, for example, Ekman's [1993] categorization of emotion). The importance of using such measurement approaches is emphasized by research that demonstrates EMG to reliably detect differences in emotional expressiveness, yet only in the intensity and valence of facial affect (Tassinary & Cacioppo, 1992). Other assessment procedures than EMG might thus be necessary in order to draw conclusions on whether psychopathy is associated with a more generalized impairment in emotional expressiveness, or whether such a deficiency is bound to more specific emotions such as fear.

PSYCHOPATHY AND EMOTION REGULATION

Emotion regulation refers to the different strategies an individual (un)consciously adopts to influence the experience and expression of emotions (Gross, 2002). Although the regulation of affect has gained interest only relatively recently, contemporary theorists agree that the processes by which emotions are controlled and possibly adjusted are crucial to understanding emotion (e.g., Frijda, 2008; Power & Dalgleish, 2008; Scherer, 2000). Regulatory attempts can change the course of emotion at a variety of different stages. We can, for example, exert control over which emotion-eliciting events we are exposed to, or modify a situation so that it will be less affect-provoking. Furthermore, we can change the meaning of a given stimulus so that its emotional significance changes (i.e., "reappraisal"). Last, the experience of emotion, as well as its psychophysiological and behavioral correlates can be changed through response modulation (e.g., the manipulation of facial affect; Gross, 2002).

The functionality of emotions is greatly dependent on the way in which an individual regulates motivational urges (Parrot, 2001). As difficulties in the regulation of behavioral impulses figure prominently in the conceptualization of psychopathy (Hare, 2003), emotion regulation deficiencies seem crucial to the understanding of this disorder. Further indications for this latter notion comes from empirical research that robustly links children's capacity to regulate emotions to empathic responsivity, conscience development, and prosocial behavior (for overviews, see Eisenberg, 2000 and Hoffman, 2000). Correspondingly, studies in adult samples show that both the overcontrol and under-regulation of emotion is associated with an increased risk for aggression (Roberton, Daffern, & Bucks, 2012). Furthermore, psychopathy is associated with dysfunction of the ventro-medial prefrontal cortex (Kiehl, 2006), a brain structure implicated in the down-regulation of emotional responses such as frustration (Harenski & Kiehl, 2010).

When considering these findings, there has been surprisingly little research on emotion regulation strategies in psychopathy and the studies that were conducted on this topic primarily relied on self-report. Heinzen, Koehler, Smeets, Hoffer, and Huchzermeier (2011), for example, found that psychopathic traits were associated with self-reported maladaptive emotion regulation strategies to reduce negative affect. Unfortunately, no differentiation was made between types of regulatory strategies. Heinzen et al. (2011) did make a differentiation between psychopathy dimensions, showing that the impulsive/irresponsible features of psychopathy uniquely predicted the dysregulation of emotion, which seemed to be particularly pertinent for angry and sad emotion states.

The only study that, as of yet, adopted an experimental paradigm in examining emotion regulation in psychopathy was conducted by Casey and colleagues (2012). In this study, prisoners were presented with differently valenced pictures (neutral, negative, positive) and were instructed to either just look, get into the feeling by imaging themselves involved in the scene shown, or suppress their emotions. Results showed the interpersonal/affective traits of psychopathy to be related to a reduced HR reactivity when getting into the feeling of the

negative pictures when compared to the just look condition, potentially reflecting a reduced capacity for "upregulating" emotion. These findings stress the importance of further investigating the association between interpersonal/affective psychopathy features and potential problems in the up-regulation of affect. Such research could potentially shed light on the emotional "flatness" associated with this component of psychopathy. To that extent, the possibility that this dimension might be associated with a superior capacity to control emotions should also be considered. Conversely, one might expect the lifestyle/antisocial component of psychopathy to be related to difficulties in the down-regulation of emotion, based on the aforementioned research on self-reported emotion regulation strategies.

RESEARCH QUESTIONS FOLLOWING FROM THE CURRENT EVIDENCE BASE

The studies that have been conducted on emotion in psychopathy constitute a considerable contribution to our understanding of the disorder. As became clear from the review above, however, there are also a number of affective components on which further empirical examination is warranted to create a more comprehensive understanding of emotional functioning in psychopathy.

Concerning the appraisal of emotion, an important direction for research is social cognition in psychopathy. As aforementioned, previous studies provide indications that psychopaths show dysfunctions in the automatic appraisal of emotionally relevant stimuli (Dawel et al., 2012), but not in the slower, deliberate processing of such information (as witnessed in an intact ToM; e.g., Dolan & Fullam, 2004). Research also suggests, however, that psychopaths' interpretation of interpersonal intentions might be distorted by the overattribution of hostility to others (i.e. a "hostility bias"; Vitale et al., 2005). These findings raise the question of whether ToM is still unimpaired in psychopathy when individuals have to rely on fast, automatic processing, and whether potential hostility biases could distort the ToM of psychopathic people. Research into these issues is especially pertinent as aberrances in the interpretative processes of psychopathic individuals could help explain their antagonistic, often times even excessively aggressive behavior towards others.

An additional empirical avenue concerns the experience of emotion in psychopathy. A number of aspects stand out from the literature reviewed so far as being in need of further research. The first concerns the physiological component of affective experience in psychopathy. The studies described earlier suggest that an individuals' sensitivity to bodily signals is inherently related to the intensity of the subjective experience of emotion (e.g., Wiens et al., 2000). One might thus wonder whether psychopaths' aforementioned tendency to report reduced emotional visceral sensations (e.g., Pham et al., 2000) could be explained by a reduced sensitivity to their own bodily signals. The second aspect pertains to the experience of moral emotions, such as guilt. Although deficiencies in the experience of guilt are highly central to theoretical explanations of psychopaths' extreme antisocial tendencies (e.g., Blair et al., 2005, pp. 76-79; Hare, 2003), there has been surprisingly little empirical research on morality in psychopathy. As stated previously, emotion is dependent on secondary factors

such as an individuals' self-concept (e.g., Aquino & Reed, 2002), raising the question of whether the experience of guilt feelings might take a less prominent position in psychopathic individuals' self-concept when compared with their nonpsychopathic counterparts. A third important element of affective experience concerns the degree to which psychopathic individuals experience themselves to be dominant. As aforementioned, dominance is one of the components that influential dimensional approaches have traditionally used to describe affective experience (besides valence and arousal, Bradley & Lang, 1994). Furthermore, the previously described research on action tendencies in psychopaths indicates that these individuals are characterized by a reduced tendency to avoid others' facial anger (von Borries et al., 2012), which in turn is considered an index for dominance (Terburg et al., 2011). Typically, dominance is considered to be an interpersonal feature. However, as approach and avoidance tendencies are intrinsically tied to other affective aspects, it might also be expected that psychopathy is associated with an increased experience of dominance. The investigation of such a possibility is warranted by research that robustly links dominance to aggression (e.g., Morrison & Gilbert, 2001).

Last, another research focus that follows from the literature reviewed above is the regulation of emotion in psychopathy. As described earlier, emotion regulation is robustly linked to a variety of constructs that are crucial to prosocial interaction (e.g., empathy, frustration tolerance, Eisenberg [2000]; Kochanska & Aksan [2006]). Moreover, recent theorizing states that difficulties in the regulation of affect pose risk factors for the development of psychopathy (Fowles & Dindo, 2009; Patrick et al., 2009). These empirical and theoretical considerations stress the need for extensive research on psychopathy and all the different types of emotion regulation that were previously described. The manipulation of facial expressive behavior is a regulation strategy that might be of particular interest with regard to this disorder though, as the capacity to control facial displays of emotion is crucial to interpersonal psychopathic behaviors like deception and manipulation.

AIMS AND OUTLINE OF THIS THESIS

The current thesis describes a series of studies that aimed to answer these research questions by examining a variety of emotional constructs with regards to psychopathy. Table 2 shows how the research in this thesis maps onto the different components of emotion that were outlined above. As concerns about truthful self-presentation and introspective abilities are pertinent to forensic contexts, our studies complemented explicit assessment (i.e., self-report) with measures that are believed to be less susceptible to deliberate distortion and that do not rely on introspective introspective abilities are pertinent to forensic contexts, our studies complemented explicit assessment (i.e., self-report) with measures that are believed to be less susceptible to deliberate distortion and that do not rely on introspective capacities. These so-called implicit measures included physiological recordings and adapted versions of the reaction-time based Implicit Association Test (Greenwald, MGhee, & Schwartz, 1998).

Part I of this thesis describes two studies that examined social cognition in psychopathy by investigating ToM capacities. Two types of ToM can be distinguished, being the capacity to infer mental states from eyes ("social-perceptual ToM") and the ability to reason about mental states ("social-cognitive ToM"; Sabbagh, 2004). As these components are related, yet dissociable (Nettle, & Liddle, 2008), their association with psychopathy was investigated separately. *Chapter 2* reports on a study that examined the influence of potential hostility biases, as well as controlled (slow) versus automatic (fast) processing on social-perceptual ToM performance in psychopathy. We hypothesized psychopaths' ToM capacities to be reduced by potential hostility biases, as well as to break down when being forced to rely on automatic processing. *Chapter 3* describes an investigation of psychopathic offenders' social-cognitive ToM. This type of ToM seems pivotal in successfully monitoring and adjusting the manner in which individuals present themselves to others, as such portrayal is dependent on the realization that others have beliefs that are separate from your own that are influenced by how you come across (Baron-Cohen, 2000). Previous research shows psychopathy to be related to self-portrayal characterized by the exaggeration of (atypical) symptoms, as well as reduced reporting of socially desirable traits (Ray et al., 2013). Therefore, the study described in *chapter 3* investigated social-cognitive ToM in psychopathy and its relation to self-portrayal, hypothesizing that psychopathy would only be related to more unlikely symptom reporting and less social desirability when combined with relatively good social-cognitive ToM skills.

Part II of this thesis focuses on the experience of emotion in psychopathy. As described earlier, affective experience is believed to be heavily influenced by the perception of bodily symptoms. *Chapter 4* reports on a study that investigated the association between psychopathy and the ability to sense visceral activity (or, "interoceptive awareness") using a heartbeat detection paradigm. We hypothesized psychopathy to be related to a reduced interoceptive awareness. Subsequently, *chapter 5* describes an examination of the association between psychopathy and guilt feelings on both an implicit and explicit level. It was hypothesized that psychopathic offenders' self-concept would be characterized by less implicit guilt, yet no association was expected between psychopathy and explicit feelings of guilt. *Chapter 5* also reports on a similar investigation of psychopathic individuals' feelings of dominance. As dominance might be less readily underreported than feelings of guilt, we expected psychopathy to be positively associated with both implicit and explicit dominance.

Finally, **part III** of this thesis focuses on the capacity to regulate emotion. More specifically, *chapter 6* describes a study on the self-reported, physiological, and facial expressive correlates of emotion regulation in psychopathy. This study provides an examination of psychopathic offenders' capacity to inhibit, as well as to express their facial affective displays while watching series of differently valenced film fragments (fear, happy, sad). We hypothesized psychopathy to be positively related to the capacity to inhibit facial

Table 2. *Current thesis research mapped onto different components of emotion*

Chapter	Emotional component	Research focus
Chapter 2	Appraisal	The influence of potential hostility biases and controlled versus automatic processing on social-perceptual ToM in psychopathic offenders.
Chapter 3	Appraisal	The association between psychopathy, social-cognitive ToM, and self-presentation (i.e., social desirability and unlikely symptom reporting).
Chapter 4	Experience of emotion	The relation between psychopathy and interoceptive awareness.
Chapter 5	Experience of emotion	Psychopathy and offenders' levels of guilt and dominance, as assessed with direct and indirect measurement methods.
Chapter 6	Emotion regulation Physiological arousal Experience of emotion Expression of emotion	Psychopathic offenders' capacity to inhibit, as well as to express their facial affective displays while watching series of differently valenced film fragments.

Note. ToM = Theory of Mind.

displays of emotion, while our hypotheses on facial expressiveness were more explorative in nature. As described earlier in this chapter, there is reason to expect that the inter-personal/affective and lifestyle/antisocial traits of psychopathy are differentially related to a number of the emotional constructs that were studied in this thesis, such as emotion regulation capacities. These factor-specific hypotheses our outlined in the individual chapters.

In *chapter 7,* the overall results of the research described in this thesis are discussed and integrated, while taking into account the strengths and limitations of the studies. This chapter will also address implications of the findings and directions for future research.

Part I

Social cognition in psychopathy

Chapter 2

The influence of psychopathy, hostility biases, and automatic processing on criminal offenders' Theory of Mind

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ABSTRACT

Theory of Mind (ToM) is a social perceptual skill that refers to the ability to take someone else's perspective and infer what others think. The current study examined the effect of potential hostility biases, as well as controlled (slow) versus automatic (fast) processing on ToM performance in psychopathy. ToM abilities (as assessed with the Reading the Mind in the Eyes Test; RMET; Baron-Cohen, Wheelwright, Hill, Raste & Plumb, 2001), was compared between 39 PCL-R diagnosed psychopathic offenders, 37 non-psychopathic offenders, and 26 nonoffender controls. Contrary to our hypothesis, psychopathic individuals presented with intact overall RMET performance when restrictions were imposed on how long task stimuli could be processed. In addition, psychopaths did not over-ascribe hostility to task stimuli (i.e., lack of hostility bias). However, there was a significant three-way interaction between hostility, processing speed, and psychopathy: when there was no time limit on stimulus presentation, psychopathic offenders made fewer errors in identifying more hostile eye stimuli compared to nonoffender controls, who seemed to be less accurate in detecting hostility. Psychopaths' more realistic appraisal of others' malevolent mental states is discussed in the light of theories that stress its potential adaptive function.

INTRODUCTION

Psychopathy is a developmental disorder that is characterized by high levels of antisocial behavior, as well as emotional impairments such as callousness and a lack of moral emotions like remorse (Cleckley, 1941; Hare, 2003). The disorder is typically assessed using Hare's Psychopathy Checklist Revised (PCL-R; Hare, 2003). Research has shown this extensively validated instrument to be comprised of two factors (Harpur, Hakstian, & Hare, 1988): Factor 1 describes affective and interpersonal items (e.g., shallow affect, conning/manipulative behavior), whereas Factor 2 reflects impulsive and antisocial lifestyle traits (e.g., parasitic lifestyle, irresponsibility).[1] A very prominent deficit in psychopathic individuals is their lack of empathy (Cleckley, 1941; Hare, 2003), a moral emotion that is believed to inhibit antisocial behavior and promote pro-social behavior (Hoffmann, 2000). Empathy is usually defined as the capacity to understand and to some extent share the feelings of another person. A distinction is made between at least two forms of empathy, i.e., cognitive and emotional empathy (Feshbach, 1975). Cognitive empathy refers to the ability to take someone else's perspective, and is closely related, or even synonymous to Theory of Mind (ToM). ToM has been described as the capacity to attribute mental states (e.g., intentions, beliefs, and desires) to others (Premack & Woodruff, 1978). In contrast, emotional empathy equals the ability to be responsive to and share in the emotional state of another person (Blair, 2005).

Research has shown psychopathic individuals to present with notable emotional empathic deficiencies, like a reduced physiological responsiveness to others' distress (Blair, Jones, Clark, & Smith, 1997). Results of studies on cognitive empathy and psychopathy have been a lot more equivocal. For many years, it has been assumed that adult psychopathy is not associated with ToM deficiencies. A study supporting this supposition was conducted by Blair and colleagues (1996), who did not find performance differences between psychopathic and nonpsychopathic offenders on Happé's advanced test of ToM (Happé, 1994), a test that requires subjects to infer story characters' thoughts, feelings, and intentions. Subsequently, Richell et al. (2003) could also not find deficits in psychopathic offenders' ToM using the Reading the Mind in the Eyes Test (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), in which subjects are instructed to identify mental states from photographs of the eye region only.

Although seemingly supportive of intact ToM in psychopathy, the results of the studies described above have to be interpreted in the light of some limitations. First, sample sizes in

[1] Subsequent studies indicate the PCL-R to be described by three factors (Cooke & Michie, 2001), or by a two-factor/four-facet model, in which Factors 1 and 2 have both been divided into two facets, resulting into four components representing 1) interpersonal, 2) affective, 3) lifestyle, and 4) antisocial traits (Bolt, Hare, Vitale, & Newman, 2004). In the present study, however, we decided to adopt a two-factor model as this has been the most widely validated so far.

the aforementioned studies were relatively small. Second, no previous ToM research has considered the potential influence of automatic versus controlled processing. Taking this distinction into account could be important as information is thought to be processed via two interacting, yet separable neural routes: an affective, subcortical pathway (depending on limbic structures like the amygdala) that provides a 'quick and dirty' impression; and a slower, cortical route, which is thought to be responsible for deliberate, cognitive processing, providing a more fine-grained, complex interpretation of information (Adolphs, 2002; Johnson, 2005). Imaging research on the RMET suggests that amygdala activation mediates performance on this task in healthy individuals (Baron-Cohen et al., 1999). In addition, patients with acquired bilateral amygdala damage have been found to show impairments on the RMET (Stone, Baron-Cohen, Calder, Keane, & Young, 2003). As psychopathy is associated with amygdala dysfunction, yet does not seem to influence RMET performance, it has been suggested that psychopathic people might compensate for their amygdala dysfunction by using cortical brain regions in the identification of mental states (Richell et al., 2003). Possibly, previous studies could not reveal any psychopathy-specific deficits in ToM as subjects could look at task stimuli for as long as they wanted, enabling them to rely on such compensatory cognitive strategies.

Another factor that has been overlooked in previous research is the potential influence of offenders' cognitive processing style on ToM performance. Anger and violent behavior are common characteristics in forensic samples, and individuals high on these traits show difficulty ignoring hostile stimuli (Cohen, Eckhardt, & Schagat, 1998; Smith & Waterman, 2004). Moreover, both aggression and psychopathy have been found to relate to the presence of hostile attributional biases, i.e., the more elevated these traits are in individuals, the more hostile intent is perceived from others in ambiguous situations (Dodge, 1980; Vitale, Newman, Serin, & Bolt, 2005). Possibly, preferential attending to hostile stimuli and the incorrect attribution of malevolent intentions to others, could interfere with correctly inferring others' mental states in psychopathy.

The current study aimed to build on previous research on ToM by administering the RMET to a group of offenders (varying in their degree of psychopathy) and a group of non-offender subjects. We took a number of precautions in order to overcome the afore-mentioned limitations. First, we took the possibility into consideration that psychopathic people only present with ToM deficits under conditions where stimuli have to be processed fast. In order to examine this prediction, we presented half of the RMET stimuli rapidly, whereas subjects could look at the other half of the task stimuli without any time restrictions. We expected psychopathic individuals to show impairments on the RMET in comparison with nonoffenders, yet only when stimuli were presented quickly (Hypothesis 1). Second, we investigated whether offenders' ToM performance might be distorted by a cognitive 'hostility bias.' In order to test this hypothesis, we changed a number of incorrect answering options in the RMET, making sure that the alternatives subjects could choose from varied in their degree of hostility. We predicted offenders' performance on the RMET to be

distorted by a bias towards more hostile answering options, reflected by a tendency to choose for more hostile answering alternatives when making mistakes (Hypothesis 2). As psychopathy has been found to positively relate to the perception of hostility (Vitale et al., 2005), we predicted this effect to be strongest in the psychopathic offender group, as compared with the nonoffenders.

METHOD

Participants

We recruited 85 male criminal offenders with cluster B personality disorders (PDs) from six forensic psychiatric centers and a prison. Thirty-six of these participants were participating in a randomized clinical trial (RCT) on the effectiveness of Schema Therapy versus Treatment as Usual in forensic patients with cluster B PDs (Bernstein et al., 2012). The inclusion and exclusion criteria for this RCT aimed to select a group of patients whose personality pathology was the primary focus of treatment. The inclusion criteria were (a) the presence of a DSM-IV antisocial, narcissistic, borderline, or paranoid PD, or a PD not otherwise specified with at least five cluster B PD traits, and (b) a good understanding of the Dutch language. Exclusion criteria were (a) the presence of current psychotic symptoms, (b) schizophrenia or bipolar disorder, (c) current drug or alcohol dependence (but not abuse), (d) low intelligence (i.e., IQ < 80), (e) serious neurological impairment, (f) an autistic spectrum disorder, and (g) fixated pedophilia. In order to create in this respect a homogeneous sample, the subjects who did not participate in the RCT (n=49) were recruited using the same inclusion and exclusion criteria as described above.

In the entire offender group, there was no RMET data available on the first nine subjects due to a programming error, resulting in a sample of 76 forensic subjects. The forensic sample was divided into a psychopathic and a non-psychopathic group using the European PCL-R cut-off of 25 (Cooke & Michie, 1999; this cut-off also happened to be the median PCL-R score in the current sample). Twenty-six healthy male controls were additionally recruited from the general population. An inclusion criterion for this group was a) good understanding of the Dutch language. Exclusion criteria were a) the presence of any axis I disorder, b) the presence of threshold minus two criteria for any DSM-IV PD, c) the presence of a PD diagnosis Not Otherwise Specified (i.e., fulfillment of five or more criteria of different PD diagnoses), d) low intelligence (i.e., IQ < 80), (e) serious neurological impairment, (f) an autistic spectrum disorder, and (g) a level of self reported psychopathy higher than one *SD* above the general population mean.

Table 1 shows an overview of participant characteristics. All of the control subjects had Dutch nationality. In the forensic sample, ten different nationalities were represented, with the most prevalent being Dutch (74.7%), Moroccan (7.2%), and Surinamese (8.4%). Types of crime that were committed in the forensic group included homicide offenses (27.7%), assault (20.5%), property crime with (10.8%) and without (1.2%) violence, pedophilic (10.8%) and nonpedophilic (19.3%) sexual offenses, arson (6.0%), and drug offenses (3.6%). The mean

time that forensic subjects had been institutionalized since their last offense was 6.7 years (*SD*=4.2, range=1–20). PD diagnoses in the forensic group included antisocial (82.9%), borderline (32.9%), narcissistic (31.6%), paranoid (10.5%), and avoidant PD (1.3%). (There were no subjects with a histrionic PD.) The study was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University. All participants provided written informed consent.

Measures

Screening measures

SIDP-IV. In the forensic participant group, PDs were assessed using the Structured Interview for DSM-IV Personality Disorders (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995). SIDP-IV scores were derived from participants' file records when these had already been scored by diagnostic staff thoroughly trained in assessing the SIDP-IV (*n*=52). Eighteen of these interviews (from different clinics) were recorded and independently scored by a second rater, yielding intra class correlation coefficients (ICCs, single measures) for item scores of the PDs of interest ranging between .52 and .93, with a mean of .71. Scores were averaged when interviews had been rated twice. When SIDP-IV results were not available (*n*=33), the interview was administered by the first author (L. N.). Following extensive training, L. N. independently scored five SIDP-IV interviews that had also been scored by a rater that conducted several of the other SIDP-IV interviews in the study. For this double scoring, single rater ICCs for the PDs of interest ranged from .75 to .96, with a mean of .84.

SCID-I and II. The nonforensic control group was screened for axis I and II psychopathology using the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997) and the SCID for Axis II Personality Disorders (SCID-II; First, Spitzer, Gibbon, Williams, & Benjamin, 1994). SCID screenings were conducted by either the first author (L. N.) or a graduate student. Prior to the actual screening, both interviewers independently rated five audiotaped SCID-I and II interviews of PD patients who participated in a different study. The number of axis I diagnoses that was present in these patients was insufficient to determine Kappas. However, both raters agreed on the presence of 24 axis I disorders over these five patients, whereas disagreement existed on the presence of only two diagnoses, suggesting a high level of consistency between raters. ICCs (single rater) for the dimensional scores of all PDs obtained with the SCID-II ranged from .79 to .99, with an average of .88.

AQ. When there was reason to suspect the presence of an autism spectrum disorder, the Autism-Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) was administered. Subjects scoring 32 or higher on the self-report questionnaire were excluded from the study (based on Baron-Cohen, Wheelwright, Skinner, et al., 2001). Offenders were not approached for this study when an autism spectrum disorder had been diagnosed by an institution's staff, for which various, often times more extensive methods

Table 1. *Sample characteristics (N=102)*

	Psychopathic offenders (*n*=39)		Nonpsychopathic offenders (*n*=37)		Nonoffenders (*n*=26)	
	M (SD)	Range	*M (SD)*	Range	*M (SD)*	Range
Age (years)	38.6 (9.7)	23–65	39.3 (10.2)	24–64	35.6 (13.5)	18–57
IQ	95.1 (11.6)	80–120	96.6 (11.1)	80–121	101.2 (12.5)	80–128
PCL-R total	29.7 (3.1)	25.0–36.8	18.5 (3.9)	11.0–24.0	–	–
PCL-R F1	12.2 (2.8)	6.0–16.0	8.5 (3.1)	3.0–16.0	–	–
PCL-R F2	13.9 (2.5)	7.2–18.0	7.6 (3.6)	1.0–14.0	–	–
% correct RMET short	58.5 (13.3)	27.8–83.3	61.4 (12.6)	38.9–88.9	61.3 (10.2)	38.9–77.8
% correct RMET long	65.7 (13.0)	38.9–88.9	64.1 (12.5)	38.9–94.4	66.9 (14.6)	22.2–94.4

Note. PCL-R = Psychopathy Checklist-Revised; F1 = Factor 1; F2 = Factor 2; % correct RMET = percentage of correctly identified trials on the Reading the Mind in the Eyes Test.

were used, e.g., patient interviewing complemented with collateral and observational information.

LSRP. Level of psychopathic traits in the nonforensic participants was determined using the Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995). In the current study, control subjects were excluded when their score exceeded a cut-off of 58, which is approximately one *SD* above the mean LSRP total score found in males in the general population (e.g., Uzieblo, Verschuere, van den Bussche, & Crombez, 2010).

Main predictor and outcome variables

PCL-R. In order to assess psychopathy in the offenders, the PCL-R (Hare, 2003) was used, an instrument based on a semi-structured interview and a review of subjects' institutional and judicial file information. PCL-R scores were obtained from clinical files when these had already been scored by the diagnostic staff in a clinic (*n*=73; all of these staff members had been extensively trained during a three day PCL-R assessment course). Sixteen of these interviews (selected from different clinics) were rated by two independent raters, resulting in single rater ICCs for PCL-R total, Factor 1, and Factor 2 scores of .76, .74, and .74, respectively. When recent PCL-R scoring was not available (which was the case for 11 subjects), the first author (L. N.) scored the PCL-R, also based on an interview and an extensive file search. Regular meetings were held with the third author (D. P. B.) to ensure adherence to the diagnostic criteria. Standardized Cronbach's alpha for PCL-R total, Factor 1, and Factor 2 scores in the entire forensic sample was .79, .82, and .82, respectively.

RMET. In order to assess ToM, we used the Reading the Mind in the Eyes Task (RMET; Baron-Cohen, Wheelwright, Hill, et al., 2001). In this test, subjects are presented with a series of 36 different pictures showing the eye region of faces only, and are asked which out of four words (one correct answer, three foils) best represents what the person in the picture is feeling or thinking. (For information on the construction and psychometric properties of this test we refer to Baron-Cohen, Wheelwright, Hill, et al., 2001). In the current study, the task was presented on a computer screen, and subjects were required to make a forced-choice using a button-box with a button representing each answering option. As mentioned before, we altered the RMET in two ways. First, we presented the first half of the eyes stimuli (trials 1–18) only shortly,[2] i.e., a trial consisted out of the consecutive presentation of

[2]Based on earlier research (e.g., Liddell, Williams, Rathjen, Shevrin, & Gordon, 2004), the short stimulus-presentation for the RMET was initially set at 400 ms. However, pilot research with two (nonpsychopathic) offenders and two employees of Maastricht University (all not participating in the actual study) was conducted, in which the four participants claimed that the presentation was too fast to properly evaluate the stimuli. In order to prevent floor effects on the RMET, we tried out various presentation times with the pilot subjects. The eventual interval was set at 1000 ms, which was still experienced as a very fast presentation time by the four pilot participants.

a fixation cross (1000 ms), the picture stimulus (1000 ms), and the answering options. The second half of the stimuli (trials 19–36) was presented for an unlimited amount of time (as in the original test), i.e., a fixation cross would appear (1000 ms) after which the eye stimulus was displayed in combination with the four answering options, for an unlimited time. For all trials (both short and long), subjects could look at the answering options as long as they wanted. Both halves of the test were preceded by two practice trials, for which eye pictures were used that were not part of the actual RMET stimulus set.

Second, we attempted to create more variation in the level of hostility in the RMET answering options by adding some hostile answering options (e.g., 'aggressive,' 'attacking') and by replacing some foils with other original RMET answering options. In this way, 23 of the 108 foils were changed, creating a wide range of hostility in the answering options throughout the test. In order to determine how hostile words were, 33 students of Maastricht University rated the level of hostility for each RMET answering option (and the additional foils) on 80 mm visual analog scales, ranging from 0 (*not hostile at all*) to 10 (*very hostile*). This procedure enabled us to calculate an average level of hostility that raters assigned to each answering option (i.e., the answering option's 'hostility score'; HS). Both the order in which trials were presented as well as the order of the four answering options for each trial was randomized. The task always began with the short stimulus presentation. Participants were instructed to do the task as fast and correct as possible.

In order to ensure construct validity of our modified version of the RMET, we looked at its association with another test of ToM, i.e., Happé's advanced test of ToM, which requires the inference of story characters' mental states (Happé, 1994). In the current sample, performance on Happé's test and RMET total scores were significantly correlated (r=.36, p<.001, n=102). Correlations between Happé's test and performance for the short and long stimulus duration of the RMET were r=.32 (p<.001) and r=.28 (p<.001), respectively. These correlations are similar in magnitude as to those found in previous studies reporting the association between the RMET and story tasks assessing ToM (e.g., Ferguson & Austin, 2010).

Potential covariates

As executive functioning has consistently been found to be associated with performance on ToM tests (e.g., Ahmed, & Stephen Miller, 2011), we took several measures into account that assess related, yet distinct domains of executive functioning: Full scale IQs were obtained from recent Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997) assessments that had been conducted at the forensic sites. When these were not available, subjects were administered a shortened version of the WAIS-III, in which IQ was based on the subtests Block Design and Vocabulary (Jeyakumar, Warriner, & Raval, 2004). The WAIS-III Picture Arrangement subtest was used as a measure of social logical reasoning. In order to assess subjects' working memory capacity a computerized version of the self-ordered pointing task (SOPT; Petrides & Milner, 1982) was administered. In this task, subjects are presented with

pictures that are spatially arranged on a computer screen in a 3 × 4 matrix. The arrangement of stimulus items is varied from trial to trial. On each trial, participants are required to point to a picture which they have not pointed to on a previous trial. The number of correct responses was summed over two repetitions of the task. A last executive function that was taken into account was impulsivity, examined using a 'stop' test, designed following the methodology described in Rubia, Smith, and Taylor (2007). This computerized task assessed the capacity to inhibit an ongoing response.

Other potential covariates in the current study included age, state and trait anxiety, as assessed with the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), and several variables that characterize the pictures in the RMET. The latter included the gender of the person in the picture, thickness of the eyebrows, color of the eyebrows (light vs. dark), visibility of the eyelashes, perspective from which the picture was taken (en face vs. en profile), visibility of the pupil, gaze direction of the eyes, diameter of the iris, the ratio between height and width of the eyes, the amount of visible sclera surface of the eyes, and the estimated age of the person in the picture (averaged ICC over two independent raters =.92).

Procedure

Control subjects were recruited using flyers and newspaper advertisements. The SCID interviews and the LSRP were administered over the phone. Eligible candidates were invited to Maastricht University, where they completed the rest of the assessment measures described above. Potential forensic participants were identified using patients' file information and with the help of therapists who were informed about the in- and exclusion criteria. Volunteers were first assessed with the PCL-R, the SIDP-IV, and the WAIS-III (if necessary), after which the other measures above were administered. At each site, testing was performed in a quiet, designated testing room. Both control and forensic subjects also completed a variety of other tests measuring different emotional capacities, which are and will be described elsewhere (e.g., Nentjes, Meijer, Bernstein, Arntz, & Medendorp, 2013). All measures were presented in counterbalanced order across participants. Subjects were reimbursed with 25 euro for their participation.

Data preparation and analysis

All analyses were conducted using IBM SPSS Statistics 19.0. We used multilevel logistic regression to model the effects of various predictors on the binary outcome correct vs. incorrect response on each RMET trial, thereby taking into account the hierarchical data structure, with trials nested within persons, as well as taking into account within-subject covariates such as trial number (Hox, 2010). The random model part consisted of a random intercept to capture residual between-subject outcome variation, plus Autoregresssive Moving Average error (ARMA 1,1) for the within-subject residual variation. ARMA 1,1 was

chosen as this is the most general structure for the within-subject variation that can be combined with a random intercept and that is still parsimonious in the presence of a large number of repeated measures per person. Fixed effects (predictors) in this model were the RMET trials' relative hostility score (HS^{rel}),[3] stimulus duration (short vs. long), and group (nonoffenders, nonpsychopathic, and psychopathic offenders). Group was coded using linear and quadratic contrasts, respectively coded as –1 (nonoffenders), 0 (nonpsychopathic offenders), 1 (psychopathic offenders), and –1 (nonoffenders), 2 (nonpsychopathic offenders), and –1 (psychopathic offenders), in order to check deviation from linearity. All two- and three-way interactions between these three predictors (HS^{rel}, stimulus duration, and group) were entered into the model. In accordance with Hypothesis 1, we expected a significant effect of the interaction term 'group × stimulus duration,' carried by worse performance of the psychopathic group compared with the nonoffenders for the short stimulus duration. Regarding Hypothesis 2, we expected an interaction of group with HS^{rel}, in the sense that the psychopathic offenders were expected to make more mistakes for trials characterized by a low HS^{rel} (implying the presence of relatively hostile foils), in combination with psychopathic offenders choosing more hostile foils than nonoffenders when making mistakes (see below).

Psychopathy is considered to be a multidimensional construct, consisting of at least two factors that are differentially related to external constructs (e.g., Verona, Patrick, & Joiner, 2001). Therefore, the analyses described above were repeated defining the two offender groups according to the median splits of PCL-R Factors 1 and 2, in order to investigate whether potential effects would be specific for one of the PCL-R factors. We decided to use this categorical approach, rather than investigating the fixed effects of the dimensional Factor 1 and 2 scores, as to enable inclusion of the nonoffender group in these analyses (on whom no PCL-R data could be obtained due to a lack of criminal background).

Next to the predictors described above, a number of between-subject covariates were taken into account in the analyses. We decided to include the main effects of age and IQ into all analyses, as these variables have been found to be robust predictors of performance on ToM tasks (including the RMET; e.g., Ahmed & Stephen Miller, 2011). Next to that, we investigated the potential influence of working memory capacity, impulsivity, state and trait anxiety, and a number of within-subject covariates, including the RMET picture characteristics described above, trial number (recoded into numbers 1–18 for the first half of the trials [short stimulus durations] and 1–18 for the last half [long stimulus durations]), and the interaction 'trial number × stimulus duration.'

Prior to the regression analyses we undertook a number of steps. First, inspection of the data revealed no multivariate outliers on the quantitative covariates and PCL-R scores,

[3] A relative hostility score (HS^{rel}) was computed for each trial, using the following formula: *'HS of the correct answering option' – 'highest HS of the three foils.'* The HS^{rel} ranged from –64.0 to 57.0 (*M*=18.7, *SD*=30.9). So the more hostile the eyes in a trial are (relative to the most hostile foil in the trial) the higher the HS^{rel}.

using a criterion of p<.001 for Mahalanobis distance (Tabachnick & Fidell, 2007). When individual scores on continuous variables deviated more than 3 *SD* from the sample mean, they were replaced by a value representing the mean plus or minus 3 *SD* (changing 3.8% and 1.8% of the scores on impulsivity and working memory capacity, respectively). Second, collinearity diagnostics were inspected for all between and within-subject factors. In order to prevent potential collinearity that could arise from the inclusion of interaction terms in the regression model, all predictor variables were centered around the sample mean (which also facilitates the interpretation of the intercept; categorical predictors were coded –0.5 and 0.5).

RESULTS

Performance on the RMET by stimulus duration, hostility, and total psychopathy level

The fixed part of the regression analysis was modeled in a number of steps. First, all main effects (group contrast, stimulus duration, HS^{rel}), as well as the two- and three-way interactions of group, HS^{rel}, and stimulus duration (short vs. long) were entered into the model, along with the main effects of age and IQ. Subsequently, clearly non-significant (p>.10) terms involving group (quadratic) were deleted, first deleting the three-way interaction, then the two-way interactions and finally the main effect, resulting in the model displayed in Table 2.

Table 2. *Multilevel logistic regression analysis of predictors (with group based on total PCL-R score) of correctly responding to trials in the Reading the Mind in the Eyes Test*

Parameter	Estimate (*B*)	*SE*	Sign.
Intercept	0.164	0.375	.662
Group (linear)	0.009	0.056	.874
HS^{rel}	–0.005	0.001	<.001
Stimulus duration	0.208	0.071	.004
Group (linear) × HS^{rel}	0.001	0.001	.300
Group (linear) × Stimulus duration	0.049	0.090	.587
HS^{rel} × Stimulus duration	0.008	0.002	<.001
Group (linear) × HS^{rel} × Stimulus duration	0.006	0.003	.035
IQ	0.010	0.004	.010
Age	–0.015	0.004	<.001

Note. Stimulus duration was coded as –0.5 (short) vs. 0.5 (long); Group (linear) was coded as –1 (nonoffenders), 0 (nonpsychopathic offenders), and 1 (psychopathic offenders). Random intercept (between-subject) variance = 0.059 (*SE*=0.029); Residual (within-subject) variance = 0.991 (*SE* = 0.024); Autocorrelation was ignorably small (first lag=0.012, *SE*=0.016).

The other between and within-subject factors described above (e.g., impulsivity and trial number) were then entered into the model as fixed effects, in order to investigate whether this would change the effects reported in Table 2. Due to computational restrictions, subsets of a maximum of three covariates could be added to the model at one time. Besides age and IQ, no other between-subject variables significantly contributed to the model (at $p<.05$). Predictive within-subject covariates were the estimated age of the person in the picture, color of the eyebrows (light vs. dark), the ratio between height and width of the eyes, the amount of visible sclera surface of the eyes, and the gender of the person in the picture. The deletion of age and IQ, or addition of the within-subject covariates to the model did not appreciably change either the direction of the regression coefficients or their associated significance levels as described in Table 2. The three-way interaction 'group (linear) × HS^{rel} × stimulus duration' was further examined by plotting the interaction between HS^{rel} and group per level of stimulus duration (see Figure 1). Furthermore, repeating the regression analyses three times, leaving out one group (i.e., either nonoffenders, nonpsychopathic offenders, or psychopathic offenders) per analysis, revealed the three-way interaction effect to be significant only when contrasting the nonoffender controls with the psychopathic offenders ($p=.034$), but not when comparing nonoffenders vs. nonpsychopathic offenders ($p=.206$) or nonpsychopathic offenders vs. psychopathic offenders ($p=.349$). Further inspecting the effect of group (linear), HS^{rel}, and the interaction between both variables per stimulus duration (controlling for the main effects of IQ and age), showed the interaction 'HS^{rel} × group (linear)' to be significant for the long duration ($p=.031$), but not for the short duration ($p=.475$). Within the short duration, the main effect was significant for HS^{rel} ($p<.001$), but not for group (linear) ($p=.727$), after deleting the interaction 'HS^{rel} × group (linear).'

Last, pairwise group contrasts for the upper quartile of HS^{rel}, for the long stimulus duration, were significant for the psychopathic offenders vs. nonoffenders pair ($B=0.735$, $p=.009$), but not for the nonpsychopathic offenders vs. nonoffenders pair ($B=0.378$, $p=.161$), or the psychopathic vs. nonpsychopathic offenders pair ($B=0.376$, $p=.108$). None of the three pairwise contrasts were significant for the lower quartile of HS^{rel} for the long stimulus duration (all p's$<.137$). In summary, these analyses show that higher HS^{rel} was associated with worse RMET performance in all three participant groups when stimuli were presented briefly. For the long stimulus duration, however, an increasing HS^{rel} was associated with better performance in the psychopathic offender group and with worse performance in the nonoffender group, such that the group difference was significant and in favor of the psychopathic offender group at the highest HS^{rel} level, and non-significant and in favor of the nonoffender group at the lowest HS^{rel}. The performance of the nonpsychopathic offenders was in between the other two groups at each level of HS^{rel}.

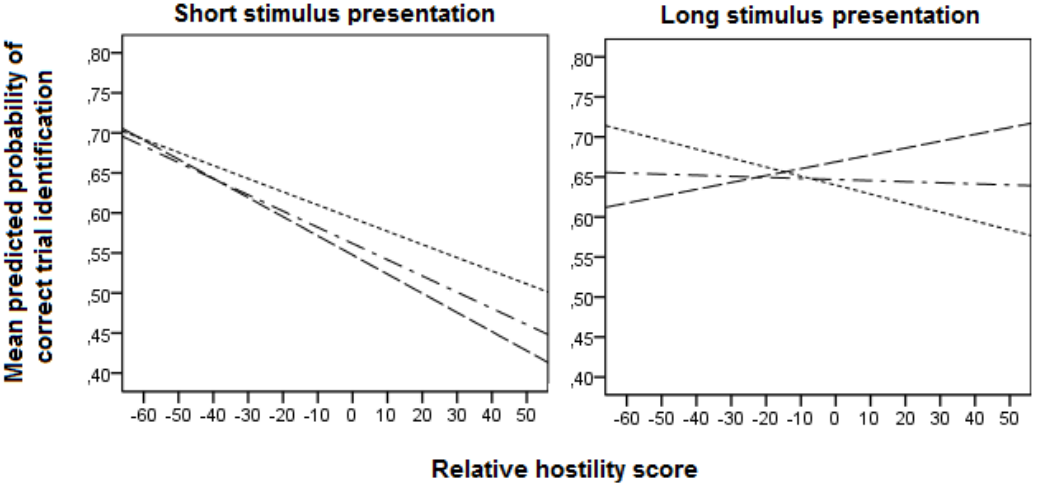

Figure 1. Associations between trials' relative hostility scores (HS^{rel}) and probability of correct identification, split up by stimulus duration, as a function of group: nonoffenders (------); nonpsychopathic offenders (- — - —); and psychopathic offenders (— — —) (corrected for age and IQ).

Performance on the RMET by stimulus duration, hostility, and psychopathy factors

In order to investigate whether the three-way interaction between group (linear), HS^{rel}, and stimulus duration was PCL-R factor-specific, we repeated the regression analysis described above twice, once per factor, by dividing the offenders into two groups on the median of the factor concerned (for Factor 1: 10.5, for Factor 2: 12.0). For the first analysis, all the main effects of group (nonoffenders, offenders low on Factor 1, offenders high on Factor 1), HS^{rel}, and stimulus duration, as well as all the two- and three-way interactions between group (Factor 1), HS^{rel}, and stimulus duration were entered into the model, along with the main effects of IQ and age, showing the three-way interaction 'group (Factor 1) × HS^{rel} × stimulus duration' to be significant (*B*=0.006, *p*=.023). Repeating this analysis using the Factor 2 grouping variable (nonoffenders, offenders low on Factor 2, offenders high on Factor 2), revealed a borderline significant three-way interaction 'group (Factor 2) × HS^{rel} × stimulus duration' (*B*=0.005, *p*=.064). Covariates that significantly contributed to these models (including either group [Factor 1] or group [Factor 2]) were the same as for the regression analysis in Table 2 where grouping was based on the total PCL-R score; addition of the within-subject covariates, or deletion of the main effects of age and IQ, again did not substantially change direction or significance of the regression coefficients. The three-way interaction 'group (linear; based on total PCL-R scores) × HS^{rel} × stimulus duration' was thus carried by both factors. When plotting the three-way interactions for Factors 1 and 2 , respectively, very similar patterns were obtained as that observed in Figure 1.

Predicting chosen hostility within incorrect answers on the RMET

As psychopathy interacted with HS^{rel}, at least for the long stimulus duration, we subsequently investigated whether psychopathy was related to choosing more hostile answering alternatives when making mistakes (Hypothesis 2). This analysis was therefore limited to the incorrect responses. A linear mixed model was specified with the same random model part as in the logistic mixed models (i.e., random intercept plus ARMA 1,1) and as fixed effects group (nonoffenders, nonpsychopathic, and psychopathic offenders; using the same linear and quadratic contrasts as before), stimulus duration (short vs. long), and the interaction between these two predictors. The dependent variable was the relative hostility score of the chosen incorrect option relative to the other incorrect answering options in that trial (HS^{chosen}; which was computed using the formula *'HS of the chosen option' – 'highest HS of the other two foils'*). To solve nonconvergence, the within-subjects random part was reduced from ARMA 1,1 to uncorrelated residuals. Analyses showed no significant relation between the outcome HS^{chosen} and the predictors (*p*>.10 for the interaction or for the main effects after taking out the interaction). Repeating this analysis using grouping based on Factor 1 showed no effects either, and the same holds for grouping based on Factor 2. These results suggest that, given an incorrect answer, psychopathy was not related to choosing a more hostile answering option.

DISCUSSION

The current study administered the RMET to a group of offenders with PDs, as well as a group of nonoffenders, expecting psychopathy to be associated with ToM deficits under certain conditions, such as fast stimulus presentation and the presence of hostile response alternatives. However, contrary to our expectations, psychopathic offenders' ToM did not break down under such conditions, providing support for the robustness of psychopathic individuals presenting with intact ToM. This finding could help explain why psychopaths – even though they lack emotional empathy for their victims (e.g., Blair et al., 1997; Hare, 2003) – are very well able to manipulate others, a capacity that requires knowledge about what another person feels or thinks.

Psychopathy and ToM capacities under time restrictions

Our first hypothesis was that psychopathy is related to impairments in ToM, yet only when limited time is available to process task stimuli, presuming this short duration to hinder compensation for deficiencies in early stages of information processing. As expected, psychopathy was not related to worse RMET performance when the stimulus duration was long. This finding is in line with previous studies showing (psychopathic) offenders to be unimpaired in the inference of complex mental states from pictures of eyes when no time restrictions are imposed (Richell et al., 2003; Dolan & Fullam, 2004). Contrary to our expectations though, we did not find psychopaths to make more mistakes than nonoffenders when stimuli were presented only briefly either. It is unlikely that this result was due to floor effects, as there was a substantial degree of variation in correctly identified RMET stimuli across participants. However, the absence of group differences might be explained by other artifacts in our experimental set-up, such as the possibility that our stimulus duration was too long in order to tap into early stages of information processing (Luo et al., 2010) . Alternatively, psychopaths might have kept the image of the eyes in visual short-term memory, still enabling the engagement in slower, cognitive strategies for identifying mental states. This potential artifact in our design might have been circumvented had we limited the time that participants could take to respond, or if we had used a visual mask presented after the stimuli to wash out iconic visual memory.

Although not supportive of our initial hypothesis, we do not feel that the current study disconfirms the possibility that psychopathic individuals relied on cortical neural circuitry during the RMET to compensate for limbic dysfunctions. In fact, such a compensatory explanation is supported by a recent study by Dadds and colleagues (2009) which showed boys high in psychopathic traits to display marked emotional empathy dysfunction across different age groups. Reduced cognitive empathy, on the other hand, was related to these traits in younger boys only, whereas the adolescent boys high in psychopathic characteristics seemed to have ‘caught up’ with their peers over time in understanding others' emotions.

Therefore, instead of dismissing the possibility that psychopaths process mental states in a different manner, a more compelling explanation could be that their processing style is

not slower. Experimental research shows that mental skills that initially require slow and controlled processing can become more automatic over time after repeated practice, a shift that is reflected in a more accurate, effortless, and fast performance (e.g., Jansma, Ramsey, Slagter, & Kahn, 2001). Likewise, the social perceptual skills of psychopathic individuals might have become automatized through extensive practice in social situations, enabling them to make judgments about others' mental states just as fast and accurate as nonpsychopaths. This conjecture would explain why the current, as well as previous studies, fail to find psychopathy-related deficits in the attribution of mental states, even under high task demands.

Psychopathy and the influence of hostility on Theory of Mind

A second hypothesis we investigated was that offenders' ToM capacities would be distorted by a cognitive bias towards hostility. Although we found that at long stimulus durations, psychopathic offenders were significantly better than nonoffenders at recognizing hostile eyes, our findings were not clearly supportive of such a cognitive bias: the offenders (both nonpsychopathic and psychopathic) did not make significantly more mistakes than nonoffenders when the relative hostility of eyes was low (so in the presence of relatively hostile foils). For the short stimulus duration, hostility did not appear to influence response correctness differently per group at all, as no group by hostility interaction was found for stimuli with a short duration. Relatedly, offenders' incorrect answers on both long and short trials were not characterized by relatively higher levels of hostility compared with nonoffenders. These findings seem to be inconsistent with previous research showing aggression and psychopathy to be related to a more hostile interpretation of others' intentions in ambiguous social situations (Dodge, 1980; Vitale et al., 2005). This discrepancy could be explained by the fact that we used a paradigm that was not analogous to those adopted in previous studies and in which stimuli were not necessarily ambiguous, i.e., there was only one right answer for each trial. Indeed, aggression does not seem to relate to the inference of more hostile intent when social situations are unambiguous (Dodge, 1980).

Though not supportive of our initial hypotheses, the current study revealed another interesting finding. When stimuli were presented briefly, all participant groups showed more difficulty in identifying the mental states of relatively hostile eyes as compared with non-hostile eyes. With a longer stimulus duration, this effect became smaller for the nonoffenders, disappeared for the nonpsychopathic offenders, and even reversed for the psychopathic offenders. As a result, psychopathic offenders were better in correctly attributing mental states when the hostility of eyes was high, compared to the nonoffender controls, with nonpsychopathic offenders falling in between both groups. Analyses focusing on the antisocial behavior component (Factor 2) and interpersonal, affective traits of psychopathy (Factor 1), showed this effect to be carried by both factors. Thus, psychopathy did not seem to be related to an over-attribution of malevolence, but rather to an increased sensitivity to actual hostile mental states. These findings are in line with recent research by

Wilkowski and Robinson (2012), showing aggressive individuals to be more accurate in detecting subtle cues of facial anger than nonaggressive participants, an effect that could not be explained by a general bias towards perceiving more anger in faces.

Psychopaths' potential realistic appreciation of others' malevolence might be explained in the light of research showing information is generally processed more readily when its content is congruent with one's own personality traits or current mood (Rusting, 1998). Depressed individuals, for example, make more negative, yet accurate inferences of the world in comparison to nondepressed people, a phenomenon referred to as 'depressive realism' (Moore & Fresco, 2012). In contrast, a positive mood, as well as more general personality traits like agreeableness, are related to a 'positivity bias,' meaning that reality is interpreted in an overly optimistic manner (for a review, see Rusting, 1998). This latter phenomenon is compatible with nonoffenders' decreased tendency to infer hostility to eyes when it was actually there. Assuming that emotion and personality can also guide perception in offenders, it is not surprising that psychopathy was related to an increased sensitivity to hostile intent, as this disorder is associated with the propensity to experience hostility and anger (Hicks & Patrick, 2006). In the current study, psychopathy thus seemed to be related to a processing style characterized by what one might refer to as 'antagonistic realism.'

A more general explanation for psychopaths' potential 'antagonistic realism' and nonoffenders' 'positivity bias' in reading others' hostile intentions comes from a developmental perspective. Psychopathic offenders' increased ability to read hostile mental states could be the result of repeated exposure to hostile environments, in which detection of others' bad intentions actually serves an adaptive purpose, i.e., signaling realistic threats. This supposition is supported by the fact that adult psychopathy is associated with childhood abuse (Lang, Klinteberg, & Alm, 2002). Furthermore, the conjecture that growing up in abusive environments fosters the ability to read hostility in others' eyes is consistent with a robust line of research showing that people get more successful at processing stimuli to which they have been exposed repeatedly (e.g., Ghuman, Bar, Dobbins, & Schnyer, 2008), and get more skillful in complex cognitive operations after practice (Jansma et al., 2001; see Pollak [2008] and Wilkowski and Robinson [2012] for similar interpretations relating to anger detection in aggressive individuals). In contrast, nonoffenders' underdetection of hostility could have originated from interacting with a mostly nonhostile environment, in which a relatively high threshold for hostile cues provides a behavioral advantage in, for example, maintaining social relationships.

A last finding that deserves further discussion is that psychopathy was only related to a more accurate inference of hostility when presentation time was unlimited. Potentially, the briefly presented eyes lacked personal relevance to the psychopathic participants, whereas the prolonged presentation of stimuli was experienced as though the eyes were staring at them. Being stared at could be particularly evoking for psychopathic people as it might signal provocation. Therefore, the prolonged presentation could have led psychopathic partici-

pants to engage in a more focused, elaborate processing of the possible intention depicted by the eyes, a process that has been referred to as 'provocation-focused rumination,' which has found to amplify the accessibility of aggressive thoughts (Pedersen et al., 2011). This interpretation is congruous with a study by Wilkowski, Robinson, and Meier (2006) showing low agreeableness to be related to difficulties in disengaging attention from antisocial stimuli.

Conclusions, limitations and future directions

The current study aimed to investigate whether psychopathy is related to ToM deficiencies under certain conditions, by comparing (non)psychopathic offenders to nonoffender controls. Contrary to our expectations, results revealed psychopaths' ToM to be intact, even under very stringent conditions (i.e., brief stimulus presentation) or in the presence of hostile answering alternatives, lending further support for intact ToM in psychopathic individuals. An unexpected intriguing finding was that during the long RMET stimulus presentation, psychopathic offenders' performance was positively influenced by the level of hostility in eyes in comparison to nonoffender controls, who seemed to be less accurate in detecting hostility. This finding requires replication though, especially since it is based on a three-way interaction, and constitutes an interesting avenue for future research.

These current results should be interpreted in the light of some limitations. First, when using a more stringent cut-off (i.e., a PCL-R score of ≥30), our sample included only 19 psychopathic offenders. However, we believe that the inclusion of nonoffender controls, as well as nonpsychopathic offenders made our sample broadly representative. Second, our experimental set-up might not have been appropriate to test whether psychopaths' ToM relies on compensatory cognitive strategies associated with a slower processing speed. Research investigating the social perceptual skills of psychopathic people using neuroimaging techniques might provide more definitive answers to this question. A last drawback of most past research on ToM and psychopathology, including the current study, is that it has disregarded the possibility that individuals' ToM could mainly be distorted in more personally relevant situations, such as when making inferences about what other people think and feel about one personally.

If research replicates the finding that psychopathy is related to more accurate hostility detection (rather than a general bias to see hostile intent), the current findings could also have some clinical implications. Instead of regarding antisocial offenders' hostile thoughts as errors in thinking, clinicians might want to focus on the fact that this accurate appraisal of hostility no longer serves an adaptive purpose, and might hinder the attainment of prosocial goals, such as building meaningful relationships with others.

Chapter 3

Theory of Mind, social desirability, and unlikely symptom reporting in personality-disordered offenders with and without psychopathy

Nentjes, L., Bernstein, D.P., Arntz, A., Slaats, M.E., & Hannemann, T. (*in press*). Theory of Mind, social desirability, and unlikely symptom reporting in personality-disordered offenders with and without psychopathy. *Journal of Nervous and Mental Disease.*

ABSTRACT

The current study investigated the relationship between psychopathy and Theory of Mind (ToM), by comparing the performance of psychopathic offenders (*n*=42), nonpsychopathic offenders (*n*=40), and nonoffender controls (*n*=26) on Happé's test of ToM (Happé, 1994). In addition, it was investigated whether offenders' ToM skills would moderate the association between the lifestyle/antisocial psychopathy component (Factor 2) and self-presentation (i.e., the tendency to report social desirability and unlikely symptoms). Results showed groups not to differ in ToM performance. As expected though, ToM moderated the association between psychopathy and self-presentation: only for offenders relatively high in ToM, Factor 2 was strongly related to less social desirability and more unlikely symptom reporting. These results could indicate that offenders who are high in both ToM and Factor 2 exaggerate their mental dysfunction to express their need for clinical attention. Results are used to critically evaluate the interpretation of occurrences in which offenders overplay their psychopathology.

INTRODUCTION

Psychopathy is a disorder that emerges early in life (Lynam & Gudonis, 2005) and that is associated with high levels of antisocial behavior, as well as with marked interpersonal and affective deficiencies. These latter characteristics, such as a manipulative and deceitful interpersonal style, a lack of guilt and remorse, emotional shallowness, and a lack of empathy for others (Hare, 2003) distinguish psychopaths from other individuals who exhibit antisocial behavior but who do not have psychopathic personality features, like offenders suffering from antisocial personality disorder (ASPD; American Psychiatric Association [APA], 2000).

The manner in which psychopathic individuals behave in social interactions is characterized by an interesting paradox: On the one hand, psychopathy is associated with deceiving and manipulating others in a controlled and calculating way (Hare, 2003), reflecting a certain level of social skillfulness. On the other hand, a substantial amount of the traits associated with psychopathy reflect poor adjustment to interpersonal situations, including increased irritability and a lower tendency to inhibit and restrain impulse expression (Hare, 2003; Patrick, Hicks, Nichol, & Krueger, 2007). This seeming contradiction raises the question of whether psychopaths have relatively poor social cognitive and interactional skills, or whether their social understanding is intact, or even superior to that of other individuals.

A capacity that is thought to be essential in understanding social interactions and in adapting one's behavior to interactional processes is Theory of Mind (ToM). ToM refers to the capacity to understand others' mental states – such as intentions and beliefs – and to subsequently explain and predict behavior using this apprehension (Baron-Cohen, 2000). As a normally developed ToM is considered to play an important, if not crucial role in the ability to tell lies and successfully deceive other people (Baron-Cohen, 2000; Talwar, Gordon, & Lee, 2007), one might expect psychopaths to have an intact ToM. However, ToM capacities have also been found to positively relate to traits on which psychopathic individuals score relatively low, such as agreeableness (Nettle & Liddle, 2008; Patrick et al., 2007). This latter observation, in combination with the finding that low ToM has found to predict angry and aggressive responding in social interactions (Mohr, Howells, Gerace, Day, & Wharton, 2007; Renouf et al., 2010), could be more indicative of potential deficiencies in psychopaths' ToM.

A number of experimental studies that have been conducted in forensic samples seem to support the stance that psychopathic individuals have intact ToM. That is, previous research could not reveal any psychopathy-specific deficits on ToM tasks that require the inference of story characters' thoughts (Blair et al., 1996) or on a test in which subjects are asked to attribute complex mental states (e.g., "sceptical", "relieved") to photographs of the eye region only (Dolan & Fullam, 2004; Richell et al., 2003). Although these studies suggest that there is no relationship between psychopathy and ToM, their interpretability is seriously limited by the fact that none of these studies took the multidimensional nature of psychopathy into account. That is, factor analytic research on the Psychopathy Checklist-Revised (PCL-R, Hare, 2003) and its preceding formats has identified two factors: Factor 1

describes interpersonal/affective traits, whereas Factor 2 covers impulsive/antisocial behavior (Hare et al., 1990; Harpur, Hakstian, & Hare, 1988).[1] Subsequent research has revealed Factor 1 and 2 to show opposing relationships with certain constructs, like stress reactivity and fearfulness (Hicks & Patrick, 2006; Verona, Patrick, & Joiner, 2001). These studies also showed that PCL-R total scores did not significantly predict these temperamental propensities, stressing the importance of taking both factors into account when studying psychopathy in order not to obscure potential relationships between this disorder and its external correlates.

Considering ToM, the multifactorial structure of the PCL-R might also help to explain why psychopaths seem to be characterized by the seemingly contradictory social traits described above. That is, psychopathy Factor 1 and 2 might also be divergently related to skills associated with social behavior and understanding. In order to elucidate these issues, we undertook an investigation of ToM capacities in a sample of psychopathic offenders, nonpsychopathic offenders and community controls (*N*=102). We decided to adopt two measures of ToM, as research suggests this construct to consist of two components, including the capacity to infer mental states from eye stimuli ("social-perceptual ToM") versus the ability to reason about mental states ("social-cognitive ToM") (Nettle & Liddle, 2008; Sabbagh, 2004). We assessed social-perceptual ToM using the Reading the Mind in the Eyes Task (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), which requires the attribution of mental states to pictures of eyes. In a previous report (Nentjes, Bernstein, Arntz, van Breukelen, & Slaats, 2015), we describe that overall performance on the RMET was unrelated to psychopathy and its factors, even when task performance was challenged by varying stimulus presentation intervals and by introducing hostile incorrect answering options that might bias responses. However, as the different components of ToM seem to be related, yet dissociable (Nettle & Liddle, 2008), it might still be expected that psychopathy is associated with aberrances in social-cognitive ToM.

In the present paper, we therefore investigate the relationship between psychopathy and ToM using a task that requires the attribution of story characters' mental states (i.e., Happé's advanced test of ToM; Happé, 1994), using the same sample as in the RMET study described above (Nentjes et al., 2015). We expected PCL-R Factor 1 to be unrelated to ToM impairments, as this factor reflects the aforementioned psychopathy characteristics that require an understanding of others' mental states (e.g., lying and conning; Hare, 2003; Talwar et al., 2007). In contrast, it was expected that PCL-R Factor 2 would be negatively predictive of performance on Happé's test, as this factor is related to traits which have found to be inversely related to social cognitive ToM skills (e.g., low agreeableness, reactive aggression; Nettle & Liddle, 2008; Patrick et al., 2007; Renouf et al., 2010).

[1]More recent research suggests psychopathy to be constituted by three (Cooke & Michie, 2001) or four factors (Hare, 2003). As the PCL-R two-factor structure has been most extensively validated so far, we focus on this conceptual model in the present study.

A second aim of the current study was to investigate the influence of social-cognitive ToM on the relationship between offenders' psychopathy level and the way in which these individuals portray themselves (i.e., their self-presentational style). Although results are somewhat mixed (for overviews, see Niesten, Nentjes, Merckelbach, & Bernstein, *in press*; Ray et al., 2013), previous research suggests that the lifestyle/antisocial factor (but not the interpersonal/affective factor) of psychopathy is associated with a self-presentational style that is characterized by conveying a relatively bad image, as indicated by the exaggeration of (atypical) symptoms (Ray et al., 2013). Congruently, the lifestyle/antisocial behavior component of psychopathy has found to be negatively associated with trying to come across favorably by, for example, reporting socially desirable traits. This relationship is not surprising, considering social desirability to be positively related to characteristics like self-control, agreeableness, emotional stability, and interpersonal adjustment (Uziel, 2010), which antisocial people tend to have to a relatively low extent (Patrick et al., 2007; Verona et al., 2001).

Thus, the antisocial factor of psychopathy appears to be associated with a disinterest, or incapacity, to behave socially desirable and a tendency to put oneself in a relatively bad light in terms of overplaying atypical symptomatology. The relevance of research into psychopathy and self-presentation is stressed by the notion that presenting oneself in a socially desirable way, as well as reporting symptoms one is not actually suffering from are behaviors that might be engaged in to obtain certain instrumental advantages in forensic contexts (Rogers, 2008). Nonetheless, scant research has investigated the mechanisms underlying self-presentation in criminal populations.[2]

ToM seems pivotal in successfully monitoring and adjusting self-presentation, as portraying yourself in a certain manner involves knowing that others have beliefs that are separate from your own that are influenced by how you come across in social interactions (Baron-Cohen, 2000). Therefore, we expected ToM to moderate the associations between PCL-R Factor 2 and the two aforementioned self-presentation indices (i.e., social desirability and unlikely symptom reporting). As social-cognitive ToM is implied in behaving in a socially

[2] Social desirability and unlikely symptom reporting have often been referred to as “faking good” and “faking bad,” respectively (e.g., Ray et al., 2013). In the present report, we decided to refrain from this terminology: as malingering instruments assess the report of traits that are highly uncommon, it is plausible that an elevated score on such measures is indicative of “faking.” However, social desirability scales are thought to tap into the (un)conscious exaggeration of good virtues (so, “faking”; Paulhus, 1991), but also into an individual's actual (un)desirable personality traits; Uziel, 2010). For this reason, we adopted the more neutral term of “self-presentational style” rather than “faking.” Next to that, we decided to use the term “unlikely symptom reporting” rather than “malingering,” as the latter implies the presence of external incentives that motivate symptom production (APA, 2000), with these incentives not being evidently present for our current sample.

sensitive manner (Paal & Bereczkei, 2007), we hypothesized offenders low in such ToM to be characterized by low levels of social desirability, regardless of their Factor 2 score. For the same reason, we hypothesized offenders high in social-cognitive ToM to convey a more socially desirable impression, yet only when being relatively low in Factor 2. That is, individuals high in Factor 2 might not care about coming across in a socially favorable way, or they might be less capable of doing so because of the disinhibitive and emotionally reactive nature of this psychopathy component (Verona et al., 2001). Figure 1 depicts the hypothesized relationship between Factor 2 and social desirability, split up per ToM level.

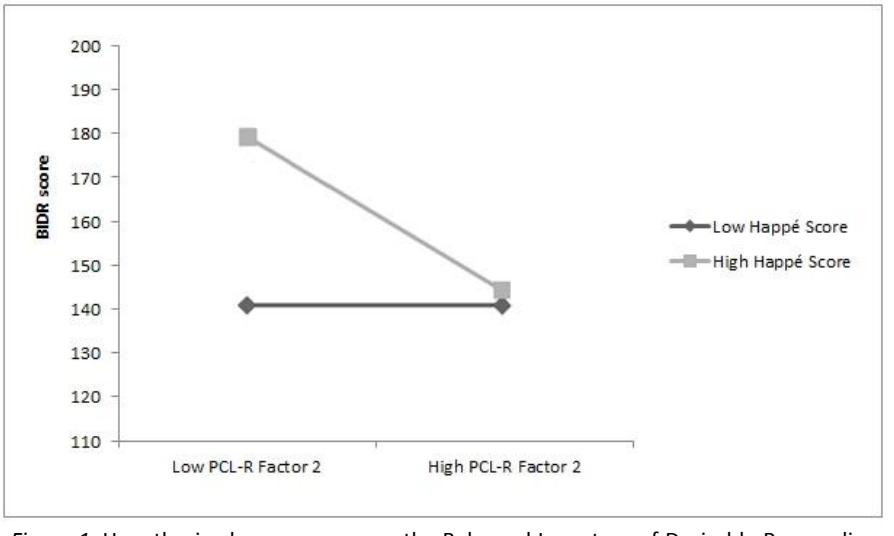

Figure 1. Hypothesized mean scores on the Balanced Inventory of Desirable Responding (BIDR) as a function of low and high Psychopathy Checklist-Revised (PCL-R) Factor 2 scores by low and high scores on Happé's test of Theory of Mind.

Finally, we also expected the positive relationship between Factor 2 and unlikely symptom reporting to depend on social-cognitive ToM levels. The report of atypical symptoms reflects a misrepresentation of one's actual functioning (APA, 2000) and might therefore thus be seen as a form of deceit. As the capacity to deceive relies on a well-developed ToM (Baron-Cohen, 2000; Talwar et al., 2007), we hypothesized offenders low in ToM to report relatively low levels of unlikely symptoms, regardless of their Factor 2 levels. In contrast, we expected to see a positive relationship between unlikely symptom reporting and Factor 2 for offenders high in ToM. (See Figure 2 for these hypothesized relationships between PCL-R Factor 2 and atypical symptom reporting.)

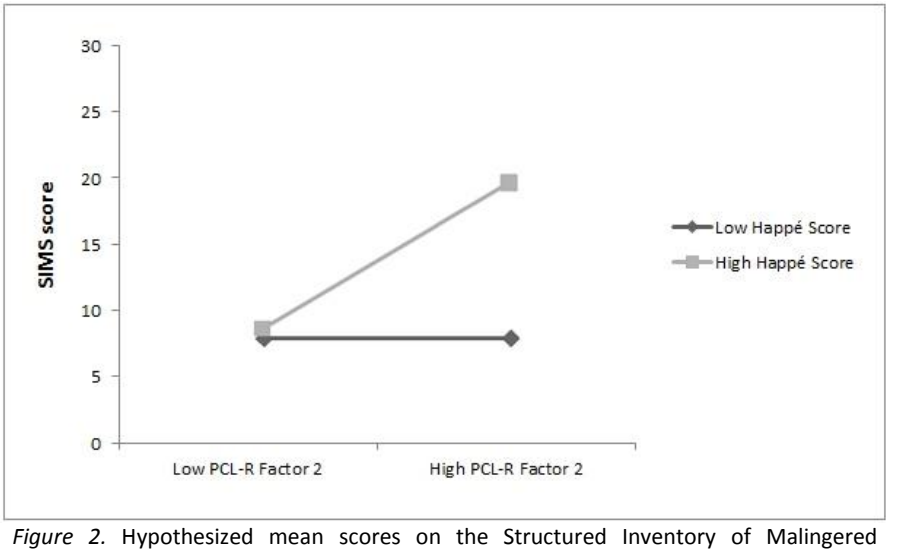

Figure 2. Hypothesized mean scores on the Structured Inventory of Malingered Symptomatology (SIMS) as a function of low and high Psychopathy Checklist-Revised (PCL-R) Factor 2 scores by low and high scores on Happé's test of Theory of Mind.

METHODS

Participants

This study is part of a larger research project examining the emotional correlates of psychopathy in a sample of delinquents and control subjects (see, Nentjes et al., 2015; Nentjes, Meijer, Bernstein, Arntz, & Medendorp, 2013; Niesten et al., *in press*). Eighty-five male criminal offenders were recruited from six forensic psychiatric centers and a prison in the Netherlands, using the following inclusion criteria: (a) the presence of a DSM-IV antisocial, narcissistic, borderline, or paranoid personality disorder (PD), or a PD not otherwise specified with at least five cluster B PD traits, and (b) good understanding of the Dutch language. Exclusion criteria were (a) the presence of current psychotic symptoms, (b) schizophrenia or bipolar disorder, (c) current drug or alcohol dependence (but not abuse), (d) low intelligence (i.e., IQ<80), (e) serious neurological impairment, (f) an autistic spectrum disorder, and (g) fixated pedophilia. Thirty-six of these subjects were also participating in an RCT on the effectiveness of Schema Therapy (Bernstein et al., 2012).

Eighty-two forensic participants completed Happé's test. Forensic participants were divided into a nonpsychopathic and a psychopathic group using the European PCL-R cut-off of 25 (Cooke & Michie, 1999), which was also the median PCL-R score in the current sample. A control group of 26 healthy males (who were not university students) was recruited from the general population. An inclusion criterion for this group was a) good understanding of the Dutch language. Exclusion criteria were a) the presence of any axis I disorder, b) the presence of threshold minus two criteria for any DSM-IV PD, c) the presence of a PD diagnosis Not Otherwise Specified, d) low intelligence (i.e., IQ<80), (e) serious neurological impairment, (f) an autistic spectrum disorder, and (g) a level of self-reported psychopathy higher than one *SD* above the general population mean.

Demographic and clinical features of the sample are reported in Table 1. All the nonoffender participants had Dutch nationality. In the forensic sample, ten different nationalities were represented, with the most prevalent being Dutch (74.7%), Moroccan (7.2%), and Surinamese (8.4%). Types of crime that were committed by the offenders were sexual offenses (30.1%), homicide (27.7%), assault (20.5%), property crime with (10.8%) and without (1.2%) violence, arson (6.0%), and drug offenses (3.6%). Offenders were diagnosed with antisocial (82.9%), borderline (32.9%), narcissistic (31.6%), paranoid (10.5%), and avoidant PD (1.3%). Nine (10.7%) of the offenders did not qualify for one of these diagnoses, but had a PD NOS with five or more cluster B traits.

Measures

Screening measures

SIDP-IV. The Structured Interview for DSM-IV Personality Disorders (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995) was used to assess PDs in the offender group. SIDP-IV scores were derived from participants' file records when these had already been scored by thoroughly trained diagnostic staff (*n*=52). In a subsample of *n*=18, single rater intraclass correlation coeffients (ICCs) for the PDs of interest ranged between .53 and .95 (*M*=.72), whereas average rater ICCs ranged between .70 and .97 (*M*=.83). When interviews had been scored twice, ratings were averaged. When the SIDP-IV had not been administered (*n*=33), the interview was administered by the first author (L.N.). Five interviews were scored by L.N. and a second rater, yielding single rater ICCs ranging from .75 to .96 (*M*=.84) for the PDs of interest.

SCID I and II. The nonoffenders were screened for Axis I and II psychopathology using the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997) and the SCID for Axis II Personality Disorders (SCID-II; First, Spitzer, Gibbon, Williams, & Benjamin, 1994). ICCs in a sample of *n*=5 (single rater) for all SCID-II PDs ranged from .79 to .99 (*M*=.88). Although there were not enough axis I diagnoses present in these patients to determine Kappas, two independent raters agreed on the presence of 24 axis I disorders, whereas disagreement existed on the presence of only two diagnoses, suggesting a high level of interrater consistency.

LSRP. The Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) was used to assess psychopathy in the nonoffenders. Subjects were excluded from the current study when their score exceeded a cut-off of 58, which is approximately one *SD* above the mean LSRP total score found in males in the general population (e.g., Uzieblo, Verschuere, van den Bussche, & Crombez, 2010).

AQ. When there was reason to suspect the presence of an autism spectrum disorder, the Autism-Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Martin, & Clubley, 2001) was administered, excluding participants who scored 32 or higher based on Baron-Cohen, Wheelwright, Skinner, et al. (2001). Offenders were not approached for this study when an autism spectrum disorder had been diagnosed by clinical staff, for which more extensive methods were used (e.g., patient and collateral interviewing, supplemented with multi-informant observational information).

Table 1. *Sample characteristics (N = 108)*

	Psychopathic offenders (*n* = 42)		Nonpsychopathic offenders (*n* = 40)		Nonoffenders (*n* = 26)		
	M (*SD*/*SE*)	Range	*M* (*SD*/*SE*)	Range	*M* (*SD*/*SE*)	Range	Test statistics
Age (years)	39.1 (9.5)	23-65	38.8 (9.9)	24-64	35.6 (13.5)	18-57	$F(2, 105)=0.94$, $p=.39$
IQ	94.9 (11.4)	80-120	96.4 (11.3)	80-121	101.2 (12.5)	80-128	$F(2, 105)=2.57$, $p=.08$
Institutionalization[a]	6.5 (3.5)	1.0-15.0	7.4 (4.5)	0.5-20.0	-	-	$t(80)=-0.66$, $p=.51$
PCL-R total	29.5 (3.2)	25.0-36.8	18.6 (3.8)	11.0-24.0	-	-	$t(80)=-13.28$, $p<.001$
PCL-R Factor 1	12.0 (2.8)	6.0-16.0	8.4 (3.1)	3.0-16.0	-	-	$t(80)= -14.36$, $p<.001$
PCL-R Factor 2	13.9 (2.5)	7.2-18.0	8.0 (3.8)	1.0-15.0	-	-	$t(80)=-13.33$, $p<.001$
Happé-Physical[b]	8.1 (2.9)	1.0-14.0	8.7 (2.9)	3.0-14.0	9.5 (2.5)	4.0-14.0	-
Happé-Physical[c]	8.4 (0.4)	-	8.7 (0.4)	-	8.9 (0.5)	-	-
Happé-Mental[b]	8.1 (2.4)	2.0-13.0	9.0 (2.2)	5.0-15.0	9.6 (2.2)	6.0-14.0	-
Happé-Mental[d]	8.2 (0.3)	-	9.2 (0.3)	-	9.2 (0.4)	-	-

Note. PCL-R = Psychopathy Checklist-Revised (Hare, 2003).
[a] Length of institutionalization since the last offense in years
[b] Uncorrected scores
[c] Predicted means corrected for covariates associated with Happé-Physical at $p>.10$ (i.e., age, IQ, state and trait anxiety, and working memory capacity)
[d] Predicted means corrected for covariates associated with Happé-Mental at $p>.10$ (i.e., IQ, reading speed, state anxiety, and impulsivity)

Main predictor and outcome variables

PCL-R. The PCL-R (Hare, 2003) was used to assess psychopathy in the offenders. PCL-R scoring was based on a semi-structured interview and a review of subjects' file information. Participants' PCL-R scores were obtained from clinical files when these had already been scored by diagnostic staff (*n*=74; all of these staff members had been extensively trained during a three-day PCL-R assessment course). Independent single rater ICCs over sixteen PCL-R interviews (from different clinics) for total, Factor 1, and Factor 2 scores were .76, .74, and .74, respectively. When PCL-R scores were not available, the first author (L.N.) scored the PCL-R, also based on an interview and an extensive file search, supported by regular meetings with the third author (D.P.B.), who has extensive experience in scoring the PCL-R, to ensure adherence to the diagnostic criteria. In the entire forensic sample, standardized Cronbach's alphas for total, Factor 1, and Factor 2 scores were .79, .82, and .82, respectively.

Happé's advanced test of ToM. "Social-cognitive ToM" was assessed using Happé's advanced test of ToM (Happé, 1994). In this task, subjects are asked to read sixteen stories out loud, and to subsequently answer a question about each story. The task is divided into a mental and a physical condition. Understanding the physical stories (*n*=8) requires making a physical inference, whereas the attribution of mental states (e.g., thoughts, desires) is needed to apprehend the mental stories, which contain elements like telling white lies, persuasion, and (double) bluff. Presentation of the mental and physical condition was counterbalanced across subjects. Previous research shows the Dutch version of Happé's ToM test to have good psychometric properties (Arntz, Bernstein, Oorschot, & Schobre, 2009). Participants' audio-recorded responses were rated by four extensively trained graduate Psychology students (three females). The answers were scored 0 (*incorrect answer*), 1 (*partially correct or implicit answer*), or 2 (*complete, explicit answer*), resulting in total scores ranging from 0 to 16 for each story type. The answers of 20 randomly selected participants were scored by all four raters, resulting in ICCs of .97 for the physical condition (Happé-Physical) and .94 for the mental condition (Happé-Mental). The responses of the remaining 88 participants were rated by two different raters (scores were averaged). The average ICC for all possible combinations of two raters was .91 for the physical condition and .90 for the mental condition. In the current study, test retest reliability in a subgroup of offender participants (*n*=14) over a one month interval was .53 for the physical condition, and .51 for the mental condition.[3]

[3]As recent research suggests that ToM might also be constituted by a cognitive and an affective dimension, with the latter being especially relevant to psychopathy (e.g., Shamay-Tsoory, Harari, Aharon-Peretz, & Levkovitz, 2010), an attempt was made to single out these underlying ToM components by conducting a confirmatory factor analysis (weighted least squares method) on the stories of Happé-Mental. This analysis revealed that the loadings of the eight stories on one of two factors were insufficiently high to ensure reliable recovery of a two-factor solution. The results from this analysis were therefore not taken into further account.

RMET. "Social-perceptual" ToM was assessed by administering the Reading the Mind in the Eyes Task (RMET; Baron-Cohen, Wheelwright, Hill, et al., 2001). Subjects completed a computerized version of the test, in which they were presented with 36 stimuli depicting the eye region of faces only. Subjects were asked to identify which of four words accompanying each picture (one correct option, three foils) best represented what the person in the picture was feeling or thinking. The RMET was changed from its original format in order to create task conditions that were hypothesized to bring psychopathy-specific deficits to light (i.e., different stimulus presentation times [short vs. long] and the presence of hostility in foils). The effect of psychopathy on this adapted version of the RMET are reported in a separate article (Nentjes et al., 2015). The partial correlation coefficient between Happé-Mental scores and the RMET total score – when controlling for Happé-Physical – was .31 (p<.01).

BIDR. Social desirability was assessed using the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991). According to Paulhus (1991), the first 20-item subscale of this questionnaire taps into the conscious effort to present oneself in a positive way, whereas the last 20 items measure respondents' actual beliefs about their good qualities. A higher score on the BIDR indicates a higher degree of social desirability. In the current study, we used the total 40-item scale, for which Cronbach's alpha was .79.

SIMS. In order to assess the report of unlikely symptoms, we administered the Structured Inventory of Malingered Symptomatology (SIMS; Smith & Burger, 1997). This 75-item questionnaire measures the overreporting of atypical psychopathological and neuropsychological symptoms (e.g., psychosis). The higher a subject's score on the SIMS, the more atypical symptoms (s)he claims to suffer from. Cronbach's alpha in the current sample was .83.

Potential covariates (CVs). A robust association has been found between executive functioning and ToM (e.g., Talwar & Lee, 2008). Therefore, we considered it important to take executive functioning into account, including working memory capacity and impulsivity. Working memory capacity was assessed using the self-ordered pointing task (SOPT; Petrides & Milner, 1982). In this computerized test, participants are presented with pictures that are spatially arranged in a 3 × 4 matrix. Picture order varies on each trial, requiring participants to click on a picture that they have not pointed to on a previous trial. Correct responses were summed over two task repetitions. Impulsivity was examined by assessing the capacity to inhibit an ongoing response, using the stop test, designed following the methodology described in Rubia, Smith and Taylor (2007). Other potential CVs that were taken into account were age, anxiety (the latter being assessed with the State-Trait Anxiety Inventory; STAI, Spielberger, 1983), and IQ. IQs were derived from clinical files if offenders had recently been assessed with the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997). If these were not available, participants completed a shortened version of the WAIS-III (based

on the subtests Block Design and Vocabulary; Jeyakumar, Warriner, Raval, & Ahmad, 2004). Scores on the Picture Arrangement subtest of the WAIS-III were taken into account as a measure of social logical reasoning. Last, the time it took participants to read the stories in Happé's ToM test was registered in order to control for potential differences in literacy.

Procedure

All participants were administered a battery of emotional tests, some of which are described elsewhere (Nentjes et al., 2013; Nentjes et al., 2015; Niesten et al., *in press*). Offenders completed these measures in a quiet testing room at the site where they were institutionalized. After being screened with the LSRP and the SCID interviews over the phone, controls completed the other measures in a comparable testing room at Maastricht University. Measures were presented in counterbalanced order. Participants provided informed consent and were reimbursed with 25 euro for their participation. This study was approved by the ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University.

Power analysis

A post-hoc power analysis was conducted using G*Power software in order to investigate the current study's power to detect group differences in Happé's ToM test scores, based on the parameters of the present sample (N=108; number of levels in the within and between subject factors [2 and 3, respectively], correlation between the within subject factor levels [r=.30], α=.05, and 1-ß=.80). This analysis demonstrated the current study to have the power to detect a small to medium effect size (f=.18; for which .10, .25, and .40 are small, medium, and large effects, respectively) (Faul, Erdfelder, Lang, & Buchner, 2007).

Statistical analyses

First, a mixed factorial ANCOVA was conducted with group (nonoffenders, nonpsychopathic offenders, psychopathic offenders) as between-subject factor, Happé story type (Happé-Physical and Happé-Mental) as within-subject factor, and the variables that were associated with either Happé-Physical and/or Happé-Mental as CVs. Post-hoc comparisons were planned to follow up on any significant effects. In order to investigate factor specific influences on ToM, we repeated the analyses described above, yet dividing the three groups according to the median splits of PCL-R Factor 1 and 2 (which were 10.0 and 12.0, respectively). Using such a median split approach (rather than dimensionally associating PCL-R total and factor scores with Happé's ToM test performance) enabled the inclusion of the nonoffender controls in the analyses on PCL-R factors and ToM.

Last, we investigated the influence of the interaction between psychopathy and ToM on both self-presentation indices by conducting two linear regression analyses with either BIDR or SIMS score as dependent variables and RMET score, Happé-Mental, PCL-R Factor 1 and 2 score, and the two-way interactions between the PCL-R factors and the two ToM test scores

as predictors (all these variables were centered around the mean). CVs in this model were selected on the basis of their bivariate correlation with either BIDR or SIMS scores, in order to limit the amount of predictor variables. As the nonoffenders were tested in a considerably different environment than the offenders (i.e., a nonforensic context, which could have a marked influence on differences in self-presentation), we limited these analyses to our offender sample in order to facilitate interpretation of the results.

RESULTS

Psychopathy and performance on Happé's test of Theory of Mind

Pearson product-moment correlation coefficients showed age, IQ, state and trait anxiety, working memory capacity, reading speed, and impulsivity to be related to performance on Happé-Mental and/or Happé-Physical (at $p<.10$). These variables were therefore taken into account as CVs in a 3 (group) × 2 (story type) mixed factorial ANCOVA. This analysis showed no main effect of group ($F[2, 98]=1.63$, $p=.20$; nonoffenders: $M=9.0$, $SE=0.3$; nonpsychopathic offenders: $M=9.0$, $SE=0.3$; psychopaths: $M=8.3$, $SE=0.3$), no main effect of story type (Pillai's trace =.01, $F[1, 98]=1.08$, $p=.30$; Happé-Mental: $M=8.9$, $SD=0.2$; Happé-Physical: $M=8.7$, $SD=0.3$), and no significant interaction between group and story type either (Pillai's trace =.01, $F[2, 98]=0.55$, $p=.58$).

Next, two similar ANCOVAs were conducted in which group was defined using Factor 1 and 2, respectively. Taking the same CVs into account as in the previous analyses, the effect of group^{Factor1} (nonoffenders, offenders low on Factor 1, offenders high on Factor 1) was not significant ($F[2, 98]=1.38$, $p=.26$; nonoffenders: $M=9.0$, $SE=0.4$; offenders low on Factor 1: $M=8.9$; $SE=0.3$; offenders high on Factor 1: $M=8.4$, $SE=0.3$), neither was the interaction between group^{Factor1} × story type ($F[2,98]=.03$, $p=.97$). Analyses pertaining to Factor 2 also showed the effect of group^{Factor2} to be nonsignificant ($F[2, 98]=0.72$, $p=.49$; nonoffenders: $M=9.0$, $SE=0.4$; offenders low on Factor 2: $M=8.8$, $SE=0.3$; offenders high on Factor 2: $M=8.5$, $SE=0.3$), as was the interaction between group^{Factor2} and story type (Pillai's trace =.00, $F[2, 98]=.02$, $p=.98$).[4]

Associations between psychopathy, Theory of Mind, and self-presentation

As aforementioned, the analyses on psychopathy, ToM, and self-presentation were limited to the offender sample. First, correlation coefficients were computed between BIDR score and the potential CVs (Happé-Physical was also taken into account as a potential CV in these

[4]The interaction between group (based on either PCL-R total, Factor 1, or Factor 2 scores) and story type was also nonsignificant when running these analyses without the covariates. When conducting regression analyses with either the dimensional PCL-R total or the dimensional factor scores (within just the offender group) as predictors of performance on Happé's ToM test, the effects of the interactions between psychopathy and Happé story type remained nonsignificant as well (all p's >.20).

analyses). Results showed state anxiety, trait anxiety, and reading speed to be associated with BIDR score (all *p*'s<.10), which were therefore taken into account in the subsequent analyses. These included BIDR score being regressed on PCL-R Factor 1, PCL-R Factor 2, RMET score, Happé-Mental, PCL-R Factor 1 × RMET score, PCL-R Factor 2 × RMET score, PCL-R Factor 1 × Happé-Mental, PCL-R Factor 2 × Happé-Mental, and the CVs state anxiety, trait anxiety, and reading speed. Next, nonsignificant interaction and main effects were deleted from the model in a backward stepwise fashion (using a *p*>.10 criterion; two-way interactions were removed before deleting any main effects). This procedure resulted in a model in which BIDR score was predicted by trait anxiety (ß=-.47, *p*<.001), reading speed (ß=.25, *p*=.01), Factor 2 (ß=-.18, *p*=.07), Happé-Mental (ß=-.20, *p*=.04), and the two-way interaction between Happé-Mental and Factor 2 (ß=-.21, *p*=.03, overall model parameters: R^2=.38, *F*[5, 75]=9.11, *p*<.001). In Figure 3, mean BIDR score is plotted as a function of low (mean – 1 *SD*) versus high Factor 2 (mean + 1 *SD*), by low (mean – 1 *SD*) versus high (mean + 1 *SD*) Happé-Mental score. This figure illustrates that BIDR scores significantly decrease as PCL-R Factor 2 goes up for offenders scoring high on Happé-Mental (ß=-.40, *t*[75]=-2.89, *p*<.01), but not for those offenders scoring low on Happé-Mental (ß=.01, *t*[75]=0.04, *p*=.96). The unstandardized regression coefficients on these levels of Happé-Mental differed significantly from one another (*Z*=2.28, *p*=.01).

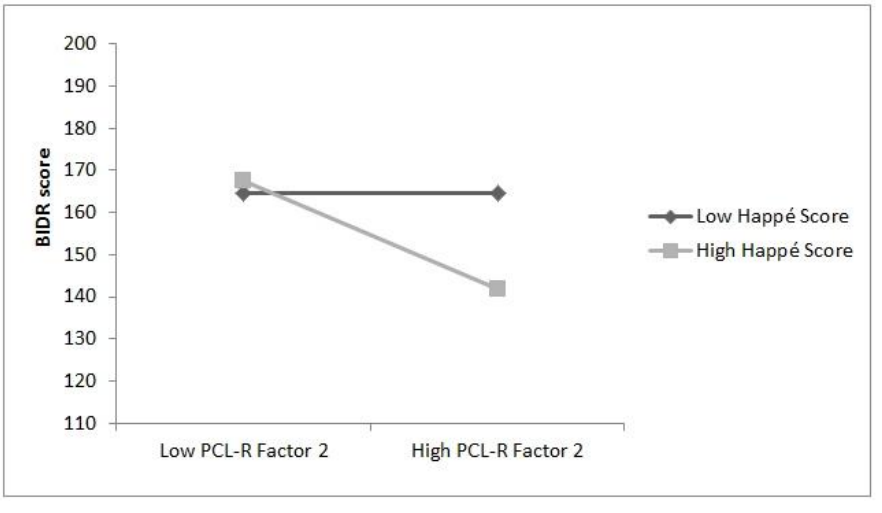

Figure 3. Mean scores on the Balanced Inventory of Desirable Responding (BIDR) as a function of low (mean – 1 *SD*) and high (mean + 1 *SD*) Psychopathy Checklist-Revised (PCL-R) Factor 2 scores by low (mean – 1 *SD*) and high (mean + 1 *SD*) scores on Happé's test of Theory of Mind.

The same analysis was repeated using SIMS score as the criterion variable. (SIMS scores were log-transformed in order to reduce skewness.) Bivariate correlation analyses showed SIMS scores to be associated with IQ, state anxiety, and trait anxiety (at $p<.10$). These CVs were therefore entered in a regression model along with the aforementioned main and interaction effects of Factor 1, Factor 2, Happé-Mental, and RMET score. After backward stepwise deletion of main and interaction effects (using a $p>.10$ criterion), SIMS scores showed to be predicted by STAI-trait (ß=.40, $p<.001$), RMET score (ß=-.31, $p<.01$), Factor 2 (ß=.24, $p=.02$), Happé-Mental, (ß=-.12, $p=.25$), and Factor 2 × Happé-Mental (ß=.20, $p=.04$, see Figure 4; overall model parameters: $R^2=.42$, $F[5, 67]=9.73$, $p<.001$). Figure 4 depicts mean SIMS scores plotted as a function of low (mean – 1 *SD*) versus high Factor 2 (mean + 1 *SD*), by low (mean – 1 *SD*) versus high (mean + 1 *SD*) Happé-Mental score. Figure 4 shows that SIMS scores increase as a function of Factor 2 for offenders scoring high on Happé-Mental (ß=.46, $t[68]=4.54$, $p<.001$), but not for those scoring low on Happé-Mental (ß=.02, $t[68]=0.14$, $p=.89$). The difference between the unstandardized regression coefficients on these levels of Happé-Mental was significant ($Z=-3.05$, $p=.001$).

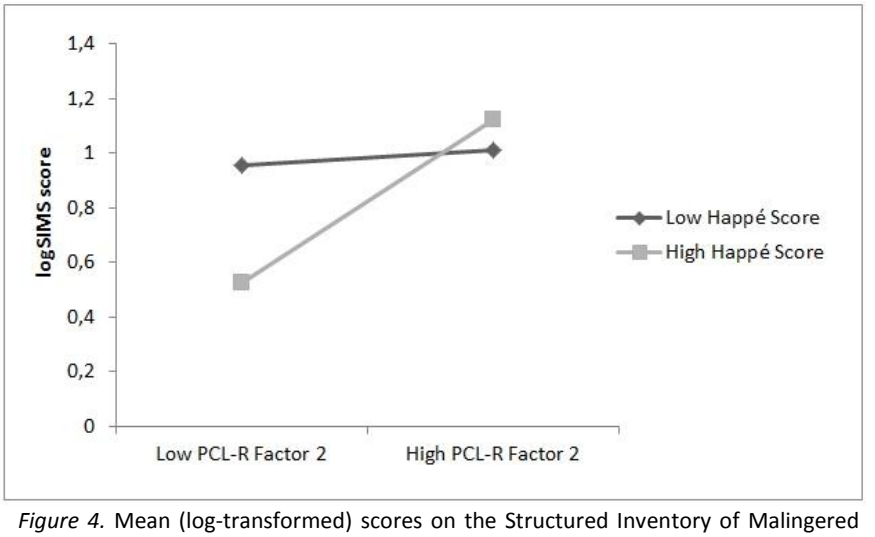

Figure 4. Mean (log-transformed) scores on the Structured Inventory of Malingered Symptomatology (SIMS) as a function of low (mean – 1 *SD*) and high (mean + 1 *SD*) Psychopathy Checklist-Revised (PCL-R) Factor 2 scores by low (mean – 1 *SD*) and high (mean + 1 *SD*) scores on Happé's test of Theory of Mind.

DISCUSSION

The current study examined the relationship between psychopathy and social-cognitive ToM capacities as assessed with Happé's advanced test of ToM (Happé, 1994). Another aim was to shed light on whether ToM influences the associations between psychopathy, social desirability, and unlikely symptom reporting, as found in Ray et al. (2013) and Niesten et al. (*in press*).

Psychopathy factors and social-cognitive ToM

Results showed psychopathic offenders, nonpsychopathic offenders, and nonoffenders not to differ from each other in performance on Happé's ToM task. This finding is consistent with previous research in which psychopathic offenders did not perform worse than their nonpsychopathic counterparts on ToM tests, including those using a narrative approach like the one in the present study (Blair et al., 1996) and those in which mental states had to be inferred from eyes (Dolan & Fullam, 2004; Nentjes et al., 2015; Richell et al., 2003).

When looking more specifically at the dimensions underlying psychopathy, we found Factor 1 to be unrelated to social-cognitive ToM. This finding is consistent with our prior expectations and is not surprising considering Factor 1 to cover lying and manipulative behavior (Hare, 2003), for which an understanding of someone else's mind is thought to be a prerequisite (Talwar et al., 2007; Talwar & Lee, 2008). Contrary to our hypotheses though, Factor 2 was also not associated with ToM deficiencies, even though this psychopathy dimension is characterized by traits that are associated with worse ToM skills, such as a tendency to respond angrily (Mohr et al., 2007). Possibly, a less developed ToM can lead to aggression in some individuals, but the “short fuse” of offenders high in Factor 2 (Hare, 2003) might be better explained by other etiological mechanisms.

Psychopathy, ToM, and self-presentational style

A second aim of the present research was to further investigate the relationship between Factor 2 and the way in which one manages self-presentation, including socially desirable responding, as well as the overreporting of atypical psychiatric symptoms. First, we expected offenders low in social-cognitive ToM to show little engagement in social desirable responding, assuming ToM to be a necessity in such self-presentation. Following this reasoning, offenders high in ToM were hypothesized to present themselves in a relatively socially desirable manner, yet only when this way of presenting would not be overridden by high levels of Factor 2. As expected, Factor 2 and ToM interacted in predicting offenders' level of socially desirable responding. Surprisingly though, the found moderation effect was explained by offenders high in ToM reporting less socially desirable traits than those low in ToM, yet only when also being relatively high in Factor 2 (see Figure 3). The current study thus does not support the assumption that ToM is a prerequisite for displaying social desirability. Possibly, ToM is associated with other interpersonal capabilities that are related, yet not identical to social desirability, such as cooperativeness (Paal & Bereczkei, 2006).

A provisional explanation for the interaction between Factor 2 and ToM in predicting social desirability comes from an interactionist perspective. According to this viewpoint, individuals are thought to adopt a social role that is consistent with how they believe others perceive them. Consequently, when an offender feels that others see him as deviant, this view might be endorsed and internalized over time (Goffmann, 1963). Indeed, stigmatization and being incarcerated in forensic settings have been found to reinforce offenders' criminal identity (Asencio & Burke, 2011) a process referred to as "deviancy amplification" (Einstadter & Henry, 2006). An offender might logically be ascribed a more criminal role when displaying a high level of antisocial traits. Because of their skillfulness in inferring mental states, it could be expected that antisocial offenders high in ToM more readily adhere to such an identity. Hence, the higher Factor 2 is in individuals high in ToM, the lower their report of social desirability might be, reflecting the pattern observed in Figure 3. In contrast, when an offender is relatively low in ToM, one would not expect him to be as sensitive to the internalization of others' views, simply because of the relative inaptness in understanding others' thoughts. Although tentative and in need of further research, this account might help explain the lack of a significant correlation between BIDR scores and Factor 2 in offenders low in ToM.

Another expectation in the current study was that offenders relatively high in Factor 2 would engage more in unlikely symptom reporting, yet only when also having relatively good ToM skills, as the latter are thought to be crucial in successful deceit (Baron-Cohen, 2000; Talwar et al., 2007). Contrary to part of this expectation though, a well-developed ToM did not seem to contribute to more unlikely symptom reporting. In fact, social-perceptual ToM was negatively predictive of this self-presentation tendency (regardless of Factor 2 level). This finding might be explained by developmental studies showing that lying only requires some basic ToM skills, whereas for complex deceit a more developed ToM is required (Talwar et al., 2007; Talwar & Lee, 2008). Hence, the fact that some individuals deliberately overreport symptoms could be indicative of them having these basic ToM skills, yet might not necessarily mean that they do very well on more sophisticated ToM tasks like the RMET.

A result that did show to be consistent with our expectations was that Factor 2 predicted unlikely symptom reporting, yet only in offenders relatively high in social-cognitive ToM. Our results indicate that offenders who have a relatively good grasp of what others think, accompanied by a high level of behavioral dysfunction (e.g., impulsivity, emotional instability, aggression; Hare, 2003; Verona et al., 2001), did not seem to take an effort to present themselves in a positive way. That is, these offenders claimed less socially desirable traits, and in fact, reported more atypical and bizarre psychiatric symptoms. As the majority of our forensic participants were institutionalized in a clinical context, these results might indicate that some antisocial offenders might stress their psychopathological burden in order to, for example, communicate their need for treatment or to get acknowledgement for their psychological suffering. In line with our findings, one might expect such behavior to be more

pronounced in individuals that realize that clinicians' attitudes can be influenced by such an exaggeration of symptoms (i.e., in offenders high in ToM; Baron-Cohen, 2000).

If the interpretation above indeed holds true, this might raise some serious questions regarding the assessment and conceptualization of the overreporting of psychiatric symptoms. First, one might wonder whether the endorsement of atypical symptoms always occurs on a conscious level, which is a commonplace assumption in forensic contexts. If indeed, elevated scores on the SIMS can be reflective of an unconscious expression of psychological discontentment, the overreporting witnessed in the current study might have bore more of a resemblance to somatization than being reflective of a deliberate attempt to mislead. This possibility is supported by a growing number of studies indicating Factor 2 to be strongly related to levels of somatization (e.g., Lilienfeld & Hess, 2001). The possibility that overreporting symptoms might not be driven by deliberate deceptive intentions, might also be another explanation why in the current study, SIMS scores were not related to ToM capacities, with the latter being considered a prerequisite for deception (Talwar et al., 2007).

Second, it is debatable whether the clinical attention that a forensic patient might (un)consciously strive for when reporting atypical symptoms should be labeled an external incentive. That is, the endorsement of unlikely symptomatology might also occur in the absence of clear external motives. In any case, the present results suggest that forensic patients' scores on the SIMS might not always be exclusively reflective of malingering, as the overreporting of unlikely symptoms is only defined as such when being deliberate, as well as motivated by secondary gain (APA, 2000). Scores on such instruments should thus always be interpreted in the light of supplementary contextual and diagnostic information.

Conclusions and future directions

The current study showed both factors of the PCL-R to be unrelated to social-cognitive ToM. This investigation also revealed that offenders' ToM skills seem to interact with Factor 2 in predicting self-presentational styles. To our best knowledge, the current study is the first to investigate the relationship between self-presentation and ToM in relation to psychopathy. However, some issues remain that future research should follow up on. For example, studies should examine social-interactional and contextual influences on self-presentation in offenders with and without psychopathy. Furthermore, empirical investigations should focus on whether psychopathy and ToM capacities have predictive value for offenders' actual symptom reporting and socially desirable behavior. Such an approach would overcome one of the current study's major limitations, being its reliance on self-report questionnaires in order to examine self-presentational styles, as well as on the assumption that the scores on such measures generalize to the way in which offenders behave in their everyday life.

Part II

Emotional experience in psychopathy

Chapter 4

The relationship between psychopathy and interoceptive awareness

Nentjes, L., Meijer, E.H., Bernstein, D.P., Arntz, A., & Medendorp, W.N. (2013). Brief communication: Investigating the relationship between psychopathy and interoceptive awareness. *Journal of Personality Disorders, 27*, 617-624.

ABSTRACT

Psychopathy is a disorder that is characterized by marked emotional deficiencies. Because previous studies suggest that an individual's sensitivity to bodily signals – or "interoceptive awareness" – is associated with various components of emotional functioning, the authors expected this capacity to be reduced in psychopathic individuals. Therefore, the current study examined the relationship between psychopathy and interoceptive awareness by assessing heartbeat detection abilities in a group of 75 male personality disordered offenders, varying in their degree of psychopathy, as assessed with the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Regression analyses revealed that PCL-R Facet 4, which reflects antisocial behavior, was predictive of reduced interoceptive awareness. These findings suggest that the expression of psychopathic behavior might be influenced by an attenuated sensitivity to one's own bodily signals.

INTRODUCTION

Psychopathic offenders are often described as charming, self-centered, manipulative, and impulsive individuals, with a striking disregard for the feelings of people around them. The most widely used instrument for the diagnosis of psychopathy in forensic contexts is the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Research on the underlying structure of the PCL-R suggests that this developmental disorder is represented by four different facets, covering symptoms in the affective (e.g., emotional shallowness), interpersonal (e.g., pathological lying), lifestyle (e.g., irresponsibility), and antisocial (e.g., criminal versatility) domains. These facets load onto two higher order factors: Factor 1 describes affective and interpersonal traits, whereas Factor 2 reflects antisocial behavior and a deviant lifestyle (Bolt, Hare, Vitale, & Newman, 2004).

Empirical studies have increasingly focused on psychopaths' deficient affective functioning as the possible core of this disorder. For example, Patrick, Bradley, and Lang (1993) showed psychopathic individuals to be characterized by a deficient affective startle reflex. Psychopathy has also been found to be associated with deficits in emotional language processing (Williamson, Harpur, & Hare, 1991) and a reduced capacity for recognizing fear (Marsh & Blair, 2008).

In many theories of emotion, the representation of internal bodily sensations is thought to play an important role in affective experience (e.g., Damasio, 1996; James, 1884; Schachter & Singer, 1962). According to these theories, an individual's sensitivity to signals that arise from within the body, or “interoceptive awareness” (Vaitl, 1996), reflects the intensity with which emotions are experienced. Research has indeed revealed ample support for a relationship between several components of emotion and interoceptive awareness, in which the latter has commonly been quantified using paradigms assessing the ability to detect one's own heartbeat. Good heartbeat detectors have been found to be characterized by a more intense subjective experience of emotion (Wiens, Mezzacappa, & Katkin, 2000), enhanced emotion-related brain activity (Herbert, Pollatos, & Schandry, 2007), and greater facial expressiveness (Ferguson & Katkin, 1996). Furthermore, heartbeat perception is correlated with anxiety measures in both healthy and clinical populations (Domschke, Stevens, Pfleiderer, & Gerlach, 2010).

Empirical research thus provides support for the idea that interoceptive awareness is associated with emotional processes. Because psychopathy is characterized by emotional deficiencies, we hypothesized that psychopathy is associated with an attenuated sensitivity to bodily signals. In order to investigate the relationship between psychopathy and interoceptive awareness, we studied heartbeat detection abilities in a group of criminal offenders varying in their degree of psychopathy. We predicted psychopathy – as assessed with the PCL-R – to be inversely correlated to performance on a heartbeat detection task.

METHOD

Participants

Eighty-five offenders with cluster B personality disorders (PDs) were recruited from five forensic psychiatric hospitals (*n*=73) and a prison (*n*=12). Nine participants were excluded from analysis due to equipment malfunction. One participant did not complete the heartbeat detection task due to a hearing impairment, resulting in a final sample of 75 subjects. Inclusion criteria were (a) the presence of a DSM-IV cluster B or paranoid PD, or a PD Not otherwise Specified with at least five cluster B PD traits. Exclusion criteria were (a) current psychotic symptoms, (b) schizophrenia or bipolar disorder, (c) current drug or alcohol dependence, (d) low intelligence (i.e., IQ < 80), (e) serious neurological impairment, (f) an autistic spectrum disorder, and (g) pedophilia (i.e., a fixated sexual preference for children).

Subjects were diagnosed with the following PDs: antisocial PD (*n*=62; 82.7%), borderline PD (*n*=26; 34.7%), narcissistic PD (*n*=25; 33.3%), and paranoid PD (*n*=8; 10.7%). Nineteen participants (25.3%) had PCL-R scores of 30 or greater. Types of crime that were committed included property crime with (12.0%) and without (1.3%) violence, homicide offenses (29.3%), sexual offenses (29.3%), assault (21.3%), arson (4.0%), and drug offenses (2.7%). Subjects' mean age and IQ were 39.0 years (*SD*=10.0) and 95.7 (*SD*=11.7), respectively. The mean time that subjects had been institutionalized since their last offense was 7.2 years (*SD*=7.2).

Procedure

The measures described below were administered together with a variety of other tests measuring different emotional capacities (which will be described elsewhere) in a quiet, designated testing room. Subjects provided informed consent prior to participation and were reimbursed with €25 for their participation.

Measures

Psychopathy was assessed using the PCL-R (Hare, 2003), which was based on a semi-structured interview and a review of subjects' institutional and judicial file information. PCL-R scores were obtained from clinical files when these had already been scored by a clinic's diagnostic staff (*n*=65; all of these staff members had been extensively trained during a 3-day PCL-R assessment course). Sixteen of these interviews (selected from different clinics) were independently scored by a second rater, yielding intraclass correlation coefficients (ICCs) (single measures) for PCL-R total, Factor 1, and Factor 2 scores of .76, .74, and .74, respectively. When recent PCL-R scoring was not available (*n*=10), the first author (L.N.) scored the PCL-R, also based on an interview and an extensive file search. To ensure adherence to the diagnostic criteria, regular meetings were held with the third author (D.B.), who has extensive experience in PCL-R assessment. For the entire sample, standardized Cronbach's alphas for PCL-R total, Factor 1, and Factor 2 scores were .74, .82, and .83, respectively.

PDs were assessed using the Structured Interview for DSM-IV Personality Disorders (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995), based on an interview supplemented with collateral information. When the SIDP-IV had already been administered by a clinic's SIDP-IV–certified diagnostician, scores were obtained from participants' file records. Eighteen of these interviews (from different clinics) were recorded and independently scored by a second rater, yielding ICCs (single measures) for item scores of the PDs of interest ranging between .52 and .93, with a mean of .71. When SIDP-IV results were not available (*n*=30), the interview was administered by the first author (L.N.). Following extensive training, L.N. independently scored five SIDP-IV interviews that had already been scored by a different rater, resulting in single-rater ICCs for the PDs of interest ranging from .75 to .96, with a mean of .84.

A heartbeat detection task was used to quantify interoceptive awareness. An Einthoven lead II electrocardiogram (ECG) was recorded using Ag/AgCl adhesive electrodes placed on the lower rib on the left side and just below both clavicles. BrainVision hardware and software were used to record the ECG signal, which was amplified and filtered with a bandpass from 0.1 to 35 Hz. The signal was digitized at 500 Hz. R-waves were detected in real time and used to trigger an 800 Hz, 100 ms audio tone. This tone was delivered either 250 or 650 ms after an R-wave, as previous research has shown that tones presented 250 ms after an R-wave are perceived as simultaneous with a heartbeat, while tones presented 650 ms after an R-wave are perceived as nonsimultaneous (e.g., Brener & Kluvitse, 1988).

The heartbeat detection task consisted of 40 trials. During each trial, 10 consecutive tones were presented through speakers in front of the subject. On half of the trials, the 10 tones were presented with a delay of 250 ms (simultaneous); on the other half, the delay was 650 ms (nonsimultaneous). Using a button box, participants made a forced choice after each trial, indicating whether they perceived the 10 tones as simultaneous with their heartbeat or not. Before the actual test, participants completed 10 practice trials, during which they were allowed to feel their pulse. Trial order was randomized within both the practice and the assessment phase.

A number of potential covariates were taken into account in the current study. First, mean heart rate during the heartbeat detection task was registered. Second, because subjects experienced the heartbeat detection task to be quite tedious, we assessed impulsivity using the Rubia Stop Task. This computerized task was designed following the methodology described by Rubia, Smith, and Taylor (2007) and measures the capacity to inhibit an ongoing motor response. Third, the Trait scale of the State-Trait Anxiety Inventory (STAI-T; Spielberger, 1983) was used to determine dispositional anxiety, which was assessed because it has found to be associated with heartbeat detection accuracy (Domschke et al., 2010). Last, IQs were derived from recent Wechsler Adult Intelligence Scale III *(*WAIS-III; Wechsler, 1997) assessments that had been conducted in the clinics. If these were not available, participants completed a shortened version of the WAIS-III (based on the Block Design and Vocabulary subtests; Jeyakumar, Warriner, Raval, & Ahmad, 2004).

Data reduction

For the heartbeat detection task, the frequency of hits (HITS: correct identification of simultaneous trials) and false alarms (FA: incorrect identification of nonsimultaneous trials) was calculated. Performance on the heartbeat detection task was indexed using *d*', a parametric measure of sensitivity based on signal detection theory (Wickens, 2002), which is frequently used in heartbeat detection research: *d*' = *z*(HITS) − *z*(FA).

RESULTS

First, bivariate relationships between PCL-R scores and *d*' were examined by means of computing Pearson product-moment correlation coefficients (see Table 1). Second, multiple regression analysis was used to explore which PCL-R factors and potential covariates were predictive of *d*'. A backward stepwise procedure (using an elimination criterion of $p>.10$) indicated that *d*' was predicted by Factor 2 (β=−.32, $p=.006$) and IQ (β=−.23, $p=.05$); Factor 2 and IQ explained a significant proportion of variance in *d*', $R^2=.12$, $F(2, 72)=4.88$, $p=.01$.

When entering the four PCL-R facets (instead of the two factors) into a regression model along with the potential covariates, it was found that Facet 4 (β=−.30, $p=.01$) and IQ (β=−.23, $p=.05$) were predictive of *d*', explaining 10.7% of the variance in *d*', $R^2=.11$, $F(2, 72)=4.32$, $p=.02$.

Table 1. *Zero-order correlations between PCL-R scores and d' (N=75)*

Measures	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*M*	*SD*
1. *d'*	-							0.00	1.18
2. PCL-R total	-.20^{+}	-						24.6	6.6
3. Factor 1	-.01	.68**	-					10.5	3.5
4. Factor 2	-.29*	.76**	.08	-				11.1	4.3
5. Facet 1	-.01	.63**	.92**	.07	-			4.4	2.2
6. Facet 2	-.04	.59**	.87**	.09	.61**	-		6.0	1.7
7. Facet 3	-.22^{+}	.67**	.07	.92**	.05	.09	-	6.4	2.4
8. Facet 4	-.24*	.70**	.08	.87**	.09	.06	.62**	5.7	2.9

Note. d'=interoceptive awareness; PCL-R=Psychopathy Checklist-Revised; Factor 1=Interpersonal/affective; Factor 2=Antisocial behavior/deviant lifestyle; Facet 1=Affective; Facet 2=Interpersonal; Facet 3=Lifestyle; Facet 4=Antisocial.
$^{+}p<.10$. *$p<.05$. **$p<.01$, two-tailed.

DISCUSSION

The goal of the present study was to investigate the relationship between psychopathy and interoceptive awareness by studying heartbeat detection accuracy in a group of offenders with cluster B PDs. As expected, psychopathy was inversely associated with interoceptive awareness. This relationship was driven by Factor 2 and Facet 4, which reflect antisocial behavioral traits such as criminal versatility and having poor behavioral controls (Bolt et al., 2004; Hare, 2003).

This association might be explained in light of Damasio's (1996) somatic marker hypothesis. In this theory, emotional signals are generated by bodily changes in response to the perception of actual or imagined situations. These bodily changes, or somatic markers, affect decision making by signaling stimulus significance to the brain (Damasio, 1996). Individuals who have an attenuated sensitivity to their own bodily signals might benefit less from this somatic marker mechanism in guiding their behavior toward favorable outcomes and inhibiting behavior that might lead to unfavorable outcomes (Werner, Jung, Duschek, & Schandry, 2009). Low interoceptive awareness may prevent psychopathic individuals from perceiving somatic sensations that signal the emotional valence of situations and behaviors, making the expression of antisocial behavior more likely.

The current results and their interpretation are in line with a recent study by Gao, Raine, and Schug (2012). These authors found that psychopathic individuals showed a "mismatch" between self-reported bodily sensations and actual changes in heart rate and skin conductance during a social stressor task. Previous research in healthy subjects is also consistent with our findings, showing that interoceptive awareness indeed relates to behavioral regulation. For example, Werner and colleagues (2009) showed that poor heartbeat detection was related to making more disadvantageous decisions on the Iowa Gambling Task (Bechara, Damasio, Damasio, & Lee, 1999), a measure that is thought to simulate real-life decision making. Furthermore, Katkin, Wiens, and Öhman (2001) found that good heartbeat detectors showed superior fear conditioning, another process thought to be important in learning to adopt adequate behavioral strategies. Notably, psychopathy is associated with poor performance on the Iowa Gambling Task (Mitchell, Colledge, Leonard, & Blair, 2002), as well as with deficient fear conditioning (Birbaumer et al., 2005).

There are limitations of the current study that deserve some attention. First, given the cross-sectional nature of this study, it is not possible to determine whether impaired interoceptive awareness is a cause, consequence, or simply a correlate of psychopathy. Second, it remains unclear under what conditions low sensitivity to bodily signals is associated with antisocial behavior. The majority of healthy subjects do not perform above chance level on heartbeat detection tasks (e.g., Wiens et al., 2000), yet they do not engage in norm-violating behavior. Last, it has to be noted that PCL-R Factor 1 and Factor 2 were not significantly correlated in the current sample. Although low correlations between both PCL-R factors are not unheard of in Dutch forensic research (e.g., Hildebrand, de Ruiter, de Vogel, & van der Wolf, 2002), we do not know whether this lack of correlation might have affected the

results and what this potential influence might look like. The absence of a substantial correlation between the two factors is also helpful, however, because it helps to disentangle the two dimensions in the analyses.

The current study indicates that a lack of sensitivity to bodily signals is associated with the deviant behavioral characteristics seen in psychopathic offenders. These findings could have important implications for clinical practice; for example, training through biofeedback might be used as a method for treating antisocial offenders. Future studies on psychopathy and interoceptive awareness are warranted, in which longitudinal and experimental research designs are adopted to gain more insight into the direction of the relationship between the two constructs, as well as to clarify the possible moderating effects of other variables.

Chapter 5

Implicit vs. explicit dimensions of guilt and dominance in psychopathy

Nentjes, L., Bernstein, D.P., Cima, M., & Wiers, R.W. (*submitted for publication*). Implicit vs. explicit dimensions of guilt and dominance in criminal psychopathy .

ABSTRACT

The current study investigated the relationship between psychopathy and two constructs that hold a central position in conceptualizations of this disorder: guilt and interpersonal dominance. Our sample consisted of a group of 26 nonoffender controls, 42 non-psychopathic offenders, and 43 psychopathic offenders. Due to the limitations of exclusive reliance on self-report in forensic settings, the current study used indirect measures to supplement explicit assessment (i.e., self-report). We assessed self-dominance and self-guilt associations with varieties of the Single Category Implicit Association Test (Sc-IAT). Results showed no overall group differences on any of the guilt or dominance measures. However, dimensional analyses did reveal that the lifestyle/antisocial traits of psychopathy (Factor 2) predicted reduced self-reported feelings of guilt, indicating that highly antisocial offenders seem to be truthful about feeling less guilty about their crimes. As hypothesized, such a relationship was absent for the interpersonal/affective dimension of psychopathy (Factor 1). Within the offender group, psychopathy total and factor scores were unrelated to self-guilt associations. Regarding dominance, the opposite pattern was observed: psychopathy was positively related to the strength of implicitly assessed self-dominance associations, but not to scores on an explicit measure of dominance. Our findings experimentally validate the psychopathy concept, adding to our understanding of how relatively psychopathic offenders implicitly relate themselves to others. Furthermore, results stress the importance of using both direct and indirect assessment methods when investigating the experimental correlates of forensic psychopathology.

INTRODUCTION

Psychopathic offenders are described as dominant, deceitful individuals, who go through life hurting and making use of others in their own interest. In doing so, they display extreme levels of aggression, seemingly uncaring and remorseless about the consequences their behavior has on others (Cooke, Michie, & Hart, 2006; Hare, 2003). In his 1941 work "The Mask of Sanity," Cleckley was one of the first to describe psychopathy, delineating a constellation of personality characteristics that define a manipulative and superficially charming individual, whose emotional life is shallow and lacks the sincere experience of emotions such as guilt (Cleckley, 1941). Current day conceptualizations of psychopathy are largely based on this description, yet also include a substantial amount of behavioral characteristics, like impulsivity and a lack of behavioral controls (Hare, 2003). Nonetheless, there is broad agreement that it is the interpersonal and affective features that lie at the heart of psychopathy, distinguishing this disorder from other antisocial constructs, such as antisocial personality disorder (American Psychiatric Association [APA], 2000).

One of the most widely used instruments to diagnose psychopathy in forensic settings is the revised Psychopathy Checklist (PCL-R; Hare, 2003). Factor analytic research on the PCL-R supports the multi-dimensional structure of this disorder, suggesting that psychopathy is represented by at least two underlying factors: Factor 1 describes affective and interpersonal traits, such as a lack of remorse, emotional shallowness, a lack of empathy, and an inflated sense of self-worth. Factor 2, on the other hand, covers behavioral characteristics, like criminality, impulsiveness, and having poor behavioral controls (Hare, 1991).[1] The importance of taking both of these dimensions into account is highlighted by research showing these factors to be divergently related to a range of external variables. For example, Blonigen and colleagues (2010) found Factor 1 to be negatively related to anxiety and depression, whereas Factor 2 showed the opposite association with these internalizing indices.

A considerable amount of empirical research aimed at providing experimental validation of psychopathy has focused on emotional empathy. Psychopathy has, for example, been found to be related to a decreased physiological response to others' distress (Blair, Jones, Clark, & Smith, 1997) and difficulties in the recognition of both vocal and facial affect (Brook, Brieman, & Kosson, 2013). Logically, this decreased emotional empathic responsiveness holds a central position in theoretical accounts explaining psychopathic behavior, such as the Violence Inhibition Model (Blair, Mitchell, & Blair, 2005, pp. 76-79). Although informative, far less experimental research has been conducted on many others

[1] Subsequent research on the structure of the PCL-R supports a three factor-model (Cooke & Michie, 2001), or a two-factor/four-facet model, in which Factor 1 and 2 have both been divided into two facets, resulting into four components, covering 1) interpersonal, 2) affective, 3) lifestyle, and 4) antisocial traits (Hare & Neumann, 2005). In the current study, however, we decided to adopt a two-factor approach as this model has been the most widely validated so far, and as factor scores had higher reliability than the facet scores.

aspects that seem relevant to psychopathy. The current study aims at addressing this gap by investigating the association between criminal psychopathy and two emotional constructs that are theoretically characteristic of this disorder, but which received far less empirical attention, being guilt and dominance.

Guilt is evoked by (un)conscious self-evaluation and refers to the negative, emotional state that individuals experience when they feel that their actual or anticipated behavior violates internalized moral standards (Tangney, Stuewig, & Mashek, 2007). Guilt is thought to serve as an internal guide in behaving in a morally appropriate way, by providing individuals with feedback on the acceptability of their behavior. As such, this moral emotion has a strong interpersonal basis, playing a central role in preventing transgressions towards others or correcting such violations, by apologizing and undoing the damage done (Sheikh & Janoff-Bulman, 2010). Not surprisingly, research supports the relationship between guilt and moral conduct, by showing that guilt is positively related to prosocial behavior (Menesini & Camodeca, 2008; Olthoff, 2012) and the propensity to take responsibility for one's actions (Berndsen & Manstead, 2007). In contrast, negative associations have been found between guilt and antisocial attitudes and behavior in both nonclinical and forensic samples (Robinson, Roberts, Strayer, & Koopman, 2007; Tangney, Stuewig, Mashek, & Hastings, 2011). Congruently, guilt seems to serve a protective function against future criminal activity, in that it is negatively predictive of recidivism in offender populations (e.g., Hosser, Windzio, & Greve, 2008; Tangney, Stuewig, & Martinez, 2014).

Theorists have consistently linked the experience of guilt over one's actions to the tendency to feel empathy for others. Hoffman (2000), for example, describes interpersonal guilt as “a painful feeling of disesteem for oneself, (…), that results from empathic feeling for someone in distress, combined with an awareness of being the cause of that distress (p. 114).” Research supports such an account, indicating guilt to be robustly related to measures of perspective-taking and empathic concern (e.g., Robinson et al., 2007; Silfver, Helkama, Lönnqvist, & Verkasalo, 2008). Such results also highlight the difference between guilt and related moral emotions, like shame, which is linked to a tendency to focus on one's own distress rather than on empathic, reparative actions towards others (Tangney et al., 2007).

Although guilt is thus considered a key motivating factor in preventing antisocial behavior, this emotion seems to be vastly understudied in relation to psychopathy when compared to other emotional constructs such as empathy. One of the few studies that did investigate the relationship between this disorder and guilt, found psychopathy (and its factors) to be unrelated to self-reported guilt about committed crimes (Batson, Gudjonsson, & Gray, 2010). The generalizability of these findings is limited though, as the offenders in this study were mostly schizophrenic, making this a rather atypical population to study. Furthermore, the use of self-report might have obscured potential associations as such measures are highly dependent on the capacity for introspection (Roefs et al., 2011). Offenders might lack the insight to truthfully self-disclose, or they might simply be unwilling to do so (e.g., Lobbestael, Arntz, Löbbes, & Cima, 2009). Especially in forensic contexts, the

latter concern might be pertinent, as the way in which offenders present themselves can have drastic consequences. For example, expressing feelings of guilt might result in offenders being more readily discharged from forensic mental health facilities (Niesten, Nentjes, Merckelbach, & Bernstein, *in press*).

A way to circumvent these problems is the use of indirect measures, which are thought to produce outcomes that are less sensitive to deliberate cognitive influences than explicit assessment methods (e.g., self-report) (Greenwald, McGhee, & Schwartz, 1998; Roefs et al., 2011). Using indirect measures, Cima, Tonnaer, and Lobbestael (2007) showed self-reported psychopathy to be correlated to reduced implicit guilt in an offender sample, as evidenced in a shift in attention away from guilt-related words on a dot-probe task. The current study further explored the relationship between psychopathy (as assessed with the PCL-R) and guilt, measured with the Single Category Implicit Association Test (Sc-IAT; Karpinski & Steinman, 2006). The Sc-IAT was designed to assess associations with a single target category, in which it differs from the original paradigm, the Implicit Association Test (IAT; Greenwald et al., 1998), which assesses the relative strength of associations with two opposing concepts. Here we assessed the relative degree to which individuals associate themselves with guilt. As both indirect measures (sometimes referred to as "implicit" measures, but see de Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009) and explicit measures have shown to provide independent, incremental validity in predicting psychopathological behavior (Roefs et al., 2011), we also included a self-report measure of guilt. Based on previous research, we hypothesized psychopathy to be associated with decreased guilt feelings on the indirect measure (i.e., on the Sc-IAT). We expected this relationship to be carried mainly by Factor 1, as this psychopathy dimension describes the lack of such moral emotion. On the explicit measure (i.e., on self-report), however, we expected an absence of such a relationship.

Another emotional construct that seems highly relevant to psychopathy is dominance, which refers to the degree to which individuals feel a sense of influence or control over the environment (Jerram, Lee, Negreira, & Gansler, 2014). Dominance holds a prominent position in the conceptualization of emotion, as it constitutes one of the three dimensions that is traditionally used to describe affective experience (with the other components being valence and arousal, Bradley & Lang, 1994). Although psychopathic individuals are described as having a strong tendency to dominate interpersonal interactions (e.g., Nyholm & Häkkänen-Nyholm, 2012), little research has been conducted on dominance in relation to psychopathy. Earlier studies showed psychopathy, especially Factor 1, to be related to a self-reported dominant interpersonal style (e.g., Verona, Patrick, & Joiner, 2001; Gullhaugen & Nøttestad, 2011), as well as to dominant interpersonal behavior during an interview (Kosson, Steuerwald, Forth, & Kirkhart, 1997; Vitacco & Kosson, 2010). Notably, this association was stronger for observer-rated dominance than for self-report, again stressing the importance of alternative assessment strategies in forensic contexts. The need to explore the role of dominance in psychopathy is further underlined by research showing that offenders who

report themselves to be more dominant and superior than others are prone to aggressive responding in the face of provocation (like humiliation or rejection; Morrison & Gilbert, 2001). Part of psychopaths' aggression might thus be explained by these individuals having a self-concept in which dominance plays an important role.

Building on these previous findings, the current study assessed self-dominance associations using a second variety of the Sc-IAT. We hypothesized psychopathy to be related to relatively strong self-dominance associations, and we expected this relationship to be explained mainly by the interpersonal/affective factor. In order to investigate potential discrepancies between implicit and explicit dominance we also adopted the Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988). Although this self-report questionnaire was derived from narcissistic personality disorder criteria, research shows a robust association between NPI scores and a variety of dominance measures (Cain, Pincus, & Ansell, 2008; Schoenleber, Sadeh, & Verona, 2011). As was found in a study by Schoenleber and colleagues (2011), we expected psychopathy to be positively related to NPI scores, with this association again being carried by Factor 1.

In sum, the current study adopted a multi-method approach to investigate two constructs that hold a central position in the conceptualization of the interpersonal/affective dimension of psychopathy, being guilt and dominance. We hypothesized to see a negative relationship between psychopathy (mainly Factor 1) and implicit, but not explicit feelings of guilt (reflective of a dissociation between actual and reported moral feelings). Last, we expected psychopathy (again, especially Factor 1) to be positively related to self-dominant associations and explicitly assessed dominance.

METHOD

Participants

Participants were 85 criminal offenders and 26 nonoffender controls. Forensic participants were recruited in six different forensic psychiatric centers and a prison in the Netherlands. Thirty-six of these offenders were also participating in a randomized clinical trial on the effectiveness of Schema Therapy versus Treatment as Usual (Bernstein et al., 2012). The selection criteria for these offenders aimed to select a group of forensic patients whose personality pathology was the main therapy focus. Exclusion criteria for the nonoffenders were a) insufficient understanding of the Dutch language; b) the presence of any current axis I disorder; c) the presence of threshold minus two criteria for any DSM-IV personality disorder (PD); d) the presence of a PD diagnosis Not Otherwise Specified (i.e., fulfilment of five or more criteria of different PD diagnoses); e) an IQ < 80); (f) serious neurological impairment; (g) an autistic spectrum disorder; and (h) an increased level of self reported psychopathy. Inclusion criteria for the offenders were (a) the presence of a DSM-IV antisocial, narcissistic, borderline, or paranoid PD, or a PD not otherwise specified with at least five cluster B PD traits; and (b) good understanding of the Dutch language. Exclusion

criteria were (a) the presence of current psychotic symptoms; (b) schizophrenia or bipolar disorder; (c) current drug or alcohol dependence (but not abuse); (d) an IQ < 80; (e) serious neurological impairment; (f) an autistic spectrum disorder; and (g) fixated pedophilia.

The offenders were diagnosed with antisocial PD (83.5%), borderline PD (31.8%), narcissistic PD (31.8%), paranoid PD (9.4%), and avoidant PD (2.4%). (Percentages do not add up to 100% because offenders could have more than one PD diagnosis.) Types of crime for which the offenders were institutionalized included homicide offenses (29.4%), assault (20.0%), property crime with (10.6%) and without (1.2%) violence, pedophilic (10.6%) and nonpedophilic (18.8%) sexual offenses, arson (5.9%), and drug offenses (3.5%). Ten different nationalities were represented in the offender sample, with the most prevalent being Dutch (74.1%), Surinamese (7.1%), and Moroccan (8.2%). All nonoffenders had Dutch nationality. Further sample descriptives are shown in Table 1. The ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University provided ethical approval for this study and all participants provided informed consent.

Measures

Screening measures

SCID I and II. The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997) and the SCID for Axis II PDs (SCID-II; First, Spitzer, Gibbon, Williams, & Benjamin, 1994) were used to assess psychopathology in the nonoffenders. The SCID I and II were administered by the first author or a second rater. Single rater intraclass correlation coefficients (ICCs) between these two raters were computed on five SCID interviews with patients that did not participate in the current study, yielding ICCs ranging from .79 to .99 (*M*=.88) for the PDs. In these five patients, insufficient Axis I diagnoses were present to determine kappas. However, disagreement over the absence/presence of a disorder only occurred for 2 out of 24 diagnoses, reflecting a high level of consistency between ratings.

LSRP. Nonoffenders' psychopathy levels were assessed using the Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995). Participants were excluded from the current study if their score exceeded 58. This cut-off score is approximately one *SD* above the mean total score found in other studies in nonoffender, male populations (e.g., Uzieblo, Verschuere, van den Busshe, & Crombez, 2010). One potential control participant was excluded as his score exceeded this cut-off criterion.

SIDP-IV. Offenders were interviewed with the Structured Interview for DSM-IV PDs (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995) in order to assess them for PDs. Diagnoses were derived from patients' clinical files when the SIDP-IV had already been recently administered (*n*=52). Single rater ICCs for a subsample of eighteen interviews (from different clinics) ranged from .53 to .95 (*M*=.72) and average rater ICCs ranged from .70 to .95 (*M*=.83). Ratings were averaged when scored twice. The first author (L.N.) administered the SIDP-IV to

Table 1. *Sample characteristics (N=108)*

	Nonoffender controls (*n*=26)		Nonpsychopathic offenders (*n*=42)		Psychopathic offenders (*n*=43)		
	M (*SD*)	Range	*M* (*SD*)	Range	*M* (*SD*)	Range	Test statistics
Age (years)	35.6 (13.5)	18–57	39.1 (9.4)	24–64	39.2 (9.4)	23–65	$F(2, 108)=1.10$, $p=.34$
IQ	101.2 (12.5)	80–28	96.2 (11.2)	80–121	94.7 (11.3)	80–120	$F(2, 108)=2.67$, $p=.07$
LSRP total	43.0 (4.7)	32–51	-	-	-	-	-
Institutionalization[a]	-	-	6.5 (3.4)	1.0–15.0	7.3 (4.5)	0.5–20.0	$t(83)=-0.93$, $p=.36$
PCL-R total	-	-	18.4 (4.1)	9.5–24.0	29.5 (3.2)	25.0–36.8	$t(83)=-14.00$, $p<.001$
PCL-R Factor 1	-	-	8.4 (3.1)	3.0–16.0	11.9 (2.8)	6.0–16.0	$t(83)=-5.51$, $p<.001$
PCL-R Factor 2	-	-	7.8 (3.9)	0.0–15.0	13.9 (2.5)	7.2–18.0	$t(68.9)=-8.57$, $p<.001$
First guilt Sc-IAT	-0.17 (0.34)	-0.78–0.81	-0.11 (0.58)	-1.25–1.22	-0.03 (0.47)	-0.83–1.42	$F(2, 108)=0.68$, $p=.51$
Second guilt Sc-IAT	-0.04 (0.16)	-0.36–0.26	0.00 (0.19)	-0.46–0.49	-0.02 (0.21)[b]	-0.75–0.41	$F(2, 104)=0.48$, $p=.62$
Dominance Sc-IAT	0.11 (0.23)	-0.43–0.62	0.04 (0.32)[c]	-0.78–0.83	0.16 (0.43)	-1.20–1.37	$F(2, 107)=1.17$, $p=.31$
GBAI-R Mental Element	-	-	11.4 (9.0)[c]	-2–27	9.3 (6.8)[c]	-7–22	$t(76.5)=1.20$, $p=.23$
GBAI-R Feelings of Guilt	-	-	33.7 (10.4)[c]	8–52	28.8 (12.1)[c]	1–5	$t(83)=1.99$, $p=.05$
GBAI-R External Attr.	-	-	-14.4 (8.7)[c]	-27–9	-11.7 (11.1)[c]	-27–14	$t(79.4)=-1.26$, $p=.21$
NPI total score	98.5 (18.9)	62–124	99.1 (23.0)[d]	47–144	98.1 (22.8)[e]	49–157	$F(2, 105)=0.04$, $p=.96$

Note. LSRP = Levenson Self-Report Psychopathy Scale (Levenson, Kiehl, & Fitzpatrick, 1995). PCL-R = Psychopathy Checklist-Revised (Hare, 2003). Sc-IAT = D measure on Single Category Implicit Association Task (Karpinski & Steinman, 2006). GBAI-R = Gudjonsson Blame Attribution Inventory-Revised (Gudjonsson & Singh, 1989). Attr. = Attribution. NPI = Narcissistic Personality Inventory (Raskin & Terry, 1988).
[a]Length of institutionalization since the last offense in years. [b]*n*=39. [c]*n*=41. [d]*n*=40. [e]*n*=42.

the remaining offenders. Five of the latter interviews were scored by a second rater, yielding single rater ICCs for the PDs of interest ranging from .75 to .96 (*M*=.84).

IQ. IQs were derived from files when these had recently been determined using the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997), which was the case for *n*=69. For the remaining participants (including all nonoffenders), a shortened version of the WAIS-III was administered, based on the subtests Block Design and Vocabulary (Jeyakumar, Warriner, & Raval, 2004), which correlates .90 with the full scale (Groth-Marnat, 1990).

AQ. When clinical observation gave reason to suspect the presence of an autistic spectrum disorder, the Autism-Spectrum Quotient (ASQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) was administered to the nonoffender controls. Individuals were excluded from participation if their score was higher than the cut-off of 32 on this questionnaire (Baron-Cohen et al., 2001), which none of the potential controls exceeded. Offenders were excluded when they had been diagnosed with an autistic spectrum disorder by clinical staff, for which more rigorous diagnostic procedures were often times used (e.g., patient interviewing and observation supplemented with collateral information).

Main predictor and outcome variables

PCL-R. The Psychopathy Checklist Revised (PCL-R; Hare, 1991, 2003) was administered to assess psychopathy in the offender participants. This 40-item scale was scored by the clinical staff of the institution in which an offender resided, based on a file review complemented with an interview. These staff members had all been trained during an extensive three day PCL-R assessment course. In the Netherlands, this course is only offered to clinical professionals holding an academic degree. The training covers both the theoretical background and practical application of the instrument and stresses the importance of scoring at least ten practice interviews combined with consensus meetings before using the PCL-R with actual patients. Single rater ICCs in a subsample of sixteen interviews (selected from different clinics) were .74, .74, and .76 for Factor 1, Factor 2, and total scores, respectively. When the PCL-R had not been administered, this was done by the first author (*n*=12), who was also extensively trained. To ensure adherence to the diagnostic criteria, regular meetings were held with the second author (D.P.B.), who has vast experience in administering the PCL-R. Standardized Cronbach's α's for Factor 1, Factor 2, and total scores were .79, .82. and .82, respectively.

Dominance Sc-IAT. The degree to which participants associated themselves with dominance was assessed with a variety of the Single Category Implicit Association Test (Sc-IAT (Karpinski & Steinman, 2006), which is an adaptation of the IAT (Greenwald et al., 1998). The traditional IAT assesses the extent to which stimuli of two target concepts (e.g., *me* and *other*) are associated with stimuli of two attributes (e.g., *good* and *bad*). Participants are

instructed to categorize exemplars of the target concepts and attributes using a right or a left response key. When individuals strongly associate a target with an attribute (e.g., *me* and *bad*), responses are thought to be faster when these categories share a response key than when less associated categories (e.g., *me* and *good*) share a response key. The difference in response speed to different combinations of targets and attributes provides an indirect measure of differential association of the two concepts with the attribute (Greenwald et al., 1998). A drawback of the IAT is that the overall score gives a measure of relative association strength (e.g., a high score on the self-concept IAT could be due to relatively strong positive associations with the self and/or due to relatively negative associations with others). The Sc-IAT can be used to circumvent this interpretative ambiguity by assessing association strength with only one target category.

The target category in the dominance Sc-IAT was 'Self' and included personalized words including a participant's first name, last name, date of birth, city, address, and province. Participants were explicitly asked for the information they associated themselves with most. The two attribute categories were dominant (*dominant*) and submissive (*onderdanig*). Attribute words were selected based on a pretest with 40 university students who indicated the degree to which they associated 65 words with both submission and dominance using two Likert scales. Six dominant words were selected based on low submission and high dominance ratings, whereas the opposite combination was used as a selection criterion for the six submissive words (see appendix for these attribute words). Words were matched on approximate word length and number of syllables, resulting in word sets that did not differ in word length (t[10]=-0.38, p=.72) or number of syllables (t[10]=0.59, p=.83). Dominant and submissive words did differ significantly in dominance (t[10]=-21.90, p<.001), as well as in submissiveness ratings (t[10]=15.28, p<.001).

Following Karpinski and Steinman (2006), the dominance Sc-IAT consisted of a test block and two combined practice/test blocks. In the first practice block (12 trials), the dominant and submissive words had to be attributed to their respective category by pressing either the left or right response key on a button box. Subsequently, participants were presented with two combined blocks that both consisted of 24 practice trials followed by 48 test trials. In one of these blocks, self-related words had to be categorized under the same response key as dominant attribute words, whereas in the other block, self-related words shared a response key with submissive attribute words. The Sc-IAT was presented on a computer screen with Presentation software. The self-related and attribute categories were presented in the top corners of the screen. The self-related and attribute words were presented on the screen one by one, and participants were instructed to categorize them as quickly and correctly as possible. In case of a mistake, a response had to be corrected in order to proceed to the next trial. For half of the participants the dominant category was presented on the left and the submissiveness category was presented on the right of the screen (and vice versa for the other half of the subjects). Furthermore, the order in which the self-related words shared a response key with dominance vs. submissiveness was

counterbalanced, thus resulting in four different versions of the Sc-IAT. Performance on the Sc-IATs was quantified using the D measure algorithm described by Greenwald, Nosek, and Banaji (2003), which is based on the difference in reaction times between the two combined practice/test blocks. A negative D measure reflects an implicit bias towards associating oneself more with submissiveness, whereas a positive D measure is indicative of a stronger association with dominance.

Guilt Sc-IAT and guilt induction. A Sc-IAT was also used to assess the extent to which participants associated themselves with guilt, using the two attribute categories guilty (*schuldig*) and not guilty (*onschuldig*). Attribute words were selected from a pretest in which the same forty students also rated 39 words on a Likert scale from 0 (*not guilty*) to 100 (*guilty*). Five words from both ends of this continuum were selected and matched on the aforementioned characteristics (see appendix for these attribute words). Words in both categories did not differ in word length ($t[8]=0.17$, $p=.87$) or number of syllables ($t[8]=-0.76$, $p=.47$), but did differ in the degree to which raters associated them with guilt ($t[4.73]=9.13$, $p<.001$). The self-related target words in the guilt Sc-IAT included first name, last name, date of birth, city, and address. The structure of the guilt Sc-IAT was identical to that of the dominance Sc-IAT, except that the first practice block had ten trials and the combined practice/test blocks both consisted of forty trials, due to the use of a different number of attribute words. For the guilt Sc-IAT, a negative D measure reflects an implicit bias towards associating oneself more with the category 'not guilty' than with 'guilty,' whereas a positive D measure indicates the reverse association.

As guilt is typically linked to a specific act (Tangney et al., 2007), this moral emotion might not be present continuously. In order to induce guilt and potentially strengthen the negative association between psychopathy and indirectly assessed guilt, we constructed a questionnaire listing 25 different antisocial behaviors on which participants were asked to indicate whether they would feel guilty had they committed an act (choosing from '*yes,*' '*I'm not sure,*' and '*no*'). We made sure that this questionnaire included a wide variety of different behaviors (e.g., stealing something, physically hurting someone, setting something on fire, having sex with someone against their will), so that it would contain relevant primes for all participants. This questionnaire was administered following the guilt Sc-IAT (responses on this questionnaire were not taken into any further account). After finishing the antisocial behavior list, participants were presented with the same guilt Sc-IAT a second time.

GBAI-R. The Gudjonsson Blame Attribution Inventory-Revised (GBAI-R; Gudjonsson & Singh, 1989) is a 42-item self-report questionnaire that measures offenders' attribution of blame for criminal offenses. Factor analytic research has revealed the GBAI-R to comprise three factors: a) Mental Element (9 items), which assesses an offender's tendency to blame offense behavior on impaired mental capacity, e.g., mental illness or poor self-control; b) External Attribution (15 items), referring to the degree to which offenses are ascribed to

external factors, like social or environmental pressure (e.g., provocation, blaming victims); and c) Feelings of Guilt (18 items), which measures feelings of shame and remorse about criminal behavior. In the current study, the GBAI-R subscale of main interest concerned Feelings of Guilt. Fifteen GBAI-R items are scored negatively in order to reduce potential response biases. Although the original GBAI-R is rated dichotomously (true/false), we adopted a five-point Likert scale format, ranging from 0 (*I do not agree at all*) to 5 (*I completely agree*), as previous research has shown this adaptation to yield a reliable measure of blame attribution (Cima, Merckelbach, et al., 2007). As was the case in earlier studies (e.g., Cima, Merckelbach, et al., 2007), Feelings of Guilt correlated negatively with External Attribution (r=-.44, p<.001), and positively with Mental Element (r=.39, p<.001). The latter two subscales were not significantly related (r=-.18, p=.10). Internal consistency in the current study was good for Feelings of Guilt (α=.76), Mental Element (α=.75), and External Attribution (α=.81).

NPI. The Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988) is a self-report instrument of overt, grandiose narcissism (Cain et al., 2008). Research on the 40-item version of this questionnaire showed the NPI to be constituted by seven factors, being Authority, Self-Sufficiency, Superiority, Exhibitionism, Exploitativeness, Vanity, and Entitlement (Raskin & Terry, 1988). More recent research, including work with the Dutch version of the NPI, has provided more support for a single-factor solution (Barelds & Dijkstra, 2010), in which one item (22) is dropped as it has little to do with narcissism. Therefore, we used the 39-item total score, which has shown to have good construct validity (Barelds & Dijkstra, 2010). In the current investigation, Cronbach's α for the 39-item total score was .93. Items were rated on a Likert scale ranging from 1 (*not applicable at all*) to 5 (*highly applicable*). Although the NPI criteria were formulated based on the DSM-III criteria for narcissistic personality disorder (Raskin & Terry, 1988), items that are concerned with leadership qualities (e.g., “I like having authority over other people”) are overrepresented in the NPI (Barelds & Dijkstra, 2010). Furthermore, research on narcissism and self-esteem has shown NPI scores to be particularly strongly related to self-esteem measures that capture dominance (e.g., Brown & Zeigler-Hill, 2004; Campbell, Bosson, Goheen, Lakey, & Kernis, 2007), suggesting the NPI to be an appropriate explicit instrument to complement our measure of implicit dominance.

Covariates

The potential confounding influence of a number of covariates was taken into account in the present study. First, we assessed state and trait anxiety using the State-Trait Anxiety Inventory (STAI; Spielberger, 1983). In the current study, Cronbach's alpha for both STAI subscales was .90. Second, impulsivity and working memory were examined as executive functioning has been found to influence IAT performance (Diamond et al., 2012). Impulsivity was assessed using a Stop task designed following the methodology in Rubia, Smith, and

Taylor (2007). In this motor inhibition task, participants were instructed to indicate the direction of airplanes that consecutively appeared on a computer screen, but to withhold this response when the airplane was followed by a bomb. An algorithm was built in the task that resulted in a personalized delay of the bombs (lengthening or shortening the delay between airplane and bomb with steps of 50 ms), so that each participant successfully inhibited their response in about 50% of the trials. Working memory was assessed using the Self Ordered Pointing Task (SOPT; Petrides & Milner, 1982). In this task, a 3 × 4 matrix with different pictures was presented on a computer screen. On each of 12 trials, the pictures shifted arrangement and participants were instructed to click on a picture they had not clicked on during previous trials. Task performance was summed over two repetitions of the SOPT. Last, IQ and age were taken into account as potential covariates.

Procedure

Nonoffenders were recruited using flyers and advertisements in local newspapers. We intentionally did not search for control participants at the university in order to keep the participant groups comparable with respect to demographics, like age and education. The nonoffender controls were screened over the phone with the LSRP and the SCID I and II, after which they finished the remaining measures at a laboratory at Maastricht University. Offenders were identified with the help of therapists who were informed about the aforementioned in- and exclusion criteria. Data collection was spread out over different sessions, starting with the PCL-R, the SIDP-IV, and a WAIS-III assessment (if necessary). The rest of the measures described above were administered together with a variety of other tests assessing different emotional constructs which are described elsewhere (e.g., Nentjes, Meijer, Bernstein, Arntz, & Medendorp, 2013; Nentjes, Bernstein, Arntz, Slaats, & Hannemann, *in press*; Niesten et al., *in press*). The measures were presented in counterbalanced order. Subjects were reimbursed with 25 euro for their participation.

Offenders were divided into a nonpsychopathic (n=42) and a psychopathic group (n=43), based on a PCL-R cut-off of 25 (Cooke & Michie, 1999). Although psychopathy is considered to be a dimensional construct (Hare & Neumann, 2005), this division enabled us to include the nonoffender control group (on whom no PCL-R scores were available) in our analyses.

Statistical analyses

First, bivariate correlation coefficients were computed between the potential covariates and the dependent measures (dominance Sc-IAT, guilt Sc-IATs, NPI score, and the GBAI-R subscale scores). Covariates were taken into account in subsequent analyses when they were related to the respective dependent variable (at p<.10). Group differences were investigated by conducting a one-way ANOVA for each dependent measure with group (nonoffenders, nonpsychopathic offenders, and psychopathic offenders) as between-subjects variable. As GBAI-R scores were not available for the control participants, and in order to

investigate factor specific influences, analyses were supplemented with correlation coefficients between PLC-R factor and total scores and the dependent variables. For Factor 1 and Factor 2, these concerned partial correlations, which control for variance shared with the other factor.

RESULTS

NPI and the dominance Sc-IAT. None of the covariates was significantly associated with the NPI total score or performance on the dominance Sc-IAT (all *p*s>.10). Therefore, covariates were not taken into account in subsequent analyses with these dependent variables. ANOVAs showed groups not to differ in NPI total score or on implicit biases on the dominance Sc-IAT (see Table 1). Correlational analyses indicated PCL-R total and factor scores not to be associated with the NPI score. PCL-R total scores, however, were significantly related to the dominance D measure (see Table 2), in that psychopathy was related to a relatively stronger implicit association between self and dominance than between self and submissiveness.

GBAI-R and the guilt Sc-IATs. None of the CVs was associated with performance on the guilt Sc-IATs. Analyses did indicate that GBAI-R Feelings of Guilt was related to age (*r*=.19, *p*<.10), meaning that relatively older offenders reported more feelings of guilt. Furthermore, analyses showed GBAI-R External Attribution to be associated with IQ (*r*=-.25, *p*=.03): offenders with a relatively low IQ ascribed their offenses to external factors to a higher degree. Age and IQ were therefore included in analyses on these respective GBAI-R scales.

One-way ANOVAs indicated groups (controls, nonpsychopathic offenders, psychopaths) not to differ in performance on the first or second guilt Sc-IAT (see Table 1). As displayed in Table 2, correlational analyses showed PCL-R total or factor scores not to be significantly related to performance on the guilt Sc-IATs. However, results revealed PCL-R total scores to be positively related to the GBAI-R Mental Element score, meaning that the higher offenders' total psychopathy levels were, the more they blamed their crimes on impaired mental capacity. Offenders' PCL-R Factor 2 score was negatively associated with GBAI-R Feelings of Guilt. Offenders relatively high in Factor 2 thus reported less feelings of guilt.

Table 2. *Correlations between PCL-R total and factor scores and dependent variables (within offenders)*

	Dominance Sc-IAT[a]	NPI total score[b]	First guilt Sc-IAT[c]	Second guilt Sc-IAT[d]	GBAI-R Mental Element[b]	GBAI-R Feelings of Guilt[b]	GBAI-R External Attribution[b]
PCL-R total	.24*	.02	.05	-.05	-.22*	-.21+ (-.21+)	.11 (.09)
PCL-R F1	.12	-.12	.11	-.18	-.21+	.12 (.09)	.16 (.19+)
PCL-R F2	.19+	.14	-.06	.07	-.13	-.38*** (-.35**)	.08 (.02)

Note. Parameter estimates in parentheses display the partial correlations between PCL-R scores and GBAI-R Feelings of Guilt while controlling for age, and between PCL-R scores and GBAI-R External Attribution while controlling for IQ. For Factor 1 (F1) and 2 (F2), partial correlations are depicted which are controlled for variance shared with the other factor. PCL-R = Psychopathy Checklist-Revised. Sc-IAT = D measure on Single Category Implicit Association Task (Karpinski & Steinman, 2006). Positive Sc-IAT scores indicate a stronger self-association with dominance and guilt, respectively. GBAI-R = Gudjonsson Blame Attribution Inventory-Revised (Gudjonsson & Singh, 1989). NPI = Narcissistic Personality Inventory (Raskin & Terry, 1988).

[a]n=84. [b]n=82. [c]n=85. [d]n=81.

+p<.10. *p<.05. **p<.01. ***p<.001.

DISCUSSION

The current study examined the association between psychopathy and two emotional constructs figuring prominently in conceptualizations of this disorder, being guilt and dominance. In view of the drawbacks of using self-report in forensic settings, we supplemented explicit assessment with indirect measures of these two concepts. Dimensional analyses within the offenders revealed some striking results: psychopathy was positively related to implicit dominance, whereas such an association was not present for explicit dominance. Regarding guilt, psychopathy and implicit guilt appeared unrelated. However, offenders relatively high on the lifestyle/antisocial psychopathy component did report less guilt on our explicit measure. Results showed no overall group differences on any of the guilt or dominance measures, which could be due to power issues.

Psychopathy and dominance

In line with our expectations, psychopathy was thus related to relatively stronger self-dominance associations. Contrary to our hypothesis, this relationship did not seem to be exclusively explained by Factor 1. Although somewhat surprising, this finding is in line with previous studies that also showed self-reported and observer-rated dominance to be carried by both factors (Kosson et al., 1997; Vitacco & Kosson, 2010). Our results suggest that a relatively dominant self-concept is most characteristic of those offenders scoring high on both behavioral and interpersonal/affective traits. The current findings add to our knowledge of psychopathy in important ways. First, although it is generally assumed that dominance is highly relevant to psychopathy, little empirical evidence exists that supports this notion. Previous research showed the interpersonal behavior of psychopathic individuals to be characterized by heightened levels of dominance (Forth, Brown, Hart, & Hare, 1996; Gullhaugen & Nøttestad, 2011; Verona et al., 2001; Vitacco & Kosson, 2010). The current study expands on these results by demonstrating that dominance also plays a role in the implicit self-concept that characterizes psychopathy. In other words, not only do relatively psychopathic offenders behave in a dominant interpersonal way, they also see themselves as more dominant on an implicit level.

Second, the current investigation underscores the importance of adopting a multi-method assessment approach when investigating the correlates of forensic psychopathology. This notion is stressed by psychopathy not being related to our explicit dominance measure, the NPI. This latter finding contrasts a previous study in which psychopathy was related to scores on this measure (Schoenleber et al., 2011). Differences in sample constitution might account for this discrepancy, as, unlike in our study, the majority of the participants in the study by Schoenleber and colleagues was not institutionalized and about one third of subjects were female. Our findings do parallel earlier research that showed psychopathy to be more weakly correlated to offenders' self-reported dominance than to more indirect, observer-ratings of their interpersonal dominant style (Kosson et al., 1997).

The dissociation between implicit and explicit dominance in psychopathy might be accounted for by psychopathy being associated with an unwillingness to explicitly admit having a dominant self-view. Such an explanation fits with conceptualizations in which psychopaths are described as insincere, pathological liars (Cleckley, 1941; Hare, 2003). However, as it was stressed that obtained data would only be used for research purposes, a more viable explanation might be that psychopathy was simply characterized by a lack of insight, which is typical for all personality disordered individuals, including those with a high level of antisocial traits (Millon & Davis, 2000). An alternative explanation comes from a growing body of literature indicating the NPI to mainly cover the adaptive sides of narcissism, such as leadership and positive self-esteem (Cain et al., 2008). Potentially, psychopathy is characterized by more maladaptive aspects of dominance that are not tapped by the NPI. This notion is supported by research showing psychopathy to be related to 'hostile' rather than 'friendly' dominance (Rauthmann & Kolar, 2013). This latter observation might also explain why our groups (psychopaths, nonpsychopathic offenders, and controls) did not differ from one another on the NPI. Future research should try to shed further light on which of these different accounts best explains the dominance dissociation found in the current study.

Our findings on psychopathy and dominance hold some theoretical implications. Although deviant interpersonal behavior strongly informs the diagnosis of psychopathy (Kosson et al., 1997; Hare, 2003), most theories that explain this disorder seem to focus much more on other deficiencies, such as a lack of empathy. Our study suggests, however, that other characteristics that color the interpersonal behavior of psychopaths might deserve a more prominent place in such conceptualizations. Dominance, and related concepts such as power and control, could be crucial in understanding psychopathy. Indications for such an apprehension come from the empirical narcissism literature, which suggests that narcissists use strategies designed to optimize their ability to get their egoistic needs met (Campbell & Foster, 2007). Examples of such strategies are being less invested in romantic relationships than their dating partners (Campbell & Foster, 2002), but also striving for dominance over others using aggression when their position in the social hierarchy is threatened (Ojanen, Findley, & Fuller, 2012). Psychopathic individuals might be similarly oriented towards achieving their egoistic goals via dominance, a possibility that warrants further research that examines how psychopathic offenders' dominant self-concept relates to aggression and exploitation.

Psychopathy and guilt

As aforementioned, psychopathy was also related to a dissociation between implicit and explicit guilt, albeit in a somewhat different way than we expected. That is, psychopathy was not related to overall performance on our guilt Sc-IATs, however, psychopathy did seem to be related to reduced guilt feelings on an explicit level. The latter association was explained by Factor 2, indicating that relatively antisocial offenders explicitly stated to feel less guilty

about their crimes. This finding on explicit guilt is compatible with recent research by Niesten and colleagues (*in press*) who showed Factor 2 to be related to reduced social desirability in the current sample, a finding that matched several previous studies. Offenders high in antisocial traits thus seem to be incapable or unmotivated to mask their undesirable traits, including a potential lack of guilt. Our findings support a notion that is crucial to psychopathy, i.e., this disorder being characterized by a reduced experience of moral emotion. Although a lack of guilt is more central to descriptions of Factor 1, the association between Factor 2 and reduced guilt might be explained by the extensive overlap that this latter factor has with antisocial personality disorder, for which a lack of remorse is explicitly mentioned as a diagnostic criterion (APA, 2000). Factor 1 not being significantly related to explicit guilt was consistent with our hypothesis, and could reflect the dishonesty associated with this component (Hare, 2003).

The finding that psychopathy was not associated with implicit guilt was not in line with our expectations and contrasts previous research that indicates psychopathy to be associated with guilt-specific aberrances (e.g., reduced attention for guilt-related words; Cima, Tonnaer, et al., 2007). A potential explanation for this finding on implicit guilt could be that offenders deliberately tried to influence their performance during the guilt Sc-IATs. Although performance on indirect measures is harder to "fake" than on direct measures, indirect assessment is not considered completely immune to deliberate strategies (de Houwer et al., 2009). However, as we did find an association between the antisocial behavior component of psychopathy and explicit guilt, other accounts might be more viable. For example, our results could indicate that on an explicit level, highly antisocial individuals minimize or deny feeling guilty, while on an implicit level, guilt is just not very salient to their self-concept. In other words, psychopathy might not be consistently related to associating oneself with (reduced) morality, whereas such an association does seem to be present for dominance. This difference in association strength between dominance and guilt might be explained by moral emotions not always being present, therefore not being continuously pertinent to one's self-concept. In contrast, the tendency to view oneself in terms of a submissive/dominant dimension might be more stable over time and contexts. For moral concepts such as guilt, it might be necessary to first evoke self-associations on an affective level. We did attempt to induce more guilt by letting participants fil out a questionnaire listing a variety of antisocial behaviors, however, this approach might not have been affect-provoking enough. Future research on moral emotion might want to use more intense primes, like letting offenders recall and report on personal life events that evoked guilt, or by showing a film fragment depicting a guilt-related scene. This reasoning is consistent with previous studies on implicit attitudes that used primes, such as that by van Goethem, Scholte, and Wiers (2010), who found that children's bullying behavior was predicted by implicit bullying attitudes, yet only when the assessment of these attitudes was preceded by a movie on bullying.

In order to shed more light on these possibilities, further research on the malleability of

implicit measures in forensic contexts, as well as the state dependency of (moral) emotions in criminal offenders is warranted. Such future studies might want to complement reaction time based tests such as our Sc-IAT with other indirect assessment strategies, like psychophysiological recording. A study by Levenston, Patrick, Bradley, and Lang (2000), for example, demonstrated psychopathy to be related to a lack of startle responding when primed with victim scenes, illustrating the added value of such psychophysiological approaches in research on morality in psychopathy.

Limitations and conclusions

Some limitations have to be taken into account when considering our results. First, our research sample consisting primarily of patients in forensic maximum security hospitals, supplemented by a small number of prison inmates. This might limit the generalizability of these findings to other populations as our results primarily apply to personality disordered forensic patients. Nonetheless, a broad range of psychopathy was represented, making our sample well-suited to investigate the correlates of this disorder. Second, our guilt Sc-IAT might not have been administered under ideal circumstances. As reported earlier, offenders' implicit associations pertaining to moral emotion might have been stronger had we used, for example, a movie prime. Third, our explicit dominance measure could have been assessing an adaptive type of narcissism, rather than the type of "hostile" dominance that might be related to psychopathy. However, our choice for the NPI was motivated by its extensive validation for over two decades and its coverage of dominance-related concepts such as authority and superiority (Cain et al., 2008).

Altogether, the present investigation is – to our knowledge – the first to examine dominance and guilt in criminal psychopathy using both indirect assessment and self-report. Results showed psychopathy to be related to implicit, but not explicit dominance, stressing the added value of using and validating indirect assessment methods in the forensic field. In addition, this finding experimentally validates the psychopathy construct and adds to our understanding of how relatively psychopathic offenders implicitly relate themselves to others. These results could also have important implications for clinical practice: Psychopathic offenders are described as deceptive and emotionally manipulative, yet also as dominant and controlling towards their interpersonal environment, thereby providing substantial challenges for those clinicians working with them (Nyholm & Häkkänen-Nyholm, 2012). Few attempts have been made to develop clinical approaches that specifically target these interpersonal behaviors in psychopaths. Our findings stress the importance of the further development of such interventions.

Last, psychopathy appeared to be unrelated to implicit self-guilt associations, yet offenders high in Factor 2 did report reduced feelings of guilt on an explicit level. These findings suggest that moral emotions are relevant to understanding the antisocial component of psychopathy and that for at least the latter subgroup of offenders, apprehension about truthful responding might not be warranted in a research context.

APPENDIX

Dominance Sc-IAT attribute stimuli

Dominant (*dominant*): leader (*leider*), ruler (*overheerser*), power (*macht*), dominant (*dominant*), bossy (*bazig*), ruler (*gezaghebber*)

Submissive (*onderdanig*): slave (*slaaf*), inferior (*minderwaardig*), humiliated (*vernederd*), weak (*zwak*), submissive (*onderdanig*), vulnerable (*kwetsbaar*)

Guilt Sc-IAT attribute stimuli

Guilty (*schuldig*): bad conscience (*slecht geweten*), guilty (*schuldig*), guilt (*schuldgevoel*), shame (*schaamte*), I'm sorry (*het spijt me*)

Not guilty (*onschuldig*): good conscience (*goed geweten*), innocence (*onschuld*), not guilty (*onschuldig*), benevolent (*goedaardig*), innocent (*onschuldige*)

Part III

Emotion regulation in psychopathy

Chapter 6

The mask of sanity: facial expressive, self-reported, and physiological consequences of emotion regulation in psychopathic offenders

Nentjes, L., & Bernstein, D.P., Meijer, E., Arntz, A., & Wiers, R.W. (*under revision*). The mask of sanity: facial expressive, self-reported, and physiological consequences of emotion regulation in psychopathic offenders. *Journal of Personality Disorders.*

ABSTRACT

The current study investigated the physiological, self-reported, and facial expressive correlates of emotion regulation in psychopathy. Specifically, we compared psychopathic offenders (*n*=42), nonpsychopathic offenders (*n*=42), and nonoffender controls (*n*=26) in their ability to inhibit and express emotion while watching affective film fragments (fear, happy, and sad). Results showed that all participants were capable of drastically diminishing their facial emotions under inhibition instructions. Contrary to expectation, psychopaths were not superior in adopting such a "poker face." Furthermore, the inhibition of emotion was associated with cardiovascular changes, although this effect was also not dependent on psychopathy (or its factors), indicating emotion inhibition to be an effortful process in psychopathic offenders as well. Interestingly, psychopathic offenders did not differ from nonpsychopathic participants in the capacity to show content-appropriate facial emotions during the expression condition. Taken together, these data provide no support for the hypothesis that psychopathy is associated with superior emotion regulation capacities.

INTRODUCTION

Even though less than one percent of the general population meets the diagnostic criteria for psychopathy, these individuals are responsible for a disproportionate amount of criminality. The latter is reflected in the relatively high prevalence rates of this disorder in forensic settings (15-25%; Hare, 1996b). It is therefore not surprising that psychopathy has received substantial attention from researchers worldwide, dating back several decades. Early research (e.g., Cleckley, 1941) already traced the extreme antisocial tendencies associated with this disorder back to deficiencies in the processing and experiencing of emotion. Indeed, a substantial body of empirical research demonstrates that psychopathy is characterized by a number of affective deficiencies, including a decreased physiological and facial responsiveness to emotional material (Herpertz et al., 2001; Lorber, 2004), difficulties in recognizing emotions (Brook, Brieman, & Kosson, 2013), and a reduced experience of physiological signals associated with emotion (Gao, Raine, & Schug, 2012; Nentjes, Meijer, Bernstein, Arntz, & Medendorp, 2013).

Yet, one important element of emotion, namely emotion regulation, has been vastly overlooked in theories and research on psychopathy. Emotion regulation has generally been defined as the strategies that individuals use to influence the course and expression of emotional experience (Gross, 2002). Various aberrances in emotion regulation (e.g., the overcontrol of emotion, or difficulties in regulating negative affective states) are increasingly recognized as potential risk factors for criminal behavior (Howells, 2009), and consequently, as treatment targets in offender rehabilitation (Day, 2009; Bernstein et al., 2012). Nonetheless, scant experimental investigations have focused on the regulatory processes by which psychopaths control and possibly adjust their emotions.

One emotional regulation strategy that has received considerable empirical attention is expressive suppression, which refers to the reduction of the overt expressive behavior that results from inner emotion experience (John & Gross, 2004). Although this suppression can have an adverse influence on one's psychological well-being and social functioning (Gross, 2002; John & Gross, 2004), the suppression of emotion can also lead to positive gain in interpersonal situations (Gross & Levenson, 1997), as every poker-player will recognize. Likewise, psychopaths could keep their malevolent motives from becoming transparent by inhibiting the expressions from which these deceptive intentions could be inferred.

Normally, the inhibition of affective expressions results in changes in physiological activity (e.g., an increase in skin conductance [SC] and a decrease in heart rate [HR]; Gross & Levenson, 1997; Kunzmann, Kupperbusch, & Levenson, 2005; Roberts, Levenson, & Gross, 2008), reflecting the physiological cost of emotional suppression. To our knowledge, only one previous study experimentally investigated emotion regulation capacities in criminal psychopathy (Casey, Rogers, Burns, & Yiend, 2012). In this study, offenders viewed positive and negative pictures under conditions of passive viewing, experiencing, and suppressing their emotion. For none of these instructions, differences were found in self-reported

emotion or cardiovascular responsiveness between nonpsychopathic and psychopathic offenders.

Besides psychophysiology and self-report, as measured by Casey and colleagues (2012), facial displays also provide an important means to evaluate emotional reactivity. Importantly, different response systems (e.g., facial expressions vs. physiological responding) do not always show identical patterns (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Very few studies have investigated individual differences in the capacity to manipulate facial expressions. In general, most individuals can deliberately manipulate their facial emotional displays, although expressive suppression generally leads to a drastic reduction, rather than a complete absence of facial expressive behavior (Gross & Levenson, 1997; Kunzmann et al., 2005; Roberts et al., 2008). This phenomenon has been labeled "emotional leakage" (Porter, ten Brinke, Baker, & Wallace, 2011) and refers to the unintentional display of facial emotion that remains present, even when trying to hide facial signals or masking affect with another emotion. With regards to psychopathy, Porter and colleagues (2011) found that undergraduate students high in interpersonal psychopathic traits (e.g., manipulation and glibness) were better at hiding their emotions: they showed less emotional leakage when viewing affective pictures. In contrast, lifestyle psychopathic traits (e.g., impulsivity) were positively related to the unintentional display of facial emotion.

The current study builds on these findings by investigating criminal psychopathy in relation to expressive suppression, taking into account three affective domains, being self-reported emotion, psychophysiology, and facial expressive behavior. For this purpose, offenders (varying in their level of psychopathy) and nonoffender controls were compared in their abilities to manipulate their emotions while watching two series of differently valenced film fragments (fear, happy, and sad). Prior to one series, participants were instructed to hide all their emotion ("inhibition"), while during the other series, subjects were asked to show their emotions ("expression").

As psychopathic individuals are described as deceptive and manipulative con-artists, we expected these offenders to have a superior capacity to inhibit their facial displays of emotion in comparison with the nonpsychopathic participants. That is, we did expect controls to be able to suppress their facial emotion to some extent, yet we expected psychopathic offenders to be better at adopting a "poker face," reflected in psychopaths showing less facial displays of emotion during the inhibition condition than controls.[1] We also expected the ease with which psychopathic offenders inhibit their emotion to be reflected in a reduced psychophysiological cost that is normally associated with the inhibition of affect (e.g., Roberts et al., 2008). We did expect to see this increase in psychophysiological indices in the normal controls during the inhibition condition (relative to the expression

[1] In all our group comparisons, we expected the nonpsychopathic offenders to fall in between the psychopathic offenders and nonoffender controls.

condition in which participants did not have to suppress their emotions).[2] As we assumed psychopathic offenders to inhibit their emotion with less effort, we hypothesized psychopaths to be characterized by a smaller difference in physiological increase during the inhibition condition, relative to the expression condition. As emotion-based accounts of psychopathy claim deficits in sadness and fear processing to be central to psychopathy (Blair, Mitchell, & Blair, 2005, 110-140), we expected to see these psychopathy-specific patterns in facial expression and physiology especially during the sad and fearful film clips. Finally, we did not hypothesize to see any differences in self-reported emotion, as psychopathy is generally related to reporting a normal subjective experience of emotion, even in the absence of accompanying physiological responses (e.g., Verona, Patrick, Curtin, Bradley, & Lang, 2004).

Factor analytic research has shown psychopathy to comprise two underlying components: Factor 1 describes interpersonal and affective traits (e.g., manipulation, shallow affect), while Factor 2 reflects lifestyle/antisocial characteristics (e.g., impulsivity, criminal versatility; Hare et al., 1990). Concerning these dimensions, we expected Factor 1 to be related to a superior capacity to inhibit emotion, as reflected in the physiological and facial expressive responses described in the aforementioned hypotheses. In contrast, we hypothesized Factor 2 to be associated with less successful inhibition of facial emotional expression and a larger physiological cost of inhibition, presuming impulsive offenders to have more difficulty suppressing biologically prepared responses (Schreiber, Grant, & Odlaug, 2012).

The current study was more explorative in nature regarding the expression condition. Previous research gives mixed results concerning the association between psychopathy and facial expressiveness (see Brook et al., 2013; Porter et al., 2011). Furthermore, no study has yet investigated whether criminal, psychopathic individuals are able to show facial emotion when explicitly asked to do so. By investigating emotion under expression instructions, we assessed whether psychopathic offenders do not differ from controls in their capacity to show facial emotion, or whether their emotional deficits are so severe that even when pushing their displays of emotion, psychopaths' facial expressiveness is not as intense or appropriate.

[2] A number of previous studies have indicated psychopaths to be characterized by a decreased modulation of physiological responsiveness as a function of stimulus valence (neutral to emotional; see Brook et al., 2013). Therefore, all our hypotheses on participants' physiological responsivity while inhibiting emotions concern participants' responses under inhibition instructions, relative to the expression condition in which participants did not have to suppress their facial emotions. This approach enabled us to disentangle potential group differences in general physiological responsiveness to affective material from the physiological reactivity associated with affective inhibition.

METHOD

Participants

The current study is part of a larger research project on psychopathy and emotion in a sample of male criminal offenders and nonoffender controls (see, e.g., Nentjes et al., 2013; Nentjes, Bernstein, Arntz, van Breukelen, & Slaats, 2015). Offenders (*n*=85) were recruited from six forensic psychiatric hospitals (*n*=73) and a prison (*n*=12) in the Netherlands. One offender did not complete the emotional regulation task, resulting in a sample of 84 offenders. Thirty-six of these participants were also participating in a randomized clinical trial (RCT) on the effectiveness of Schema Therapy versus treatment as usual in forensic patients with cluster B personality disorders (PDs; Bernstein et al., 2012). Inclusion criteria were (a) the presence of a DSM-IV antisocial, narcissistic, borderline, or paranoid PD, or a PD not otherwise specified with at least five cluster B PD traits, and (b) good understanding of the Dutch language. Exclusion criteria were (a) the presence of current psychotic symptoms, (b) schizophrenia or bipolar disorder, (c) current drug or alcohol dependence (but not abuse), (d) low intelligence (i.e., IQ<80), (e) serious neurological impairment, (f) an autistic spectrum disorder (ASD), and (g) fixated pedophilia. These criteria also applied to offenders who did not participate in the RCT (*n*=49) so that a homogeneous sample was created. Offenders were divided in psychopaths (*n*=42) and nonpsychopaths (*n*=42) using the European PCL-R cut-off of 25.

The nonoffender control group (*n*=26) was recruited from the general population using advertisements in local newspapers. An inclusion criterion was a) good understanding of the Dutch language. Exclusion criteria were a) the presence of any axis I disorder, b) the presence of threshold minus two criteria for any DSM-IV PD, c) the presence of a PD diagnosis not otherwise specified (i.e., fulfilment of five or more criteria of different PDs), d) low intelligence (i.e., IQ<80), (e) serious neurological impairment, (f) an ASD, and (g) a level of self-reported psychopathy higher than one *SD* above the general population mean.

Ten different nationalities were represented in the forensic sample, with the most prevalent being Dutch (73.8%), Moroccan (7.1%), and Surinamese (8.3%), whereas all of the nonoffender controls had Dutch nationality. Types of crime that were committed by the offenders included homicide offenses (28.6%), assault (20.2%), property crime with (10.7%) and without (1.2%) violence, pedophilic (10.7%) and nonpedophilic (19.0%) sexual offenses, arson (6.0%), and drug offenses (3.6%). PD diagnoses in the offender group included antisocial (83.3%), borderline (31.0%), narcissistic (32.1%), paranoid (9.5%), avoidant PD (2.4%), and PD NOS with five or more cluster B traits (10.7%). Offenders were diagnosed with one (47.6%), two (38.1%), three (11.9%), or four (2.4%) PDs. Further demographic and clinical features of the sample are reported in Table 1.

Table 1. *Sample characteristics (N=110)*

	Psychopathic offenders (*n*=42)		Nonpsychopathic offenders (*n*=42)		Nonoffenders (*n*=26)		
	M (SD)	Range	*M (SD)*	Range	*M (SD)*	Range	Test statistics
Age (years)	39.1 (9.5)	23-65	39.1 (10.1)	24-64	35.6 (13.5)	18-57	$F(2, 107)=1.07$, $p=.35$
IQ	94.9 (11.4)	80-120	96.2 (11.2)	80-121	101.2 (12.5)	80-128	$F(2, 107)=2.53$, $p=.08$
INST	7.4 (4.5)	0.5-20.0	6.5 (3.4)	1.0-15.0	-	-	$t(82)=-0.95$, $p=.34$
PCL-R total	29.5 (3.2)	25.0-36.8	18.4 (4.1)	9.5-24.0	-	-	$t(82)=-13.89$, $p<.001$
PCL-R F1	12.0 (2.8)	6.0-16.0	8.4 (3.1)	3.0-16.0	-	-	$t(82)=-5.58$, $p<.001$
PCL-R F2	13.9 (2.5)	7.2-18.0	7.8 (3.9)	0.0-15.0	-	-	$t(69.3)=-8.46$, $p<.001$

Note. PCL-R = Psychopathy Checklist-Revised (Hare, 2003). F1 = Factor 1. F2 = Factor 2. INST = Length of institutionalization since the last offense in years.

Post-hoc power analyses were conducted using G*Power software based on the current study's parameters (α=.05; 1–ß=.80; *N*=110; average correlation between conditions [inhibit vs. express], *r*=.00; average correlation between film types [fear, happy, sad], *r*=.50). These analyses showed the current study to have the power to detect a small to medium effect size for psychopathy × condition effects (*f*=.14), as well as psychopathy × film type effects (*f*=.21) (for which .10, .25, and .40 are small, medium, and large effects, respectively; Faul, Erdfelder, Lang, & Buchner, 2007, see below for data analytical approach).

Screening measures

SIDP-IV. The Structured Interview for DSM-IV PDs (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995) was used to assess PDs in the offenders. SIDP-IV diagnoses were derived from files when an offender had already been assessed by thoroughly trained clinical staff (*n*=52). For the PDs of interest, single rater intraclass correlation coefficients (ICCs) ranged between .53 and .95 (*M*=.72) and average rater ICCs ranged between .70 and .97 (*M*=.83) (over *n*=18 interviews). Ratings were averaged had interviews been scored twice. The SIDP-IV was administered by the first author (L.N.) for the remaining offenders (*n*=33). For five interviews scored by L.N. and a second rater, single rater ICCs ranged from .75 to .96 (*M*=.84) for the PDs of interest.

SCID I and II. The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 1997) and the SCID for Axis II PDs (SCID-II; First et al., 1994) was used to screen nonoffender controls for axis I and II psychopathology. Single rater ICCs ranged from .79 to .99 (*M*=.88) for five taped SCID I and II interviews of clinically referred patients that did not take part in the current study. Although there were not enough axis I diagnoses present to determine Kappas, a high level of rating consistency was observed, with raters agreeing on the presence of 24 out of 26 axis I disorders.

AQ. When controls were suspected to have an ASD based on clinical impressions, they were asked to fill out the Autism-Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). Individuals were excluded if their score exceeded the cut-off of 32 (Baron-Cohen, Wheelwright, Skinner, et al., 2001). We did not approach offenders for the study if they had been diagnosed with an ASD by an institution's clinical staff, for which more extensive diagnostic procedures were used (e.g., observation and patient/informant interviewing).

LSRP. The Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitz-patrick, 1995) was administered to the nonoffenders to screen them for psychopathy. Individuals were excluded from participation when scoring higher than 58. This score is

approximately one *SD* above the mean LSRP score generally found in males in noncriminal European populations (e.g., Uzieblo, Verschuere, van den Bussche, & Crombez, 2010).

IQ. Full scale IQs were obtained from Wechsler Adult Intelligence Scale-III assessments (WAIS-III; Wechsler, 1997). When these had not been recently conducted (which was the case for some offenders and all controls), a shortened version of the WAIS-III was administered, in which a full-scale IQ estimate was derived from scores on the subtests Block Design and Vocabulary (Jeyakumar, Warriner, Raval, & Ahmad, 2004), which correlates .90 with the full scale (Groth-Marnat, 1990).

Measures for main independent and outcome variables

PCL-R. The PCL-R (Hare, 2003) was used to assess psychopathy in the offenders, based on an extensive interview supplemented with institutional and judicial file information. When available, scores were obtained from clinical files (*n*=65, these assessments had all been administered by diagnostic staff members that had been thoroughly trained during a three-day PCL-R course). A subsample of these interviews (*n*=16) was rated by two independent staff members, yielding single rater ICCs for PCL-R total, F1, and F2 scores of .76, .74, and .74, respectively. The first author (L.N.) administered the PCL-R when recent scores were not available (*n*=10), also based on an interview and an extensive file search. To ensure adherence to the diagnostic criteria, consensus meetings were held with author D.B., who has extensive experience in PCL-R assessment. For the entire sample, standardized Cronbach's alphas for PCL-R total, Factor 1, and Factor 2 scores were .74, .82, and .83, respectively.

Emotion regulation task. Film fragments for the emotion regulation task were selected based on previous research showing these clips to elicit significantly higher self-reported ratings of their respective target emotion than any other emotion (Gross & Levenson, 1995; Hewig et al., 2005). For fear, we used excerpts from *The shining* (83 sec) and *Silence of the lambs* (202 sec). The sad film clips were taken from *The champ* (167 sec) and *Return to me* (169 sec), whereas the happy film fragments were selected from *On golden pond* (32 sec) and *An officer and a gentleman* (115 sec). The neutral film clips were given low intensity and valence ratings in previous research (Hewig et al., 2005) and were taken from *Crimes and misdemeanors* (65 sec) and *All the president's men* (67 sec).

The emotion regulation task consisted of two blocks. Participants were shown four films in each block (neutral, fearful, happy, sad). Each block started with the presentation of a neutral film clip (which was used as a baseline), after which an instruction was given for the emotional film clips. For one block, participants received the instruction not to show any emotions while watching the film clips that were going to be presented (i.e., the inhibition condition). For the other block, participants were told to show all the feelings they

experienced during the fragments (i.e., the express condition). Between each emotional film clip within a block, a short reminder was presented describing the instructions pertaining to that block. All participants thus sequentially received both the instruction to inhibit and to express their emotion. Condition order was counterbalanced and the order in which the film clips were presented was randomized, with the restriction that each valence was only presented once per block. During the task, continuous recordings were made of participants' facial expressions and physiological responses, and after each film fragment, subjects indicated how they had felt during the video clip. After the task, participants answered five questions on self-report Likert scales (ranging from 0 to 8) concerning the extent to which they tried to inhibit vs. suppress their emotion.

Facial emotions. A digital video camera on a tripod was used to record a frontal view of participants' upper torso and face during each film clip. Four graduate psychology students (three women) were extensively trained in coding participants' facial behavior, using the Emotional Expressive Behavior Coding System (Gross, 1996). This system covers 18 expressive responses, including anger, confusion, disgust, fear, happiness, interest, sadness, surprise, body movement, face touching, overall facial movement, mouth movement, (un)pleasantness, intensity, smiles, yawns, blinks, and obscuring vision. The occurrence of smiles, yawns, blinks, as well as participants obscuring their vision was counted during each film clip. (Un)pleasantness was rated on a 0 (*very unpleasant*) to 4 (*very pleasant*) Likert scale, intensity was rated on a 0 (*not emotionally expressive at all*) to 6 (*extremely emotionally expressive*) Likert scale, whereas the rest of the expressive behaviors was coded on a 7-point Likert scale constituted by two dimensions (intensity and duration). Ratings for each of the 18 categories were converted to a score per minute. An overall activity composite was computed by summing ratings for mouth movement, facial movement, face touching, and body movement (which were all correlated, ranging from r=.31 to .72, all ps<.001). All clips were rated by at least three raters and ICCs were determined for all possible combinations of three raters. Ratings of anger, fear, disgust, sadness, and yawning were excluded from further analyses, as base rates were too low to adequately determine ICCs. The average ICC for the remaining codes was excellent, ranging from .86 to .98 (M=.93). Participant groups did not differ in the frequency with which they obscured their vision to any of the film clips (by e.g., looking away or closing their eyes, Fs[2, 107] ranging from 0.26 till 2.25, all ps>.10).

Self-reported emotion. Directly after viewing each film fragment, participants rated the extent to which they had felt 11 different emotions (fear, happiness, disgust, surprise, amusement, content, sympathy, anger, sadness, tenseness, and interest) on a Likert-scale ranging from 0 (*not at all*) to 8 (*very much*).

Psychophysiological responses. We assessed skin conductance (SC) as an index of emotional arousal. In addition, HR (expressed in beats per minute) and HR variability (HRV) were measured. All physiological signals were amplified and recorded continuously using a Portable BrainAmp system with a sample rate of 500 Hz. Signal processing was performed using Brain Vision software. SC was assessed via two Ag/AgCl electrodes (8 mm diameter), which were supplied with an external constant 0.5 Voltage. The electrodes were filled with isotonic paste (0.5% NaCl) and secured to the volar surface of the medial phalanges of the second and third fingers of the non-dominant hand. Participants' SC data was imported using Ledalab software and analyzed by means of continuous decomposition analyses (Benedek & Kaernbach, 2010), by which the phasic component of participants' electrodermal activity is extracted during each film clip (expressed as the integrated SC response; ISCR). Continuous decomposition analyses also provided the number of SC responses (nSCRs; i.e., each response ≥0.02 μ*S*), which were converted to SCRs per minute.

To assess HR and HRV, an Einthoven lead II electrocardiogram (ECG) was recorded using Ag/AgCl adhesive electrodes (36 × 45 mm diameter) placed on the lower left rib and below both clavicles. The ECG signal was filtered with a bandpass from 0.1 to 35 Hz. R-peaks were detected using a Brain Vision Analyzer algorithm, after which ECGs were visually inspected and manually corrected for aberrances and missing beats (Task Force, 1996). Subsequently, HRV measures were algorithmically extracted from the ECG signal, including the SDNN (standard deviation of the normal-to-normal [NN; representing R-waves] interval) and the RMSDD (square root of the mean squared differences of successive NN intervals). The RMSSD is thought to represent parasympathetically mediated HRV, whereas the SDNN reflects both sympathetic and parasympathetic activity (Task Force, 1996).

Covariates

A number of covariates (CVs) were taken into account in the current study as they have been found to be related to the success of emotion regulation attempts. Working memory capacity and impulsivity were assessed using a computerized self-ordered pointing task (SOPT; Petrides & Milner, 1982) and the stop test (Rubia, Smith, & Taylor, 2007), respectively. Other CVs included state and trait anxiety, which were assessed using the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), age and IQ.

Procedure

The current study was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University. The measures described above were administered in counterbalanced blocks together with a variety of other tests assessing different emotional capacities which are described elsewhere (Nentjes et al., 2013; Nentjes et al., 2015). Participants were told that the study was aimed at investigating personality and emotions and signed informed consent before being tested individually in a quiet, designated testing room. All subjects were reimbursed with 25 euro for their participation.

Data preparation and analyses

Data preparation. Data was inspected for missing values, showing that less than one percent of the psychophysiological data was missing, whereas for facial expressive behavior and self-reported emotion 1.03 and 1.25 percent of the data was missing, respectively. Missing values were replaced using a missing values analysis based on regression with missing values serving as dependent variables. Next, all raw dependent variables (except for HR) were log-transformed in order to reduce deviations from normality. For all the affective film clips (sad, happy, and fear), change scores were computed for each dependent measure as an index for emotional responsivity during the emotional film fragments (i.e., untransformed response during the emotional film clip minus untransformed response during the neutral baseline clip preceding the emotional film fragment; as these change scores were approximately normally distributed, they were not based on log-transformed values).

Preparatory analyses. First, it was investigated whether there were any time effects on the raw baseline scores for the dependent measures in the self-report, facial expressive, and physiological domain. For this purpose, a 2 (order of task conditions - inhibition first vs. expression first) × 2 (time - first vs. second neutral clip) × 3 (psychopathy – nonoffender controls, nonpsychopathic offenders, psychopathic offenders) mixed design ANOVA was conducted. These analyses were also used to determine whether groups differed in baseline responsivity on any of the dependent measures, by examining the main effect of psychopathy. Second, it was investigated whether the emotional clips induced self-reported, physiological, and facial responses that deviated from the responses that were elicited by the neutral baseline clips. For this purpose, a 2 (condition - inhibition vs. expression) × 4 (film type - neutral, happy, sad, fear) repeated measures ANOVA was conducted for each dependent measure.

Main analyses. In order to answer our hypotheses, a 2 (condition - inhibition vs. expression) × 3 (psychopathy - controls, nonpsychopathic offenders, psychopathic offenders) × 3 (film type - fearful, happy, sad) mixed design ANOVA was conducted for the dependent measures in each domain (using change scores). All main effects and higher-order interactions between the within and between-subject factors were included in these models. Significant main and interaction effects were followed up on using similarly structured mixed design ANOVAs, univariate ANOVAs, and/or Bonferroni corrected pairwise comparisons. When follow-up analyses were ran per film type, these analyses were controlled for the order in which participants had seen the film clips within the particular emotional valence.

As aforementioned, psychopathy is constituted by two factors, which are differentially related to certain external correlates (e.g., Porter et al., 2011). We therefore considered it important to take the influence of these factors on our outcome measures into account. In order to examine factor-specific effects, offenders were divided into two groups based on

the median split of Factor 1 (median=10.5), resulting in a grouping variable we named "F1," with three levels (nonoffenders, offenders low on Factor 1, offenders high on Factor 1). The same was done for Factor 2 (median=12.0), yielding the variable "F2" (nonoffenders, offenders low on Factor 2, offenders high on Factor 2). All the main analyses were ran again separately, using F1 and F2 as between-subject factors, respectively. Although psychopathy is thought to be dimensional in nature (Edens, Marcus, Lilienfeld, & Poythress, 2006), this approach enabled us to include the controls (who could not be PCL-R assessed) in these analyses.

We ran our main analyses again including CVs to investigate whether findings might be better accounted for by CVs rather than psychopathy. For each dependent measure, CVs were taken into account in these analyses if they showed to be bivariately correlated with the dependent measure in either the inhibition or expression condition (using a $p<.10$ criterion). These analyses are only described when yielding different results in terms of significance.

RESULTS

Preparatory analyses

In the appendix of this chapter, participants' raw self-reported, facial, and psycho-physiological responses to the different film types (neutral, fear, happy, sad) are described. This appendix also describes the ANOVA parameters on which the undermentioned conclusions about time effects on the neutral baselines, group differences during baselines, and the effect of the emotional films are based.

Time effects on the neutral baselines. Analyses showed some self-reported emotions to decrease, whereas some of the psychophysiological measures increased over time. For facial expressiveness, both increases and decreases were observed from the first to the second neutral film clip. For the main analyses, it was therefore decided to compute change scores by subtracting the neutral scores directly preceding an emotional film clip from the scores during that emotional clip. Based on these results, it was also decided to control for condition order (inhibit vs. express first) in all subsequent analyses. Order effects are not reported though, as these were not relevant to our hypotheses.

Group differences during the neutral baselines. Results indicated that psychopathic offenders expressed more facial pleasantness than controls during the neutral baselines. Furthermore, offenders low in F1 and high in F2 showed more movement than the other participants. Concerning physiology, offenders high in F1 were found to have a lower HR during baseline than offenders low in F1. No differences were found for self-reported emotion. Groups thus differed on relatively few dependent variables during baseline.

Manipulation check: effect of the emotional films. Each film type seemed to evoke a distinct pattern of emotional responses when compared to the neutral baselines. For example, participants reported significantly more content-matching emotion during the fearful (e.g., fear), happy (e.g., happiness, amusement), and sad film type (e.g., sadness). Concerning facial expressions, the fearful and sad film types induced more blinking and a decrease in movement and pleasantness, whereas the opposite was true for the happy film type. Last, participants showed an increase in nSCRs per minute during all three emotional film types and a deceleration in HR during the sad film type when compared to baseline.

Manipulation check: group differences in regulation effort. No main effect was found of psychopathy, F1, or F2 on any of the questions assessing the self-reported extent to which participants tried and succeeded in inhibiting vs. expressing their emotion (*F*s ranging from 0.27 to 2.00 [all *df*s 2, 107], all *p*s>.10; range on all questions: 0–8, mean [*SD*] for the inhibit questions: *M*=4.7, *SD*=2.5; mean [*SD*] for the express questions: *M*=4.6, *SD*=2.2).

Main analyses

Responses to the emotional film types (fear, happy, sad; change scores) for each measurement domain are described in the appendix (by condition and psychopathy level). In the main text of this chapter, Tables 2 through 4 report the ANOVAs that were conducted to test our main hypotheses concerning facial expressions, self-reported emotion, and psychophysiology, respectively. As film effects were not of our primary interest (and as the effect of film type on raw responses was already described under "Preparatory analyses"), significant effects of film type are only described below when these concern interactions with condition and/or psychopathy level.

Facial expressive behavior

Table 2 displays the results of the main and interaction effects of the psychopathy grouping variables (psychopathy, F1, and F2), condition, and film type on facial emotions.

Confusion. Condition had a main effect on confused facial expressions, with less confusion during inhibition (*M*=-0.3, *SE*=0.1) than during expression (*M*=0.03, *SE*=0.1).

Happiness. Condition, film type, and condition × film type predicted facial happiness. Follow-up analyses showed that for the fearful and sad film type, condition did not affect happy facial expressions (*F*[1, 106]=0.36, *p*=.55; *F*[1, 106]=1.04, *p*=.31, respectively). For the happy film type, condition did have an effect (*F*[1, 106]=15.52, *p*<.001), with participants showing less happiness when inhibiting (*M*=0.3, *SE*=0.1) than during expressing emotion (*M*=1.1, *SE*=0.2).

***Pleasantness*.** No main or interaction effects were found for any of the grouping variables (psychopathy, F1, and F2) and/or condition on facial expressions of pleasantness.

***Intensity*.** Analyses showed significant effects of condition, film type, and condition × film type on intensity. Follow-up analyses showed that for the fearful film type, condition did not predict intensity (F[1, 106]=2.43, p=.12). For the happy film type, condition did predict intensity (F[1, 106]=28.40, p<.001), with participants showing less intense emotion during the inhibition condition (M=-0.02, SE=0.2) than during expression (M=1.5, SE=0.2). For the sad film type, a condition effect was present as well (F[1, 106]=9.03, p<.01). Again, intensity was lower during inhibition (M=-0.5, SE=0.1) than expression (M=-0.1, SE=0.1). Regarding the factor based groups, intensity was predicted by F2 × film type. Univariate ANOVAs, however, showed F2 not to be significantly predictive of intensity during the fearful (F[2, 100]=0.09, p=.92), happy (F[2, 100]=1.70, p=.19), or sad film type (F[2, 100]=0.13, p=.88).

Interest. Analyses indicated an effect of F2 × condition × film type, which was examined by conducting a 3 (F2) × 2 (condition) ANOVA per film type. For the fearful film type, F2 did not predict facial interest (F[2, 98]=1.88, p=.16), yet condition did (F[1, 98]=26.17, p<.001), with participants showing less interest during inhibition (M=-1.0, SE=0.03) than expression (M=-0.8, SE=0.03). F2 × condition predicted interest during the fearful film type too (F[2, 98]=5.31, p<.01). A univariate ANOVA indicated that F2 predicted interest in the inhibition condition (F[2, 100]=3.88, p=.02). Offenders high in F2 (M=-1.0, SE=0.04) differed in facial interest from controls (M=-1.1, SE=0.05, p=.02), but not from offenders low in F2 (M=-1.0, SE=0.04, p=1.00). The offenders low in F2 and controls did not differ from each other (p=.11). For the expression condition of the fearful film type, F2 was not predictive of interest (F[2, 100]=2.74, p=.07). For the happy film type, interest was not predicted by F2 (F[2, 98]=1.03, p=.36), condition (F[1, 98]=.85, p=.36), or F2 × condition (F[2, 98]=0.37, p=.69). For the sad film type, F2 and condition did not predict interest (F[2, 98]=0.73, p=.48; F[1, 98]=0.32, p=.57, respectively), yet F2 × condition did (F[2, 98]=5.52, p<.01). In the inhibition condition of the sad films, F2 predicted facial interest (F[2, 100]=3.72, p=.03), with offenders high in F2 (M=-1.1, SE=0.04) showing more interest than controls (M=-1.2, SE=0.05, p=.03), but not than offenders low in F2 (M=-1.1, SE=0.04, p=1.00). Offenders low in F2 and controls did not differ (p=.10). F2 did not predict facial interest in the expression condition of the sad film type (F[2, 100]=1.93, p=.15).

***Surprise*.** A main effect was found for condition, with less surprise being displayed during the inhibition condition (M=-0.3, SE=0.1) than during expression (M=0.1, SE=0.1).

***Movement*.** A main effect was found of psychopathy on movement, with psychopaths (M=-2.4, SE=0.3) showing a larger decrease in movement than the controls (M=-1.0, SE=0.4, p=.03), but not than the nonpsychopathic offenders (M=-1.8, SE=0.3, p=.68). The

nonpsychopathic offenders and controls did not differ from each other (p=.40). Analyses also indicated a main effect of condition, with participants moving less during inhibition (M=-2.5, SE=0.3) than expression (M=-1.0, SE=0.3). Regarding the factors, movement was predicted by F2 and F2 × condition × film type. To examine this latter effect, a 3 (F2) × 2 (condition) ANOVA was conducted per film type. For the fearful film type, analyses indicated an effect of F2 (F[2, 98]=4.11, p=.02): offenders high in F2 (M=-3.6, SE=0.4) differed from controls (M=-2.0, SE=0.4, p=.02), but not from offenders low in F2 (M=-2.8, SE=0.3, p=.32). Offenders low in F2 did not differ from controls (p=.45). A condition effect was also found, with less movement during inhibition (M=-3.3, SE=0.3) than expression (M=-2.3, SE=0.3). F2 × condition did not predict movement during the fearful films (F[2, 98]=1.44, p=.24).

For the happy film type, no effect was found for F2 (F[2, 98]=1.37, p=.26) or F2 × condition (F[2, 98]=0.16, p=.85). Condition did have a main effect (F[1, 98]=16.25, p<.001), with participants moving less during inhibition (M=0.2, SE=0.5) than expression (M=3.3, SE=0.5). Regarding the sad film type, the main effect of F2 predicted movement (F[2, 98]=8.25, p<.001). Offenders high in F2 (M=-5.3, SE=0.4) did not differ from those low in F2 (M=-4.3, SE=0.4, p=.12), yet they did differ from controls (M=-3.0, SE=0.4, p<.001). The offenders low in F2 did not differ from controls (p=.09). Condition also predicted movement during the sad films (F[1, 98]=9.10, p<.01), with less movement during inhibition (M=-4.8, SE=0.3) than expression (M=-3.6, SE=0.3). The F2 × condition interaction did not predict movement during the sad films (F[2, 98]=1.29, p=.28).[3]

Smiles. Condition and condition × film type were predictive of smiling. Follow-up analyses showed condition not to be predictive of smiling during the sad (F[1, 106]=2.14, p=.15) and fearful films (F[1, 106]=2.91, p=.09). For the happy film type, condition did predict the occurrence of smiles (F[1, 106]=35.04, p<.001), with participants smiling less in the inhibition (M=0.2, SE=0.2) than in the expression condition (M=1.5, SE=0.2).

[3] Offenders thus seemed to show a larger decrease in movement than controls. However, these results could be misleading as our preparatory analyses showed the participant groups to differ in absolute baseline movement. A 2 (condition) × 3 (film type) × 3 (psychopathy) ANOVA on (logtransformed) raw movement scores indicated a main effect of condition (F[1, 104]=19.36, p<.001), film type (F[1.93, 190.41]=397.74, p<.001), and psychopathy (F[2, 104]=4.92, p<.01). For the raw movement scores, the difference between conditions and film types showed to be very similar to those observed for the change scores. However, pairwise comparisons indicated that the psychopathic offenders (M=6.0, SE=0.3) showed more absolute movement than controls (M=4.7, SE=0.4, p=.02), but not than the nonpsychopathic offenders (M=6.0, SE=0.3, p=1.00). The nonpsychopathic offenders also moved more than the controls during the emotional film clips (p=.02). A similar pattern was observed when repeating these analyses for Factor 2 (nonoffenders: M=4.7, SE=0.3; low Factor 2: M=5.6, SE=0.3; high Factor 2: M=6.4, SE=0.3, F[2, 104]=6.58, p<.01).

***Blinks*.** Condition × film type predicted blink rate, however, follow-up analyses showed condition not to be predictive of blinks during the fearful (F[1, 106]=0.86, p=.36), sad (F[1, 106]=1.83, p=.18), or happy film type (F[1, 106]=0.20, p=.66).

Summary of findings on facial expressions. In sum, all participants showed less facial expressions under inhibition than expression instructions (reflected in most emotion terms). For the majority of facial emotions, there were no main or interaction effects of psychopathy, F1, or F2, indicating that groups (regardless of psychopathy total or factor scores) did not differ in their capacity to inhibit or show facial emotions when being instructed to do so. One exception regarded offenders high in F2 displaying more facial interest than controls during the inhibition conditions of the sad and fearful film types. Regardless of condition, psychopaths generally showed a larger decrease in movement from baseline to the emotional films than nonoffenders. Furthermore, offenders high in F2 showed a larger decrease in movement than nonoffenders, yet only for the sad and fearful films. (In absolute terms, offenders still moved more during the emotional films than controls though).[4]

[4] Results for facial expressions remained highly similar when controlling for covariates. Only the effect of film type × condition on blinking rate was no longer significant when controlling for age (F[1.90, 195.98]=3.09, p=.05).

Table 2. *Mixed factorial ANOVAs with main and interaction effects of groups, condition, and film type on facial expressive behavior (change scores) (N=110)*

	Psycho-pathy	Condition	Film type	Psycho-pathy × condition	Psychopathy × film type	Condition × film type	Psychopathy × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Confusion	F=0.53	F=9.92**	F(1.29, 134.47)=20.12***	F=0.36	F(2.59, 134.47)=2.49^{+}	F(1.35, 140.23)=2.04	F(2.70, 140.23)=1.28
Happiness	F=1.96	F=7.17**	F(1.26, 131.28)=49.71***	F=1.03	F(2.53, 131.28)=0.99	F(1.56, 162.38)=14.41***	F(3.12, 162.38)=1.28
Pleasantness	F=1.12	F=0.39	F(1.21, 125.44)=1294.06***	F=0.08	F(2.41, 125.44)=1.71	F(1.16, 120.71)=0.85	F(2.32, 120.71)=0.97
Intensity	F=0.34	F=16.71***	F(1.17, 121.48)=40.68***	F=0.16	F(2.34, 121.48)=1.83	F(1.17, 121.66)=14.00***	F(2.34, 121.66)=4.17
Interest	F=1.28	F=0.00	F(1.33, 137.89)=4281.21***	F=0.81	F(2.65, 137.89)=1.14	F(1.16, 120.46)=0.50	F(2.32, 120.46)=0.36
Surprise	F=0.93	F=9.74**	F(1.35, 140.01)=16.41***	F=2.37^{+}	F(2.69, 140.01)=1.59	F(1.34, 139.43)=2.39	F(2.68, 139.43)=0.60
Movement	F=3.36*	F=9.41**	F(1.17, 121.84)=260.89***	F=0.08	F(2.34, 121.84)=1.58	F(1.18, 122.76)=2.56	F(2.36, 122.76)=1.09
Smiles	F=0.30	F=22.59***	F(1.17, 121.28)=46.13***	F=0.73	F(2.33, 121.28)=1.32	F(1.26, 130.49)=21.78***	F(2.51, 130.49)=0.75
Blinks	F=1.47	F=0.71	F(2, 208)=50.55***	F=1.33	F(4, 208)=0.75	F(1.90, 197.70)=3.12*	F(3.80, 197.70)=0.19
	F1	Condition	Film type	F1 × condition	F1 × film type	Condition × film type	F1 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Confusion	F=1.05	F=11.04**	F(1.26, 130.99)=15.73***	F=0.13	F(2.52, 130.99)=1.73	F(1.35, 139.99)=1.52	F(2.69, 139.99)=1.54
Happiness	F=1.72	F=6.54*	F(1.29, 134.01)=46.40***	F=1.81	F(2.58, 134.01)=1.21	F(1.57, 162.88)=13.90***	F(3.13, 162.88)=0.84
Pleasantness	F=1.84	F=0.35	F(1.22, 126.69)=1252.89***	F=0.09	F(2.44, 126.69)=1.45	F(1.16, 120.18)=0.43	F(2.31, 120.18)=0.83
Intensity	F=0.37	F=14.70***	F(1.17, 121.97)=35.72***	F=0.22	F(2.35, 121.97)=1.02	F(1.18, 122.84)=12.18***	F(2.36, 122.84)=0.62
Interest	F=1.41	F=0.02	F(1.33, 138.11)=4342.84***	F=0.98	F(2.66, 138.11)=1.65	F(1.16, 120.16)=0.83	F(2.31, 120.16)=0.42
Surprise	F=0.86	F=8.53*	F(1.32, 136.99)=13.23***	F=0.61	F(2.63, 136.99)=1.42	F(1.33, 138.70)=2.01	F(2.67, 138.70)=0.93
Movement	F=2.54^{+}	F=9.63**	F(1.18, 122.70)=267.48***	F=1.42	F(2.36, 122.70)=2.65^{+}	F(1.18, 123.04) =1.98	F(2.37, 123.04)=1.18

(Table 2 continues)

Table 2 (continued). *Mixed factorial ANOVAs with main and interaction effects of groups, condition, and film type on facial expressive behavior (change scores) (N=110)*

	F1	Condition	Film type	F1 × condition	F1 × film type	Condition × film type	F1 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Smiles	F=1.00	F=21.00***	F(1.17, 121.16)=42.62***	F=0.94	F(2.33, 121.16)=1.23	F(1.25, 130.31)=19.72***	F(2.51, 130.31)=0.56
Blinks	F=0.29	F=0.26	F(2, 208)=47.99***	F=1.31	F(4, 208)=0.53	F(1.90, 197.36)=3.00^{+}	F(3.80, 197.36)=0.13
	F2	Condition	Film type	F2 × condition	F2 × film type	Condition × film type	F2 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Confusion	F=0.35	F=10.18**	F(1.28, 132.74)=17.00***	F=0.70	F(2.55, 132.74)=1.86	F(1.32, 137.12)=1.64	F(2.64, 137.12)=1.36
Happiness	F=0.22	F=6.88*	F(1.29, 133.97)=49.55***	F=0.23	F(2.58, 133.97)=2.21^{+}	F(1.59, 165.69)=15.07***	F(3.19, 165.69)=1.64
Pleasantness	F=0.82	F=0.52	F(1.22, 126.61)=1306.28***	F=0.42	F(2.44, 126.61)=2.35	F(1.16, 120.89)=0.58	F(2.33, 120.89)=2.04
Intensity	F=0.81	F=15.73***	F(1.18, 122.79)=38.63***	F=0.06	F(2.36, 122.79)=2.92*	F(1.18, 122.65)=13.04***	F(2.36, 122.65)=1.70
Interest	F=1.52	F=0.00	F(1.33, 137.86)=4287.89***	F=0.17	F(2.65, 137.86)=0.35	F(1.16, 120.88)=0.77	F(2.33, 120.88)=2.95*
Surprise	F=0.28	F=9.27**	F(1.33, 137.76)=13.82***	F=1.53	F(2.65, 137.76)=1.25	F(1.33, 135.89)=2.07	F(2.67, 135.89)=0.61
Movement	F=4.28*	F=9.64**	F(1.18, 122.76)=267.41***	F=0.06	F(2.36, 122.76)=2.15	F(1.18, 122.87)=2.17	F(2.36, 122.87)=3.14*
Smiles	F=0.10	F=21.80***	F(1.17, 121.97)=46.05***	F=0.77	F(2.34, 121.97)=2.79^{+}	F(1.25, 130.26)=20.75***	F(2.51, 130.26)=0.66
Blinks	F=1.59	F=0.18	F(1.98, 206.06)=50.25***	F=0.46	F(2, 208)=1.64	F(1.91, 198.38)=3.17*	F(3.82, 198.38)=0.13

Note. ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Psychopathy: nonoffenders, nonpsychopathic offenders, psychopathic offenders. F1: nonoffenders, offenders low in Factor 1, offenders high in Factor 1. F2: nonoffenders, offenders low in Factor 2, offenders high in Factor 2. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at p<.05). Degrees of freedom were df = 2, for the effects of the grouping variables (psychopathy, F1, and F2), df = 1, 104 for condition, and df = 2, 104 for the interactions between the grouping variables and condition.

^{+}p < .10. $^{*}p$ < .05. $^{**}p$ < .01. $^{***}p$ < .001.

Self-reported emotion

The results of the main and interaction effects of the psychopathy grouping variables (psychopathy, F1, and F2), condition, and film type on self-reported emotion are presented in Table 3. Results showed no main or interaction effects of any of the grouping variables and/or condition on self-reported disgust, surprise, content, and sympathy. For the other self-reported emotions, analyses revealed the following:

Fear. Analyses showed an effect of F2 × condition on fear, however, univariate ANOVAs showed that F2 did not affect self-reported fear in either the inhibition (F[2, 104]=0.97, p=.38) or expression condition (F[2, 104]=0.85, p=.43).

Happiness. A main effect was found for condition, with less happiness being reported during inhibition (M=1.0, SE=0.2) than during expression (M=1.4, SE=0.2). Also, F1 showed to be predictive of self-reported happiness: Offenders high in F1 (M=1.6, SE=0.2) differed from offenders low in F1 (M=0.9, SE=0.2, p<.05), but not from controls (M=0.9, SE=0.2, p=.10). Offenders low in F1 and controls did not differ from each other either (p=1.00).

Amused. A main effect of condition was observed, i.e., participants reported less amusement during inhibition (M=1.5, SE=0.2) than during expression (M=2.0, SE=0.2).

Anger. Self-reported anger was predicted by psychopathy × film type. However, univariate ANOVAs showed psychopathy not to have a main effect on anger during the fearful (F[2, 100]=1.95, p=.15), happy (F[2, 100]=0.90, p=.41), or sad film type (F[2, 100]=1.17, p=.32). Regarding the factors, an effect was observed for F1 × film type. However, univariate ANOVAs showed F1 not to have a main effect on anger during the fearful (F[2, 100]=1.51, p=.22), happy (F[2, 100]=0.56, p=.57), or sad film type (F[2, 100]=2.71, p=.07).

***Sadness*.** F1 predicted self-reported sadness, with offenders high in F1 (M=2.0, SE=0.1) reporting more sadness than controls (M=1.4, SE=0.2, p=.04), but not than offenders low in F1 (M=1.6, SE=0.1, p=.26). Offenders low in F1 and controls did not differ (p=.89).

Tenseness. For self-reported tenseness, a main effect was found for psychopathy, film type, and psychopathy × film type. Univariate ANOVAs showed no main effect of psychopathy on tenseness for the fearful (F[2, 100]=1.90, p=.16) or the happy film type (F[2, 100]=1.55, p=.22). Psychopathy did have a main effect within the sad film type (F[2, 100]=6.60, p<.01), with psychopaths (M=2.1. SE=0.3) reporting more tenseness than controls (M=0.5, SE=0.4, p<.01), but not than the nonpsychopathic offenders (M=2.1, SE=0.3, p=1.00). The nonpsychopathic offenders also differed from controls (p<.01).

Regarding the factors, a main effect was found for F1. Offenders high in F1 (M=1.7, SE=0.2) reported more tenseness than controls (M=0.7, SE=0.3, p<.01), but not than offenders low in F1 (M=1.3, SE=0.2, p=.53). Offenders low in F1 did not differ from controls

(p=.16). Concerning F2, a main effect of F2 and F2 × condition was found. During inhibition, F2 predicted tenseness (F[2, 104]=4.03, p=.02), with offenders high in F2 (M=1.0, SE=0.2) differing from offenders low in F2 (M=1.9, SE=0.2, p=.04), but not from controls (M=0.9, SE=0.3, p=1.00). Offenders low in F2 and controls did not differ from each other (p=.07). F2 also predicted tenseness during expression (F[2, 104]=5.07, p<.01). Offenders high in F2 (M=1.7, SE=0.2) differed from controls, (M=0.4, SE=0.3, p<.01), but not from offenders low in F2 (M=1.4, SE=0.2). Offenders low in F2 also differed from controls (p=.04).

Interest. A main effect was found for condition, with the inhibition condition (M=0.8, SE=0.2) inducing less self-reported interest than the expression condition (M=1.5, SE=0.2). Furthermore, an effect was found of F2 × condition × film type, which was examined by conducting a 3 (F2) × 2 (condition) ANOVA per film type. For the fearful film type, F2 (F[2, 98]=0.70, p=.50) and condition (F[1, 98]=2.20, p=.14) did not predict interest, yet F2 × condition did (F[2, 98]=5.88, p<.01). During inhibition, F2 predicted interest (F[1, 100]=3.78, p=.03), with offenders high in F2 (M=0.3, SE=0.4) differing from offenders low in F2 (M=1.7, SE=0.4, p=.03), but not from controls (M=1.7, SE=0.4, p=.14). Offenders low in F2 and controls did not differ from each other (p=1.00). During the expression condition of the fearful film type, F2 did not predict interest (F[2, 100]=0.88, p=.42). For the happy film type, self-reported interest was not predicted by F2 (F[2, 98]=0.35, p=.71), condition (F[1, 98]=2.68, p=.11), or F2 × condition (F[2, 98]=1.36, p=.26). For the sad film type, neither F2 (F[2, 98]=0.51, p=.60) or F2 × condition (F[2, 98]=2.77, p=.07) predicted interest, yet condition did (F[1, 98]=7.49, p<.01). For the sad film type, participants reported less interest during inhibition (M=0.8, SE=0.3) than during expression (M=1.8, SE=0.3).

***Summary of findings on self-report*.** In sum, all participants reported less happiness, amusement, and interest during the inhibition condition than when expressing emotions. As expected, no main or interaction effects were found for psychopathy, F1 or F2 on self-report for the majority of emotion terms (especially after controlling for CVs). (Non)psychopathic offenders only reported more tenseness than controls during the sad films and, regardless of film type valence, offenders high in F1 reported more tenseness than controls.[5]

[5] Results for self-report remained highly similar when controlling for covariates. Findings that were no longer significant concerned the following: F1 was no longer predictive of self-reported happiness when controlling for age, state and trait anxiety, executive functioning, and impulsivity (F[2, 98]=2.31, p=.10). F1 was also no longer predictive of self-reported sadness when taking age, trait and state anxiety, and impulsivity into account (F[2, 99]=2.13, p=.12). For tenseness, F2 was no longer predictive during inhibition when controlling for trait and state anxiety, and executive functioning (F[2, 101]=2.40, p=.10). During the expression condition, self-reported tenseness no longer differed between offenders low in F2 (M=1.3, SE=0.3) and controls (M=0.5, SE=0.3, p=.15) when including trait and state anxiety, executive functioning, and impulsivity as covariates. Last, the three-way interaction between F2, condition, and film type no longer significantly predicted interest when controlling for executive functioning, trait anxiety, and impulsivity (F[3.89, 194.65]=2.30, p=.06).

Table 3. *Mixed factorial ANOVAs with main and interaction effects of groups, condition, and film type on self-reported emotion (change scores) (N=110)*

	Psycho-pathy	Condition	Film type	Psycho-pathy × condition	Psychopathy × film type	Condition × film type	Psychopathy × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Fear	F=0.17	F=0.28	$F(1.64, 170.02)=45.29^{***}$	F=1.13	$F(3.27, 170.02)=0.49$	$F(2, 208)=0.12$	$F(4, 208)=0.29$
Happiness	F=0.89	$F=4.00^{*}$	$F(1.59, 165.05)=170.82^{***}$	$F=3.00^{+}$	$F(3.17, 165.05)=0.43$	$F(1.70, 176.57)=0.59$	$F(3.40, 176.57)=1.77$
Disgust	F=0.36	F=2.52	$F(1.77, 184.28)=11.39^{***}$	F=2.83	$F(3.54, 184.28)=0.54$	$F(1.72, 178.42)=0.20$	$F(3.43, 178.42)=1.26$
Surprise	F=0.14	F=2.11	$F(1.79, 186.60)=6.88^{**}$	F=1.07	$F(3.59, 186.60)=0.75$	$F(1.89, 196.46)$ =0.08	$F(3.78, 196.46)=0.33$
Amused	F=0.23	$F=4.82^{*}$	$F(1.69, 176.10)=31.09^{***}$	F=2.08	$F(3.39, 176.10)=1.56$	$F(2, 208)=0.22$	$F(4, 208)=0.35$
Content	F=0.15	F=2.05	$F(1.69, 175.54)=54.02^{***}$	F=0.77	$F(3.38, 175.54)=0.39$	$F(2, 208)=0.55$	$F(4, 208)=1.26$
Sympathy	F=1.54	F=0.26	$F(1.77, 183.73)=306.20^{***}$	F=0.18	$F(3.53, 183.73)=1.14$	$F(2, 208)=0.36$	$F(4, 208)=0.72$
Anger	F=0.86	F=0.02	$F(1.80, 187.15)=40.24^{***}$	F=1.57	$F(3.60, 187.15)=2.81^{*}$	$F(1.73, 180.01)=1.15$	$F(3.46, 180.01)=0.40$
Sadness	F=2.30	F=0.00	$F(1.55, 161.08)=308.38^{***}$	F=1.27	$F(3.10, 161.08)=1.45$	$F(1.71, 178.08)=1.45$	$F(3.43, 178.08)=0.15$
Tense	$F=4.60^{*}$	F=0.18	$F(2, 208)=81.35^{***}$	F=1.85	$F(4, 208)=3.01^{*}$	$F(2, 208)=1.01$	$F(4, 208)=0.99$
Interested	F=0.28	$F=6.01^{**}$	$F(2, 208)=6.45^{**}$	F=0.81	$F(4, 208)=1.54$	$F(2, 208)=1.30$	$F(4, 208)=0.38$
	F1	Condition	Film type	F1 × condition	F1 × film type	Condition × film type	F1 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Fear	F=0.85	F=0.14	$F(1.64, 170.71)=45.33^{***}$	F=1.87	$F(3.28, 170.71)=1.49$	$F(2, 208)=0.13$	$F(4, 208)=0.89$
Happiness	$F=3.72^{*}$	$F=3.26^{+}$	$F(1.58, 164.53)=167.29^{***}$	$F=2.68^{+}$	$F(3.16, 164.53)=0.24$	$F(1.68, 174.51)=0.51$	$F(3.36, 174.51)=1.04$
Disgust	F=0.35	F=2.22	$F(1.76, 183.21)=10.31^{***}$	F=0.35	$F(3.52, 183.21)=0.71$	$F(1.73, 180.27)=0.25$	$F(3.35, 180.27)=1.01$
Surprise	F=0.87	F=1.89	$F(1.78, 185.17)=6.97^{**}$	F=0.42	$F(3.56, 185.17)=0.87$	$F(1.88, 195.25)=0.14$	$F(3.76, 195.25)=0.96$
Amused	F=0.80	$F=3.50^{+}$	$F(1.69, 175.36)=30.69^{***}$	F=1.23	$F(3.37, 175.36)=0.90$	$F(2, 208)=0.20$	$F(4, 208)=0.75$
Content	F=1.81	F=2.15	$F(1.66, 172.25)=51.81^{***}$	F=1.37	$F(3.31, 172.25)=0.94$	$F(2, 208)=0.71$	$F(4, 208)=2.32^{+}$
Sympathy	F=1.08	F=0.41	$F(1.77, 183.74)=306.24^{***}$	F=1.48	$F(3.53, 183.74)=0.68$	$F(2, 208)=0.32$	$F(4, 208)=1.10$

(Table 3 continues)

Table 3 (continued). *Mixed factorial ANOVAs with main and interaction effects of groups, condition, and film type on self-reported emotion (change scores) (N=110)*

	F1	Condition	Film type	F1 × condition	F1 × film type	Condition × film type	F1 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Anger	F=0.71	F=0.01	$F(1.84, 191.73)=39.04^{***}$	F=0.37	$F(3.69, 191.73)=4.21^{**}$	$F(1.74, 180.40)=1.29$	$F(3.47, 180.40)=0.67$
Sadness	$F=3.49^{*}$	F=0.00	$F(1.54, 160.59)=300.77^{***}$	F=0.27	$F(3.09, 160.59)=1.88$	$F(1.71, 177.91)=0.03$	$F(3.42, 177.91)=0.23$
Tense	$F=4.89^{**}$	F=0.31	$F(2, 208)=80.11^{***}$	F=1.19	$F(4, 208)=2.28^{+}$	$F(2, 208)=0.97$	$F(4, 208)=0.52$
Interested	F=0.16	$F=5.77^{**}$	$F(2, 208)=6.83^{**}$	F=1.06	$F(4, 208)=1.37$	$F(2, 208)=1.36$	$F(4, 208)=0.78$
	F2	Condition	Film type	F2 × condition	F2 × film type	Condition × film type	F2 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
Fear	F=0.25	F=0.20	$F(1.62, 168.80)=46.10^{***}$	$F=3.68^{*}$	$F(3.25, 168.80)=0.76$	$F(2, 208)=0.15$	$F(4, 208)=1.40$
Happiness	F=0.77	F=3.64+	$F(1.58, 164.01)=168.17^{***}$	F=1.73	$F(3.15, 164.01)=0.32$	$F(1.71, 3.17)=0.56$	$F(3.41, 3.17)=1.42$
Disgust	F=1.24	F=2.31	$F(1.73, 180.10)=10.94^{***}$	$F=3.00^{+}$	$F(3.46, 180.10)=0.76$	$F(1.72, 178.62)=0.21$	$F(3.44, 178.62)=1.52$
Surprise	F=0.30	F=0.15	$F(1.80, 187.49)=7.25^{**}$	F=0.54	$F(3.61, 187.49)=0.77$	$F(2, 208)=0.09$	$F(4, 208)=0.21$
Amused	F=0.18	$F=3.92^{+}$	$F(1.69, 175.67)=29.83^{***}$	F=1.40	$F(3.38, 175.67)=0.70$	$F(2, 208)=0.24$	$F(4, 208)=0.47$
Content	F=0.07	F=2.12	$F(1.68, 174.50)=51.45^{***}$	F=2.12	$F(3.36, 174.50)=0.18$	$F(2, 208)=0.62$	$F(4, 208)=0.16$
Sympathy	$F=2.52^{+}$	F=0.34	$F(1.79, 185.85)=311.91^{***}$	F=0.52	$F(3.57, 185.85)=1.16$	$F(2, 208)=0.31$	$F(4, 208)=1.32$
Anger	F=2.32	F=0.00	$F(1.81, 187.87)=38.92^{***}$	$F=2.78^{+}$	$F(3.61, 187.87)=2.25^{+}$	$F(1.73, 180.35)=1.24$	$F(3.47, 180.35)=0.51$
Sadness	$F=2.72^{+}$	F=0.00	$F(1.53, 159.05)=312.10^{***}$	F=1.74	$F(3.06, 159.05)=1.74$	$F(1.72, 179.29)=0.05$	$F(3.45, 179.29)=0.07$
Tense	$F=4.78^{*}$	F=0.28	$F(2, 208)=80.52^{***}$	$F=4.16^{*}$	$F(4, 208)=2.00^{+}$	$F(2, 208)=0.87$	$F(4, 208)=0.34$
Interested	F=0.16	$F=6.04^{**}$	$F(2, 208)=6.84^{**}$	$F=2.86^{+}$	$F(4, 208)=0.96$	$F(2, 208)=1.42$	$F(4, 208)=3.11^{**}$

Note. ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Psychopathy: nonoffenders, nonpsychopathic offenders, psychopathic offenders. F1: nonoffenders, offenders low in Factor 1, offenders high in Factor 1. F2: nonoffenders, offenders low in Factor 2, offenders high in Factor 2. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at $p<.05$). Degrees of freedom were $df = 2, 104$ for the effects of the grouping variables (psychopathy, F1, and F2), $df = 1, 104$ for condition, and $df = 2, 104$ for the interactions between the grouping variables and condition.

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Psychophysiology

Table 4 shows the main and interaction effects of the psychopathy grouping variables (psychopathy, F1, and F2), condition, and film type on the psychophysiological indices.

SC responding. No main or interaction effects were found for any of the groups (psychopathy, F1, and F2), condition, or film type on nSCRs or ISCR.

HR. Analyses indicated a significant main effect of condition, with HR decreasing during inhibition (*M*=-0.8, *SE*=0.3) relative to expression (*M*=0.3, *SE*=0.3, *p*=.04).

SDNN. A significant effect was found for film type and psychopathy × film type. For the fearful films, psychopathy predicted SDNN (*F*[2, 100]=5.65, *p*<.01), with psychopaths (*M*=-0.1, *SE*=2.5) showing less of an increase in SDNN than controls (*M*=9.6, *SE*=2.9, *p*=.04), but not than nonpsychopathic offenders (*M*=-2.6, *SE*=2.3, *p*=1.00). Nonpsychopathic offenders and controls also differed in SDNN (*p*<.01). Psychopathy did not predict SDNN for the happy (*F*[2, 100]=0.10, *p*=.91) or the sad film type (*F*[2, 100]=1.58, *p*=.21).

Regarding the factors, analyses showed F1 to predict SDNN. Offenders high in F1 (*M*=0.8, *SE*=2.1) did not differ from offenders low in F1 (*M*=-4.6, *SE*=2.0, *p*=.20) or controls (*M*=3.4, *SE*=2.6, *p*=1.00). Offenders low in F1 showed a borderline significant decrease in SDNN when compared to controls (*p*=.05). Considering F2, analyses demonstrated effects of F2 and F2 × film type on SDNN. For the fearful film type, F2 affected SDNN (*F*[2, 100]=8.15, *p*=.001). The difference between offenders high in F2 (*M*=-5.3, *SE*=2.4) and those low in F2 (*M*=2.7, *SE*=2.2, *p*=.05) was borderline significant. Offenders high in F2 did differ significantly from controls (*M*=9.6, *SE*=2.9, *p*<.001), whereas offenders low in F2 and controls did not differ from each other (*p*=.19). During the happy film type, F2 also had an effect on SDNN (*F*[2, 100]=4.20, *p*=.02). Offenders high in F2 (*M*=-5.1, *SE*=2.4) differed from those low in F2 (*M*=4.9, *SE*=2.5, *p*=.02), but not from controls (*M*=-0.3, *SE*=3.1, *p*=.64). Offenders low in F2 and controls did not differ from each other in SDNN during the happy film type (*p*=.62). F2 did not affect SDNN during the sad film type (*F*[2, 100]=0.21, *p*=.81).

RMSDD. No main or interaction effects were found for any of the grouping variables (psychopathy, F1, and F2), condition, or film type on RMSDD.

Summary of findings on psychophysiology. Across all participants, HR decreased during inhibition relative to expression. However, results did not indicate psychopaths to show a different physiological cost of suppression on any of the measures, as reflected in the absence of psychopathy × condition effects. Regardless of condition, (non)psychopathic offenders did show a reduced SDNN response during the fearful film type when compared to controls. Offenders high in F2 showed a decrease in SDNN relative to the controls (for the fearful films), as well as when compared to the offenders low in F2 (for the happy films).

Table 4. *Mixed factorial ANOVAs with main and interaction effects of groups, condition, and film type on physiological change scores (N=110)*

	Psycho-pathy	Condition	Film type	Psychopathy × condition	Psychopathy × film type	Condition × film type	Psychopathy × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
SCRs	F=0.51	F=1.08	$F(1.83, 190.31)=8.38^{***}$	F=0.45	$F(3.66, 190.31)=0.73$	$F(1.88, 195.69)=0.05$	$F(3.76, 195.69)=2.23^{+}$
ISCR	F=0.25	$F=2.97^{+}$	$F(1.45, 150.48)=8.48^{**}$	F=2.34	$F(2.89, 150.48)=1.17$	$F(1.21, 125.51)=0.56$	$F(2.41, 125.51)=0.21$
HR	F=1.33	$F=4.33^{*}$	$F(2, 208)=6.07^{**}$	F=0.39	$F(4, 208)=0.21$	$F(1.73, 180.12)=0.01$	$F(3.46, 180.12)=2.18^{+}$
SDNN	F=2.07	F=1.53	$F(1.89, 196.01)=6.50^{**}$	F=0.05	$F(3.77, 196.01)=2.70^{*}$	$F(1.85, 192.51)=0.02$	$F(3.70, 192.51)=0.09$
RMSDD	F=0.59	F=0.96	$F(2, 208)=0.13$	F=0.11	$F(3.86, 200.98)=1.58$	$F(2, 208)=0.98$	$F(4, 208)=1.68$
	F1	Condition	Film type	F1 × condition	F1 × film type	Condition × film type	F1 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
SCRs	F=0.31	F=1.08	$F(1.82, 189.26)=8.26^{**}$	F=1.71	$F(3.84, 189.26)=1.86$	$F(1.88, 195.59)=0.04$	$F(3.76, 195.59)=2.25^{+}$
ISCR	F=1.33	$F=3.01^{+}$	$F(1.46, 151.65)=8.64^{**}$	F=0.98	$F(2.92, 151.65)=0.61$	$F(1.20, 124.77)=0.94$	$F(2.40, 124.77)=1.58$
HR	F=0.81	$F=4.44^{*}$	$F(2, 208)=6.45^{**}$	F=0.78	$F(4, 208)=0.25$	$F(1.72, 178.57)=0.02$	$F(3.43, 178.57)=1.37$
SDNN	$F=3.32^{*}$	F=1.46	$F(1.86, 193.61)=6.28^{**}$	F=0.22	$F(3.72, 193.61)=2.32^{+}$	$F(1.85, 191.84)=0.05$	$F(3.69, 191.84)=0.18$
RMSDD	F=1.32	F=1.16	$F(2, 208)=0.20$	F=0.29	$F(4, 208)=1.20$	$F(1.88, 195.36)=0.84$	$F(3.76, 195.36)=0.94$
	F2	Condition	Film type	F2 × condition	F2 × film type	Condition × film type	F2 × condition × film type
	F-value	*F*-value	*F*-value (*df*)	*F*-value	*F*-value (*df*)	*F*-value (*df*)	*F*-value (*df*)
SCRs	F=1.25	F=1.09	$F(1.84, 191.10)=8.81^{**}$	F=0.25	$F(3.68, 191.10)=0.83$	$F(1.88, 195.91)=0.03$	$F(3.77, 195.91)=2.38^{+}$
ISCR	F=0.09	$F=3.26^{+}$	$F(1.48, 153.68)=8.84^{**}$	F=1.59	$F(2.96, 153.68)=2.54^{+}$	$F(1.21, 125.40)=0.69$	$F(2.41, 125.40)=0.34$
HR	F=1.01	$F=4.37^{*}$	$F(2, 208)=6.41^{**}$	F=0.80	$F(4, 208)=0.78$	$F(1.72, 179.34)=0.01$	$F(3.45, 179.34)=1.94$
SDNN	$F=3.83^{*}$	F=1.52	$F(1.89, 196.70)=6.75^{**}$	F=0.21	$F(3.78, 496.70)=3.29^{*}$	$F(1.84, 191.68)=0.03$	$F(3.69, 191.68)=0.20$
RMSDD	F=2.01	F=1.17	$F(2, 208)=0.15$	$F=2.42^{+}$	$F(4, 208)=1.68$	$F(1.88, 195.61)=0.94$	$F(3.76, 195.61)=1.11$

Note. SCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver over the film clip duration); HR = heartbeats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Psychopathy: nonoffenders, nonpsychopathic offenders, psychopathic offenders. F1: nonoffenders, offenders low in Factor 1, offenders high in Factor 1. F2: nonoffenders, offenders low in Factor 2, offenders high in Factor 2. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at $p<.05$). Degrees of freedom were df = 2, 104 for the effects of the grouping variables (psychopathy, F1, and F2), df = 1, 104 for condition, and df = 2, 104 for the interactions between the grouping variables and condition.

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

DISCUSSION

In this study, we investigated differences in emotion regulation between psychopaths, nonpsychopathic offenders, and nonoffender controls. We compared self-reported emotion, psychophysiology, and facial displays of emotion during a task that required the regulation of emotion while watching differently valenced film clips (i.e., fear, happy, sad). Surprisingly, we did not observe psychopathic offenders to have a superior capacity for affective inhibition (as witnessed in facial and physiological indices). Interestingly, psychopaths did not differ from nonpsychopathic participants in their ability to display facial affect under the instruction to express emotions either.

In general, participants were able to significantly reduce their facial emotions under inhibition instructions, paralleling previous research on emotion suppression (e.g., Gross & Levenson, 1997; Kunzmann et al., 2005). Contrary to our hypothesis though, psychopaths were not better able to adopt such a "poker face," neither was this capacity related to the interpersonal/affective factor (Factor 1) of psychopathy. Our findings contrast findings by Porter et al. (2011) who found interpersonal psychopathic traits to be related to less "emotional leakage" in deceptive displays. This discrepancy might be explained by differences in research populations, as the majority of subjects in the study by Porter and colleagues were female students, or by the use of another experimental set-up. Whereas our participants were instructed to hide all their emotion, "emotional deception" in the study by Porter and colleagues (2011) could imply both hiding affect and/or showing emotions that were inconsistent with stimulus valence. It remains unclear whether the negative association between interpersonal psychopathic traits and emotional leakage was carried by the inhibition of facial emotion, the fabrication of emotional displays, or both. In any case, our findings do not support the notion that psychopaths have a superior capacity to inhibit facial emotion.

We additionally hypothesized psychopathic offenders to be characterized by an attenuated cost of emotional suppression, reflected in reduced changes in the psychophysiological indices that are associated with affective suppression. Over the entire sample, participants showed a deceleration in HR during inhibition when compared to the expression condition, extending previous findings showing emotion suppression to result in a reduced HR (e.g., Roberts et al., 2008; Kunzmann et al., 2005). Contrary to our hypothesis, the effect of affective inhibition on HR was not dependent on participants' psychopathy total or Factor 1 score. An explanation for these results might be the fact that we contrasted our inhibition condition to an expression condition. Previous research in nonclinical samples used comparison conditions in which instructions entailed merely watching film fragments. Instead, we chose to use a condition in which participants were asked to show all emotion they experienced, reasoning that forensic participants might show diminished emotional responses during a "just watch" condition due to patients, for example, displaying a "tough guy image." Although using instructions to simply look at the film fragments would have been informative, it also would have compromised an important goal of the current study,

i.e., examining whether psychopaths have the capacity to show adequate affective expressions if they try. On the downside, some participants might have enhanced affective expressiveness rather than just portrayed actually felt emotions under expression instructions. As previous research has shown that the enhancement of affective expressions results in similar increases in SC as expressive suppression (Kunzmann et al., 2005), we might not have observed differences in SC between our conditions. However, findings on the effect of suppression on this physiological measure have been quite equivocal, with some studies showing affective inhibition to affect SC (Gross & Levenson, 1997; Kunzmann et al., 2005), whereas some do not (Gross & Levenson, 1997; Roberts et al., 2008). Previous research does show affective suppression to robustly affect HR (Roberts et al., 2008; Kunzmann et al., 2005), whereas this cardiovascular index is not influenced by the enhancement of emotions (Kunzmann et al., 2005). Therefore, the current findings do support the notion that attempts to conceal facial expressions do not result in differences in cardiovascular cost between psychopaths and nonpsychopaths, indicating emotion inhibition to be an active, effortful process in psychopathic offenders as well (Gross & Levenson, 1997). This notion is supported by Casey and colleagues (2012), who also did not find an effect of psychopathy or its factors on HR during emotion suppression in the context of pictorial stimuli.

One of our other hypotheses concerned offenders high in the lifestyle/antisocial component of psychopathy (Factor 2) to be worse at hiding their emotions, due to the emotional and impulsive nature of this psychopathy dimension (Schreiber et al., 2012). Under inhibition instructions, offenders high in Factor 2 did seem to show somewhat more facial interest than nonoffenders during the negatively valenced film types (sad and fearful), with the offenders low in Factor 2 falling in between both groups. Results did not broadly support our hypothesis though, as offenders high in Factor 2 did not differ in their capacity to reduce all other facial emotions compared with the less antisocial participants. No differences were found in physiological responsiveness during inhibition between participants with varying Factor 2 levels either. These findings seem at odds with studies showing the impulsive dimension of psychopathy to be positively related to self-reported emotion regulation difficulties (e.g., Long, Felton, Lilienfeld, & Lejuez, 2014). Possibly, the disturbances that highly antisocial offenders have in inhibiting emotion might be more pronounced for other affective states than the ones we studied. For example, the affective dysregulation described by the PCL-R Factor 2 items focuses solely on controlling anger (Hare, 2003), highlighting the importance of future research on anger inhibition in relation to psychopathy.

Concerning subjective experience, we found self-reported emotion to be attenuated during inhibition relative to expression, yet only for positive emotion (e.g., happiness), which parallels previous research (Gross & Levenson, 1997). As expected, few group differences emerged in self-reported affect, adding to a growing number of studies indicating that psychopathy is not related to aberrances in the subjective judgment of responsivity to affective material (e.g., Casey et al., 2012; Herpertz et al., 2001). We did find offenders high

in Factor 1 to report a larger increase in tenseness than controls during all emotional films, with offenders low in Factor 1 falling in between both groups. For the sad films specifically, all offenders reported more tenseness than nonoffenders. These findings might indicate that the negative aspects of our stimulus material might have been more salient for these individuals on a cognitive level. A different explanation might be that offenders exaggerate their self-reported emotional responses as a means of maintaining a facade of normality, which would logically be more pertinent to offenders high in Factor 1.

Another important focus of the current study was psychopaths' capacity to display affective facial behavior when explicitly instructed to show emotion. In general, the intensity of participants' expressive behavior increased significantly for the majority of emotional behaviors when compared to the inhibition condition. This effect was not group dependent, meaning that psychopaths did not differ from nonpsychopathic participants in facial signs of emotion under expression instructions. Results also revealed that each of the emotional film types (fear, happy, sad) produced facial emotions that matched stimulus valence over the entire sample, indicating that the type of emotion psychopaths displayed was also content-appropriate. These findings converge with previous research showing psychopathic offenders to show normal corrugator activity (i.e., frowning) while watching emotional stimuli (e.g., Lobbestael & Arntz, 2010; Verona et al., 2004). Although other studies did find psychopaths to show attenuated frowning in emotional contexts (e.g., Herpertz et al., 2001), our current results indicate that such findings might be indicative of psychopaths being less motivated to show affect under certain circumstances rather than being inherently incapable of displaying facial emotions.

In general, psychopathic offenders thus did not show a superior capacity for the inhibition of facial affect, and interestingly, the suppression of emotional expressions was not associated with a reduced cardiovascular cost in psychopaths. Furthermore, psychopaths did not show an impaired capacity to display content-appropriate facial emotions, nor did they report a reduced emotional experience themselves. Two different processes might underlie these intriguing results. First, psychopathic offenders might have simply experienced genuine emotions that they showed during the expression condition and that took regulated effort to suppress under inhibition instructions. Although these results seem surprising in the light of emotion-based accounts of psychopathy (e.g., Blair et al., 2005; Cleckley, 1941), there is a substantial number of studies that concur with our results, showing psychopaths to respond with the same changes on affective indices (SCR, HR, facial expressiveness) as nonpsychopaths when looking at (un)pleasant emotional stimuli (see Brook et al. [2013], for a review; Lobbestael & Arntz, 2010). The fact that in a number of studies, including our own, psychopaths do not seem to differ in their emotional responding could be explained by cluster analytic research revealing two subtypes of psychopathy. On the one hand, the emotionally stable variant is characterized by affective resiliency, whereas the aggressive subtype is typified by mental disorder and negative emotionality (e.g., Hicks, Markon, Patrick, Krueger & Newman, 2004). The majority of our offenders were institutionalized in forensic

psychiatric facilities. Therefore, our psychopathic subgroup might have been predominantly constituted by the latter, emotionally more reactive variant, explaining the lack of psychopathy-specific aberrances in emotion regulation in the current study.

A second, alternative interpretation of our findings is that psychopathy is related to the simulation of emotion (in e.g., self-report and facial expressions) in the absence of accompanying physiological responsiveness. This explanation coincides with Cleckley's highly influential theory, in which psychopaths' affective displays are described as a mask of sanity: "facsimiles of actual feeling, an automatic and undesigned mimicry" (Cleckley, 1941). Such an account is in line with offenders in our current study presenting with a highly similar pattern of subjective affective experience and facial emotion, while also being characterized by a decreased HRV when compared to nonoffenders. The latter effect seemed to be carried by Factor 2, as offenders high on this psychopathy component showed a decrease in HRV during the films intended to produce fear and happiness. As Factor 2 only influenced our measures of SDNN, but not RMSDD, these observations appear to reflect a decreased sympathetically mediated arousal to happiness and fear-inducing stimuli in offenders high on the lifestyle/antisocial psychopathy dimension (Task Force, 1996).

An explanation for the dissociation between offenders' reduced autonomic responsiveness on the one hand, and their normal self-reported and facial emotion on the other hand, can be derived from recent developments in cognitive neuroscientific research on morality. Green (2014) suggests moral judgment to result from a dual-process mechanism which engages brain regions associated with intuitive emotional responding (e.g., the amygdala), as well as brain structures involved in more controlled cognitive processes (e.g., the dorsolateral prefrontal cortex [DLPFC]). Interestingly, a study by Glenn, Raine, Schug, Young, and Hauser (2009) showed psychopathy to be related to a reduced activity in the amygdala and increased activity in the DLPFC during the judgment of personal moral dilemmas. As individuals high in psychopathy did appear to provide relatively similar moral judgments, these findings suggest that psychopaths might make use of alternative cognitive strategies to process and respond to material that involves more visceral, emotional processing in nonpsychopathic individuals. Such a cortical, compensatory mechanism could also have enabled the offenders in the current study to show normal responsiveness in certain domains (self-reported and facial emotion), while presenting with reduced reactivity on an index of physiological arousal (HRV) while looking at affective film material.

Notably, the combination of atypical amygdala and DLPFC activity in the study by Glenn and colleagues (2009) was especially characteristic of individuals high in lifestyle/antisocial psychopathic features. Similarly, the effect of psychopathy on reduced HRV in the current research was also explained by Factor 2. Although it is generally assumed that it is Factor 1 that explains the affective deficiencies in psychopathy, other studies have provided indications of Factor 2 being associated with emotional deficits as well (see Brook et al. [2013], for some examples). Future studies should therefore further clarify how different psychopathy components are related to affective abnormalities. As we chose to focus on the

analyses of group comparisons in the current study (as to include our nonoffender control group), our results do not reveal the unique predictive values of both factors on our dependent measures. This limitation should be overcome in future studies using analytical models in which the shared variance between psychopathy factors is controlled for.

Conclusions, implications, and future directions

The current investigation did not show psychopaths to have better poker faces than nonpsychopathic offenders and controls. Potentially, we failed to detect psychopathy-specific differences in the capacity to manipulate facial expressiveness due to our sample size (*N*=110) that enabled us to detect a small to medium effect, raising the possibility of having missed small group differences. However, if differences between psychopathic and nonpsychopathic individuals would indeed only be small, a superior capacity for inhibiting facial affect does not seem to be central to psychopathy. A second striking finding was that adopting a poker face was not associated with differences in cardiovascular cost between participants with varying levels of psychopathy. Besides adding to our scientific understanding of psychopathy, this finding might have important clinical implications. Our findings suggest that emotional inhibition is related to physiological changes in both community controls and antisocial offenders (including psychopaths). This could imply that inhibiting the outward signs of inner emotion might have similar adverse consequences in offenders as has been demonstrated for nonclinical populations, such as cardiovascular disease and mental health problems (Gross, 2002; John & Gross, 2004). In forensic institutions, the expression of intense emotions is often times considerably restricted. The current study suggests that creating a safe atmosphere in which (psychopathic) offenders are given the opportunity to express their feelings could protect these individuals from the (psycho)pathological consequences associated with holding back emotions.

Our last main finding concerned the intriguing observation that under expression instructions, psychopaths did not differ from nonpsychopathic offenders and controls in displaying content-appropriate facial emotions. Future research should further try to disentangle whether psychopaths' expressive behaviors are the result of refined simulation, or whether they could be a mere expression of genuine affective experience. Both possibilities could have major implications for treatment, as psychopaths successfully mimicking emotion could seriously threaten the monitoring of treatment progress. Psychopaths being capable of genuinely feeling emotions, on the other hand, would be promising for their treatability. In any case, future studies should investigate the emotional correlates of different psychopathy subtypes, in order to further challenge the widely held belief that psychopathy is per definition associated with an incapacity of experiencing and showing emotions.

APPENDIX

In preparation for the main analyses that were used to test our hypotheses, a number of preparatory analyses was conducted. These included the investigation of time and psychopathy (total, Factor 1 [F1], and Factor 2 [F2]) effects on the neutral baselines, as well as an examination of the effects of the different film valences (sad, happy, fear) on our three measurement domains (self-reported emotions, facial expressiveness, and psychophysiology). All these analyses were based on raw scores (rather than change scores) and used log-transformed dependent variables (except for HR). In order to facilitate interpretation, the means and standard errors of the untransformed variables are reported.

Time effects on the neutral baselines

Facial emotion. Ratings of pleasantness went up over time (F[1, 104]=7.97, p<.01), whereas movement (F[1, 104]=14.55, p<.001) and blinking rate (F[1, 104]=26.58, p<.001) decreased. These time effects did not depend on psychopathy level (i.e., the effect of psychopathy × time was *ns* for all expressive measures, Fs[2, 104] ranging from 0.00 to 1.53, all ps>.05) or on the order of the conditions (i.e., the effect of time × condition order was *ns* for all expressive measures, Fs[1, 104] ranging from 0.001 to 1.10, all ps>.05).

Self-reported emotion. Time had a main effect on self-reported ratings of fear (F[1, 104]=8.78, p<.01), happiness (F[1, 104]=22.05, p<.001), disgust (F[1, 104]=8.13, p<.01), surprise (F[1, 104]=5.84, p=.02), amusement (F[1, 104]=15.25, p<.001), content (F[1, 104]=29.23, p<.001), sympathy (F[1, 104]=5.52, p=.02), tenseness (F[1, 104]=4.09, p=.04), and interest (F[1, 104]=28.90, p<.01). All these self-reported emotions decreased over time. Time effects did not depend on psychopathy level (i.e., the effect of psychopathy × time was *ns* for all self-reported ratings, Fs[2, 104] ranging from 0.02 to 1.33, all ps>.05) or on the order of the conditions (i.e., the effect of time × condition order was *ns* for all self-reported emotions, Fs[1, 104] ranging from 0.00 to 3.32, all ps>.05).

Physiological responsiveness. Time had a main effect on nSCRs (F[1, 104]=1003.24, p<.001) and SDNN (F[1, 104]=25.92, p<.001), which both increased over time. Time effects for the physiological measures did not depend on psychopathy level (i.e., the effect of psychopathy × time was *ns* for all physiological measures, Fs[2, 104] ranging from 0.28 to 1.37, all ps>.05) or on the order of the conditions (i.e., the effect of time × condition order was *ns* for all measures, Fs[1, 104] ranging from 0.04 to 0.60, all ps>.05).

Influence of psychopathy on neutral baseline responsivity

Facial emotion. Psychopathy had a main effect on pleasantness (F[2, 104]=3.40, p=.04) and movement ratings (F[2, 104]=5.45, p<.01). Bonferroni corrected pairwise comparisons indicated that psychopaths (M=8.5, SE=0.4) did not move more than nonpsychopathic offenders (M=7.8, SE=0.4, p=1.00), but that psychopaths did move more than controls

(*M*=5.7, *SE*=0.6, *p*<.01). Nonpsychopathic offenders and controls also differed in movement during baseline (*p*=.03). Furthermore, psychopaths (*M*=1.9, *SE*=0.04) were given higher pleasantness ratings than controls (*M*=1.7, *SE*=0.1, *p*<.05), but not than nonpsychopathic offenders (*p*=.19). No differences in pleasantness were observed between nonpsychopathic offenders (*M*=1.8, *SE*=0.04) and controls (*p*=1.00).

Concerning factor based groups, F1 had an effect on movement ratings (*F*[2, 104]=7.31, *p*<.01), but not on any of the other facial expressive behaviors (*F*s[2, 104] ranging from 0.03 to 2.47, all *p*s>.05). Offenders high in Factor 1 (*M*=7.5, *SE*=0.4) did not differ in movement from offenders low in Factor 1 (*M*=8.6, *SE*=0.4, *p*=.12) or from controls (*p*=.16). Offenders low in Factor 1 did move more than controls (*p*<.01). F2 had a main effect on movement as well (*F*[2, 104]=8.89, *p*<.001). Offenders high in Factor 2 moved more than offenders low in Factor 2 (*M*=7.3, *SE*=0.4, *p*=.03) and controls (*p*<.001). Offenders low in Factor 2 and controls did not differ in movement (*p*=.24). Offenders low in Factor 1 and high in Factor 2 thus appeared to show the most upper torso and facial movement during baseline. F2 did not have a significant effect on any of the other expressive behaviors (*F*s[2, 104] ranging from 0.07 to 1.87, all *p*s>.05).

Self-reported emotion. Psychopathy did not have a main effect on any of the self-reported emotion terms during baseline (*Fs*[2, 104] ranging from 0.07 to 2.00, all *p*s>.05). There were no main effects of F1 (*Fs*[2, 104] ranging from 0.07 to 2.00, all *p*s>.05) or F2 (*Fs*[2, 104] ranging from 0 .02 to 1.25, all *p*s>.05) on self-report either.

Physiological responsiveness. Psychopathy did not have an effect on any of the physiological measures during the neutral baselines (*F*s[2, 104] ranging from 0.34 to 1.74, all *p*s>.05). However, F1 did have a main effect on HR (*F*[2, 104]=4.04, *p*=.02). Offenders high in Factor 1 (*M*=66.7, *SE*=2.0) had a significantly lower HR during baseline than offenders low in Factor 1 (*M*=74.1, *SE*=1.9, *p*=.03), but not than the controls (*M*=67.8, *SE*=2.5, *p*=1.00). Offenders low in Factor 1 and controls did not differ from each other in baseline HR (*p*=.14). The main effect of F1 on the other physiological variables was *ns* (*F*s[2, 104] ranging from 0.48 to 2.63, all *p*s>.05). Analyses showed no main effects of F2 on any of the physiological measures during baseline (*F*s[2, 104] ranging from 0.41 to 1.89, all *p*s>.05).

Manipulation check: effect of the emotional films

Tables 1 through 3 in this appendix display participants' mean (*SE*) responses to the different film types (neutral, fear, happy, sad) for facial expressiveness, self-reported emotion and psychophysiology, respectively. These tables also describe the results of the ANOVAs that were conducted to investigate whether the emotional films induced responses that deviated from baseline responsivity. In general, the following patterns emerged from these analyses:

***Facial emotion*.** While watching the negatively valenced film types (fear and sad), participants blinked more, and showed a decrease in facial pleasantness, movement, and interest when compared to the neutral baseline clips. The happy film type evoked less blinking, more smiling, more movement and a higher score on facial happiness, pleasantness, and interest than any of the other film types (see Table 1).

Self-reported emotion. After watching the fearful film type, participants reported significantly more fear than after any of the other emotional film types. Also, they reported more sympathy, sadness, tenseness, interest, anger, disgust, and surprise than during the neutral films. The sad films induced more self-reported sympathy, anger, and sadness than any other emotional film type. Also, participants reported more fear, disgust, tenseness, and interest than during the neutral films. After watching the happy film type, more happiness, amusement, and content was reported than after any other film type. Also, the happy film type induced more interest than the neutral films (see Table 2).

***Physiological responsiveness*.** Participants showed an increase in number of skin conductance responses per minute during all three emotional film types when compared with the neutral baselines. This effect was most pronounced for the happy film type (for both the number of skin conductance responses, as well as for integrated skin conductance responding). Overall, no differences in heart rate or heart rate variability were observed between the film types, except that participants showed a deceleration in heart rate during the sad film type when compared to baseline (see Table 3).

Self-reported, facial, and psychophysiological responses per film type

Tables 4 through 7 in this appendix describe participants' self-reported, facial, and psychophysiological responses per group (nonoffenders, nonpsychopathic offenders, and psychopathic offenders) and per film type (neutral, fear, happy, and sad, respectively).

Table 1 - appendix. *Mean (SE) facial responses to the different film types (neutral, fear, happy, and sad) by condition (inhibition vs. expression) (N=110)*

	Inhibition				Expression						
	Neutr.	Fear	Happy	Sad	Neutr.	Fear	Happy	Sad	Film type	Condition	Film type × condition
	M (SE)	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*M (SE)*	*F*-value (*df*)	*F*-value	*F*-value (*df*)
Confused	0.64_{a} (0.10)	0.31_{a} (0.05)	0.46_{b} (0.09)	0.18_{ab} (0.03)	0.62 (0.09)	0.55 (0.06)	0.96_{a} (0.15)	0.43_{a} (0.04)	$F(2.51, 271.18)=10.17^{***}$	$F=26.54^{***}$	$F(2.37, 256.17)=4.44^{**}$
Happy	0.36 (0.09)	0.29 (0.07)	0.61_{a} (0.15)	0.15_{a} (0.04)	0.40_{a} (0.08)	0.39_{b} (0.07)	1.94_{abc} (0.25)	0.30_{c} (0.05)	$F(1.74, 209.08)=37.35^{***}$	$F=31.39^{***}$	$F(2.33, 251.67)=14.64^{***}$
Pleasant	1.80_{a} (0.04)	1.00_{a} (0.05)	2.55_{a} (0.14)	0.59_{a} (0.02)	1.80_{a} (0.03)	0.96_{a} (0.05)	2.84_{a} (0.18)	0.60_{a} (0.02)	$F(2.48, 268.26)=1520.29^{***}$	$F=0.09$	$F(1.60, 172.74)=0.37$
Intensity	1.14_{a} (0.11)	0.85 (0.08)	1.14 (0.16)	0.66_{a} (0.04)	0.99_{a} (0.10)	0.91_{b} (0.07)	2.45_{abc} (0.25)	0.88_{c} (0.05)	$F(2.45, 264.23)=16.66^{***}$	$F=22.82^{***}$	$F(2.17, 234.09)=16.67^{***}$
Interest	1.83_{a} (0.03)	1.06_{a} (0.04)	2.47_{a} (0.13)	0.71_{a} (0.00)	1.87_{a} (0.02)	1.00_{ab} (0.04)	2.37_{b} (0.14)	0.74_{ab} (0.01)	$F(2.56, 276.62)=4951.74^{***}$	$F=0.18$	$F(1.47, 158.32)=0.40$
Surprise	0.64_{a} (0.09)	0.40 (0.06)	0.54_{b} (0.10)	0.24_{ab} (0.03)	0.56_{a} (0.08)	0.56 (0.06)	1.02_{ab} (0.17)	0.41_{b} (0.04)	$F(2.75, 296.97)=8.26^{***}$	$F=17.30^{***}$	$F(2.65, 286.17)=4.38^{**}$
Moving	7.71_{a} (0.35)	4.41_{ab} (0.26)	8.26_{b} (0.58)	2.75_{ab} (0.14)	7.37_{a} (0.32)	4.67_{a} (0.21)	10.54_{a} (0.71)	3.51_{a} (0.13)	$F(2.78, 299.91)=322.33^{***}$	$F=12.02^{**}$	$F(2.11, 228.30)=3.50^{*}$
Smiles	0.21 (0.05)	0.17_{a} (0.04)	0.45_{a} (0.09)	0.12_{a} (0.03)	0.23_{a} (0.06)	0.35_{b} (0.07)	1.66_{abc} (0.21)	0.27_{c} (0.06)	$F(1.75, 189.02)=47.82^{***}$	$F=35.86^{***}$	$F(2.13, 229.71)=19.36^{***}$
Blinks	15.50_{a} (1.05)	17.37_{b} (1.17)	12.03_{abc} (1.05)	16.01_{c} (1.17)	16.57_{ab} (1.25)	17.53_{a} (1.19)	12.96_{a} (1.07)	18.80_{ab} (1.22)	$F(2.58, 278.70)=54.10^{***}$	$F=4.64^{*}$	$F(2.53, 272.94)=2.16$

Note. Neutr. = Neutral. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at $p < .05$). ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Degrees of freedom for condition were $df = 1, 108$ for each measure. ANOVAs were conducted using log-transformed values. In order to facilitate interpretation, the mean and standard error columns display untransformed values. Mean scores in each row that share subscripts within a condition (inhibition vs. expression) differ significantly at $p < .05$ (Bonferroni corrected).

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 2 - appendix. *Mean (SE) self-reported emotional responses to the different film types (neutral, fear, happy, and sad) by condition (inhibition vs. expression) (N=110)*

	Inhibition				Expression						
	Neutral	Fear	Happy	Sad	Neutral	Fear	Happy	Sad	Film type	Condition	Film type × condition
	M (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*F*-value (*df*)	*F*-value	*F*-value (*df*)
Fear	0.26_{a}	1.71_{ab}	0.15_{b}	1.14_{ab}	0.19_{a}	1.74_{ab}	0.19_{b}	1.13_{ab}	$F(1.85, 200.25)=74.26^{***}$	$F=0.00$	$F(2.47, 267.00)=0.44$
	(0.08)	(0.22)	(0.05)	(0.20)	(0.07)	(0.20)	(0.09)	(0.19)			
Happiness	0.64_{a}	0.40_{b}	3.44_{ab}	0.92_{b}	0.43_{a}	0.76_{b}	3.59_{ab}	1.15_{a}	$F(2.59, 280.08)=176.15^{***}$	$F=0.83$	$F(2.64, 285.29)=1.59$
	(0.12)	(0.09)	(0.23)	(0.17)	(0.10)	(0.16)	(0.24)	(0.20)			
Disgust	0.25_{ab}	0.67_{ac}	0.24_{cd}	0.77_{bd}	0.24_{ab}	0.99_{ac}	0.34_{cd}	1.05_{bd}	$F(2.62, 282.93)=17.63^{***}$	$F=4.25^{*}$	$F(2.45, 264.65)=1.17$
	(0.09)	(0.13)	(0.08)	(0.15)	(0.08)	(0.16)	(0.10)	(0.19)			
Surprise	0.78_{ab}	1.70_{a}	1.58_{bc}	2.21_{ac}	0.71_{abc}	2.06_{a}	1.96_{b}	2.47_{c}	$F(3, 324)=34.87^{***}$	$F=3.31^{+}$	$F(3, 324)=0.92$
	(0.16)	(0.19)	(0.22)	(0.24)	(0.14)	(0.21)	(0.23)	(0.26)			
Amused	1.24_{a}	2.65_{a}	3.36_{a}	1.98_{a}	0.99_{a}	2.80_{a}	3.79_{a}	2.21_{a}	$F(2.69, 290.08)=60.15^{***}$	$F=0.91$	$F(3, 324)=2.16^{+}$
	(0.15)	(0.21)	(0.23)	(0.21)	(0.14)	(0.21)	(0.23)	(0.23)			
Content	1.58_{a}	1.71_{b}	3.14_{abc}	1.39_{c}	1.58_{a}	1.71_{b}	3.14_{abc}	1.39_{c}	$F(2.79, 301.48)=47.05^{***}$	$F=0.69$	$F(3, 324)=1.64$
	(0.18)	(0.19)	(0.24)	(0.20)	(0.18)	(0.19)	(0.24)	(0.20)			
Sympathy	0.16_{a}	1.01_{ab}	0.47_{b}	5.15_{ab}	0.27_{a}	1.38_{ab}	0.61_{b}	5.44_{ab}	$F(2.46, 265.94)=355.21^{***}$	$F=4.66^{*}$	$F(2.45, 264.04)=0.05$
	(0.06)	(0.16)	(0.12)	(0.23)	(0.07)	(0.20)	(0.13)	(0.23)			
Angry	0.22_{a}	0.73_{b}	0.13_{b}	1.53_{ab}	0.29_{a}	0.68_{b}	0.17_{b}	1.88_{ab}	$F(2.09, 225.38)=45.80^{***}$	$F=2.36$	$F(2.59, 279.13)=0.06$
	(0.09)	(0.18)	(0.05)	(0.22)	(0.08)	(0.15)	(0.06)	(0.24)			

(Table 2 - appendix continues)

Table 2 - appendix (continued). *Mean (SE) self-reported emotional responses to the different film types (neutral, fear, happy, and sad) by condition (inhibition vs. expression) (N=110)*

	Inhibition				Expression						
	Neutral	Fear	Happy	Sad	Neutral	Fear	Happy	Sad	Film type	Condition	Film type × condition
	M (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*F*-value (*df*)	*F*-value	*F*-value (*df*)
Sad	0.15_{a}	0.57_{a}	0.30_{b}	4.61_{ab}	0.16_{a}	0.61_{ab}	0.28_{b}	4.66_{ab}	$F(2.20, 237.89)=400.25^{***}$	$F=0.00$	$F(2.72, 293.71)=1.33$
	(0.07)	(0.14)	(0.10)	(0.24)	(0.05)	(0.13)	(0.10)	(0.26)			
Tense	0.69_{ab}	2.86_{ac}	0.80_{cd}	2.35_{bd}	0.77_{a}	2.99_{ab}	0.59_{bc}	2.53_{ac}	$F(2.46, 265.14)=114.32^{***}$	$F=0.08$	$F(2.80, 302.08)=5.51^{**}$
	(0.13)	(0.24)	(0.16)	(0.23)	(0.14)	(0.24)	(0.15)	(0.25)			
Interested	3.09_{ab}	4.21_{a}	3.52	3.88_{b}	2.89_{abc}	4.48_{a}	4.08_{b}	4.74_{c}	$F(3, 324)=23.35^{***}$	$F=9.57^{**}$	$F(3, 324)=8.06^{*}$
	(0.24)	(0.26)	(0.25)	(0.25)	(0.24)	(0.22)	(0.25)	(0.24)			

Note. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at $p < .05$). ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Degrees of freedom for condition were *df* = 1, 108 for each measure. ANOVAs were conducted using log-transformed values. In order to facilitate interpretation, the mean and standard error columns display untransformed values. Mean scores in each row that share subscripts within a condition (inhibition vs. expression) differ significantly at $p < .05$ (Bonferroni corrected).

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 3 - appendix. *Mean (SE) psychophysiological responses to the different film types (neutral, fear, happy, and sad) by condition (inhibition vs. expression) (N=110)*

	Inhibition				Expression						
	Neutr.	Fear	Happy	Sad	Neutr.	Fear	Happy	Sad	Film type	Condition	Film type × condition
	M (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*M* (*SE*)	*F*-value (*df*)	*F*-value	*F*-value (*df*)
nSCRs	2.95_{abc} (0.23)	5.85_{a} (0.39)	6.30_{b} (0.41)	5.53_{c} (0.37)	2.87_{abc} (0.24)	6.22_{a} (0.36)	6.99_{b} (0.48)	5.81_{c} (0.37)	$F(2.79, 301.28)=209.89^{***}$	$F=2.97^{+}$	$F(3, 324)=0.89$
ISCR	14.14_{a} (1.74)	11.43_{b} (1.06)	16.82_{bc} (2.66)	10.98_{ac} (1.15)	11.27_{a} (0.97)	11.48_{b} (1.03)	15.52_{abc} (1.76)	12.57_{c} (1.18)	$F(3, 324)=13.14^{***}$	$F=2.26$	$F(2.71, 292.69)=1.96$
HR	70.14_{a} (1.29)	69.53 (1.25)	69.74 (1.28)	69.00_{a} (1.25)	69.93 (1.26)	70.21 (1.25)	70.54 (1.30)	69.54 (1.27)	$F(3, 324)=4.82^{**}$	$F=3.12^{+}$	$F(2.62, 282.59)=1.49$
SDNN	58.61 (2.94)	58.37 (3.09)	56.89 (2.94)	53.68 (2.52)	57.34 (2.81)	60.49 (3.14)	58.45 (3.28)	56.03 (2.77)	$F(2.79, 300.91)=2.62^{+}$	$F=0.41$	$F(2.76, 297. 94)=0.61$
RMSDD	40.18 (2.65)	42.83 (2.83)	41.89 (2.99)	41.23 (2.75)	42.80 (3.09)	41.36 (2.78)	42.52 (3.19)	44.20 (2.96)	$F(3, 324)=0.60$	$F=0.17$	$F(2.70, 291.68)=0.90$

Note. Neutr. = Neutral; SCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver during film clip); HR = heartbeats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. ANOVAs were conducted controlling for condition order (inhibition first vs. expression first). Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity when *df*s are reported with two decimals (i.e., when Mauchly's test statistic was significant at $p < .05$). Degrees of freedom for condition were $df = 1, 108$ for each measure. ANOVAs were conducted using log-transformed values for SCRs, ISCR, SDNN, and RMSSD. In order to facilitate interpretation, the mean and standard error columns display untransformed values. Mean scores in each row that share subscripts within a condition (inhibition vs. expression) differ significantly at $p < .05$ (Bonferroni corrected).
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4 - appendix. *Mean (SD) responses to the neutral baselines preceding the inhibition and expression condition by group (N=110)*

	Nonoffender controls (*n* = 26)		Nonpsychopathic offenders (*n* = 42)		Psychopathic offenders (*n* = 42)	
	Neutral - Inhibit	Neutral - Express	Neutral - Inhibit	Neutral - Express	Neutral - Inhibit	Neutral - Express
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
			Self-reported emotion			
Fear	0.4 (0.8)	0.2 (0.5)	0.2 (0.5)	0.2 (0.9)	0.3 (1.1)	0.1 (0.6)
Happiness	0.9 (1.4)	0.8 (1.4)	0.5 (1.0)	0.4 (1.0)	0.7 (1.5)	0.3 (0.8)
Disgust	0.3 (0.7)	0.4 (0.9)	0.2 (0.7)	0.3 (1.1)	0.3 (1.3)	0.1 (0.4)
Surprise	0.8 (1.4)	0.7 (0.9)	0.7 (1.3)	0.9 (2.0)	0.9 (2.1)	0.5 (1.2)
Amused	1.4 (1.7)	1.4 (1.9)	1.3 (1.7)	0.8 (1.4)	1.3 (1.8)	1.3 (1.7)
Content	1.4 (1.7)	1.4 (1.9)	1.8 (2.3)	1.3 (2.0)	1.5 (2.0)	1.3 (1.8)
Sympathy	0.2 (0.5)	0.3 (0.9)	0.2 (0.7)	0.3 (0.7)	0.2 (0.6)	0.3 (0.8)
Anger	0.1 (0.3)	0.3 (0.7)	0.2 (0.8)	0.4 (1.0)	0.3 (1.3)	0.2 (0.9)
Sadness	0.2 (0.5)	0.2 (0.5)	0.1 (0.5)	0.1 (0.5)	0.2 (0.9)	0.2 (0.7)
Tense	0.8 (1.1)	1.0 (1.5)	0.5 (1.2)	0.8 (1.3)	0.8 (1.7)	0.6 (1.6)
Interested	2.6 (2.2)	2.6 (2.3)	3.4 (2.7)	2.9 (2.6)	3.1 (2.7)	3.1 (2.8)
			Facial emotion			
Confusion	0.6 (0.9)	0.3 (0.6)	0.7 (1.1)	0.9 (1.1)	0.6 (0.9)	0.6 (0.9)
Happiness	0.4 (0.8)	0.2 (0.6)	0.1 (0.3)	0.4 (0.9)	0.6 (1.3)	0.4 (1.0)
Pleasantness	1.8 (0.3)	1.7 (0.3)	1.7 (0.2)	1.8 (0.4)	1.9 (0.5)	1.9 (0.4)
Intensity	1.0 (0.9)	0.9 (1.0)	1.1 (1.1)	1.0 (1.0)	1.8 (0.2)	1.3 (1.3)
Interest	1.9 (0.5)	1.9 (0.2)	1.8 (0.1)	1.8 (1.0)	1.9 (0.3)	1.9 (0.3)
Surprise	0.5 (0.9)	0.4 (0.8)	0.8 (1.1)	0.6 (0.7)	0.6 (0.9)	0.6 (0.9)
Movement	6.1 (2.9)	5.4 (2.5)	7.6 (3.8)	7.8 (3.0)	8.8 (4.2)	8.1 (3.7)
Smiles	0.3 (0.5)	0.1 (0.3)	1.0 (0.3)	1.0 (0.3)	0.3 (0.7)	0.3 (0.7)
Blinks	15.6 (9.9)	15.1 (9.9)	13.9 (10.2)	13.9 (10.2)	16.9 (12.7)	17.0 (13.2)
			Psychophysiological responses			
nSCRs	2.9 (3.2)	3.1 (3.7)	2.8 (3.9)	2.9 (3.5)	3.0 (4.0)	2.8 (4.0)
ISCR	10.6 (7.0)	11.5 (9.1)	13.4 (13.0)	11.8 (10.1)	17.0 (26.0)	10.6 (11.0)
HR	68.4 (15.0)	67.1 (13.0)	69.6 (13.7)	69.8 (13.3)	17.7 (12.5)	71.8 (13.1)
SDNN	65.8 (36.0)	65.5 (31.3)	59.0 (32.5)	57.9 (34.5)	53.5 (25.4)	52.1 (23.3)
RMSDD	47.3 (31.6)	55.1 (37.2)	41.1 (31.9)	41.1 (37.4)	34.9 (18.8)	36.9 (20.2)

Note. nSCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver during film clip); HR = heart rate in beats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. Neutral - Inhibit = neutral baseline that preceded the inhibition condition. Neutral - Express = neutral baseline that preceded the expression condition.

Table 5 - appendix. *Mean (SD) responses (change scores) to the fearful film type by condition and group (N=110)*

	Nonoffender controls (*n* = 26)		Nonpsychopathic offenders (*n* = 42)		Psychopathic offenders (*n* = 42)	
	Inhibit	Express	Inhibit	Express	Inhibit	Express
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
			Self-reported emotion			
Fear	1.8 (2.2)	1.2 (1.6)	1.5 (2.1)	1.7 (2.1)	1.2 (2.0)	1.6 (2.4)
Happiness	-0.4 (1.3)	0.1 (1.9)	-0.1 (1.2)	0.1 (1.4)	-0.3 (1.7)	0.8 (2.3)
Disgust	0.5 (1.7)	0.4 (1.4)	0.6 (1.6)	0.7 (1.8)	0.1 (1.6)	1.0 (1.8)
Surprise	0.7 (2.2)	1.0 (1.4)	1.0 (2.2)	1.4 (2.5)	1.0 (1.9)	1.6 (2.4)
Amused	2.2 (2.4)	2.0 (1.8)	1.0 (2.7)	2.0 (2.9)	1.3 (1.8)	1.6 (2.5)
Content	0.3 (2.3)	0.2 (2.5)	0.0 (2.9)	0.7 (2.7)	0.2 (2.3)	0.4 (2.3)
Sympathy	0.9 (1.2)	1.0 (2.6)	1.2 (2.1)	1.2 (2.2)	0.7 (1.3)	1.0 (2.0)
Anger	0.4 (1.0)	-0.1 (0.7)	1.0 (2.8)	0.7 (2.3)	0.1 (1.9)	0.3 (1.1)
Sadness	0.3 (1.1)	0.3 (0.9)	0.6 (1.7)	0.3 (1.1)	0.3 (0.7)	0.7 (1.7)
Tense	2.2 (2.4)	1.5 (2.3)	2.5 (2.6)	2.8 (2.2)	1.8 (2.5)	2.1 (2.5)
Interested	1.5 (3.1)	1.7 (2.2)	0.9 (2.6)	2.0 (2.8)	1.1 (2.1)	1.5 (2.6)
			Facial emotion			
Confusion	-0.5 (0.9)	0.0 (0.6)	-0.4 (1.0)	-0.1 (1.0)	-0.2 (0.8)	-0.1 (0.9)
Happiness	-0.3 (0.8)	0.1 (0.8)	0.3 (0.7)	0.1 (1.2)	-0.3 (1.5)	-0.1 (1.0)
Pleasantness	-0.8 (0.5)	-0.7 (0.5)	-0.7 (0.5)	-0.8 (0.7)	-0.8 (0.7)	-0.9 (0.6)
Intensity	-0.4 (1.0)	0.0 (1.2)	-0.2 (1.2)	0.1 (1.1)	-0.3 (1.4)	-0.3 (1.1)
Interest	-1.1 (0.5)	-0.9 (0.5)	-1.0 (0.4)	-0.8 (0.5)	-0.9 (0.4)	-1.0 (0.5)
Surprise	-0.3 (0.9)	0.1 (1.0)	-0.5 (1.1)	0.1 (0.9)	0.0 (1.0)	-0.1 (0.8)
Movement	-2.8 (3.0)	-1.2 (2.1)	-3.3 (3.3)	-2.7 (2.6)	-3.6 (3.8)	-3.6 (3.7)
Smiles	-0.2 (0.5)	0.3 (1.0)	0.1 (0.5)	0.1 (0.8)	-0.1 (0.7)	0.0 (0.7)
Blinks	2.2 (8.1)	2.6 (6.7)	3.1 (7.7)	-0.1 (7.2)	0.5 (8.9)	0.9 (6.1)
			Psychophysiological responses			
nSCRs	3.4 (4.7)	3.7 (4.6)	3.3 (5.0)	3.5 (4.6)	2.5 (5.5)	2.9 (3.7)
ISCR	13.3 (13.1)	15.3 (18.3)	15.0 (24.1)	11.4 (18.9)	4.7 (36.0)	18.3 (21.7)
HR	-0.6 (5.3)	1.3 (3.9)	-0.8 (2.7)	0.4 (3.8)	-0.5 (3.8)	-0.4 (3.8)
SDNN	6.5 (23.6)	12.3 (21.4)	-3.1 (18.5)	-0.7 (25.6)	-2.4 (17.3)	2.2 (19.0)
RMSDD	2.6 (13.7)	0.2 (16.8)	1.7 (17.0)	-1.1 (20.3)	3.4 (23.7)	-2.9 (14.4)

Note. nSCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver during film clip); HR = heart rate in beats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. Responses are expressed in change scores (raw score minus score on the preceding neutral baseline clip).

Table 6 - appendix. *Mean responses (change scores) to the happy film type by condition and group (N=110)*

	Nonoffender controls (*n* = 26)		Nonpsychopathic offenders (*n* = 42)		Psychopathic offenders (*n* = 42)	
	Inhibit	Express	Inhibit	Express	Inhibit	Express
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
			Self-reported emotion			
Fear	-0.1 (0.6)	0.0 (0.3)	-0.1 (0.6)	-0.1 (1.0)	-0.1 (0.9)	0.1 (1.1)
Happiness	3.2 (2.7)	2.4 (2.6)	2.7 (2.3)	3.5 (2.4)	2.7 (2.3)	3.3 (2.7)
Disgust	-0.2 (0.6)	0.2 (1.3)	0.1 (1.0)	-0.1 (1.3)	-0.1 (1.5)	0.2 (1.2)
Surprise	0.7 (2.4)	0.8 (1.6)	1.0 (2.5)	1.3 (3.0)	0.7 (2.3)	1.5 (2.3)
Amused	2.7 (2.2)	2.4 (2.7)	2.0 (2.6)	3.2 (2.2)	1.9 (2.3)	2.7 (2.6)
Content	2.0 (2.4)	1.5 (2.8)	1.5 (2.8)	2.5 (2.8)	1.4 (2.4)	2.6 (3.0)
Sympathy	0.3 (1.0)	-0.1 (0.6)	0.1 (1.2)	0.4 (1.2)	0.6 (1.6)	0.6 (1.6)
Anger	0.0 (0.2)	0.0 (0.9)	-0.1 (1.0)	-0.3 (1.0)	-0.2 (1.3)	0.0 (1.2)
Sadness	0.1 (0.7)	0.0 (0.6)	0.2 (1.2)	0.0 (0.5)	0.1 (1.5)	0.3 (1.6)
Tense	-0.2 (1.3)	-0.6 (1.4)	0.4 (1.2)	-0.2 (1.5)	-0.1 (1.8)	0.1 (1.9)
Interested	0.7 (3.2)	0.5 (2.3)	0.1 (2.4)	1.6 (2.8)	0.6 (2.3)	1.3 (3.0)
			Facial emotion			
Confusion	-0.3 (1.0)	0.1 (0.6)	-0.3 (1.5)	0.5 (1.6)	0.0 (1.0)	0.4 (1.1)
Happiness	0.1 (1.7)	0.9 (1.5)	0.5 (1.0)	1.2 (2.0)	0.1 (1.8)	1.2 (1.7)
Pleasantness	0.9 (1.7)	0.7 (1.7)	0.7 (1.4)	1.2 (1.9)	0.7 (1.5)	1.1 (2.0)
Intensity	-0.1 (2.3)	0.9 (2.0)	0.1 (1.7)	1.4 (2.4)	0.0 (1.9)	1.9 (3.2)
Interest	0.6 (1.4)	0.4 (1.3)	0.6 (1.3)	0.6 (1.4)	0.7 (1.3)	0.5 (1.4)
Surprise	-0.3 (0.9)	0.1 (0.6)	-0.3 (1.1)	0.5 (1.6)	0.2 (1.4)	0.6 (2.2)
Movement	1.4 (6.5)	2.7 (4.3)	0.7 (6.0)	3.7 (7.0)	0.0 (5.4)	3.0 (8.7)
Smiles	0.0 (1.0)	1.2 (2.3)	0.3 (0.8)	1.5 (2.0)	0.3 (1.1)	1.5 (2.3)
Blinks	-2.7 (7.9)	-0.5 (9.1)	-2.3 (10.1)	-5.7 (9.0)	-5.0 (8.3)	-3.6 (10.3)
			Psychophysiological responses			
nSCRs	5.0 (5.5)	3.8 (4.8)	3.5 (4.8)	4.7 (7.8)	2.5 (5.9)	4.4 (6.1)
ISCR	2.7 (12.6)	4.7 (15.2)	2.0 (15.2)	3.4 (18.1)	0.8 (26.6)	6.8 (16.7)
HR	0.2 (5.1)	1.2 (4.5)	-0.1 (5.0)	0.0 (4.2)	-1.2 (2.9)	0.6 (3.9)
SDNN	0.2 (28.8)	3.2 (19.6)	-1.6 (25.7)	0.7 (29.7)	-2.8 (20.6)	0.6 (18.4)
RMSDD	0.4 (18.3)	-8.1 (20.3)	3.1 (27.8)	4.5 (27.7)	2.4 (19.4)	-0.5 (21.3)

Note. nSCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver during film clip); HR = heart rate in beats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. Responses are expressed in change scores (raw score minus score on the preceding neutral baseline clip).

Table 7 - appendix. *Mean (SD) responses (change scores) to the sad film type by condition and group (N=110)*

	Nonoffender controls (*n* = 26)		Nonpsychopathic offenders (*n* = 42)		Psychopathic offenders (*n* = 42)	
	Inhibit	Express	Inhibit	Express	Inhibit	Express
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
			Self-reported emotion			
Fear	0.7 (1.6)	0.6 (0.9)	0.9 (2.1)	1.2 (2.1)	1.0 (1.9)	0.9 (2.0)
Happiness	0.2 (2.1)	0.0 (1.8)	0.6 (2.2)	0.6 (1.9)	0.0 (2.2)	1.3 (2.6)
Disgust	0.4 (0.9)	0.4 (1.7)	0.8 (2.1)	0.7 (2.3)	0.3 (1.9)	1.2 (2.0)
Surprise	1.9 (2.9)	1.6 (2.3)	1.6 (2.6)	1.6 (2.7)	1.0 (2.2)	2.0 (3.1)
Amused	0.9 (1.9)	1.1 (1.9)	0.3 (2.7)	1.2 (2.6)	1.1 (2.1)	1.4 (3.2)
Content	-0.2 (1.9)	0.1 (2.2)	-0.5 (2.4)	-0.1 (2.4)	0.1 (2.4)	0.2 (2.5)
Sympathy	4.5 (2.2)	4.6 (2.8)	5.4 (2.4)	5.5 (2.5)	4.9 (2.4)	5.1 (2.6)
Anger	0.9 (1.4)	0.8 (1.7)	1.6 (2.9)	1.6 (2.8)	1.3 (2.6)	2.1 (3.0)
Sadness	3.7 (2.0)	3.8 (2.7)	4.6 (2.7)	4.5 (2.6)	4.7 (2.5)	4.9 (2.7)
Tense	0.8 (1.5)	0.4 (1.9)	2.1 (2.5)	2.1 (2.4)	1.7 (2.1)	2.4 (2.5)
Interested	0.6 (2.6)	1.4 (2.6)	0.4 (2.8)	2.0 (3.2)	1.3 (2.4)	2.1 (2.8)
			Facial emotion			
Confusion	-0.5 (0.9)	0.0 (0.5)	-0.5 (1.0)	-0.3 (1.0)	-0.4 (0.8)	-0.2 (0.8)
Happiness	-0.3 (0.8)	0.1 (0.5)	0.1 (0.5)	-0.2 (0.9)	-0.5 (1.2)	-0.1 (0.9)
Pleasantness	-1.2 (0.3)	-1.0 (0.3)	-1.1 (0.3)	-1.2 (0.4)	-1.3 (0.5)	-1.3 (0.4)
Intensity	-0.5 (1.0)	0.0 (1.0)	-0.4 (1.1)	-0.2 (0.9)	-0.6 (1.2)	-0.1 (1.0)
Interest	-1.2 (0.5)	-1.1 (0.3)	-1.1 (0.1)	-1.1 (0.1)	-1.1 (0.2)	-1.2 (0.3)
Surprise	-0.4 (0.8)	-0.1 (0.8)	-0.6 (1.0)	-0.2 (0.7)	-0.2 (0.9)	-0.2 (0.8)
Movement	-4.2 (2.6)	-1.9 (2.5)	-4.5 (3.7)	-4.4 (2.6)	-5.8 (3.6)	-4.6 (3.2)
Smiles	-0.2 (0.5)	0.3 (0.9)	0.0 (0.4)	-0.1 (0.6)	-0.2 (0.5)	0.0 (0.6)
Blinks	0.4 (7.0)	3.5 (7.0)	2.2 (11.0)	1.4 (9.7)	-1.0 (9.1)	2.1 (7.4)
			Psychophysiological responses			
nSCRs	2.3 (4.5)	3.2 (3.6)	3.3 (4.7)	2.9 (4.3)	2.3 (6.0)	2.8 (5.4)
ISCR	12.5 (16.2)	21.9 (15.2)	22.9 (36.1)	24.0 (30.4)	9.1 (27.1)	22.0 (34.6)
HR	-1.5 (3.9)	0.6 (4.4)	-1.1 (4.6)	-0.4 (3.2)	-1.2 (2.5)	-1.1 (3.9)
SDNN	-2.5 (28.2)	0.5 (24.0)	-9.3 (24.1)	-6.0 (20.5)	-3.6 (21.9)	2.1 (24.1)
RMSDD	-0.9 (16.6)	-0.3 (21.2)	2.0 (22.5)	-1.9 (22.5)	1.3 (17.1)	4.9 (23.9)

Note. nSCRs = number of skin conductance responses per minute; ISCR = integrated skin conductance response (time integral of phasic driver during film clip); HR = heart rate in beats per minute; SDNN = standard deviation of the normal-to-normal interval; RMSDD = square root of the mean squared differences of successive normal-to-normal intervals. Responses are expressed in change scores (raw score minus score on the preceding neutral baseline clip).

Chapter 7

General discussion

Deficits in affective functioning play a central role in the development of psychopathy in the majority of theories that explain this disorder (e.g., Blair, Mitchell, & Blair, 2005; Cleckley, 1941; Fowles & Dindo, 2009; Hare, 2003; Lykken, 1995; Patrick, Fowles, & Krueger, 2009). As several empirical studies show that psychopathy is related to deficiencies in fear reactivity (e.g., Patrick, 1994; Herpertz et al., 2001; Ogloff & Wong, 1990), a disposition for fearlessness logically plays a central role in several of these theoretical perspectives (Cleckley, 1941; Fowles & Dindo, 2009; Lykken, 1995; Patrick et al., 2009). These accounts and existent research have tremendously advanced our understanding of psychopathy, yet many emotions that are relevant to psychopathy (e.g., guilt, hostility) have received far less empirical and theoretical attention. Furthermore, contemporary perspectives on emotion recognize several elements that are considered crucial to an integrated understanding of affective functioning, including cognitive appraisal processes, physiological arousal, action potential, subjective experience, the expression of affect, and emotion regulation (e.g., Frijda, 2008; Scherer, 2000). While some of these emotional aspects have been studied quite extensively in psychopathy (e.g., physiological responsiveness), studies on other affective domains are far more scarce (e.g., facial expressiveness).

In the current thesis, a series of studies was described which aimed to build on previous research by investigating a variety of these elements in emotion theory with regards to criminal psychopathy. In **part I**, two studies were reported that investigated the role of appraisal processes (i.e., Theory of Mind [ToM]) in psychopathy (*chapters 2* and *3*). **Part II** described two studies that examined various aspects of psychopathy and affective experience (*chapters 4* and *5*), whereas **part III** focused on self-reported, psycho-physiological, and facial expressive correlates of emotion regulation (*chapter 6*). (See Table 1, for an overview of the hypotheses in each chapter, along with a short summary of whether findings matched our predictions.)

Table 1. *Hypotheses and results per thesis chapter*

	Hypotheses	Confirmation of hypotheses	Results
Ch. 2	H1: Psychopathic offenders will show impairments in their capacity to attribute mental states to eyes (i.e., social-perceptual ToM), yet only when eyes are presented briefly.	Not confirmed	Groups did not differ in social-perceptual ToM.
	H2: Psychopathic offenders' ToM will be distorted by a cognitive "hostility bias."	Partially confirmed	Groups did not differ in their tendency to mistakenly attribute hostility to the eyes. However, during long eye stimulus presentation, psychopaths' capacity to infer mental states increased as the hostility of eyes went up, whereas nonoffenders' mental state attribution got less accurate as the hostility of eyes increased (with nonpsychopathic offenders falling in between both groups).
Ch. 3	H1: Factor 1 will be unrelated to the inference of emotions and thoughts to story characters (i.e., social-cognitive ToM), whereas Factor 2 will be positively related to such ToM.	Partially confirmed	Groups did not differ in social-cognitive ToM, neither were Factors 1 and 2 related to this capacity within the offender group.
	H2: Social-cognitive ToM will moderate the previously found association between Factor 2 and self-presentation (i.e., social desirability and unlikely symptom reporting).	Partially confirmed	Within the offenders, Factor 2 was negatively related to social desirability, while being positively related to unlikely symptom reporting, and these associations only held in offenders relatively high in ToM.
Ch. 4	H1: Psychopathy will be negatively related to interoceptive awareness (as assessed with a heartbeat detection task).	Confirmed	Psychopathy was negatively predictive of interoceptive awareness. Surprisingly, this relationship was explained by antisocial psychopathic features, rather than interpersonal/affective traits.

(Table 1 continues)

Table 1 (continued). *Hypotheses and results per thesis chapter*

	Hypotheses	Confirmation of hypotheses	Results
Ch. 5	1: Psychopathy (mainly Factor 1) will be negatively related to implicit, but not explicit guilt.	Not confirmed	Groups did not differ in implicit or explicit guilt, neither was Factor 1 related to these constructs. Factor 2 did, however, negatively predict explicit guilt.
	H2: Psychopathy (again, especially Factor 1) will be positively related to self-dominant associations and explicitly assessed dominance.	Partially confirmed	Groups did not differ in implicit or explicit dominance, neither did Factor 1 uniquely predict these constructs. PCL-R total scores, however, were positively predictive of implicit, but not explicit, dominance.
Ch. 6	H1: Psychopaths will have a superior capacity to inhibit their emotion, as reflected in reduced facial affect and a reduced physiological cost of affective suppression. This effect will be explained by Factor 1, whereas offenders high on Factor 2 will have a decreased capacity to inhibit emotion.	Not confirmed	Participants could drastically diminish their facial emotions, which was associated with a decrease in heart rate (i.e., a cardiovascular cost). This effect, however, was not dependent on psychopathy total or factor levels.
	H2: Groups will not differ in self-reported emotion.	Confirmed	Offenders (especially those high in Factor 1) reported more tenseness during the emotional films, yet for most positive and negative self-reported emotions, no group differences were found.
	There were no hypotheses on psychopathic offenders' capacity to express facial emotions, the study was explorative in nature regarding facial expresiveness.	-	When asked to display their emotions, all participants showed an increase in facial affect, with the latter matching the content of differently valenced film clips (fear, happy, sad). This effect was not dependent on psychopathy total or factor levels.

Note. Ch. = Chapter. H = hypothesis. ToM = Theory of Mind. Groups = nonoffender controls, non-psychopathic offenders, and psychopathic offenders. PCL-R = Psychopathy Checklist-Revised (Hare, 2003). In the group comparisons, we expected the offenders low in psychopathy to fall in between the offenders high in psychopathy and the nonoffenders.

The current chapter provides a critical discussion and integration of the findings of this thesis research. First, several findings will be attended to that seem especially pertinent to psychopaths' interpersonal functioning. Subsequently, a number of results will be discussed that showed psychopathy to be associated with deficiencies in affective experience and emotional responding. This will be followed by a review of the emotional constructs that psychopathy did not seem to be related to. This chapter then continues with an overview of potential implications of the results and some of the studies' strengths and limitations. Last, directions for future research on psychopathy will be outlined in the light of our current evidence base.

Several studies suggest that psychopathy is best represented by a dimension, rather than a discrete category (e.g., Walters, 2014). In the present chapter, the term “psychopath” or “psychopathic offender” is used to describe an offender with relatively many psychopathic traits. For the studies in this thesis, this implied having a score of 25 or higher on the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), whereas in other studies that are referred to a different cut-off might have been used, such as a PCL-R score of ≥ 30. This categorical terminology is adopted to describe the results of group-based analyses and to facilitate comparison with the existing literature. It is by no means used to imply that offenders high in psychopathic traits constitute a subgroup of individuals whose symptoms are qualitatively different from the symptoms of nonpsychopathic individuals. Rather, people differ in the degree to which they display psychopathic traits.

OVERVIEW AND DISCUSSION OF THE MAIN FINDINGS

Psychopathy and aberrances in emotional constructs important to social interaction

A first set of intriguing findings that resulted from the research in this thesis concerns emotional constructs that seem to be best understood in an interpersonal context, being dominance and hostility. In line with our expectations, psychopathy was positively related to the strength of self-dominance associations (*chapter 5*), as well as with the tendency to see hostility in others' eyes (*chapter 2*). Surprisingly, such a tendency to see hostility was not attributable to a general perceptual bias for such stimuli, yet seemed to be specific to eyes that actually depicted hostility. These findings provide some valuable information on how offenders with psychopathic features might perceive the world around them. Although psychopathy has previously been linked to a dominant and hostile interpersonal style (Miller & Lynam, 2003; Vitacco & Kosson, 2010), the results in this thesis shed new light on the potential emotional, interpretative mechanisms underlying this interpersonal behavior. As offenders high in psychopathic traits seem to see themselves as relatively dominant (*chapter 5*), it might logically be expected that they view others as weak and vulnerable, which is indeed supported by previous experimental research in criminal samples (e.g, Book, Costello, & Camilleri, 2013). This way of relating oneself to others might explain the interpersonal exploitation and manipulation that is highly characteristic of psychopathy.

Our findings on hostility perception in psychopathic offenders (*chapter 2*) might provide an additional explanation to such antisocial interpersonal behavior. In the normal population, social interpretive processes seem to influence prosocial, but also antagonistic behavioral choices. In a study by Singer and colleagues (2006), for example, healthy males were found to respond with empathy-related neural responses to others receiving pain when these other individuals had been playing fairly in an economic game that preceded the pain induction. Had others been playing unfairly, on the other hand, this empathy-related brain activity was significantly reduced, an effect that was accompanied by increased activity in reward-related brain areas and a self-reported desire for revenge. Such cognitive evaluation of others' intentions (e.g., others playing unfair, or being hostile) might logically have the same effect in offenders. Psychopathic offenders' capacity to identify hostile intentions in others (*chapter 2*) might similarly pave the way for decreased empathic responding, and relatedly, a reduced experience of moral emotions (e.g., anticipatory guilt) in antisocial interpersonal encounters. These interpretations concerning hostility and dominance parallel recent research that revealed psychopathy to be associated with a hostile/dominant interpersonal style, which in turn is positively related to holding aggression-supporting beliefs and criminal recidivism (Daffern et al., 2013; Podubinski, Lee, Hollander, & Daffern, 2014).

Another finding that stresses the relevance of social-cognitive and interpersonal processes in psychopathy was described in *chapter 3*. This study showed that the lifestyle/antisocial features of psychopathy were related to conveying a “bad” self-image to others, yet only in offenders with relatively good ToM skills. This bad image was characterized by a decreased tendency for social-desirable responding and an increased level of unlikely symptom-reporting. Potentially, an increased sensitivity to others' thoughts and emotions enables highly antisocial offenders to present themselves in a certain way in order to obtain instrumental advantages. These findings, however, could also be indicative of less strategic processes, such as the internalization of others' stigmatization or the unconscious overplay of symptomatology to get clinical attention. Albeit in a somewhat different way, hostility perception (*chapter 2*), a more general capacity for inferring others' thoughts and emotions (*chapter 3*), and the experience of dominance (*chapter 5*) might thus all be related to psychopaths' interpersonal and behavioral deviancies.

Deficits in emotional experience and responsiveness in psychopathy

For our studies on psychopathic offenders' emotional experience and responsiveness to affective material, we followed theoretical models that describe psychopathic individuals' affective deficiencies to be more generalized in nature (Blair et al., 2005; Cleckley, 1941; Hare, 2003), rather than primarily concerning deficits in fear responses (as stated in, for example, Lykken, 1995; Patrick et al., 1994). Based on such general emotion-based accounts, as well as on previous research on affective functioning and/or antisocial behavior in (non)clinical samples, we generally hypothesized that psychopathy would be related to a

wide range of aberrances in affective functioning. Several findings in this thesis were in line with this prediction, showing psychopathy to be related to an attenuated interoceptive awareness (*chapter 4*), reduced self-reported guilt feelings (*chapter 5*), and a decreased sympathetically mediated arousal (indexed by heart rate variability) to happiness and fear-inducing film clips (*chapter 6*). These outcomes stress the importance of both moral affect and the physiological aspects of feeling emotion in understanding deficiencies in psychopathic offenders' emotional experience. Results also imply that a wider range of emotions besides fear might be affected in psychopathy. Interoceptive awareness is, for example, related to a reduced affective experience while watching film fragments designed to elicit different emotions, including amusement, anger, and fear (Wiens, Mezzacappa, & Katkin, 2000). Our findings thus seem to be more in line with theorizing that stresses the blunted experience of emotion in general (Cleckley, 1941) and fit with previous research that shows psychopathy to be related with aberrances in both positive and negative emotions (e.g., Blair, Richell, Mitchell, et al., 2006; Blair, Morton, Leonard, & Blair, 2006; Mitchell, Richell, Leonard, & Blair, 2006; Verona, Patrick, Curtin, Bradley, & Lang, 2004).

It has to be noted that the negative association between psychopathy on the one hand, and interoceptive awareness (*chapter 4*), guilt feelings (*chapter 5*), and heart rate variability (*chapter 6*) on the other hand, seemed to be carried by the lifestyle/antisocial dimension (Factor 2) rather than the interpersonal/affective component (Factor 1) of the PCL-R. These results seem somewhat surprising given the centrality of emotional dysfunction in the conceptualization of the interpersonal/affective factor of psychopathy (Hare, 2003). A reason for this unexpected outcome could be that Factor 1 was not as reliably assessed as Factor 2. This might be a concern as we used PCL-R ratings from the clinical institutions where participants resided, instead of scores that were derived from assessments that were done for research purposes. Results from analyses on the psychometric properties of our PCL-R assessments are not in line with such an interpretation though. There was substantial agreement on these PCL-R scores, with intraclass correlation coefficients for total, Factor 1, and Factor 2 scores of .76, .74, and .74, respectively. Similarly, the internal consistency was good for total PCL-R scores (.74) and excellent for both Factor 1 (.82) and Factor 2 (.83).

Further (indirect) support for the overall quality of the PCL-R assessments which the current thesis is based on comes from factor analytic research that was recently conducted by Professor Craig Neumann. Using data collected at the Expertise Center Forensic Psychiatry in the Netherlands, he analyzed a large number of PCL-R assessments (*N*=3224) that were done since 2006 in Dutch Forensic Psychiatric Centers (F.P.C.s), and replicated the two-factor/four-facet structure of the PCL-R. This analysis yielded very similar modelling results as those found in a North American sample of male offenders (*N*=4865) (C. Neumann, personal communication, February 12, 2015; see Neumann, Hare, & Pardini, 2014, for comparisons of Dutch PCL-R ratings with many other samples across the globe that give similar results). These findings support the psychometric quality of psychopathy diagnostics in Dutch F.P.C.s and provide support for the quality of the PCL-R assessments of our forensic

participants, as the majority of these individuals was institutionalized in one of these twelve F.P.C.s.

More psychometric support for Factor 1 specifically can be derived from its association with other constructs in the sample described in the current thesis. That is, the interpersonal/affective features of psychopathy were found to be significantly associated with lower resting heart rate (*chapter 6*). Although this finding was not of our main interest, it is in line with other psychophysiological research on psychopathy (Hansen, Johnsen, Thornton, Waage, & Thayer, 2007) and could be considered support for the convergent validity of Factor 1.

Another interpretation for our findings might thus be that results reflect an association with the listed emotional features that is truly stronger for Factor 2 than for Factor 1. Such an explanation coincides with other research on emotion in psychopathy. Blair and colleagues (2002), for example, showed both Factor 1 and 2 to be related to impaired recognition of sad and fearful vocal affect. Furthermore, there have been several studies that showed Factor 2, but not Factor 1, to be related to emotional deficiencies, such as a decreased ability to infer others' emotions from video clips showing interpersonal interactions (Brook & Kosson, 2013), electrodermal and cardiovascular hyporeactivity during the mental imagery of fearful scenes (Patrick, Cuthbert, & Lang, 1994), and reduced affective modulation of the startle reflex (Baskin-Sommers, Curtin, & Newman, 2013; Brook, Brieman, & Kosson, 2013).

Potentially, both Factor 1 and 2 are associated with emotional deficiencies, albeit in a somewhat different fashion. That is, research suggests that Factor 1 is characterized by an affective callousness that interacts with the environment, yet which is also under relatively strong genetic influence (Blair et al., 2005, pp. 28-46; Waller et al., 2014). Factor 2, on the other hand, might be associated with certain emotional deficits due to “hardening” in the context of abusive and unresponsive parenting. In other words, offenders high in Factor 2 might have learned to ignore affective sensations (*chapter 4*) due to the occurrence of abuse, and might have failed to develop the capacity for normal emotional responsivity (*chapters 5* and *6*) in the absence of parental warmth. This potential explanation is supported by a recent review that indicated psychopathic offenders to report greatly elevated levels of childhood separations, physical abuse, and indifferent parenting styles while growing up (Bailey & Shelton, 2014). Notably, such latter influences hold a central position in relatively recent theoretical formulations, which stress that psychopathic symptoms are the result of an interplay between genes and environmental factors, such as the nature of parent-child interactions (Fowles & Dindo, 2009; Patrick et al., 2009). Importantly, these accounts also stress that Factor 2 is highly relevant to understanding psychopathy, due to the antagonistic and alienated behavior associated with this dimension.

This interpretation does not account for the fact that Factor 1 was not related to the emotional constructs described above though. There might be different explanations for this surprising outcome. As deficiencies in the experience of moral emotion hold such a central

position in the theoretical conceptualization of Factor 1, the lack of a significant association between this factor and explicit guilt feelings might be the result of reduced insight or self-disclosure in individuals high in interpersonal/affective psychopathic traits. As heart rate variability and interoceptive awareness were assessed with measures that are less dependent on introspection and truthfulness, these emotional constructs might not have been associated with Factor 1 for a different reason.

Potentially, Factor 1 might actually not be broadly reflective of a deficit in affective functioning. Rather, this psychopathy component might, at least partially, be better conceptualized in terms of protective characteristics. This seems in line with a relatively recent theory in which psychopathy is operationalized in terms of boldness, meanness and disinhibition (Patrick et al., 2009). In this model, meanness and disinhibition clearly reflect pathological traits, such as decreased empathy for others and impulse control difficulties, respectively. Boldness, on the other hand, taps adaptive features such as social efficacy and emotional resiliency. Research shows that PCL-R Factor 1 is characterized by a combination of boldness and meanness (Venables, Hall, & Patrick, 2014). Potentially, the meanness part of Factor 1 is associated with affective deficits, whereas the boldness part is not. Notably, meanness shows similar, if not stronger associations with PCL-R Factor 2 when compared to Factor 1 (Venables et al., 2014), which matches the fact that we did find associations between Factor 2 and a number of emotional deficiencies. In other words, Factor 1 might not have been saturated with meanness enough to show consistent associations with the aforementioned emotional constructs, and might rather be more reflective of the adaptive boldness component. This interpretation is speculative though, and further studies should aim to further investigate this possibility. Such research is warranted as it could prove useful in resolving some of the discrepancies in the existent literature on the associations between both PCL-R factors and emotional functioning.

Emotional domains in which psychopathic offenders did not show reduced performance

The complicated nature of emotional processes in psychopathic offenders is further illustrated by results showing psychopathy not to be related to dysfunction in a number of affective domains described in this thesis. Concerning the appraisal of emotion, psychopathic offenders did not differ from nonpsychopathic offenders and control participants in their ability to attribute mental states to eyes (or, social-perceptual ToM, *chapter 2*), even when under high task demands such as the fast presentation of eye stimuli. Psychopathy also appeared to be unrelated to implicit guilt feelings (*chapter 5*) and psychopaths did not differ from nonpsychopaths in the capacity to control and express emotion as witnessed on our emotion regulation task (*chapter 6)*. That is, all participants (regardless of their psychopathy level) were quite able to adopt a "poker face" when instructed to inhibit emotion, and showed a decrease in heart rate during such affective suppression. Furthermore, psychopathic offenders were able to produce content-appropriate facial emotion during film fragments intended to induce a range of different

emotions (i.e., fear, happy, sad), and did not differ from nonpsychopathic participants in this respect. Similarly, all participants showed an increase in skin conductance when watching these emotional film clips (again, regardless of their psychopathy total or factor score, *chapter 6*).

As the research in this thesis is based on null-hypothesis significance testing, it is not possible to demonstrate that the association between psychopathy and these emotional capacities is completely nonexistent (Rogers, Howard, & Vessey, 1993). However, our findings do not support theories stating that marked deficiencies in these emotional functions are very central to psychopathy. Our results raise the question of whether the abilities tapped by our emotional tasks are indeed not crucial to understanding psychopathy, or, if the failure to find differences was instead the consequence of methodological factors in our studies. One such methodological issue could be that our PCL-R ratings might have been unreliable. As described above, the psychometric quality of these psychopathy assessments seemed to be quite good though. Therefore, there might be other interpretations that are more viable.

One explanation could be that psychopathic individuals compensate for their emotional deficiencies using alternative cognitive strategies. Such an interpretation is in line with brain imaging research indicating that while processing and responding to emotional stimuli, psychopathy is associated with reduced activity in limbic brain areas and increased activity in brain regions associated with semantic processes and decision-making (Glenn, Raine, Schug, Young, & Hauser, 2009; Kiehl, 2006; Kiehl et al., 2001). A lifetime of using compensatory cognitive operations might have automatized this processing style, explaining why the psychopathic offenders in our research were able to infer mental states from the eye region even when stimulus presentation was fast (*chapter 2*). It could be the case that the fast presentation of the eyes was not fast enough, giving psychopaths enough time to compensate for their deficits. Perhaps a shorter stimulus presentation might have yielded more differences between groups. The use of compensatory strategies could also help explain why psychopathy was unrelated to performance on a social-cognitive ToM task that required the inference of story characters' thoughts and emotions. A cognitive understanding of emotions might enable psychopathic individuals to infer even those affective states to story characters that are thought to be deficient in psychopathy, such as fear and empathy (*chapter 3*).

These cognitive processes might not only aid psychopaths' understanding of emotion, but could also underlie their responses to emotional information. That is, psychopathic offenders might have learned which situations are associated with certain emotions in other people, enabling them to provide the same verbal responses as nonpsychopaths when being asked about their feelings in affective contexts, without necessarily experiencing emotion. As with these semantic descriptions, psychopaths might have acquired knowledge of the distinct patterns of facial expressiveness that accompany different affective states. In normal populations, most individuals are well able to produce facial emotions in the absence of

genuine emotion, and observers are often times unable to distinguish between fake and genuine expressions (Porter & ten Brinke, 2008). Likewise, psychopathic individuals might be able to produce appropriate changes in facial musculature, due to having observed other people experiencing emotions. This interpretation could explain why psychopathic offenders did not differ from nonpsychopaths in their self-reported and facial expressive responses to emotional film fragments in this thesis research (*chapter 6*).

The observation that highly antisocial offenders in the current research sample showed reduced heart rate variability while watching the emotional films, might indeed indicate that their capacity to produce verbal and facial emotional responses occurs in the absence of certain physiological signals that would normally accompany such affective reactivity. This decoupling between experienced and expressed emotion is central to Cleckley's description of psychopathy (Cleckley, 1941) and has been described as "knowing the words but not the music" by other theorists (Johns & Quay, 1962). This interpretation warrants further research though, as no other studies have yet investigated criminal psychopathy and the capacity to manipulate facial emotions. Our findings also stress the importance of taking into account multiple measures of physiological reactivity in such research, as no differences were found between psychopathic offenders and nonpsychopaths in heart rate (beats per minute) and skin conductance reactivity to the emotional films. This could mean that the emotional deficits in psychopathy are quite specific, rather than generalized, as the aforementioned physiological measures could index different affective processes.

A second explanation for the lack of differences between psychopathic and nonpsychopathic participants in some of the studies in this thesis comes from a state-perspective on psychopathy. That is, the emotional functioning of psychopathic offenders might not be as trait-like as described in many theoretical accounts of psychopathy (e.g., Blair et al., 2005; Hare, 2003; Lykken, 1995). Rather than being stable and fundamentally inherent to psychopathic individuals, certain affective dysfunctions might be more context-dependent than has long been assumed. An expanding body of research supports such an account and indicates that some of the emotional capacities that are considered deficient in psychopathy (e.g., emotional startle reflex, amygdala responsiveness to threat and others' pain) tend to normalize when offenders' attention is manipulated or when they receive instructions to increase their emotional responsiveness (Baskin-Sommers, Curtin, & Newman, 2011; Larson et al., 2013; Meffert, Gazzola, den Boer, Bartels, & Keysers, 2013). This malleability of emotional responding could help explain why psychopathic offenders in the current study, for example, did not show reduced cardiovascular effort when inhibiting their emotion or a decreased electrodermal responsiveness to emotional film clips (*chapter 6*). Potentially, psychopathic individuals are characterized by a decreased emotional reactivity in some contexts. However, psychopaths' responsiveness to our emotional clips might have normalized, as in other studies (e.g., Larson et al., 2013), due to our task instructions that explicitly stated to closely watch the video fragments, as well as to show emotions during an express condition. This possibility implies that psychopathic offenders

might actually be able to experience genuine emotion and therein contrasts the aforementioned explanation in which psychopaths' emotional responding is considered the result of cognitive compensatory processes.

The state-dependency of emotions might also explain why psychopathy was unrelated to implicit guilt feelings in our research (*chapter 5*). Guilt is thought to be especially strong when thinking about acts that violate one's own moral standards (Tangney, Stuewig, & Mashek, 2007). Although some people are more prone to experiencing moral emotions (Tangney et al., 2014), the tendency to feel guilty thus also has state-like qualities (i.e., being stronger when thinking about a regrettable act). As described in *chapter 5,* we might not have sufficiently activated guilt feelings in participants low in psychopathy during the assessment of implicit guilt, resulting in a lack of differences between psychopathic and nonpsychopathic participants.

A third explanation for why psychopathic offenders did not perform worse than nonpsychopathic participants in a number of affective domains comes from cluster analytic research on psychopathy. This research seems to indicate the presence of a “primary” and a “secondary” subtype of psychopathy within broader groups of inmates scoring above the clinical cut-off of the PCL-R (Hicks, Markon, Patrick, Krueger & Newman, 2004; Skeem, Johansson, Andershed, Kerr & Louden, 2007). Contrary to what one might expect, PCL-R Factor 1 and 2 scores did not consistently distinguish between these two subgroups in these studies. That is, Hicks and colleagues (2004) found that secondary psychopathy was associated with slightly higher Factor 2 scores than primary psychopathy, whereas Skeem and colleagues (2007) found that primary psychopathy was associated with elevated Factor 2 (and Factor 1) scores when compared with secondary psychopathy. In both studies, these two groups did show differences in other constructs. That is, primary psychopathic inmates reported more emotional stability and dominance, whereas secondary psychopathic inmates were characterized by negative emotional reactivity and poor interpersonal functioning. Some studies on psychopathy have aimed to take a similar distinction into account by dividing participants into groups scoring low and high on anxiety. These investigations have shown that performance on some experimental emotional tasks is only affected in low-anxious, but not high-anxious, psychopathic individuals (e.g., Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012). Potentially, the psychopathic offenders in our sample differed from each other as well, with some of these individuals being more emotionally responsive than others. Some psychopaths might have been, for example, capable of experiencing guilt (*chapter 5*) and recognizing others' mental states based on amygdala-reliant neural processing (*chapter 2*). This could have weakened negative associations between psychopathy and these emotional capacities. As we have no information on potential clusters of psychopathy in our sample, this interpretation remains speculative though, and should be followed up on by future studies that take into account the potential phenotypic heterogeneity of psychopathy.

Regardless of which of the explanations described above proves to have the most explanatory power, it has to be noted that there have been several other empirical investigations in which psychopathy was also unrelated to emotional responding in a number of domains. A recent review by Brook and colleagues (2013) revealed that PCL-R assessed psychopathy was unrelated to electrodermal activity, heart rate responsivity, the magnitude of frowning responses, memory performance, and affect recognition in an appreciable number of experimental investigations of emotion in criminal samples. This clearly matches some of the results described in this thesis, and seems to suggest that our current evidence base is far less consistent in supporting the various emotion-deficit models of psychopathy than is usually assumed (e.g., Blair et al., 2005; Cleckley, 1941; Fowles & Dindo, 2009; Hare, 2003; Lykken, 1995; Patrick et al., 1994, 2009). Across different types of professionals, including theorists and clinicians, this could be the result of selectively reviewing and attending to the psychopathy literature, resulting in the disregard of research findings that do not match existing theoretical conceptions of this disorder. In order to prevent such a confirmation bias, it is of utmost importance that theories on psychopathy keep being revised as our empirical knowledge increases, reflecting a full appreciation of the literature. This means that both research results supportive of certain emotional deficiencies in psychopathy are taken into account, as well as findings that do not support such aberrances.

IMPLICATIONS

Several chapters in this thesis describe the first experimental investigations of certain emotional constructs with regards to psychopathy (e.g., interoceptive awareness, the instructed inhibition and expression of facial affect) and are therefore in need of replication. If these studies are replicated over other samples and using different methodological approaches, there are some important implications that result from these findings.

On a theoretical level, the current findings imply that psychopaths' appraisals of self and others (and related interpersonal and emotional processes) deserve a far more prominent position in theoretical conceptualizations of psychopathy than is currently the case. Furthermore, perspectives that focus on deficiencies in fear-reactivity as being at the core of psychopathy (e.g., Lykken, 1995; Patrick et al., 1994), might have to broaden their focus in order to explain the role of other “families” of emotion (e.g., guilt, hostility) and as to include other emotional domains (e.g., the subjective experience of affect). The explanatory power of general emotion theories (e.g., Cleckley, 1941; Hare, 2003), in contrast, would benefit from specifying which emotional mechanisms are dysfunctional in psychopathy, as the current thesis suggests that there are a number of emotional domains in which psychopathic offenders do not show deficits. As stated before, theories should also be based on a more critical review of the literature, taking into account findings that contrast commonly held beliefs about psychopathy. In such an integration of research findings, it is important not to ignore those emotional processes that do not seem related to psychopathy (or, only under certain conditions), as certain intact capacities might enable the expression of some

psychopathic features. The ability to show appropriate facial expressive emotion, for example, could facilitate the use of deceptive and manipulative strategies.

There are also some practical implications that follow from the findings in this thesis. In order to illustrate these implications, Table 2 gives a description of the "prototypical" offender with relatively many psychopathic traits, based on the findings of the current thesis research. As described in this table, psychopathy was characterized by a dominant self-view on an implicit level. These results suggest that the controlling and dominant behavior of psychopathic individuals might interact with such a self-view, and implies that the further development of clinical interventions that target such interpersonal behavior is needed. Furthermore, the finding that psychopaths were superior in detecting hostility during long stimulus duration, implies that clinicians should be careful in thinking of the paranoia that characterizes psychopathy (Hildebrand & de Ruiter, 2004) as the result of perceptual distortions. Rather, they should consider that when psychopaths ascribe hostility to others, such an appraisal might very well be legitimate. Therefore, therapists might want to focus on the dysfunctionality of this distrust, rather than on whether it is based on realistic appraisals or not.

Table 2. *The prototypical offender high in psychopathy, based on the current thesis research*

Based on the current thesis research, the prototypical offender high in psychopathy is typified by a number of characteristics. On an implicit level, this offender has a relatively dominant self-view, although he will not explicitly state to have more narcissistic traits (e.g., being superior, entitled and exploitive) than others. He more easily recognizes other people's hostile intentions when compared to individuals with lower psychopathy levels, given that he has sufficient time to "read" such mental states, for example, when being stared at. In that case, he will very often correctly recognize the hostility in others' intentions. In general, he shows no difficulties in understanding others' thoughts and emotions on a rational level. Similarly, he is capable of describing his own feelings to a variety of different affective situations (i.e., fear, happy, sad). The offender high in psychopathic traits also shows electrodermal responsivity in all these different emotional contexts. His heart rate variability, however, seems to be lower in certain affect-laden situations (e.g., fear, happy) than that of his nonpsychopathic counterparts.* When being asked, he can show appropriate facial emotions in the aforementioned emotional contexts (i.e., fear, happy, sad), and when this offender inhibits his emotion in these situations, his heart rate decreases (in which he does not differ from nonpsychopaths). He is less sensitive to his own bodily responses though,* and he will more readily admit that he feels less guilty over his crimes than offenders low in psychopathy.*

* These features are most characteristic of offenders high in behavioral psychopathic traits, while the other characteristics are typical for offenders high in overall psychopathy levels.

Table 2 also illustrates that psychopathy is not associated with being affectively hyporesponsive in all the different domains that are deemed relevant to emotional functioning. If psychopathic offenders might indeed be able to experience and show genuine emotions under certain circumstances, this would be very beneficial for their treatability, as psychopaths' emotional "flatness" has been theoretically and empirically linked to their recurrent antisocial behavior (Bernstein et al., 2012; Patrick et al., 1994; Roberton, Daffern, & Bucks, 2012; Tangney, Stuewig, & Martinez, 2014). This thesis, however, also seems to provide some support for the notion that psychopathic individuals can display an intact cognitive understanding and responsiveness in the context of emotion that might not necessarily be accompanied by a very embodied affective experience due to a reduced awareness of visceral sensations. Clinicians might thus want to be attentive to whether their (psychopathic) forensic patients seem to fully experience emotions, or whether affective expressions might be the result of a more detached way of describing and showing emotion. If the latter seems to be the case, therapists could place interventions that help offenders recognize their own emotional signals.

Another finding that is illustrated by Table 2, is that information derived from different sources (e.g., self-report, physiological assessments, observational measures) was not necessarily in accordance with each other in some of the studies in this thesis. Psychopathy was, for example, associated with discrepancies between implicit and explicit assessment for both dominance and guilt. As highly antisocial offenders were quite straightforward about having reduced guilt feelings on self-report, dishonesty might not seem like the best explanation for the inconsistency between different assessment methods. A lack of insight might prove more valuable in explaining this divergence, as decreased introspection in one's own functioning has been robustly linked to personality pathology in general (Millon & Strack, 2015). Regardless of the mechanisms underlying discrepancies between offenders' self-report and other measurement domains, clinicians should adopt multi-method approaches when gathering information about their (psychopathic) patients. However, implicit measures are not completely resistant to "faking" (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009) and empirical support for their sensitivity and specificity on an individual level in forensic samples is still lacking. Therefore, forensic assessment might want to combine multi-informant interviewing and observational measurement methods. If differences between these sources indeed emerge, clinicians should explore the reason for such discrepancies with their (psychopathic) forensic patients.

LIMITATIONS AND STRENGTHS

Limitations

There are some drawbacks to the research described in this thesis that deserve attention. A first important limitation is that all our studies were conducted in the same sample of offenders and community controls. This implies that, by chance, potential peculiarities in our sample could have affected all our results. Furthermore, we did not apply alpha-corrections over studies, which increases the chance that some findings might be due to chance, rather than being reflective of true systematic variation between nonpsychopathic and psychopathic people in the general population.

A second limitation to this research is that all studies were cross-sectional in nature. Although cross-sectional associations can be highly informative with regards to the nature of psychopathology, the current research does not provide clear-cut answers of whether the emotional aberrances that were found to be related to psychopathy are causes, consequences, or simply correlates of the disorder. This warrants future longitudinal and experimental research in which more insight is created into the direction of the relationship between psychopathy and emotional functioning.

Another limitation might concern the low correlation between PCL-R Factors 1 and 2 in the current sample. As the quality of our PCL-R assessments seemed to be quite good, this is somewhat surprising given the fact that in most international studies these two psychopathy dimensions are moderately correlated with one another (Harpur, Hakstian, & Hare, 1988). However, we have no theoretical reason to believe that this atypical data structure would have affected the results presented in the current thesis. If anything, this weak correlation makes it easier to interpret some of the findings. That is, when entering both factors in a regression model, they are corrected for the variance that each shares with the other. Partialling out the effect of one scale on the other using regression can cause interpretive problems when these scales are highly correlated (it is difficult to know what a scale represents once it is corrected for variance shared with the other scale, see, Lynam, Hoyle, & Newman, 2006). As the correlation between the psychopathy dimensions in our sample was low, interpreting the contribution of each PCL-R factor might thus be more straightforward on a conceptual level than if Factors 1 and 2 would have been correlated more strongly. Also, it gives justification to the analytical approach in which we divided our participants into groups based on Factors 1 and 2, respectively. That is, in the light of the weak association between both factors, the groups based on Factor 1 scores are less “contaminated” with Factor 2 and vice versa.

Somewhat lower correlations between both psychopathy factors are not unheard of in Dutch forensic samples (despite reliable assessment, see e.g., Hildebrand, de Ruiter, de Vogel, & van der Wolf, 2002). However, it has to be acknowledged that the weak association between Factors 1 and 2 is rather different from that seen in other international samples and might therefore have some implications for the generalizability of the results described in

this thesis. Possibly, the sample described in this thesis is different in nature than some populations in other forensic research because of our selection criteria, like the presence of a cluster B personality disorder. Our findings thus primarily apply to personality disordered forensic patients. As ample research shows that psychopathy is highly comorbid with cluster B personality pathology (e.g., Fowles & Dindo, 2009; Hildebrand & de Ruiter, 2004), one could speculate that such psychopathology is inherent to this disorder, making our current research sample very representative with respect to this inclusion criterion. Findings do not generalize, however, to individuals suffering from, for example, mental retardation, exclusive pedophilia, autism, or a psychotic disorder.

Another potential threat to the generalizability of this thesis research is that a substantial number of our participants (*n*=36) were also participating in a randomized clinical trial (RCT) on the effectiveness of Schema Therapy versus treatment as usual in forensic patients with cluster B personality disorders (Bernstein et al., 2012). As these participants agreed to participate in this RCT, they might have been more open to showing and experiencing emotion than offenders who were not ready to start therapy yet. Also, Schema Therapy specifically targets forensic patients' emotional states (e.g., an offender's vulnerable side), which might have made offenders receiving this intervention more affectively responsive than before they started treatment.

A related drawback pertains to the fact that the use of psychotropic medication was not an exclusion criterion for the studies described in this thesis. This was decided on as medication use is very common in forensic populations; excluding these individuals would therefore have resulted in a less representative sample. Certain types of medication, however, can have an effect on affective capacities, such as emotion regulation (Outhred et al., 2013). Although not all the emotional constructs investigated in this thesis seem to be as sensitive to the influence of psychotropic substances (e.g., interoceptive awareness; Mussgay, Klinkenberg, & Rüddel, 1999), it cannot be ruled out that offenders' task performance might have been influenced by medication, potentially reducing the effects of psychopathy. It seems unlikely though, that offenders can overcome the gross impairments associated with psychopathy just by using medication.

Another methodological aspect that could be controvertible is the fact that in a number of studies in this thesis we adopted a categorical analytical approach in which participants were divided into groups based on their psychopathy level. As the PCL-R can only be administered to individuals with a criminal background, this approach enabled us to include the healthy controls in our analyses. Dimensional analytical strategies, however, have more statistical power and future studies should therefore administer the same psychopathy instrument to both community and forensic participants. Besides the screening version of the PCL-R (PCL-SV; Hart, Cox, & Hare, 1995) and a number of self-report questionnaires, such instruments are as of yet nonexistent. This highlights the need for the development of diagnostic instruments that can tap psychopathic traits in the entire population (and that do not rely on self-report so that biased reporting is prevented).

A last limitation is that we did not take into account differences in motivation and the tendency to be truthful, which could have potentially distorted findings might these processes have been related to psychopathy. We did, however, aim to circumvent this potential problem by testing our main hypotheses with results obtained from experimental tasks that are believed to be less susceptible to the influence of higher-order cognitive processes, such as psychophysiological measures and implicit, reaction-time based tasks. Furthermore, the high internal consistency that was generally observed for our self-report measures, as well as the fact that highly antisocial offenders seemed quite frank about their lack of moral emotion (*chapter 3*), are not indicative of potential distortive effects of, for example, lying or a lack of motivation. As recent research does indicate though, that psychopathic individuals' performance on emotional tasks might be better when cognitive processes are manipulated (e.g., by receiving explicit instructions or when their attention to task stimuli is enhanced, *chapter 6,* and see above, Larson et al., 2013; Meffert et al., 2013), future research on factors like motivation in psychopathy is warranted.

Strengths

The research described in this thesis also has some considerable strengths. First, a wide range of different emotions was taken into account with regards to psychopathy. Whereas a lot of previous studies only distinguished between positive and negative emotional valence (Blair, Richell, Mitchell, et al., 2006; Casey, Rogers, Burns, & Yiend, 2012; Mitchell, Richell, Leonard, & Blair, 2006), our studies covered a number of more specific affective categories (e.g., sadness, fear, happiness). Moreover, some of these emotions concerned more complex affective states that have, as of yet, received very limited attention in empirical research on psychopathy (e.g., guilt feelings, hostility). This differentiation allows for more specific conclusions concerning psychopathic individuals' emotional functioning.

Second, various different aspects of emotion were investigated in our studies. Although having been highly informative so far, research on psychopathy has tended to overlook a number of components that are considered crucial to an integrative understanding of emotion, such as appraisal processes and emotion regulation (e.g., Frijda, 2008; Scherer, 2000). By taking into account a more diverse range of emotional constructs, the research in this thesis broadens our empirical knowledge on the affective functioning of psychopathic individuals.

A third strength concerns the constitution and size of our research sample. The number of participants that were included in the studies enabled us to detect small to medium effect sizes. Moreover, a broad range of psychopathy was represented by including highly psychopathic offenders, nonpsychopathic offenders and a community control group with similar demographic characteristics. Not only did the inclusion of such control participants boost our statistical power, it also enabled us to draw conclusions on whether psychopathic individuals might actually show superior capacities in certain domains (e.g., ToM) compared with non-institutionalized individuals that do not suffer from psychopathology. This latter

possibility fits well with recent empirical developments that suggest that psychopathy might be associated with some adaptive characteristics (Glenn, Kurzban, & Raine, 2011).

SUGGESTIONS FOR FUTURE RESEARCH

There are still many questions concerning psychopathy that future studies should follow up on. From positioning the studies described in the current thesis in a broader theoretical context, it already became apparent that research findings on emotion in psychopathy are far from conclusive. As aforementioned, this evidence base should therefore be extended with studies guided by general emotion theories. Being informed by such a perspective, research should cover a range of different affective components (e.g., emotion regulation, facial expressive behavior) and emotional "families" (e.g., anger and sadness, but also more complex emotional states such as envy and grief). Two other important avenues for further research on psychopathy will be described next that follow from the studies in this thesis as well as from other empirical developments. First, the time has come to realize that psychopathy in adult offenders might not be such a static entity as is implicitly and explicitly assumed in current theoretical accounts. Second, and related to that, is the importance of future studies that further investigate the interpersonal processes that are relevant to understanding psychopathy.

There are different types of research that support the notion that psychopathic traits might be more malleable than often times assumed. As described above, there are several, relatively recent experimental studies that suggest that the emotional deficiencies that are related to psychopathy can "disappear" in laboratory settings when offenders' attention and/or effort is manipulated (Larson et al., 2013; Meffert et al., 2013). Future research should further investigate this potential state-dependency of the affective dysfunctions seen in psychopathy, and examine under which circumstances and in which emotional domains psychopathic individuals might be capable of showing normal emotional functioning. Importantly, such research should also investigate whether there are spontaneous instances during which psychopathic offenders' emotion normalizes and what the characteristics of such events are. Such studies call for more ecologically valid assessment methods, such as observational procedures.

A large body of developmental literature also provides indications that psychopathy might be amenable to change. In addition, it stresses the importance of interpersonal processes in the etiology of psychopathy. Numerous studies indicate that disturbances in family-related processes, such as parenting practices, are related to children developing problems that are associated with psychopathy, such as a lack of empathy and aggression (for reviews, see Eisenberg, 2000; Farrington, & Loeber, 2000; Feshbach, 1987; Smith, & Stern, 1997). Similarly, more recent research indicates that psychopathic traits in children (i.e., both callous-unemotional [CU] and antisocial features) are indeed under the reciprocal influence of factors like parental warmth (Kimonis, Centifanti, Allen, & Frick, 2014). Such findings might explain why a substantial group of children with CU traits does not develop

adult psychopathy (Lynam & Gudonis, 2005) and why psychopathic offenders more often report disturbed and emotionally detached attachment styles (Bailey & Shelton, 2014).

As interpersonal influences seem so important in the development of psychopathic traits in childhood, future research should further investigate the role of disturbed inter-actional processes in adult psychopathy. As aforementioned, many empirical studies have tried to reveal the dispositional deficiencies that are inherent to psychopathy, while environmental factors remain highly unspecified in theories of psychopathy. In most influential theories of personality pathology in general, however, personality disorders do not only find their origins in certain temperamental inclinations (such as emotional hyporesponsivity). Rather, such psychopathology is also characterized, as well as maintained by (the interpretation of) interpersonal events, the way in which somebody feels related to others, and the manner in which one engages in relationships (e.g., Millon & Strack, 2015). Fundamental research has vastly overlooked these interpersonal processes in psychopathic adults, even though promising therapeutic interventions for personality disorders (including psychopathy) recognize the importance of the interactional nature of these disorders. Forensic Schema Therapy, for example, puts heavy emphasis on the importance of developing a strong patient-therapist attachment relationship in order to provide corrective interpersonal and emotional experiences for (psychopathic) patients (Bernstein et al., 2012). Future research should, therefore, examine which interpersonal influences have an effect on psychopathy at a later age and which strategies psychopaths adopt themselves to control their interpersonal environment. As social-interpretative processes (like the perception of hostility) have a direct effect on such interpersonal interactions, studies should also take into account how psychopathic offenders see themselves and others.

Last, future investigations should try to create stronger theoretical links between the interpersonal, affective and behavioral components of psychopathy. In the context of the aforementioned research suggestions, one could for example investigate how psychopathic offenders' social-cognitive appraisals are related to interpersonal emotions (e.g., empathy) and antisocial behavior (e.g., aggression, exploitation). Such research would aid the conceptual integration of different aspects of psychopathy, thereby providing a theoretical framework that can inform forensic interventions and research on the effectiveness of psychological treatment.

Summary

In many theories on psychopathy, deficiencies in emotional functioning are considered to be at the heart of this disorder. General contemporary perspectives on affective processes describe emotion as the activation and interaction of a number of different aspects, such as appraisal processes, the experience of emotion, physiological responsivity, and the regulation of affect (Frijda, 2008; Scherer, 2000). In the current thesis, a series of studies is described that investigated several of these components in relation to criminal psychopathy. In this research, both the interpersonal/affective traits (Factor 1) and lifestyle/antisocial features of psychopathy (Factor 2) were taken into account, as psychopathy has a multi-componential structure (Hare et al., 1990). The studies also adopted a multi-method approach, including direct (e.g., self-report) and indirect assessment procedures (e.g., physiological recording, reaction-time based tests), in order to circumvent potential concerns regarding offenders' truthfulness and insight.

Chapter 1 provides an introduction to the current thesis, and presents an overview of the main theoretical perspectives on psychopathy, followed by a discussion of the applicability of these theories in explaining the emotional impairments that are clinically and theoretically relevant to this disorder. The chapter continues by presenting a more general theoretical approach to emotion and its potential relevance to psychopathy. The aims of each study are then outlined against the backdrop of this theoretical integration.

Subsequently, **part I** of this thesis reports on two studies (*chapters 2* and *3*) that examined appraisal processes (i.e., social cognition) with regards to psychopathy. *Chapter 2* describes an investigation of the potential influence of hostility biases, as well as controlled (slow) versus automatic (fast) processing on Theory of Mind (ToM) performance in psychopathy. In this study, ToM was operationalized as the ability to infer mental states to the eye region of faces (so called “social-perceptual” ToM). Results indicated psychopathic offenders, nonpsychopathic offenders, and nonoffender controls not to differ in social-perceptual ToM, even when restrictions were imposed on how long eye stimuli could be processed. Groups did seem to differ, however, in their ability to recognize hostility to eyes. That is, psychopathic offenders appeared superior to nonoffenders in identifying relatively hostile mental states (with nonpsychopathic offenders falling in between both groups) when eye stimuli were presented for a longer duration. This finding could not be explained by a more general tendency to (inaccurately) see hostile intentions in eyes. These results suggest that psychopathic offenders do not differ from nonpsychopaths in their capacity to “read” others' thoughts and emotions. Notably, psychopathic individuals might even have a more realistic appraisal of others' intentions under certain circumstances (e.g., when being stared at in a hostile manner).

In *chapter 3*, an investigation is presented of psychopathic offenders' capacity to correctly attribute mental states (e.g., thoughts, emotions) to story characters (i.e., “social-cognitive” ToM). In line with the findings described in *chapter 2,* psychopathic offenders did not differ from nonpsychopaths in this type of ToM either. *Chapters 2* and *3* further support

the notion that psychopathic offenders – even in the absence of emotional empathy for victims – generally do not show deficiencies in the cognitive appraisal of mental states (including emotions). The research described in *chapter 3* also investigated the potential moderating role of social-cognitive ToM on the relation between Factor 2 of psychopathy and self-presentation (i.e., social desirability and unlikely symptom reporting). Results showed that only for offenders relatively high in such ToM, Factor 2 was positively related to social desirability and negatively associated with the tendency to report unlikely symptoms. These findings seem to suggest that offenders with antisocial behavior features of psychopathy and relatively good social-cognitive ToM skills are more likely to present themselves in a bad light. This could be indicative of offenders exaggerating their mental dysfunction to express a need for clinical attention.

Part II of this thesis describes two studies (*chapters 4* and *5*) investigating processes related to the experience of emotion in psychopathy. The ability to sense one's own bodily symptoms (or, "interoceptive awareness") is believed to be an important component of affective experience. *Chapter 4* reports on a study that investigated the association between psychopathy and interoceptive awareness, indexed by heartbeat detection accuracy. As expected, psychopathy was related to an attenuated interoceptive awareness, an association that was explained by the antisocial features of psychopathy. These results suggest that a reduced sensitivity to the bodily symptoms accompanying emotion might influence the expression of psychopathic behavior.

In *chapter 5,* the importance of emotional experience in understanding psychopathy is further illustrated. The research in this chapter aimed to investigate the association between psychopathy and feelings of dominance, as assessed with both direct (i.e., self-report) and indirect measures (i.e., the Single Category Implicit Association Test). *Chapter 5* also describes a similar examination of psychopathy and the experience of guilt. Results revealed no differences between groups of psychopathic offenders, nonpsychopathic offenders, and normal controls on any of these measures. Dimensional analyses, however, showed that psychopathy was positively related to implicit, but not explicit, dominance within the offender group. These results suggest that dominance – besides being characteristic for interpersonal psychopathic behavior – also plays a role in the implicit self-concept that characterizes psychopathy. Concerning guilt, the findings in *chapter 5* showed Factor 2 to be related to less explicit, but not implicit guilt feelings, thereby experimentally validating the importance of a reduced experience of moral emotion to psychopathy. As discrepancies were found between implicit and explicit assessment for both guilt and dominance with regards to psychopathy, these results emphasize the importance of using multi-method approaches in the forensic field. In addition, both *chapters 4* and *5* seem to suggest that emotional aberrances might be more pertinent to Factor 2 of psychopathy than is often assumed.

Part III of this thesis presents an extensive investigation of psychopathic offenders' capacity to regulate their emotions under the instructions to inhibit and express their feelings while watching different emotional film fragments (fear, happy, sad) (*chapter 6*). Psychopaths were able to drastically diminish their facial displays of emotion, although they did not differ in this capacity from nonpsychopathic offenders and nonoffenders. This inhibition of emotion was associated with a cardiovascular cost that did not differ across these three groups either. Interestingly, psychopaths could show a significant increase in content-appropriate facial affect when being instructed to express their emotions. Again, they did not differ in this capacity from nonpsychopaths. These results provide no support for the notion that psychopathy is associated with either a deficient or superior capacity for the emotion regulation of fear, happiness, or sadness. Findings do raise the question of whether psychopaths' facial displays are simulated or whether these expressions are the result of genuine emotional experience. The study in *chapter 6* also showed that regardless of condition (inhibition versus expression), psychopathic offenders did not differ from nonpsychopaths in their self-reported emotions or electrodermal responsiveness during the films. Offenders high in Factor 2 did show reduced heart rate variability to fearful and happy film clips. These findings illustrate the complexity of emotional functioning in psychopathy and highlight the importance of future research that aims to identify which emotional deficiencies are associated with psychopathy and which are not.

This thesis is concluded with an overall discussion of the findings that were presented in the preceding chapters, in the light of our current scientific evidence base (*chapter 7*). *Chapter 7* also outlines the limitations and strengths of this thesis research and describes the theoretical and practical implications that follow from its results. Last, some suggestions are made for future research aimed at further advancing our understanding of psychopathy.

Samenvatting

In veel theorieën over psychopathie worden deficiënties in het emotioneel functioneren gezien als de kern van deze stoornis. Emotie wordt in algemene hedendaagse perspectieven omschreven als de activatie en interactie van een aantal verschillende aspecten, zoals emotionele cognitie, de ervaring van emotie, fysiologische responsiviteit en affectregulatie (Frijda, 2008; Scherer, 2000). In deze thesis wordt een serie studies beschreven waarin verscheidene van deze componenten werden onderzocht in relatie tot psychopathie. Gezien de multi-dimensionele structuur van psychopathie (Hare et al., 1990), werd in dit onderzoek de distinctie tussen interpersoonlijk/affectieve trekken (Factor 1) en levensstijl/antisociale psychopathische kenmerken (Factor 2) in ogenschouw genomen. Daarnaast werd gebruik gemaakt van meetinstrumenten uit meerdere meetdomeinen, zoals directe (bijv. zelf-rapportage) en indirecte methoden (bijv. fysiologische opnames, testen gebaseerd op reactietijd). Op deze manier werd getracht problemen te voorkomen die samen zouden kunnen hangen met mogelijke oneerlijkheid en het zelfinzicht van de deelnemers.

In *Hoofdstuk 1* wordt een introductie gegeven op de huidige thesis. Hierin wordt eerst een overzicht gegeven van de voornaamste theoretische perspectieven op psychopathie, gevolgd door een discussie van de toepasbaarheid van deze theorieën in het verklaren van de emotionele verstoringen die klinisch en theoretisch met deze stoornis in verband worden gebracht. Het hoofdstuk wordt voortgezet met een beschrijving van een algemenere theoretische benadering van emotie en de potentiële relevantie van deze invalshoek voor psychopathie. De doelstellingen van elke studie worden vervolgens in het licht van deze theoretische integratie uiteengezet.

Vervolgens worden in **deel 1** van deze thesis twee studies (*hoofdstukken 2* en *3*) gepresenteerd waarin de relatie tussen psychopathie en sociaal-emotionele cognitie werd onderzocht. *Hoofdstuk 2* beschrijft een onderzoek naar de relatie tussen de neiging om vijandigheid bij anderen te zien en *Theory of Mind* (ToM) in relatie tot psychopathie. Ook werd in deze studie gekeken naar de mogelijke invloed van gecontroleerde (langzame) vs. automatische (snelle) verwerking op ToM. In *hoofdstuk 2* werd ToM geoperationaliseerd als het vermogen om mentale staten af te leiden van de ogen van gezichten (ook wel "sociaal-perceptuele ToM" genoemd). Resultaten lieten zien dat psychopathische delinquenten, niet-psychopathische delinquenten en niet-delinquente controledeelnemers niet van elkaar verschilden in sociaal-perceptuele ToM. Deze verschillen deden zich zelfs niet voor wanneer er restricties opgelegd werden op de tijdsduur waarmee deelnemers naar de ogen konden kijken. Groepen verschilden echter wel in hun vermogen om vijandigheid in de ogen te herkennen. Psychopathische delinquenten leken beter dan niet-delinquenten in het identificeren van relatief vijandige mentale staten (waarbij de niet-psychopathische delinquenten tussen deze twee groepen invielen). Dit was echter alleen het geval wanneer ogen gedurende een langere tijd gepresenteerd werden. Deze bevinding kon niet worden verklaard door een algemenere neiging om (onterecht) vijandige intenties in ogen te zien. Deze resultaten suggereren dat psychopathische delinquenten over het algemeen niet verschillen in hun capaciteit om de gedachten en emoties van anderen te "lezen".

Psychopathische mensen zouden onder sommige omstandigheden zelfs een realistischere inschatting maken van andermans intenties (bijv., wanneer zij op een vijandige manier aangestaard worden).

In *hoofdstuk 3* wordt een studie gepresenteerd naar de capaciteit van psychopathische delinquenten om mentale staten (bijv. gedachten, emoties) correct toe te schrijven aan personages in verhaaltjes (i.e., "sociaal-cognitieve ToM"). Resultaten waren overeenkomstig met de bevindingen in *hoofdstuk 2* en lieten zien dat psychopathische mensen ook in dit vermogen niet verschilden van niet-psychopaten. *Hoofdstukken 2* en *3* leveren ondersteuning voor de aanname dat psychopathische delinquenten – zelfs bij een gebrek aan emotionele empathie voor hun slachtoffers – over het algemeen geen deficiënties vertonen in de cognitieve inschatting van mentale staten (waaronder emoties). Het onderzoek dat in *hoofdstuk 3* omschreven wordt focuste daarnaast op de potentiële modererende rol van sociaal-cognitieve ToM op de relatie tussen Factor 2 van psychopathie en zelf-presentatie (te weten, sociale wenselijkheid en de rapportage van onwaarschijnlijke symptomen). Resultaten lieten zien dat alleen voor die delinquenten die een relatief goede ToM hadden, Factor 2 positief gerelateerd was aan sociale wenselijkheid en negatief samenhing met de neiging om onwaarschijnlijke symptomen te rapporteren. Deze bevindingen suggereren dat delinquenten met antisociale, psychopathische gedragskenmerken en relatief goede sociaal-cognitieve ToM vaardigheden zich eerder in een relatief slecht daglicht presenteren. Dit zou een indicatie kunnen zijn dat deze delinquenten hun mentale dysfunctie overdrijven om hun behoefte aan klinische aandacht te uiten.

In **deel II** van deze thesis worden twee studies gepresenteerd (*hoofdstukkken 4* en *5*) waarin psychopathie onderzocht werd in relatie tot processen die gerelateerd zijn aan de ervaring van emotie. Het vermogen om de eigen lichamelijke signalen te voelen (ofwel, het "interoceptief bewustzijn") wordt gezien als een belangrijke component van de affectieve ervaring. In *hoofdstuk 4* wordt een studie beschreven waarin gekeken werd naar de relatie tussen psychopathie en interoceptief bewustzijn, waarbij het laatste construct geoperationaliseerd werd als het vermogen om de eigen hartslag te detecteren. Zoals verwacht was psychopathie geassocieerd met een verminderd interoceptief bewustzijn. Deze associatie werd verklaard door de antisociale kenmerken van psychopathie. Deze bevindingen suggereren dat een verminderde gevoeligheid voor lichamelijke, emotionele signalen de uiting van psychopathisch gedrag mogelijk beïnvloedt.

Hoofdstuk 5 illustreert het belang van de emotionele ervaring voor het begrijpen van psychopathie nog verder. De studie in dit hoofdstuk was er op gericht om de associatie tussen psychopathie en gevoelens van dominantie te onderzoeken. Dit laatste construct werd gemeten met zowel directe (i.e., zelf-rapportage) als indirecte meetmethoden (i.e., de Single Category Implicit Association Test). In *hoofdstuk 5* wordt ook een soortgelijke studie gepresenteerd naar psychopathie en de ervaring van schuldgevoelens. Resultaten lieten geen verschillen zien tussen psychopathische delinquenten, niet-psychopathische delinquenten en niet-delinquente deelnemers op deze uitkomstmaten. Dimensionele

analyses lieten echter zien dat psychopathie positief samenhing met impliciete, maar niet met expliciete dominantie binnen de groep delinquenten. Naast dat dominantie kenmerkend is voor interpersoonlijk, psychopathisch gedrag, suggereren deze bevindingen dat dit concept ook een rol speelt in het impliciete zelf-concept dat psychopathie karakteriseert. Wat schuld betrof lieten de resultaten in *hoofdstuk 5* zien dat Factor 2 negatief samenhing met expliciete, maar niet met impliciete schuldgevoelens, een bevinding die experimentele validatie levert voor het belang van een gereduceerde ervaring van morele emoties voor ons begrip van psychopathie. De geobserveerde discrepanties tussen resultaten verkregen middels impliciete en expliciete meetmethoden benadrukken hoe belangrijk het is om meerdere meetbenaderingen te gebruiken in het forensische veld. Daarnaast suggereren *hoofdstukken 4* en *5* dat emotionele afwijkingen relevanter zijn voor Factor 2 van psychopathie dan vaak wordt verondersteld.

In **deel III** van deze thesis wordt een uitgebreid onderzoek gepresenteerd naar de capaciteit van psychopathische delinquenten om hun emoties te reguleren onder de instructies om hun gevoel in te houden, dan wel te uiten, tijdens het kijken naar verschillende emotionele filmfragmenten (angstig, vrolijk, verdrietig) (*hoofdstuk 6*). Psychopaten waren in staat om hun emotionele gezichtsuitdrukkingen drastisch te verminderen, hoewel ze in dit vermogen niet verschilden van niet-psychopathische delinquenten en niet-delinquenten. Het inhiberen van emoties was geassocieerd met cardiovasculaire veranderingen die ook niet verschilde over deze drie groepen. Interessant was ook de bevinding dat psychopaten een significante toename konden laten zien in gepaste emotionele gezichtsexpressiviteit wanneer zij geïnstrueerd werden om hun emoties te laten zien. Ook in deze capaciteit verschilden zij niet van niet-psychopaten. Deze bevindingen leveren geen ondersteuning voor de aanname dat psychopathie geassocieerd is met een slechter, dan wel superieur vermogen om angst, blijdschap, of verdriet te reguleren. Resultaten wekken echter wel de vraag of de gezichtsexpressies van psychopaten gesimuleerd zijn, of dat deze uitdrukkingen het resultaat zijn van de daadwerkelijke ervaring van emoties. De studie in *hoofdstuk 6* laat verder zien dat, ongeacht conditie (inhibitie versus expressie), psychopathische delinquenten niet verschilden van niet-psychopaten in hun zelf-gerapporteerde emoties of electrodermale responsiviteit tijdens de films. Deze bevindingen illustreren de complexiteit van het emotionele functioneren van psychopathische mensen en benadrukken het belang van toekomstig onderzoek dat poogt te identificeren welke emotionele dysfuncties wel en niet met psychopathie geassocieerd zijn.

Deze thesis wordt afgesloten met een overkoepelende discussie van de bevindingen die gepresenteerd werden in de voorgaande hoofdstukken, tegen de achtergrond van onze huidige wetenschappelijke kennis (*hoofdstuk 7*). *Hoofdstuk 7* geeft ook een overzicht van de beperkingen en sterktes van dit thesisonderzoek en beschrijft de theoretische en praktische implicaties die uit de resultaten voortkomen. Tot slot wordt geconcludeerd met enkele suggesties voor vervolgonderzoek gericht op het verder bevorderen van ons begrip van psychopathie.

Valorization addendum

This thesis describes a series of studies that aimed to investigate psychopathic individuals' emotional functioning in a number of areas. Various chapters throughout this thesis already described the theoretical and practical implications of this research. In the present addendum, these studies and their outcomes are further positioned in a broader societal framework in order to illustrate their valorization value.

Psychopathy and its societal impact

Psychopathy is characterized by a constellation of interpersonal and affective characteristics such as glibness, manipulation, and a decreased experience of prosocial emotions like guilt and empathy. In addition, psychopathic individuals display certain behavioral features, including impulsivity, having a short fuse and engagement in a wide range of criminal activities (Hare, 2003). When considering these traits, it is not surprising that psychopathic offenders are responsible for a relatively large amount of crime. Whereas the prevalence of psychopathy is estimated to be less than 1 percent in the general population, around 15 to 25 percent of criminal offenders are believed to fulfill a diagnosis of psychopathy (Blair, Mitchell, & Blair, 2005, pp. 18-19). It goes without saying that this disorder is associated with tremendous financial and societal costs. Over 2005, for example, the annual financial cost of criminality in the Netherlands was estimated at 20,2 billion euros (Groot, de Hoop, Houkes, & Sikkel, 2007). Notably, these costs do not include the more indirect burden that criminal behavior creates in terms of, for example, emotional damage to those who are victimized by antisocial individuals. In order to reduce these harmful consequences, we are in need of a thorough understanding of the mechanisms underlying psychopathy. Such knowledge is crucial for informing prevention and intervention programs targeting this disorder. In addition, a better understanding of psychopathy and the ways in which it could be treated could facilitate a societal mindset of rehabilitating offenders rather than punishing them (as will be described later on). The research in the current thesis describes a series of studies that generated insights into the processes underlying psychopathy, thereby providing an important contribution to the foundation for these translational processes.

The current thesis: contributions to clinical practice and science

The studies presented in the previous chapters aimed to disentangle the complex nature of the emotional functioning of psychopathic individuals. In many theories of psychopathy, emotional aberrances are considered to be at the core of this disorder (Cleckley, 1941; Blair, Mitchell, & Blair, 2005, pp. 110-140; Hare, 1996a; Patrick, Cuthbert, & Lang, 1994). Although all of these various theoretical accounts have a somewhat different take on the nature of this dysfunction, there is general agreement that psychopaths' emotional deficiencies are related to the extreme antisocial tendencies that characterize psychopathy. Not surprisingly, forensic therapeutic interventions have been developed alongside these growing theoretical insights that increasingly adopt a focus on targeting emotional problems in (psychopathic) offenders in order to reduce recidivism (e.g., Schema Therapy; Bernstein et al., 2012). The

research in the current thesis created some important insights into these emotional capacities, thereby contributing to the development of better treatments for psychopathy.

This addendum will now turn to some examples of ways in which the results of the current research are of value to clinical interventions. Before doing so, it has to be stressed that replication of a number of these results is of great importance before any translation to a more applied context is justified. Several of the studies in this thesis were among the first to investigate certain affective constructs in relation to psychopathy. Hastily implementation of findings from basic research into practical forensic contexts could do more damage than good. Therefore, some of the studies in this thesis should be followed up on with new fundamental and applied research in order to warrant the sound evidence base needed for, for example, clinical interventions. The following paragraph therefore describes both some direct practical contributions of the current thesis research, as well as some illustrations of the way in which findings contribute to the broader scientific process leading up to such clinical use.

In the first chapters of this thesis (*chapters 2* and *3*), an investigation was described of psychopathic offenders' Theory of Mind capacities, showing this social cognitive ability not to differ between psychopaths and nonpsychopaths. These findings give us some important information on psychopaths' perception and understanding of their social world, being that psychopathic individuals seem to have a good cognitive grasp of what others think and feel. Such theoretical knowledge can directly help clinicians in translating the theoretical assumptions of the Risk Need, and Responsivity model into practice (RNR model; Andrews & Bonta, 2006). This model, which has greatly increased the effectiveness of forensic treatments (e.g., Lowenkamp, Latessa, & Holsinger, 2006), states that offender treatment should be matched to an individual's motivation, abilities, and strengths. The results in *chapters 2* and *3* inform therapeutic approaches based on the RNR, empirically supporting the justification to provide psychopaths with interventions for which good social cognitive abilities are a prerequisite. Next to that, these findings inform clinicians on the potential cause of psychopaths' aggression. Whereas for some individuals, a decreased Theory of Mind interacts with their aggressive behavior towards others (Renouf et al., 2010), these results show that psychopaths' antisocial behavior is most likely better explained by other mechanisms. Findings thus suggest that clinicians do not need to spend time on interventions aimed at improving psychopathic offenders' understanding of, for example, their victims. In fact, the research described in *chapter 2* even suggests that psychopathic offenders are better at understanding others' intentions than nonpsychopaths under some circumstances, being when these intentions are relatively hostile. When this finding endures empirical replication, it suggests that clinicians might want to be careful to ascribe paranoia to a psychopathic patient who beliefs that others have bad intentions (which is quite typical of these patients and which could lead to aggression). An intervention strategy for such an offender would be more beneficial if it focused on developing prosocial means of dealing with hostile encounters rather than on challenging beliefs about others' hostile intentions.

In *chapter 4*, a study is described that showed psychopathy, especially the antisocial behavioral features, to be related to a reduced awareness of one's own cardiovascular signals. Such "interoceptive awareness" is considered important to emotional experience, and has been linked to the display of dysfunctional behavior in other lines of research. The findings in *chapter 4* therefore constitute an inspiration for future research to more extensively investigate the role of a reduced experience of (affective) bodily symptoms in antisocial behavior. If a lowered interoceptive awareness can indeed be experimentally linked to the destructive behaviors of highly antisocial offenders, such findings could be the basis of clinical interventions, such as therapeutic approaches that focus on the experience of emotional sensations (e.g., experiential techniques). The findings presented in *chapter 4* also inform future translational research on the effectiveness and underlying mechanisms of such therapeutic interventions. One could, for example, investigate whether interventions that aim to improve offenders' interoceptive awareness result in a) an increased sensitivity for bodily signals, b) an better capacity to control one's behavior and make more functional decisions, and c) a decreased display of antisocial behavior.

In *chapter 5*, psychopathy was found to be related to a self-concept characterized by relatively high levels of dominance. This finding also gives rise to the need for future research in this domain to enable translation to the clinical field. Such research should, for example, investigate whether this dominance is related to the use of interpersonal strategies to control and dominate others in an aggressive manner. Studies might also want to examine whether a dominant self-concept and the antisocial, interpersonal behavior that might very well stem from it, could be predictive of criminal recidivism. If these hypotheses hold true, these fundamental insights inform the development of interventions that target the dominant and controlling behavior of psychopathic offenders. *Chapter 5* also gives some important information on assessment in forensic contexts. For both dominance and guilt, psychopathy showed divergent associations with implicit measures on the one hand, and explicit assessment on the other hand. These results clearly indicate that professionals working in the forensic field should ideally not rely on one single assessment domain, but should combine information from multiple sources when doing patient assessments.

Finally, *chapter 6* showed psychopathic individuals not to differ from nonpsychopaths on a number of different outcome measures associated with the deliberate manipulation of emotion. This research avenue is clearly in need of further investigation, yet matches some recent studies which seem to suggest that psychopathic offenders' emotional aberrances might be more state-dependent than has long been believed (e.g., Meffert, Gazzola, den Boer, Bartels, & Keysers, 2013). Obviously, such malleability of affective responsivity would be highly relevant to treatments for psychopathic people, whose emotional flatness is believed to play a major role in their typically long and versatile criminal careers. In forensic Schema Therapy, for example, therapists aim at "breaking through" the emotional detachment of forensic patients, in order to reach more emotionally responsive, vulnerable sides. The results described in *chapter 6* support and further inform this therapeutic

approach (which seems to be very promising in reducing forensic patients' pathology and recidivism risk; Bernstein et al., 2012). That is, findings in *chapter 6* suggest that even highly psychopathic patients are able to show, and potentially even experience, emotions under certain circumstances, thereby supporting the theoretical assumptions of Schema Therapy. These results also inform future translational research on the malleability of emotional states in a therapeutic context, and the potential relationship of such affective states with therapy success in forensic patients.

Innovation

The research described in this thesis was innovative in a number of ways. First, it comprised an investigation of a wide range of constructs that are considered highly relevant to emotional functioning (Frijda, 2008; Power & Dalgleish, 2008), including appraisal, physiological arousal, subjective experience, expression of emotion, and affect regulation. Much of the previously conducted research on psychopathic individuals' affect has been limited to the study of only few of these components, while neglecting many other important aspects of emotion. Several of the studies in this thesis were among the first to investigate emotional capacities in psychopathy that have previously received scant empirical attention. No previous research, for example, investigated how psychopathy is related to the subjective experience of cardiovascular signals that often times accompany emotion. Furthermore, the current thesis describes the first experimental examination of psychopathic individuals' capacity to inhibit and express their facial affect when being asked to do so. Moreover, the studies in this thesis were embedded in a sound theoretical framework that provided a critical review of the current literature in light of our contemporary understanding of emotional functioning in general. This latter overview and theoretical integration facilitates a new perspective on psychopathy research, leading the way for some exciting and innovative empirical avenues.

Another innovative quality of this thesis research concerns its multi-method approach to investigating the constructs of interest. Such an assessment enabled us to add to the development of a more differentiated picture of psychopaths' affective reactivity, by taking into account a variety of different response domains. These included written and verbal self-report, skin conductance responsivity, heart beat frequency, cardiovascular variability, bodily movement, facial expressive behaviors, and indirectly assessed self-associations based on reaction time. In doing so, the research in this thesis made use of some measurement methods that, as of yet, have rarely been used in forensic psychology research. Previous studies on psychopathy and facial expressiveness, for example, have all relied on the assessment of frowning, using corrugator electromyography (e.g., Herpertz et al., 2001). In contrast, the research in this thesis is the first in which continuous multi-rater observation of a wide variety of different facial emotional signals was used, adding to a significantly more fine-grained understanding of psychopaths' affective expressiveness.

Communication of thesis results

The outcomes of the studies described in this thesis, as well the knowledge that was acquired while conducting the studies, has been communicated to a variety of individuals other than academic scholars. First, the current thesis research has been presented at a number of national and international conferences. Without exception, these conferences were attended by professionals working in research as well as in the clinical forensic field. Furthermore, various presentations were given to the staff of Forensic Psychiatric Centers and prisons. During these meetings, active communication was always sought with forensic health care professionals, as well as with the management of these institutions in order to facilitate interaction between science, clinical practice, and institutional decision-making. This interaction is reflected in, for example, the fact that several of the publications that resulted from this thesis research are co-authored by professionals working in either forensic clinics or prison. Notably, while collecting data in these institutions, the current author has also answered numerous questions of both nonpsychopathic and psychopathic forensic patients, many of which were (in)directly related to her scientific knowledge on forensic psychology. Furthermore, she has continuously been involved in the education of university students, teaching both the practical skills, as well as the theoretical insights that were acquired in the process of conducting this research.

Research and its influence on the public opinion

The current judicial system is less than optimal in decreasing offenders' criminal behavior and the related suffering for both these individuals and their victims (Andrews et al., 1990). One element that currently does contribute to the reduction of recidivism is the fact that offenders with a mental disorder are considered less responsible for their criminal actions in the majority of Western countries and therefore receive treatment instead of being punished with prison sentences (Bernstein et al., 2012; Spaans, Barendregt, Haan, Nijman, & de Beurs, 2011). This is based on the notion that many people feel that when an individual has mental problems, such as psychosis or mental retardation, he or she is less capable of overseeing the consequences of behavior, which in turn is related to a reduced intentionality of inflicting harm on others. Psychopathy, unfortunately, is generally not perceived as a mental disorder. In fact, research shows that when people attribute more psychopathic traits to criminals, they are more supportive of harsh punishment of these offenders, including execution, than treatment (e.g., Edens, Davis, Fernandez Smith, & Guy, 2013).

Scientific research, such as the studies described in this thesis, can be of great influence on such public opinions and, relatedly, on governmental decision-making in a number of ways. First, people are likely to be more nuanced in their judgements of psychopathic offenders when certain psychopathic traits (e.g., a lack of guilt and empathy) are conceptualized as deficits that compromise one's decision-making ability, rather than as a reflection of being “plain evil.” Scientific research enables the objectification of such deficits and can thereby have a subsequent effect on philosophical debates on criminal

responsibility. If, for example, psychopaths' antisocial behavior is related to a decreased interoceptive awareness (*chapter 4*), one might argue that this reduced capacity to register bodily signals (which might normally guide functional decision-making) could be seen as a legally relevant mental deficit that is related to antisocial behavior. Such a perspective is likely to create more support for treatment of these offenders. Second, a combination of fundamental and applied research is needed to show the public that mental disorders associated with antisocial behavior are indeed treatable, and that forensic rehabilitation will vastly outweigh the costs of a punishment-based approach to crime. Research alone is obviously not a panacea to complex matters of how to perceive and deal with psychopathy. It does, however, constitute an absolute prerequisite in moving towards a societal mindset that enables the reduction of the financial costs and emotional suffering associated with mental disorders in the legal context.

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Curriculum vitae

About the author

Lieke Nentjes was born on August 25th, 1986 in Utrecht (the Netherlands). In 2004, she completed secondary education (bilingual VWO) at the Anna van Rijn College in Nieuwegein. Subsequently, she started studying Health Sciences at the University of Maastricht. During her bachelor and master's studies, she worked as a research assistant and tutor at the Department of Medical, Clinical, and Experimental Psychology at the same university. In 2008, she obtained her master's degree in Mental Health Sciences (cum laude). From 2009 onwards, she worked as a PhD student at the Forensic Psychology Section of the Department of Clinical Psychological Science at Maastricht University. During her PhD project, she took several additional clinical courses (in, for example, psychopathy assessment) and she continued to teach students within various subjects on psychopathology and forensic psychology. Together with one of her promotores, prof. dr. David Bernstein, she also wrote a set of manuals on Schema Therapy for forensic patients with personality disorders that led to the official acknowledgement of the effectiveness of this intervention by the Dutch Ministry of Safety and Justice. Currently, Lieke holds a position as Assistant Professor at the Department of Clinical Psychology of the University of Amsterdam, where she has been working since 2013. Here, she coordinates education on forensic interventions within the master's program of Clinical Forensic Psychology. Next to that, she continues her research on the experimental correlates of psychopathy.

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Nentjes, L., & Bernstein, D.P., Meijer, E., Arntz, A., & Wiers, R.W. (*under revision*). The mask of sanity: facial expressive, self-reported, and physiological consequences of emotion regulation in psychopathic offenders. *Journal of Personality Disorders.*

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Nentjes, L., van den Berg, L., & Bernstein, D.P. Reading psychopathic faces: detection of psychopathy from thin slices of emotional behavior. *Manuscript in preparation.*

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Nentjes, L., Bernstein, D.P., Arntz, A., van Breukelen, G.J.P., & Slaats, M.E. (2013, January). *Theory of Mind and psychopathy: are psychopathic people better at reading your mind?* Poster presented at the European Winterschool in Forensic Psychology, Seeon, Germany.

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Nentjes, L., Bernstein, D. P., Cima, M., & Wiers, R.W. (2014, December). *Implicit vs. explicit dimensions of guilt and dominance in criminal psychopathy*. Poster presented at the conference "Treatment of psychopathy: making the impossible possible," Antwerp, Belgium.

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