EMOTION, EMPATHIC AND MORAL PROCESSING IN PERSONALITY DISORDERED OFFENDERS

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Dedicated to Joe, Mum and Maureen

You are always in my thoughts

ABSTRACT

This thesis provides a diverse and detailed account of research that has examined emotion, empathic and moral processing in antisocial personality disordered (ASPD) and dissocial personality disordered (DPD) populations with and without co-morbid psychopathy. It incorporates a systematic review, empirical research and a psychometric critique and in doing so provides a comprehensive overview of the methods employed to examine these constructs and findings which inform how emotion, empathic and moral processing manifest in these groups.

The rationale for this topic is founded on theories and research which suggest that deficient emotion, empathic and moral processing plays a central role in the development and maintenance of antisocial behaviour and violence.

Chapter 1 provides an introduction to the thesis.

Chapter 2 is comprised of a systematic review which assesses what emotion processing and empathy deficits exist in ASPD/DPD groups with and without co-morbid psychopathy. The rationale for this systematic review was to resolve ambiguity regarding whether emotion processing and empathy deficits differentiate populations with ASPD/DPD and co-morbid psychopathy (ASPD+P) from those with ASPD/DPD only (ASPD-P). A total of 22 studies were quality assessed and sampling bias was

highlighted as a key methodological limitation. However, whilst a synthesis of the findings from these studies highlighted substantial evidence of emotion processing deficits in ASPD/DPD groups, the review was unable to conclusively determine the extent to which ASPD/DPD groups with and without co-morbid psychopathy could be differentiated in terms of emotional dysfunction because the majority of reviewed studies employed mixed ASPD/DPD populations consisting of some participants with and some without co-morbid psychopathy (ASPD+/-P or DPD+/-) and did not examine emotion processing or empathy in participants with ASPD/DPD-P independently of those with ASPD/DPD+P.

Consequently, chapter 3 describes empirical research which employed self-report and behavioural measures to examine emotional and empathic processing in adult male patients with ASPD/DPD with and without co-morbid psychopathy (combined ASPD), an ASPD/DPD group without co-morbid psychopathy (ASPD-P), an ASPD/DPD group with co-morbid psychopathy (ASPD+P) group and non-offending, non-personality disordered adult male controls. The rationale for this study was to enhance the current literature base regarding emotion and empathic processing in ASPD/DPD by determining whether patients with ASPD/DPD (the combined ASPD group) exhibit emotion processing and empathy deficits when compared to non-personality disordered controls and then examining whether delineated ASPD-P and ASPD+P patients can be differentiated in terms of these deficits. Whilst a comparison of the

combined ASPD and control group suggested emotion processing deficits in ASPD, a three group comparison (comparing ASPD-P, ASPD+P and control groups) indicated co-morbid psychopathy mediated both emotion processing and empathy deficits in ASPD. In contrast, no significant differences were found between ASPD-P and control groups once analyses were adjusted to control for confounding variables. Still, a primary limitation of this research was the small sample sizes for the three group analysis and possibility that this study lacked statistical power, thereby increasing the likelihood of type 2 error.

Chapter 4 then builds upon the empirical research in chapter 3 and examines moral processing in the same ASPD and control groups. The rationale for this study was to determine the relationship between empathic and moral processing, to examine whether ASPD groups (combined ASPD, ASPD-P and ASPD+P) would differ in their identification with moral emotions (i.e., guilt, compassion, self-anger and other-anger) and endorsement of utilitarian solutions to sacrificial moral dilemmas (i.e., choosing to sacrifice the life of one individual to save multiple individuals) when compared to non-personality disordered adult male controls and whether patients with ASPD+P would identify with fewer moral emotions and endorse more utilitarian solutions when compared to those with ASPD-P. Findings suggested that co-morbid psychopathy did mediate moral emotions deficits in ASPD but these deficits did not promote significantly higher endorsement of utilitarian solutions in

response to impersonal or personal moral dilemmas. Furthermore, all groups were more willing to endorse utilitarian solutions to moral dilemmas that involved impersonal rather than personal contact, thereby highlighting that moral emotions deficits do not prevent those with ASPD+P from distinguishing behaviour that is commonly considered morally acceptable from that which is not. Still, this research was subject to a range of limitations including the use of hypothetical scenarios which may not elicit responses typical of those that would be incurred in real-life situations.

Chapter 5 provides a psychometric critique of the Interpersonal Reactivity Index (IRI; Davis, 1980) which was employed as an assessment tool for research outlined in Chapter 3. The IRI was examined for its utility, validity and reliability and its suitability for use with violent offending when compared to non-offending populations, for whom it was initially designed. The key finding from this critique was that the IRI is neither valid or reliable when employed with violent offender groups and that it should not be employed with forensic populations in its current form.

Chapter 6 reflects on the aims of the thesis, provides a summary of the findings from each chapter and concludes that whilst emotion, empathic and moral processing deficits do exist in ASPD, evidence of reduced emotional reactivity in ASPD-P populations is limited and it is in fact largely co-morbid psychopathy which acts to mediate these deficits. Still,

whilst chapter six highlights the valuable contribution that this thesis has made in identifying the differences between these groups, it not only identifies the need for researchers and treatment providers to recognise differences between and distinguish ASPD-P and ASPD+P populations but also emphasises the need to address heterogeneity in the origins of impairment and deficits manifest in those with ASPD+P. Equally, it argues that in view of the limited evidence to support effective interventions with ASPD populations, further methodologically rigorous and transparent research is required to determine the effectiveness of targeted treatment approaches employed with delineated ASPD populations. It then concludes that there should be an increased emphasis on early intervention strategies as a means to not only broaden current knowledge of the developmental origins which underlie the deficits observed in those with ASPD+P but also to address these deficits when they may be more amenable to change.

Statement of Authorship

Chapter 2 contains material that has been published by the journal *Aggression and Violent Behaviour* and was co-authored by Professor Birgit Völlm, Medical Director and Professor of Forensic Psychiatry at the University of Rostock, Cris Glazebrook, Professor of Health psychology, Faculty of Medicine & Health Sciences, University of Nottingham and Dr Ruth Tully, HCPC Registered and BPS Chartered Forensic Psychologist, University of Nottingham.

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GLOSSARY OF TERMS

AD	Alcohol Dependent
ADHD	Attention Deficit Hyperactivity Disorder
ASPD	Antisocial Personality Disorder
BES	Basic Empathy Scale
CAM	Cambridge Mind Reading Face Voice Battery
CD	Conduct Disorder
CS	Conditioned Stimulus
CU	Callous Unemotional
DLPFC	Dorsolateral Prefrontal Cortex
DPD	Dissocial Personality Disorder
DSM I	Diagnostic and Statistical Manual of Mental Disorders - Version One
DSM II	Diagnostic and Statistical Manual of Mental Disorders - Version Two
DSM III	Diagnostic and Statistical Manual of Mental Disorders - Version Three
DSM IV-TR	Diagnostic and Statistical Manual of Mental Disorders - Version Four Text Revision
DSM V	Diagnostic and Statistical Manual of Mental Disorders - Version Five
EDA	Electrodermal Activity
EMG	Electromyography
ERP	Event Related Potential
HEQ	Hogan’s Empathy Questionnaire

IAPS	International Affective Picture System
ICD-10	International Classification of Diseases – Tenth Revision
ICU	Inventory of Callous Unemotional Traits
IES	Integrated Emotions Systems Model
IQ	Intelligence Quotient
IRI	Interpersonal Reactivity Index
JORT	Joystick Operated Runway Task
MPFC	Medial Prefrontal Cortex
PANAS	Positive and Negative Affect Schedule
PCL	Psychopathy Checklist
PCL-R	Psychopathy Checklist Revised
PCL-SV	Psychopathy Checklist: Screening Version
PD	Personality Disorder
PPI	Psychopathic Personality Inventory
PPI-R	Psychopathic Personality Inventory Revised
QT	Ammons Quick Test
RMET	Reading the Eyes in the Mind Test
SAM	Self-Assessment Manikin
SCR	Skin Conductance Response
SOA	Startle Onset Asynchrony
SSRI	Selective Serotonin Reuptake Inhibitor
TAS-26	Toronto Alexithymia Scale – 26 Item Version
TAS-20	Toronto Alexithymia Scale - 20 Item Version
US	Unconditioned Stimulus
VMPFC	Ventromedial Prefrontal Cortex

CHAPTER ONE

GENERAL INTRODUCTION TO THESIS

1.0 INTRODUCTION

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; *DSM-5*; American Psychiatric Association [APA], 2013) diagnosis of Antisocial Personality Disorder (ASPD), otherwise identified within the International Classification of Diseases – Tenth Revision (ICD-10; World Health Organization [WHO], 1993) as Dissocial Personality Disorder (DPD) and psychopathy are associated with disproportionately high levels of antisocial and violent behaviour and a failure to conform to moral norms that commonly serve to prevent individuals from committing harm. They are, however, separable constructs that are differentiated not only in terms of how they are characterised and assessed, but in terms of their developmental origins.

1.1 *Developmental Origins of ASPD and Psychopathy*

Whilst a history of conduct disorder (CD) is not a requirement for a diagnosis of ASPD (APA, 2013) or DPD (WHO, 1993) and is not necessary for psychopathy classification as assessed by the Psychopathy Checklist-Revised (PCL-R; Hare, 1991), it is widely considered to be a common precursor to ASPD and psychopathy (Delisi, Drury, & Elbert, 2019; Vloet, Herpertz, & Herpertz-Dahlmann, 2006).

However, some evidence suggests that higher levels of callous-unemotional (CU) traits could underlie divergent developmental trajectories in children and adolescents with CD, that these traits may

manifest from as young as four years of age and that higher levels of CU traits with CD could act as a marker for serious antisocial behaviour and psychopathy in adulthood (Frick, Ray, Thornton, & Kahn, 2014; Herpers, Scheepers, Bons, Buitelaar, & Rommelse, 2014; Viding, Blair, Moffitt & Plomin, 2005; Viding & McCrory, 2012; Waller & Hyde, 2018; Werner, Few & Bucholz, 2015). Moreover, in accordance with these findings, the DSM-V diagnostic criteria for CD now includes a specifier which differentiates CD sub-types based on limited prosocial emotions, as evidenced through the presence or absence of guilt/remorse, a callous lack of empathy and shallow or deficient affect (APA, 2013; Pisano et al., 2017).

Whilst longitudinal studies highlight the role of environmental factors (i.e., abuse, inconsistent and harsh parenting, lack of parental monitoring, delinquent peer relationships, poor socialisation and low socio-economic status) as mechanisms that may contribute to the development of CD and antisocial behaviour in childhood and adolescence (Calkins & Keane, 2009; Holmes, Slaughter, & Kashani, 2001; Luntz & Widom, 1994; Waller & Hyde, 2018), Lykken (1995) contends that parenting and socialization in childhood may be less influential as a contributary factor for psychopathy than it is for antisocial behaviour.

Equally, the results of a study which employed a population-based sample of 1480 twin pairs (assessed at 13-14 years and 16-17 years) to identify

genetic and environmental influences on psychopathic traits and antisocial behaviour suggested that genetics contributed substantially to covariance between grandiose/manipulative, callous/unemotional, impulsive/irresponsible psychopathic personality dimensions and antisocial behaviour whilst shared environments contributed purely to antisocial behaviour (Larsson et al., 2007). Likewise, evidence from wider research suggests that shared environmental influences account for approximately 50% of the variation in antisocial behaviour (Tuvblad & Beaver, 2013), whereas genetic heritability accounts for 42-68% of the variance in CU traits (Frick et al., 2014).

Whilst Blair, Peschardt, Budhani, Mitchell & Pine (2006) acknowledge that social and environmental factors (i.e., sexual and physical abuse; early exposure to criminality and poverty) may contribute to the antisocial and behavioural manifestation of psychopathy in adulthood, they highlight that only 25% of individuals diagnosed with CD will exhibit psychopathic tendencies and argue that psychopathy is in fact a neurodevelopmental disorder. They contend that the genetic influence on psychopathy manifests as disruption to the development of neural systems (amygdala, orbital and ventrolateral frontal cortex) associated with emotion, empathic and moral processing and that this disruption in the function of neural systems acts as an obstacle to aversive conditioning and the ability to learn stimulus-reinforcement associations which commonly act to inhibit antisocial behaviour and decrease the likelihood of criminality.

In accordance with this view, emotional dysfunction continues to be widely regarded as the defining characteristic that not only distinguishes those with psychopathy from those with ASPD but predisposes them to an increased risk of violence and recidivism (Herpertz & Sass, 2000).

Still, Hare (1996) contends that whilst ASPD and psychopathy are not synonymous, revisions to the DSM diagnostic criteria for ASPD may have contributed to diagnostic confusion and ambiguity regarding how these disorders are differentiated. Likewise, Raine (2018) highlights how attempts to revise the DSM criteria for ASPD so that it more closely represents psychopathy have led to *'psychopathy creep*' (pg. 279), despite the fact that the two disorders are in fact distinct. He therefore contends that individuals who meet the criteria for ASPD and co-morbid psychopathy may in fact be better understood as a minority sub-type of those who meet the criteria for ASPD.

1.2 *The Construct of Psychopathy*

Although the DSM-5 criteria for ASPD is considered by some to be more analogous with the construct of psychopathy than it has been in previous editions (Raine, 2018), psychopathy is not recognised and has never been classified as a mental disorder within the DSM.

The earliest conceptualisations of psychopathy referenced 'manie sans delire' (insanity without delirium), a disorder of 'moral incapabilities' and

more widely 'moral insanity' (Berrios, 1999; Kavka, 1949; Kiehl & Hoffman, 2011) and whilst the term 'psychopathy' was employed at the end of the 19th century, it was the pioneering work of Cleckley (1941; 1976) which operationalised the defining characteristics and criteria for psychopathy or antisocial personality as it was subsequently identified within the first and second editions of the DSM (*DSM-I/DSM-II*; APA, 1952; 1968) . Thus, when the third edition of the DSM (*DSM-III*; APA, 1980) revised the criteria for the renamed antisocial personality disorder to allow more emphasis on behavioural characteristics as a means of improving diagnostic accuracy and inter-rater reliability, critics argued that these were too extensive, lacked validity and had led to construct drift (Hare, Hart, & Harpur, 1991) (Appendix 1).

Consequently, when the 22-item Psychopathy Checklist (PCL) was published in the same year in an attempt to provide a more valid and reliable psychopathy assessment which incorporated personality characteristics identified by Cleckley (1941; 1976) and antisocial traits identified through research with adult male offenders (Hare, 1980), it was welcomed as a valid clinical tool which could be employed to assess the traditional construct of psychopathy in forensic populations using data derived from semi-structured interviews, historical files and psychometric assessment (Coid, 1993; Lynam & Gudonis, 2005) (Appendix 2).

Still, whilst a range of evidence supported the validity and reliability of the PCL when employed with offender populations, it was subsequently updated and replaced by its progeny, the 20-item psychopathy checklist – revised (PCL-R, Hare, 1991; 2003) as a means to address difficulties in scoring and provide more clarity regarding factor structure. Based on the results of factor analysis, the PCL-R criteria for psychopathy were considered to represent two distinct factors, the first of which (factor one) is divided into interpersonal and affective facets that incorporate eight items related to core personality traits and the second of which (factor two) is divided into lifestyle and antisocial facets that incorporate ten items related to behavioural traits[1]. PCL-R items are rated according to a 3-point Likert rating scale (0 = not present, 1 = maybe present, 2 = present) and summed to generate a total score range of 0-40, thereby facilitating common scoring criteria, clear identification of those who meet the threshold for psychopathy (US threshold = PCL-R total ≥ 30; European threshold = PCL-R total ≥25) and comparison of psychopathic trait scores (Appendix 2).

The psychometric properties of the PCL-R have since been examined by a broad range of international research which suggests that it is a valid tool which has high inter-rater reliability and is predictive of recidivism, violent recidivism and treatment outcome/drop-out in adult male offender

[1] Items 11 'Promiscuous sexual behaviour' and 17 'many short-term marital relationships' contribute to the total PCL-R score but do not load onto F1 or F2

populations (Storey, Hart, Cooke & Michie, 2016; Ogloff, Wong & Greenwood, 1990).

In response to the increasing popularity of the PCL-R (Hare 1991; 2003) and criticisms that the third edition DSM (DSM-III) criteria for ASPD were too extensive and more broadly aligned with PCL-R factor two traits, an attempt was made to revise and incorporate more reference to personality traits associated with the traditional construct of psychopathy into the fourth version of the DSM (DSM-IV TR; APA, 2000). However, this proposal met with objections from clinicians who were concerned about overlap with criteria for other personality disorders and potential difficulties with diagnostic co-occurrence (Crego & Widdiger, 2015).

Consequently, despite being shortened and revised, the DSM-IV criteria for ASPD remained incongruent with the traditional concept of psychopathy, necessitated a history of conduct disorder before the age of 15, were heavily focused on behavioural traits and overly inclusive, leading to high levels of ASPD diagnosis (Cunningham & Reidy, 1998). Thus, in accordance with Hare's (1996) observation that "*most individuals with ASPD are not psychopaths"* (pg. 2.), subsequent research which examined the prevalence of ASPD and psychopathy in forensic populations highlighted an asymmetry between the two whereby only a minority of those with ASPD met the criteria for co-morbid psychopathy (Ogloff, Campbell, & Shepherd, 2016).

Despite a relative dearth of research evidence related to the ICD-10 diagnosis of DPD (WHO, 1993), it continues to be commonly viewed as broadly similar to ASPD because although the criteria for DPD have never included a history of conduct disorder before the age of 15 and are more closely aligned with personality characteristics and deficits in affect identified in the PCL-R than those outlined in the DSM-IV/V criteria for ASPD, they are comparatively narrow and do not incorporate the broad range of affective and behavioural traits identified within the PCL-R (Hare 1991; 2003; NICE, 2009; Rodrigo, Rajapakse & Jayananda, 2010) (Appendix 3).

However, the release of DSM-V did see a substantial shift in the criteria for ASPD, through the inclusion of an alternative model in Section III headed 'emerging models and measures' (APA, 2013). This hybrid diagnostic nosology is informed by impairments in personality functioning (identity OR self-direction), interpersonal functioning (empathy OR Intimacy), traits of antagonism (manipulativeness, deceitfulness, callousness and hostility) and disinhibition (irresponsibility, impulsivity and risk taking). Moreover, whilst the DSM-V continues to omit psychopathy as a clinical disorder, section III does now include reference to an ASPD specifier which references low anxiousness and social withdrawal coupled with high attention seeking as criteria which can be used in conjunction with section II and III ASPD criteria to better

distinguish ASPD individuals with and without psychopathic features (Miller, Lamkin, Maples-Keller, Sleep & Lynam, 2018).

Nevertheless, whilst many view low anxiousness, social withdrawal and attention seeking as traits that are particularly relevant to the construct of psychopathy (Derefinko, 2015; Frick, Lilienfeld, Ellis, Loney, & Silverthorn, 1999), their inclusion within the ASPD specifier was informed by the recently developed triarchic model of psychopathy (Patrick, Fowles & Krueger, 2009) and not based on the criteria employed by either Cleckley (1941; 1976) or Hare (1991, 2003). Added to this, some research suggests that these traits demonstrate low intercorrelations, are unrelated to other traits characteristic of psychopathy and do not represent a coherent, unidimensional measure (Miller et al., 2018). Consequently, some critics contend that the DSM-V represents a missed opportunity to unify ASPD with the more traditional concept of psychopathy (Lynam & Vachon, 2012).

Equally, whilst the criteria for ASPD, DPD and psychopathy all incorporate reference to deficient emotional affect (APA, 2013; Hare, 1991; WHO, 1993), thereby highlighting a degree of overlap between their associated features, the extent to which co-morbid psychopathy mediates emotional dysfunction in ASPD and DPD remains unclear because the majority of extant literature examining emotion, empathic and moral processing has focussed on psychopathic populations or ASPD/DPD populations not assessed for co-morbid psychopathy. Therefore, as emotion, empathic

and moral processing deficits are commonly associated with an increased risk for antisocial behaviour and violence, determining the extent to which these phenomena are dysfunctional in ASPD/DPD populations with and without co-morbid psychopathy has important implications for effective intervention strategies and behaviour/violence risk management.

1.3 *Definition and Economic Cost of Antisocial Behaviour*

Defined in chapter 37 of the 1998 Crime and Disorder Act (Legislation.Gov.uk, 1998; pg. 2) as "*Acting in a manner that caused or was likely to cause harassment, alarm or distress to one or more persons not of the same household"*, the Home Office Research Development and Statistics Directorate identifies antisocial behaviour according to four core typologies: misuse of a public space (i.e., drug/substance misuse and dealing), disregard for community/personal well-being (i.e. nuisance behaviour), acts directed at people (i.e., intimidation/harassment) and environmental damage (i.e., criminal damage/vandalism). Official estimates based upon recorded instances of antisocial behaviour defined in accordance with these typologies suggest that 13.5 million instances of antisocial behaviour are reported to UK public service and local authority organisations annually with associated costs estimated at approximately £3.4 billion (Home Office, 2004). However, this figure does not account for the wider social and emotional costs to victims, their families and the wider community.

1.4 *Definition and Economic Cost of Violence*

Violence is defined by the World Health Organisation as "*The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation*" (World Health Organisation, 2002, pg. 4). Other-directed violence is commonly distinguished in terms of function and categorised as either reactive or proactive, with reactive violence considered to occur more as a response to a perceived threat or provocation and proactive (also called instrumental) violence widely associated with goal attainment (Buss, 1961; Cornell et al., 1996; Feshbach, 1964; Tapscott, Hancock, & Hoaken, 2012; Walsh, Swogger, & Kosson, 2009).

Regardless of whether other-directed violence is reactive or instrumental, violent crimes have an immeasurable cost with respect to the emotional and physical well-being of victims, their families and wider society. Whilst official estimates for the UK highlighted that only a third of the total individual crimes committed in 2015/2016 involved violence, these crimes were nevertheless found to account for the largest proportion of the £50 billion annual cost associated with individual crimes (Heeks, Reed, Tafsiri, & Prince, 2018).

1.5 *Emotion Processing Deficits, Antisocial Behaviour and Violence*

Emotion processing deficits are commonly identified in violent antisocial populations and a range of theories and research highlight how they may contribute to antisocial behaviour and violence.

Low autonomic arousal for instance is argued to represent an aversive psychophysiological state that predisposes individuals to stimulation seeking (Hare, 1970), thereby increasing the likelihood of disinhibited antisocial behaviour. In support of this view, longitudinal research (Farrington, 1997) found that a low resting heart rate in males aged 18 years was a significant predictor for violent offending by the age of 25 even after controlling for factors including impulsivity, IQ, parent criminality and employment. Added to this, a range of research has found evidence to support a relationship between low psychophysiological arousal and antisocial behaviour (Armstrong, Keller, Franklin, & Macmillan, 2009; Choy, Farrington, & Raine, 2015). Low arousal is also commonly associated with fearlessness and the low fear hypothesis (Lykken, 1995) highlights how an absence of fear conditioning may reduce responsivity to punishment cues and could thus prevent inhibition of harmful antisocial behaviour. Whilst commonly associated with psychopathy, one study found that poor fear conditioning in younger children (aged 3-8 years) was associated with higher rates of aggression by age 8 (Gao, Raine, Venables, Dawson, & Mednick, 2010). Similarly, another found evidence that adolescent males with early and late onset

conduct disorder exhibited deficits in fear conditioning when compared to non-conduct disordered controls (Fairchild, Van Goozen, Stollery, & Goodyer, 2008).

Added to this, the response modulation hypothesis (RMH; Patterson & Newman, 1993) contends that psychopaths have attentional rather than emotion or empathic deficits and that attentional dysfunction limits their ability to re-direct attention towards emotional or contextual stimuli that is peripheral or secondary to the focus of their goal-directed activity. In support of this view, a meta-analysis by Smith and Lilienfeld (2015) found evidence of small to medium sized effects when they examined outcomes from studies that had explored the relationship between psychopathy and response modulation deficits. However, whilst this would suggest that attentional dysfunction could mediate the likelihood of antisocial behaviour and/or violence in populations with psychopathy in situations where emotionally salient cues are unattended, other studies have found evidence which suggests that violent antisocial and/or psychopathic populations exhibit emotion recognition and categorisation deficits which cannot be explained purely in terms of impaired attentional processing (Jusyte, Stein, & Schönenberg, 2019).

Facial emotion recognition is argued to play a key role in facilitating emotional learning because facial emotions function as an important communicatory tool during social interactions, provide salient cues that

inform about the feelings and intentions of others and guide approach/avoidance behaviours (Seidel, Habel, Kirschner, Gur, & Derntl, 2010). Whilst deficits in the recognition of facial affect are commonly associated with poor social adjustment, psychopathology and violent offending, meta-analytic research concluded that antisocial populations exhibited specific impairment in the recognition of fear cues (Marsh & Blair, 2008). However, a range of studies have found evidence of emotion recognition deficits for emotions other than fear in antisocial populations (Dolan & Fullam, 2006; Bagcioglu et al., 2014) and from a social information processing perspective, some suggest that hostile attribution bias is more evident in antisocial populations and highlight how the misattribution of ambiguous expressions as hostile could promote an increased risk of violence (Wegrzyn, Westphal, & Kissler, 2017). Crucially, facial emotion recognition is argued by some to be an essential precursor to empathy and therefore the inability to accurately perceive and/or interpret facial emotions could mediate deficits in remorse and/or empathy which would otherwise act to reduce the likelihood of antisocial and/or violent behaviour.

1.6 *Empathic Processing Deficits, Antisocial Behaviour and Violence*

Translated from the German term *'Einfühlung' in the early 1900s*, empathy was largely conceptualised as a form of imaginative projection until the 1950s when it became more widely acknowledged as the ability

to interpret the feelings of others (Readers Digest, 1955). Whilst a consistent and universal definition of empathy remains elusive, it is currently defined in terms of the ability to accurately perceive, interpret and identify with another's situation and argued to involve both cognitive and affective components (Decety, Bartal, Uzefovsky, & Knafo-Noam, 2016; Eisenberg & Miller, 1987; Marshall & Marshall, 2011; Preston, 2007; Preston & de Waal, 2002; Richardson, Hammock, Smith, Gardner, & Signo, 1994; Schroeder, Dovidio, Sibicky, Matthews, & Allen, 1988).

The integration of these components is considered essential to the generation of empathy and empathic behaviour as whilst cognitive empathy informs our ability to see things from another's perspective and explicitly understand others' emotional states as distinct from our own, affective empathy is argued to involve the vicarious sharing of emotions that another feels or would be expected to feel in a given situation and in conjunction with cognitive empathy, facilitates pro-social behaviour (Decety & Moriguchi, 2007; Bons et al., 2013; Wang & Wang, 2015).

Still, affective and cognitive constructs are considered partially dissociable in terms of the information processing systems through which they are governed as whilst affective empathy is considered to depend on bottom-up processing mediated through the amygdala, hypothalamus and orbitofrontal cortex (OFC), cognitive empathy is thought to involve top-down processing mediated through the anterior insula cortex (AIC),

medial prefrontal cortex and (mPFC) and ventromedial prefrontal cortex (vmPFC) (Decety, 2011).

Furthermore, whilst studies that have explored the evolutionary and developmental origins of empathy have highlighted that both genetic and environmental factors (i.e., parenting style) contribute to the development of empathy (de Waal, 2008; Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008), a multitude of research suggests that affective empathy manifests earlier than cognitive empathy and may in fact be innate. Hoffman (1979) for instance, identified different stages of empathy development and highlighted global empathy (an involuntary form of emotion matching that does not involve a distinction between self and other) as the most basic level of empathy evident from infancy. He suggested that in their second year, children exhibit *'person permanence*' (pg. 6) and a more ego-centric form of empathy which prompts them to respond to the distress of others in ways that they themselves find comforting because whilst they are able to differentiate themselves from others on a physical level they remain unable to differentiate their inner state from that of others. However, he suggested that by the age of two to three years, children are more aware of and responsive to other's emotions as distinct from their own and by late childhood recognise that others have emotional experiences which are linked to personal identities and life experiences outside of their immediate situation.

In support of Hoffman's view, new-born infants have been found to demonstrate a rudimentary and self-oriented form of pre-empathic arousal in response to the distress cries of other new-borns (Decety, 2010; Simner, 1971). However, in contrast to the notion that children under the age of one year are unable to differentiate their own emotions from those of others, a range of research suggests that empathic concern may manifest earlier than this (Davidov, Zahn-Waxler, Roth-Hanania & Knafo, 2013). For instance, one study found that new-born infants became distressed by audio recordings of other new-borns crying but were relatively unresponsive to their own (Dondi, Simion, & Caltran, 1999). Similarly, research which employed six month old infant pairs found that spontaneous distress in one infant generated increased attention and contact (leaning, gesturing or touching) from the other in the absence of personal distress (Hay, Nash, & Pederson, 1981).

Nevertheless, wider research suggests that the ability to accurately identify and respond to the emotional experiences of others develops markedly during a child's second year. For instance, one longitudinal study which assessed toddler's responses to distressing situations repeatedly at 13-15 months, 18-20 months and 23-25 months, observed a significant increase in their empathic concern and prosocial behaviours during their second year coupled with a significant decrease in their personal distress (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992).

Added to this, evidence from a wide range of studies suggests that affective empathy remains relatively stable across childhood whereas cognitive empathy increases in accordance with the development of theory of mind (TOM) which is commonly and reported in pre-schoolers from the age of four years (Bensalah, Callies, & Anduze, 2016). However, whilst cognitive empathy and TOM share common neural networks related to social perception, are closely related and commonly conflated, TOM is in fact a broader psychological construct than cognitive empathy, distinguished as the ability to infer the mental states, beliefs, goals and intentions of others, regardless of their emotional state (Bons et al., 2013; McInnis, 2014; Wang & Wang, 2015).

Crucially, meta-analytic research reported a weak association between TOM and prosocial behaviour in children (Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016). In contrast, cognitive and affective empathy are argued to play a key role in the generation of caring and helping behaviours and to facilitate positive social interactions (Eisenberg & Miller, 1987). For instance, longitudinal research which repeatedly assessed empathic concern, perspective taking and prosocial behaviour in a community cohort aged between 4-20 years found that higher levels of empathy and prosocial behaviour in childhood predicted greater prosocial tendencies in adulthood (Eisenberg et al., 1999).

Conversely, empathy deficits are associated with disruptive, oppositional behaviour, conduct disorder and early disregard for others in childhood. They are also considered to mediate the risk of antisocial behaviour and violence in adulthood and argued to be a core characteristic of violent, antisocial adult populations (Hunnikin, Wells, Ash, & van Goozen, 2020; Martin-Key, Brown & Fairchild, 2017; Miller & Eisenberg, 1988; Rhee et al., 2020; van Zonneveld, Platje, de Sonneville, van Goozen & Swaab, 2017).

Still, some contend that empathic arousal moderates the relationship between empathy and prosocial behaviour and argue that individuals with higher levels of personal distress are more likely to engage in self-oriented as opposed to other oriented behaviour in a bid to resolve personal discomfort (Decety & Lamm, 2009). In support of this view, violent offenders commonly self-report higher levels of personal distress than non-violent controls (Díaz-Galván, Ostrosky-Shejet, & Romero-Rebollar, 2015; Seidel et al., 2013), thereby highlighting the role of emotional dysregulation as a potential contributory mechanism for their lack of other-oriented empathic behaviour.

Nevertheless, research which employed both psychophysiological and self-report measures to examine autonomic arousal and empathy in violent offender populations with high trait psychopathy found

inconsistencies between low autonomic reactivity and self-reported empathy (Pfabigan et al., 2015).

Equally, although there is some evidence to suggest that individuals with psychopathy or high psychopathic traits exhibit cognitive as opposed to affective empathy deficits (Brook & Kosson, 2013) and are limited in their ability to accurately identify others' emotions and distress cues such as fear, sadness and disgust (Blair et al., 2004), psychopathy is more commonly associated with affective empathy deficits and a multitude of studies have found that psychopathic populations exhibit less personal distress and empathic concern when responding to empathy-inducing stimuli than non-psychopathic populations (Blair, Jones, Clark, & Smith, 1997; Jones, Happé, Gilbert, Burnett, & Viding, 2010; Seara-Cardoso & Viding, 2015).

Added to this, research that has employed electrophysiological, psychophysiological or neuroimaging measures to examine how psychopathic populations respond to emotive stimuli suggests they exhibit reduced autonomic reactivity and aberrant patterns of activity in brain regions associated with affective empathy and emotion processing (i.e., amygdala, orbitofrontal cortex [OFC], ventromedial prefrontal cortex [vmPFC], insula, anterior cingulate cortex [ACC]), an absence of fear conditioning and inability to form the stimulus-reinforcement associations

which Blair (2008) considers essential to empathy based learning (Birbaumer et al., 2005; Kiehl et al., 2001).

Still, Mayer, Jusyte, Klimecki-Lenz, & Schönenberg (2018) found no association between empathy and violence and whilst a systematic review and meta-analysis that explored the relationship between empathy and offending identified a significant positive association between cognitive empathy deficits and violent offending, the association was no longer evident once differences in intelligence and socio-economic status were accounted for (Jolliffe & Farrington, 2004).

1.7 *Moral Processing Deficits, Antisocial Behaviour and Violence*

Whilst traditional theories on moral development and behaviour adopted a rationalist approach, contemporary explanations for moral behaviour highlight the role of moral emotions (i.e., guilt, compassion, self-anger, other-anger) in promoting either prosocial and/or antisocial behaviour (Haidt, 2003). Other-anger for instance is recognised as a moral emotion that can motivate actions that ultimately benefit others (i.e. political activism) but which may also elicit a desire to attack or seek revenge against transgressors and is associated with both instrumental and reactive violence (Ohlsson & Ireland, 2011). Conversely, guilt deficits are commonly regarded as characteristic of antisocial and psychopathic populations and associated with higher rates of blame externalisation and aggression (Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010).

Psychopathy is also commonly associated with higher rates of utilitarian decision making in response to personal sacrificial moral dilemmas (i.e. greater willingness to sacrifice the life of one individual using direct physical contact in order to save the lives of many). However, whilst utilitarianist philosophy argues that the morally right action is the one that achieves the most good for the most people (Hoffman, 2000) and the dual process model (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001) argues that utilitarian moral decisions are determined predominantly through slower cognitive processing, one study found that utilitarian decisions made by an adult male community population were negatively associated with empathic concern and peer empathy but positively associated with callous affect, interpersonal manipulation and aggressiveness (Jack, Robbins, Friedman, & Meyers, 2014).

Added to this, Rota et al. (2016) highlighted evidence which suggests that gender differences exist in relation to the mechanisms that contribute to decision making for moral dilemmas. They found that although empathic concern and personal distress appeared to inhibit females from endorsing utilitarian action, higher endorsement of utilitarian solutions in males may be attributable to lower harm aversion which, in a real-world setting, could prevent inhibition of behaviours that involve harm to others and which are commonly considered to be morally unacceptable.

1.8 *Emotion, Empathic and Moral Processing Assessment Measures*

Crucially, a range of methods have been employed to examine how emotion, empathic and moral processing manifests across violent antisocial and control populations. Electrophysiological and psychophysiological measures of autonomic reactivity (i.e., electroencephalography [EEG], skin conductance response [SCR], startle response, heart rate, facial electromyography [EMG]), for instance, enable monitoring of autonomic responses to emotion eliciting stimuli (i.e., positively and/or negatively valenced images/videos; unexpected blasts of noise) that may occur without conscious awareness and a range of studies that have employed these measures have found evidence to suggest that psychopathic populations exhibit deficits in autonomic reactivity to emotion eliciting stimuli when compared to those who are non-psychopathic (Benning, Patrick, & Iacono, 2005; Blair et al., 1997). Behavioural paradigms such as facial emotion/perception tests/tasks that examine behavioural responses to emotion-eliciting or neutral stimuli enable an objective account of the relationship between emotion, empathic or moral processing and behaviour and have been similarly employed to examine whether differences exist between psychopathic/antisocial and control populations. Conversely, self-report questionnaires/Likert scales afford a subjective insight of individual differences in these constructs and remain the most popular method for researchers and clinicians examining the relationship between these

phenomena, antisocial behaviour and violence (Blair, 1999; Dolan & Fullam, 2006; Hoff, Beneventi, Galta, & Wik, 2009; Kosson, Lorenz, & Newman, 2006; Levenston, Patrick, Bradley, & Lang, 2000; Mauss & Robinson, 2009; Ogloff & Wong, 1990. Crucially however, a range of studies that have employed both objective and subjective measures have identified inconsistencies in outcomes which have led some to challenge the validity, reliability and suitability of self-report assessment measures with violent offender populations.

1.9 *Emotion, Empathic and Moral Processing Deficits in ASPD/DPD Populations with and without Co-Morbid Psychopathy*

Whilst a number of studies have found evidence to suggest that ASPD populations exhibit deficits in emotional and empathic processing which may impact upon their capacity to experience moral emotions and contribute towards aberrant moral decision making, some of these findings are based upon research with mixed male and female ASPD/DPD populations but do not delineate gender specific effects and so are limited in terms of their relevance to the wider ASPD/DPD population because a range of research has found evidence to suggest that emotion, empathic and moral processing may differ depending on gender. Crucially, females are generally more empathic than their male counterparts, more sensitive to emotion stimuli and able to accurately discriminate facial expressions of emotion. They are also more influenced by their emotions when making moral decisions and less likely to endorse utilitarian solutions to personal moral dilemmas than males (Fumagalli et al., 2010; Kret & De

Gelder, 2012; Mestre, Samper, Frias, & Tur, 2009; Rota et al., 2016; Saylik, Raman, & Szameitat, 2018).

Equally, other studies have employed ASPD/DPD populations who either meet the criteria for co-morbid psychopathy or who have not been assessed for co-morbid psychopathy and may therefore be confounded by undetected psychopathy effects. As psychopathy is widely associated emotion, empathic and moral processing deficits as outlined in previous sections (Sections 1.4-1.6), drawing inferences from findings that do not differentiate between these groups could have a detrimental impact on our understanding of the treatment needs of ASPD populations without co-morbid psychopathy. However, relatively few studies have compared emotion processing and empathy in ASPD/DPD populations with and without co-morbid psychopathy and heterogeneity in the methodological approaches employed by those that have prevents firm conclusions from being drawn about the nature and extent of deficits that are characteristic to ASPD alone.

2.0 THESIS AIMS AND OVERVIEW

The aims of this thesis are therefore to determine what emotion, empathic and moral processing deficits exist in adult male ASPD/DPD populations with and without co-morbid psychopathy, to determine the degree to which these ASPD/DPD groups may be differentiated in terms

of the deficits that they exhibit and to inform the relevance of these deficits to the antisocial, violent behaviour exhibited by these groups.

Chapter two describes a systematic review which explores what emotion processing and empathy deficits exist in adult male ASPD/DPD populations with and without co-morbid psychopathy and what overlap/differences are apparent in the deficits manifested by these groups. It incorporates an evaluation of the methodological quality of 22 studies that have utilised psychophysiological, behavioural and/or self-report approaches to examine emotion processing or empathy in these populations and is then followed by a discussion which synthesises the results of these studies, draws attention to methodological limitations that may impact upon the evidence offered by each and explores what the evidence from these studies suggests regarding factors that may mediate empathy deficits in ASPD/DPD populations. Research limitations are then outlined and recommendations for future research advised.

Chapter three describes cross-sectional research which employed a multi-modal approach incorporating both self-report and behavioural measures to assess emotion processing and empathy in 37 adult male patients with ASPD/DPD (with and without co-morbid psychopathy) and 19 adult male controls. The quantitative analysis and results for each measure are then outlined in detail and followed by a discussion and consideration of how results compare to the findings of previous research and what inferences

may be drawn about the relationship between emotion processing, empathy and violence in these groups. The limitations of this research and implications for practice are considered and recommendations for future research provided.

Chapter four builds upon chapter three by describing cross-sectional research which employed a multi-modal approach incorporating self-report and behavioural measures to explore whether the same patient and control populations would differ in their identification of moral emotions and endorsement of utilitarian decisions when presented with impersonal (non-contact) and personal (direct contact) sacrificial moral dilemmas. A detailed outline of the quantitative analysis and results from these measures is given and followed by an evaluation of how the findings from these measures compare to those reported by similar studies that have examined moral processing in psychopathic/antisocial populations, whether results are concordant with the dual process theory of moral decision making (Greene, 2001) and what they suggest about the relationship between moral processing and violent behaviour in ASPD/DPD groups with and without co-morbid psychopathy. The limitations of this research are then discussed and recommendations for future research provided.

Chapter five concludes with a psychometric critique of the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983b), a multi-dimensional empathy

assessment measure which has been widely employed as both a research and assessment tool with violent antisocial and psychopathic offenders. The chapter begins by examining the rationale for the tool's development and goes on to outline the psychometric properties of the measure with community populations before examining its utility and psychometric properties with violent offender populations. This is followed by a brief outline of alternative self-report empathy assessments and the chapter concludes with recommendations regarding the suitability of the IRI for use with offender populations and directions for further research.

CHAPTER TWO

DO ADULT MALES WITH ANTISOCIAL PERSONALITY DISORDER (ASPD) WITH AND WITHOUT CO-MORBID PSYCHOPATHY HAVE DEFICITS IN EMOTION PROCESSING AND EMPATHY? A SYSTEMATIC REVIEW

ABSTRACT

Background: *A lack of concern for the feelings, needs or suffering of others and lack of remorse after hurting or mistreating others are key characteristics of antisocial personality disorder (ASPD) and suggest that impaired emotion processing and empathy may contribute to antisocial behaviour. Whilst psychopathy is more commonly associated with an absence of empathy and emotional affect, the nature of emotion processing and empathy deficits specific to adult male ASPD populations with and without co-morbid psychopathy has not been systematically reviewed.*

Aim: *The aim of this systematic review was therefore to determine the nature of emotion and empathic processing deficits specific to adult male ASPD or dissocial personality disordered (DPD) populations with and without co-morbid psychopathy.*

Method: *A literature search was conducted across seven electronic databases and a range of grey literature sites. Reference lists of included papers were also hand searched and fourteen authors of published studies related to this topic were contacted for advice on suitable papers. Inclusion and exclusion criteria were applied and quality assessments undertaken on eligible studies.*

Results: *Searches located 10,217 records and 205 were fully assessed. 22 were identified as suitable for inclusion in this review and 19 reported evidence of emotion processing deficits in ASPD/DPD groups with and without co-morbid psychopathy.*

Conclusion: *This review found no evidence of empathy deficits in ASPD/DPD groups with or without co-morbid psychopathy and only limited evidence of diminished startle reactivity in those with ASPD alone. In contrast, ASPD groups with co-morbid psychopathy were found to exhibit aberrant patterns of affective reactivity and difficulty when processing negative/aversive stimuli which lends support to the notion that these groups may be differentiated in terms of emotional dysfunction. However, as the majority of reviewed studies employed ASPD/DPD groups that included participants with co-morbid psychopathy/psychopathic traits and did not delineate effects for ASPD/DPD groups with and without co-morbid psychopathy, the degree to which emotion processing deficits were mediated by co-morbid psychopathy or evident in ASPD/DPD alone could not be established and further research to compare emotion processing and empathy in both groups is required before firm conclusions can be drawn about the extent of overlap between these populations and/or the differences that exist between them.*

Keywords: *Facial emotion recognition, psychophysiological, self-report*

1.0 INTRODUCTION

Indifference to the feelings, needs or suffering of others and an absence of remorse after hurting or mistreating others are key criteria for a diagnosis of ASPD in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5; APA, 2013) and similar to those identified for Dissocial Personality Disorder (DPD) as defined in the International Classification of Diseases - Tenth Edition (ICD-10; WHO, 1993). ASPD is prevalent within prison and psychiatric populations and estimates suggest that almost 50% of the UK prison population have a diagnosis of ASPD compared to just 4% of the general population. ASPD is also widely associated with violent offending and high rates of recidivism (Moeller & Dougherty, 2001; National Institute for Health and Care Excellence [NICE], 2009; Shepherd, Campbell, & Ogloff, 2018; Stone, 2007). Still, epidemiological research found that only 47% of those who met the criteria for ASPD in the community had significant arrest records (Robins, Tipp, & Przybeck, 1991) and ASPD is recognised as a heterogeneous disorder which some contend may be better understood in terms of sub-types differentiated by the presence or absence of specific personality and psychopathic traits (Poythress et al., 2010).

Consistent with this view, some evidence suggests that populations with ASPD and co-morbid psychopathy have significantly lower grey matter volumes in brain regions associated with empathy, moral reasoning and

the processing of emotions such as guilt and embarrassment than those with ASPD alone (Gregory et al., 2012).

Whilst psychopathy is conceptually similar and regarded by many as a more severe form of ASPD associated with increased levels of violence and recidivism (Coid & Ullrich, 2010), it is a distinct disorder which is not classified as a mental disorder according to DSM-V (APA, 2013) criteria but assessed through a range of clinical and self-report diagnostic tools, the gold standard of which is the Psychopathy Checklist Revised (PCL-R; Hare, 1991). Psychopathy is less prevalent than ASPD and evident in <10% of remanded and/or sentenced male and female prisoners in England and Wales. Furthermore, the co-morbidity between psychopathy and ASPD is asymmetric as whilst a high proportion of those assessed as psychopathic would also meet the criteria for ASPD, only 10% of those with ASPD would meet the criteria for psychopathy (Coid et al., 2009; Motz et al., 2015; NICE, 2009). Whilst antisocial traits are inherent in both psychopathy and ASPD, psychopathy is widely recognised as a two-dimensional disorder, consisting of factor 1 (affective/interpersonal) traits characterised by emotional dysfunction, reduced guilt, empathy and attachment to significant others and factor 2 (lifestyle/antisocial) traits related to antisocial behaviour, impulsivity and poor behavioural control (Seara-Cardoso, Dolberg, Neumann, Roiser, & Viding, 2013). Furthermore, emotional dysfunction is commonly regarded as the characteristic which differentiates those with psychopathy from those with

ASPD (Sarkar, Clark, & Deeley, 2018) and numerous studies have identified emotion processing and empathy deficits in psychopathic populations (Blair, Jones, Clark, & Smith, 1997; Brook & Kosson, 2013).

The Perception-Action model of empathy (PAM; Preston, 2007; Preston & de Waal, 2002) argues that empathy relies not only on an individual's ability to attend to, perceive and activate personal representations of a state similar to that of another (the target) but also their ability to generate an emotional response that is appropriate to that state. According to this view, emotion processing occurs when an emotionally salient stimulus triggers activity throughout a complex and associative neural network that governs how stimulus is perceived, evaluated and interpreted at an unconscious (implicit) and/or conscious (explicit) level, with physiological, psychological and behavioural consequences (Newman & Lorenz, 2003). It is essential to the generation of empathy which although broadly defined is recognised as a multidimensional construct incorporating both cognitive (related to perspective taking) and affective (related to emotional contagion) dimensions and regarded by many as a driver for prosocial behaviour (Decety, Bartal, Uzefovsky, & Knafo-Noam, 2016; Marshall & Marshall, 2011). Consequently, a number of studies have found that individuals with traumatic brain injury (i.e., to areas such as the amygdala, orbitofrontal and ventromedial cortex) or aberrant neural connectivity exhibit a range of difficulties, including deficits in facial emotion recognition, autonomic reactivity to emotion stimuli, emotion

regulation and empathy (Blair, 2013; Carballedo et al., 2011; Decety, Skelly, Yoder, & Kiehl, 2014; Genova et al., 2015; Williams & Wood, 2012).

1.1 *Measures of Emotion Processing and Empathy*

Facial expressions play a key role in modulating interpersonal behaviour and eliciting empathy (Dadds, Cauchi, Wimalaweera, Hawes, & Brennan, 2012; Seidel et al., 2013) because emotion recognition is intrinsic to the processing of emotion-related information during social interactions. Moreover, emotion recognition deficits are commonly associated with impaired perspective taking (Morosan et al., 2017) and some contend that impaired perspective taking may be an indirect mechanism through which fear recognition deficits contribute to problems with social interaction (Trubanova et al., 2016).

Facial emotion recognition tasks are therefore commonly employed as a means identifying the relationship between impaired facial emotion recognition and psychopathology and require participants to identify basic facial emotions from photographs or computer-generated images that are either static, combined (i.e. two emotions merged) and displayed at variable intensity or morphed from a neutral expression to an emotion expression over a fixed time-span, with responses measured in terms of recognition accuracy and/or latency. However, some contend that emotion recognition varies according to how emotions are presented as

composite images (averaged from multiple individuals) and morphed images provide more information about the target emotion and require a more complex level of emotion processing than static stimuli (Brook, Brieman, & Kosson, 2013). Moreover, static or extreme prototypical facial expressions are considered to have limited ecological validity (Adolphs, 2002).

Psychophysiological and electrophysiological measures (i.e. skin conductance response [SCR], startle blink reflex or event related potentials [ERP]) are argued to provide a reliable and objective account of emotion processing because they measure autonomic arousal and are not subject to social desirability.

SCR represents the electro-dermal activity (EDA) or electrical properties of the skin, which increase when an individual is physiologically aroused by emotive stimuli. It is determined through measurement of the electrical flow between two points of skin contact and informs implicit emotional responses that occur without conscious awareness (Braithwaite, Watson, Jones, & Rowe, 2015). SCR is commonly utilised to measure the intensity of an emotional response and can inform the degree to which an individual is able to generate personal representations of an object's state. Moreover, in accordance with meta-analytic research which highlighted low electrodermal activity (EDA) in psychopathy (Lorber, 2004), reduced arousal in anticipation of punishment or aversive

stimuli is widely considered to be indicative of impaired fear/aversive conditioning which some contend is characteristic of psychopathic populations (Blair, 2013).

The startle reflex is an uncontrolled physiological and defensive brainstem response generated within 30-50ms of abrupt and intense stimulation and modulated (attenuated or potentiated) by attention and emotion (Lang, Bradley, & Cuthbert, 1990; Sabatinelli, Bradley, & Lang, 2001).

Affective modulation of the startle reflex is a non-invasive method whereby participants have sensors attached to their eye muscles to measure changes in their startle magnitude as they view affective (pleasant, neutral and negative) images and are subjected to startle stimuli (e.g. a blast of white noise) at time-lapsed intervals that vary in length (startle onset asynchrony [SOA]). When startle stimulus is presented within 300-500ms of viewing affective images, startle magnitude is usually attenuated irrespective of the emotional context because attentional information processing antagonises the processing of noise probes. Alternatively, if presented at later intervals (i.e., >1300ms), startle magnitude is generally potentiated when startle stimulus is presented in a context that promotes a negative emotional state (whilst viewing negative/aversive images) and attenuated when presented in a context that promotes a positive emotional state (i.e., whilst viewing pleasant images). Consequently, affective startle

modulation is commonly employed as a measure of valence, can inform the direction of an emotional response, response matching and emotion contagion (Bradley, Codispoti, & Lang, 2006; Lang, 1995; Loomans, Tulen, & Van Marle, 2015; Patrick, Bradley, & Lang, 1993; Neumann & Westbury, 2011).

Event related potentials or ERP (i.e., late positive P300 component or P450 wave) are small voltages elicited as the brain responds to specific sensory, cognitive or motor events, measured through electrodes positioned around the scalp. They provide an accurate and non-invasive measure of otherwise unobservable cognitive processing and are used to investigate affective responses to a range of emotional stimuli (Orozco & Ehlers, 1998). For instance, a range of studies have employed ERP to examine the influence of unconscious perceptual processes on emotion recognition and found that specific ERP components prioritise the attentional processing of emotion expressions when compared to positive or neutral expressions. ERP reactivity is also highly sensitive to changes in the valence and arousal levels generated by alternative types of emotion eliciting stimuli (i.e., emotion sounds/words; affective images) as attentional resources are more commonly allocated to unpleasant when compared to pleasant and neutral stimuli (Ding, Li, Wang, & Luo, 2017).

However, neither psychophysiological nor electrophysiological measures can specifically identify emotions vicariously felt or offer the insightful

account of an individual's conscious experience of emotions provided by self-report measures.

Self-report measures, such as the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983) or Hogan's Empathy Questionnaire (HEQ; Hogan, 1969) have been widely used to measure empathy in both offending and non-offending populations (Casey, Rogers, Burns, & Yiend, 2013; Dolan & Fullam, 2004; Pfabigan et al., 2015). They are advantageous because they are cheap, quick to complete, can be applied across larger populations and used to measure multiple dimensions of empathy. Nevertheless, a substantial body of evidence suggests they are unreliable due to their subjectivity, vulnerability to response bias, low validity and inter-correlations (Boyle, Saklofske, & Matthews, 2014; Neumann & Westbury, 2011). Therefore, findings generated through self-report measures should be interpreted with caution and ideally in conjunction with the results of measures (i.e., behavioural/psychophysiological) that enable a more objective, reliable and ecologically valid assessment of this construct.

Crucially however, whilst none of the methodological approaches employed to determine how emotion processing and empathy deficits manifest in ASPD are without disadvantage, clarifying this link has important implications for our understanding of the mechanisms that

underlie antisocial behaviour and for treatment aimed at reducing violent offending.

1.2 Aims

Although a review by Rogstad and Rogers (2008) examined emotion processing and empathy deficits in ASPD, it did not specifically focus on this population or on males but reviewed evidence for emotion processing deficits in both males and females diagnosed with either ASPD and/or psychopathy. Whilst the authors concluded that emotion processing and empathy deficits varied between male and female offenders and particularly between those diagnosed with ASPD or classified as psychopathic, they also acknowledged a dearth in research studies comparing these populations and proposed that further research to examine emotion processing and empathy deficits in ASPD and psychopathy would be valuable in differentiating between these two disorders. Added to this, whilst a meta-analysis examining facial emotion processing deficits in antisocial groups reported a robust link between antisocial behaviour and deficits in the recognition of fearful facial affect (Marsh & Blair, 2008), results were based upon mixed samples of male/female and adult/adolescent participants and did not specifically examine evidence from studies of adult males with a formal diagnosis of ASPD/DPD.

The aim of this systematic review is therefore to update and expand upon previous reviews/meta-analyses by evaluating and synthesising current literature that has examined emotion processing and empathy in adult male ASPD/DPD populations with and without co-morbid psychopathy and determine what impairment that is manifest within these groups.

As the PAM (Preston, 2007; Preston & de Waal, 2002) contends that emotion processing (i.e., perception, autonomic arousal, conditioning) represents the earliest stage of the empathic process, this review evaluated evidence from studies that have examined these phenomena (i.e., through psychophysiological, self-report and behavioural approaches such as SCR; affective startle modulation, ERP; fear conditioning; facial emotion recognition; psychometric assessment) as well as those that have examined the subsequent manifestation of affective empathy (i.e., through psychometric evaluation of self-reported personal distress, empathic concern) and cognitive empathy (through psychometric evaluation of perspective taking ability and tendency to fantasize or project into the feelings and actions of others) in ASPD and control populations. The rationale for this being that identification of the differences manifest between these groups could help to inform the relationship between emotion/empathic processing deficits and behaviour and ensure that intervention strategies designed to address emotion processing/empathic deficits in ASPD populations are more effectively able to target and address early/later stage and dimension specific

impairment (Weisz & Zaki, 2017). Equally, in view of the advantages and disadvantages associated with approaches employed to assess emotion and empathic processing, incorporating studies that have employed a range of measures will enable this review to determine the consistency with which deficits in these phenomena are identified.

In addition, whilst there is significant overlap between ASPD/DPD and psychopathy, they are not synonymous and some individuals with psychopathy do not meet the criteria for ASPD/DPD (Abdalla-Filho & Vollm, 2020; Anton, Baskin-Sommers, Vitale, Curtin, & Newman, 2012; Lilienfeld, Latzman, Watts, Smith, & Dutton, 2014). Therefore, as this review aimed to establish what emotion and empathic processing deficits exist in ASPD/DPD, research which employed psychopathic populations without a confirmed diagnosis of ASPD/DPD were excluded on the basis that their contribution to this topic was unclear and studies were only selected for inclusion if they had employed populations with a confirmed DSM IV/V diagnosis of ASPD or ICD-10 diagnosis of DPD who a) were assessed for but did not meet the criteria for psychopathy (ASPD-P), b) included some participants with co-morbid psychopathy or participants that were not assessed for and may therefore have had undetected co-morbid psychopathy (ASPD +/-P) or c) were assessed for and fulfilled the criteria for psychopathy (ASPD+P)[2].

[2] Where studies employed Dissocial PD populations, these will be specified as DPD-P (where Dissocial PD group/s did not meet criteria for co-morbid psychopathy), DPD+/-P (for Dissocial groups that included some participants with and some without co-morbid psychopathy or where participants were not assessed for co-morbid psychopathy) or DPD+P (where Dissocial PD groups were assessed and met criteria for co-morbid psychopathy)

Examining the deficits that exist in these groups is an important area of focus as clarification regarding the emotion processing and empathic deficits evident in ASPD/DPD populations with and without co-morbid psychopathy would be beneficial in informing the extent to which these constructs differ or overlap. Furthermore, by focussing purely on male ASPD/DPD populations, this review also hopes to add to the current literature regarding the underlying causal mechanisms for the disproportionately high levels of violence that are more evident in males with ASPD/DPD than in females with ASPD/DPD.

2.0 METHOD

This review employed a systematic approach as described in Petticrew and Roberts (2006) and the selection process was undertaken in accordance with PRISMA guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.1. Inclusion/Exclusion Criteria

Table 1: Inclusion/Exclusion Criteria

	Inclusion	Exclusion
Population	Adult (aged 18+) males with a diagnosis of ASPD (as defined by DSM IV/V) or DPD (as defined by ICD-10).	Children, female only samples, mixed samples where results relating to sub-groups of interest cannot be extracted, ASPD or DPD populations with >15% definite diagnosis of co-morbid major mental illness (i.e., schizophrenia or bipolar disorder
Measures of Emotion Processing and Empathy	Self-report, psychophysiological and behavioural measures that provide quantitative data (self-report scores, facial emotion recognition accuracy or latency, SCR or startle blink amplitude)	Tools not designed for the assessment of emotion processing or cognitive/ affective empathy, methods that provide qualitative data only
Comparator	Adult male controls (aged 18+) with no diagnosis of ASPD or DPD.	Adult (aged 18+) males with a diagnosis of ASPD or DPD, mixed samples where adult male sub-group data cannot be extracted, adult male populations with >15% definite diagnosis of major mental illness (i.e., Schizophrenia or Bi-Polar Disorder), studies without a control group
Study Design	Observational study, cohort or cross-sectional design	Case-series of reports, qualitative studies, reviews or other non-empirical reports
Other Considerations	Empirical research published post-1980 (when ASPD was first introduced into DSM-III), studies from all countries and in all languages, published or grey literature.	Empirical studies dated pre-1980

2.2. Information Sources

The following sources were searched:

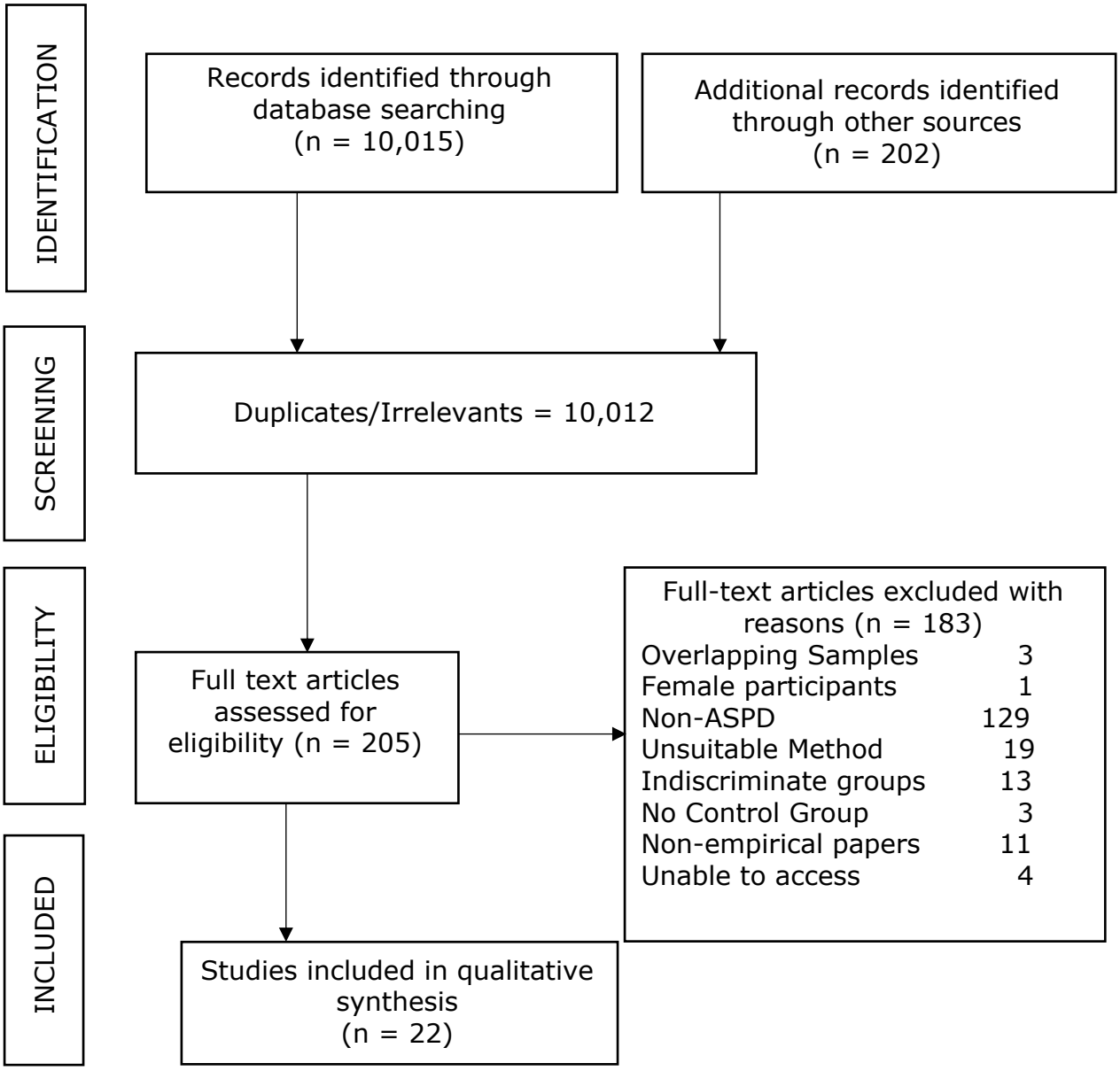
1. Electronic bibliographic databases (06-07/07/16; 05-13.02.19):

   Psychinfo; MEDLINE; Embase; Applied Social Sciences Index and Abstracts (ASSIA); Web of Science; Scopus; Pro-quest International Dissertations and E-theses

2. Theses/Unpublished literature sources (13-17/07/16; 18-19/02/19): DART-EUROPE; Educational Resource Information Centre (ERIC); National Criminal Justice Reference Service (NCJRS); The British Library UK/E-theses online service (EThOS);
3. Other sources (13.07.16; 19.02.19): Cochrane Library
4. Search Engines (09.07.16; 18.02.19):

   The first 200 hits from search engines Google; Google Scholar; Yahoo

Fig. 1 The Selection Process (Following PRISMA guidelines, Moher et al, 2009)



Additional search techniques undertaken:

a) Reference List Searching: The reference lists of all papers considered suitable for inclusion were hand searched to identify further suitable studies.
b) Contact with authors/experts: 14 published authors/experts were identified through a literature review of studies examining emotion processing or empathy and contacted to determine if they were aware of any unpublished or recently published papers that may be relevant to this review. A total of 8 responses were received.

2.3. Search Terms

The same search terms were applied across all databases with adjustments made to accommodate the specific requirements of search sites where required (Appendix 4).

2.4. Study Selection

References were excluded where title/abstracts indicated no relevance to the topic explored and where it was clear that inclusion/exclusion criteria (see above) were not met. For all cases where the relevance or inclusion/exclusion of the reference was not clear, papers were assessed in full to determine suitability and authors contacted in cases where there was potential for sample overlap.

2.5. Data Extraction

A data extraction pro-forma was utilised for recording information relevant to the study design, sample demographics, mediating variables, data analysis and main results (Appendix 5).

2.6. Critical Appraisal of Study Quality & Risk of Bias

A cross-sectional study quality appraisal form was designed following a review of published appraisal tools including: Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; Vandenbroucke et al., 2007); Critical Appraisal Skills Programme Case Control and Cohort Study Checklists (CASP, 2014a, 2014b). Adaptation of these tools aimed to improve clarity of quality assessment through incorporation of items that had direct relevance to the population and phenomena under review (i.e., 'Was the ASPD group representative of wider ASPD population?'; 'Are outcome measures appropriate to the measurement of empathy/emotion processing?'). It also enabled a structured and standardised approach to scoring risk of sampling, attrition, measurement and statistical bias with each item rated along a three-point Likert scale (Yes = 2, Not clear/Partial Info = 1, No = 0) (Appendix 6). An independent quality appraisal was then completed for 18% of the studies after which discrepancies were discussed and resolved.

2.7. Data Synthesis

As the included studies provided limited data on emotion processing and empathy in ASPD/DPD-P and ASPD/DPD+P groups, a meta-analysis was considered inappropriate and a narrative synthesis was undertaken.

3.0 RESULTS

3.1. Literature Search

The combined electronic bibliographic database search produced 10,015 hits and a further 202 references were located via additional sources (grey literature, web and reference-list searches, contact with authors/experts). The elimination of duplicate and irrelevant references reduced this number to 205 full-text articles to be assessed, four of which were unobtainable. Of the remaining 201 papers, 179 were excluded on the basis that they failed to meet the minimum inclusion criteria for this review leaving 22 papers suitable for inclusion.

3.2. Characteristics of Included Studies

All studies adopted a cross sectional design and the total number of participants for included studies was n = 2,025 although only data for the population of interest (n = 1,718) contributed to this review. See Table 2 for details of study characteristics.

Table 2: Study Characteristics

Authors	ASPD/DPD GROUP			CONTROL GROUP		TYPE OF MEASURE USED			COUNTRY			
	Hospital or secure psychiatric facility	Prison	Community	Prison or secure psychiatric facility	Community	Behavioural	Self-report	Psychophysiological /Electrophysiological	Europe	USA	South America	Asia
Bagcioglu et al (2014)	✓				✓	✓						✓
Barbosa et al (2015)		✓			✓	✓			✓			
Bertone et al (2017)		✓		✓		✓					✓	
Dinn and Harris (2000)			✓		✓		✓	✓		✓		
Dolan and Fullam (2006)	✓	✓			✓	✓			✓			
Domes et al (2013)	✓	✓		✓	✓	✓			✓			
Drislane et al (2013)		✓		✓				✓		✓		
Habel et al (2002)	✓				✓	✓			✓			
Jusyte et al (2015)		✓			✓	✓			✓			
Levenston et al (2000)		✓		✓			✓	✓		✓		
Loomans et al (2015)	✓				✓			✓	✓			
Lorenz and Newman (2002)		✓		✓		✓				✓		
Miranda et al (2003)			✓		✓		✓	✓		✓		
Rothemund et al, 2012			✓		✓		✓	✓	✓			
Sayer et al (2001)	✓				✓		✓					✓
Schiffer et al (2017)	✓	✓			✓	✓	✓		✓			
Schonenberg et al (2013)		✓			✓	✓			✓			
Schonenberg et al (2014)		✓			✓	✓			✓			
Sedgwick (2017)	✓				✓	✓		✓	✓			
Shamay-Tsoory et al (2010)		✓			✓		✓					✓
Vaidyanathan et al (2011)		✓		✓				✓		✓		
Vitale et al (2018)		✓		✓		✓				✓		

3.3. Quality of Included Studies

Studies were assessed and scored for sampling, attrition, measurement and statistical bias. They were then categorised as low risk (LR), unclear risk (UR) or high risk (HR) for different types of bias according to scores given (Table 3).

Table 3: Scoring for Risk of Bias

TYPE OF BIAS	MAXIMUM SCORE	LOW RISK	UNCLEAR RISK	HIGH RISK
Sampling	12	9-12	5-8	0-4
Attrition	4	4	2-3	0-1
Measurement	12	9-12	5-8	0-4
Statistical	10	8-10	4-7	0-3

The inter-rater reliability of quality appraisal was calculated using a 2-way mixed intra-class correlation co-efficient and agreement ranged from ICC .767 - .935 which is considered to be excellent (Cicchetti & Sparrow, 1981). The mean total quality score for included studies was *M = 29.64* out of a possible 46 and none of the studies were rated as low risk across all categories (Table 4). A detailed breakdown of the quality assessment findings further outlines why sampling bias was identified as the primary area of high risk (Appendix 7-8).

Table 4: Quality Assessment Scores Overview

Author	Sampling Bias	Attrition Bias	Measurement Bias	Statistical Bias
Bagcioglu et al, 2014				
Barbosa et al, 2016				
Bertone et al, 2017				
Dinn et al, 2000				
Dolan et al, 2006				
Domes et al, 2013				
Drislane et al, 2013				
Habel et al, 2002				
Jusyte et al, 2015				
Levenston et al, 2000				
Loomans et al, 2015				
Lorenz et al, 2002				
Miranda et al, 2003				
Rothemund et al, 2012				
Sayer et al, 2001				
Schiffer et al, 2017				
Schonenberg et al, 2013				
Schonenberg et al, 2014				
Sedgwick, 2017				
Shamay Tsoory et al, 2010				
Vaidyanathan et al, 2011				
Vitale et al, 2018				

GREEN = LOW RISK OF BIAS **ORANGE = UNCLEAR RISK OF BIAS** **RED = HIGH RISK OF BIAS**

Table 5: Study Methodology and Outcome

BEHAVIOURAL MEASURES (FACIAL EMOTION RECOGNITION)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Bagcioglu et al. (2014)	Turkey	Facial emotion recognition task with computer-generated stimuli presentation and multiple-choice response format (*n* = 7 emotion options)	55 adult male offenders recruited from a forensic military hospital incl. 21 with ASPD and 34 with ASPD/ADHD. 39 adult male community controls	APSD/Controls: <18 or >65, Axis I disorder (i.e., substance dependence), intellectual disability, visual problems, chronic medical condition, current use of pharmacologic agents	56 digitised static photographs of emotion expressions from Ekman & Friesen series (Ekman, 1999) incl. happy, sad, fear, disgust, anger, surprised and neutral	Emotion recognition deficits in ASPD+/-P: ASPD+/-P significantly less accurate when identifying disgust and significantly slower than controls when identifying disgust and neutral expressions. ASPD+/-P with ADHD significantly less accurate than controls when identifying disgust and significantly slower than controls to identify all emotions.
Bertone, Díaz Granados, Vallejos, and Muniello (2017)	Argentina	Complex facial emotion recognition tasks with computer generated stimuli presentation and multiple choice response format (*n* = 4 emotional state options)	57 adult male offenders recruited from a local prison incl. 17 with ASPD and 20 controls[a]	ASPD/Controls: Medical or neurological disease, those exhibiting simulation, intellectual disability. Controls only: ASPD or Psychosis	36 static images from the revised Reading the Eyes in the Mind Test (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) and 50 videos of facial emotions from the Cambridge Mind Reading Face-Voice Battery (CAM; Golan, Baron-Cohen, & Hill, 2006)	Emotion processing deficits in ASPD+/-P: ASPD+/-P significantly less able to accurately identify complex facial emotions from static pictures or videos than controls
Dolan and Fullam (2006)	UK	Facial emotion recognition task with computer generated stimuli presentation and multiple-choice response format (*n* = 7 emotion options)	49 adult male offenders with DPD, recruited from a high secure hospital and a local prison incl. 27 without and 22 with co-morbid psychopathy. 49 adult male controls recruited from local university	DPD: Axis I disorder incl. affective disorder and schizophrenia, learning disability, significant head injury, current use of psychotropic medication. Controls: same + historical drug/alcohol use, current use of medication	96 morphed photographs of emotion expressions from Ekman & Friesen standardised battery (Ekman & Friesen, 1976) incl. anger, disgust, fear, sad, happy, surprised and neutral	Emotion recognition deficits in DPD+/-P: DPD+/-P significantly less accurate than controls in recognition of 'sad', 'happy' and 'surprised' faces' (surprised at <100% intensity only) and had significantly longer mean response latencies for all emotion expressions than controls
Habel, Kuhn, Salloum, Devos, and Schneider (2002)	Germany	Facial emotion discrimination task with 7-point bipolar intensity scale (1=extremely happy - 7=extremely sad)	17 adult male offenders with ASPD and PCL-R scores between 20 and 37 recruited from prison/forensic treatment facilities. 17 adult male controls recruited by advertisement	ASPD: neurological or psychiatric co-morbidity (except substance abuse). Controls: history of psychiatric disorder, psychopathological symptoms	40 slides of static emotions from Penn facial discrimination Test (Erwin et al., 1992) incl. 10 x happy, 10 x sad and 20 x neutral	Emotion recognition deficits in ASPD+/-P: ASPD+/-P significantly less overall discrimination accuracy than controls

BEHAVIOURAL MEASURES (FACIAL EMOTION RECOGNITION) CONT'D						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Schiffer et al. (2017)	Germany	Complex facial emotion recognition with computer generated stimuli and dichotomous response options (i.e., which of two words best described emotional state presented)	47 adult male violent offenders incl. 18 with ASPD. 36 adult male non-offenders incl. 18 controls[b]	ASPD: No major mental disorder. Controls only: No DSM-IV diagnosis other than historical substance misuse disorders	36 static images of the upper part of the face (eyes and brows) from the revised Reading the Eyes in the Mind Test (RMET; Baron-Cohen et al., 2001)	No emotion processing deficits in ASPD-P: No significant difference in RMET error rates of ASPD-P and control groups.
Schonenberg, Louis, Mayer, and Jusyte (2013)	Germany	Facial emotion recognition with computer-generated images and multiple-choice response format (*n* = 3 emotion options)	32 adult male ASPD from two correctional facilities. 32 adult male controls recruited by advertisement	ASPD: Borderline PD, schizophrenia Controls: Psychopathology, criminal offending	72 morphed digitised colour photographs of emotion expressions incl. anger, happy and fear from Karolinska Directed Emotional Faces database (KDEF; Lundqvist, Flykt, & Ohman, 1988), presented at 51 intensity levels ranging from 0% to 100%	Emotion processing deficits in ASPD+/-P: ASPD+/-P required significantly higher levels of emotion intensity to accurately recognise angry expressions than controls
Schonenberg and Jusyte (2014)	Germany	Facial emotion recognition with computer-generated images and multiple-choice response format (*n* = 3 emotion options)	55 adult male ASPD recruited from a correctional facility including 6 with co-morbid major depression or dysthymia. 55 adult male controls recruited from local vocational schools	ASPD: Borderline PD, schizophrenia, mental retardation Controls: Historical/current psychiatric morbidity	180 morphed pictures of combined emotion expressions of variable intensity (ratio = 90:10, 70:30, 50:50, 30:70) from Radboud Faces database (Langner et al., 2010) incl. fear:anger, anger:happy and happy:fear	Emotion processing deficits in ASPD+/-P: ASPD+/-P significantly more 'angry' responses than controls for angry/fearful dimensions at maximal ambiguity (50:50 ratio) ASPD+/-P significantly more 'angry' responses than controls for angry/happy dimensions at maximal (50:50 ratio) and high (30:70 ratio) ambiguity
Sedgwick (2017)	UK	Facial emotion recognition with computer generated stimuli presentation and multiple-choice response format (*n* = 5 emotion options) Facial emotion discrimination with computer generated stimuli presentation and dichotomous response options (i.e., which of two emotion images was more intense)	58 adult male patients recruited from high secure hospital incl. 17 with DPD (some with, some without co-morbid psychopathy). 30 adult male controls recruited from hospital employees[c]	DPD: history of traumatic brain injury, impaired uncorrected vision or hearing, clinically unstable, imminent risk of violence Controls: history of mental disorder or traumatic brain injury, impaired/uncorrected vision or hearing	Emotion Perception Task: 60 static images of emotion expressions (anger, fear, sad, happy, neutral) of either 50% or 100% intensity from Ekman & Friesen standardised battery (Ekman & Friesen, 1976) Emotion Discrimination Task: 64 pairs of static images of emotion expressions (*n* = 16 x anger, fear, sad and happy) presented at unequal intensity (0%, 25%, 50%, 75%, 100%) (Ekman & Friesen, 1976)	Emotion processing deficits in DPD+/-P: No significant difference in emotion perception accuracy or latency of DPD+/-P and control groups DPD+/-P significantly lower overall discrimination accuracy than controls and significantly less accurate when distinguishing intensity of anger and fear expressions than controls. No significant difference in discrimination latency between DPD+/-P and control groups

BEHAVIOURAL MEASURES (OTHER)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Barbosa, Almeida, Ferreira-Santos, and Marques-Teixeira (2016)	Portugal	Signal detection task with computer generated stimuli presentation/Likert scale ratings of arousal/valence (1=lowest/most unpleasant – 9=highest/most pleasant)	38 adult male offenders with ASPD, recruited from two local prisons 30 adult male controls recruited from prison staff, university staff and friends	ASPD: mental or neurological illness, history of substance dependence, sensory dysfunction, first time offenders. Controls: History of offending	120 static pictures from International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997), divided across 6 levels of arousal and valence intensity (low-high) + Self-Assessment Manikin (SAM; Bradley & Lang, 1994)	Emotion processing deficits in ASPD+/-P: ASPD+/-P significantly higher ratings of arousal but less sensitive to changes in arousal levels of stimuli (low-high) than controls. ASPD+/-P modified arousal/higher valence responses at significantly lower signal intensity than controls
Domes, Mense, Vohs, and Habermeyer (2013)	Germany	Emotional stroop task with computer generated presentation of congruent and incongruent stimuli (i.e., target word same or different ink colour to colour word) and dichotomous response option (i.e., whether ink colour of target word and colour words match/do not match)	69 adult male offenders recruited from a German prison and psychiatric hospital incl. 35 with ASPD and 34 non-ASPD. Offenders divided into sub-groups according to PCL-R scores: 11 high (>25), 35 medium (16-24), 23 low (0-15). 24 adult male controls recruited from university	Offenders: aged >70, lifetime diagnosis of schizophrenia, ADHD, bipolar affective disorder, major depression, dysthymia, neurological disorder, chromosomal anomaly, colour-blindness, dyslexia, IQ below 70. Controls: same + convictions	120 trials incl. 72 neutral, negative and violence related words matched on word length + 48 buffer trials (rows of x = target)	Emotion processing deficits in ASPD+/-P: ASPD+/-P significantly more attentional bias (longer response latency) for congruent violence-related and negative words than controls but no significant difference between offender groups with/without ASPD+/-P
Habel et al. (2002)	See Above	Mood induction task with self-report ratings of agreement for *n* = 10 x positive and 10 x negative statements (5-point unipolar intensity scale)	See above	See above	40 sad/happy mood induction probes (Weiss, Salloum, & Schneider, 1999), Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988)	No emotion processing deficits in ASPD+/-P: No significant group difference in agreement ratings of ASPD+/-P and controls following mood induction task
Jusyte, Mayer, Kunzel, Hautzinger, and Schonenberg (2015)	Germany	Continuous flash suppression task with computer generated stimuli presentation and multiple-choice response options (location of target emotion = top, bottom, left or right of screen)	26 adult male offenders with ASPD, recruited from a German correctional facility including 8 with co-morbid substance/alcohol dependency. 24 adult male controls recruited from local vocational school	ASPD: Schizophrenia, intellectual disability, drug-related crimes, domestic violence or sexual assault; insufficient knowledge of German language. Controls: historical/current psychiatric comorbidity	224 trials involving presentation of frontal affective pictures from Radboud Faces database (Langner et al., 2010) incl. neutral, angry, happy, fearful, disgusted, surprised and sad. Coloured high-contrast Mondrian-like mask stimuli (Matlab psychophysics toolbox)	Emotion processing deficit in ASPD+/-P: Significant negative correlation between Inventory of Callous Unemotional Traits unemotional subscale scores (ICU; Essau, Sasagawa, & Frick, 2006) and processing of fearful expressions in ASPD+/-P but not controls No significant group differences or associations identified in relation to early processing of angry, happy, disgusted, surprised or sad expressions

BEHAVIOURAL MEASURES (OTHER) CONT'D						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Lorenz and Newman (2002)	United States	Lexical decision-making task with computer generated stimuli presentation and dichotomous response option (whether stimuli presented is a word or non-word)	409 adult male/female offenders rom correctional institutions incl. 155 adult males with ASPD and 94 adult male non-ASPD controls. All participants assessed for psychopathy[d]	ASPD/Controls: > 45 years, scored below fourth grade level on prison achievement tests, estimated WAIS-R scores of <70 on Shipley Institute of Living Scale (SILS; Zachary & Shipley, 1986)	12 positive words, 12 negative words, 24 neutral words and 48 non-words presented in four experimental blocks.	No emotion processing deficits in ASPD+/-P: No significant difference in accuracy or latency of emotion facilitation between ASPD+/-P and control groups
Sedgwick (2017)	See above	Joystick Operated Runway Task JORT) with computer generated stimuli and force sensitive joystick measure of fear and anxiety	38 adult male patients recruited from high secure hospital incl. 10 with DPD (with and without co-morbid psychopathy). 30 adult male controls recruited from hospital employees[e]	See above	48 trials involving presentation of dot stimulus (representing subject + pursuers) incl. 24 x one-way active avoidance (12 with and 12 without 115db white noise), 24 x two-way active avoidance (12 with and 12 without 115dB white noise), 12 x two-way active avoidance	No emotion processing deficits in DPD+/-P: No significant difference in fear or anxiety scores of DPD+/-P and control groups
Vitale, Kosson, Resch, and Newman (2018)	United States	Lexical decision-making task with computer generated stimuli presentation and dichotomous response option (whether stimuli presented is a word or non-word)	86 adult male offenders from correctional institution incl. 27 with ASPD, 22 with ASPD and co-morbid psychopathy and 37 non-ASPD/non-psychopathic controls	ASPD/Controls: ≥ 40 years, left handed, estimated WAIS-R scores of <70 on Shipley Institute of Living Scale (SILS; Zachary & Shipley, 1986), current use of psychotropic medication	48 word/non-word pairs (12 positive words, 12 negative words, 24 neutral words and 48 pronounceable non-words), presented in four experimental blocks.	Emotion processing deficit in ASPD+P but not ASPD-P: Significant response accuracy x latency interaction (specific to negative words) observed for ASPD+P group but not for ASPD-P group or controls
PSYCHOPHYSIOLOGICAL MEASURES						
Dinn and Harris (2000)		Skin Conductance Response (SCR) with computer generated stimuli presentation	12 adult males with ASPD (and co-morbid psychopathy), recruited from community through newspaper advertisement. 10 adult male non-ASPD community controls recruited through newspaper advertising	ASPD/Controls: current use of psychotropic substances, current alcohol abuse, history of electroconvulsive treatment, history of traumatic head injury (with loss of consciousness or cognitive sequalae), central nervous system pathology	30 words (negative, positive and neutral) categorised in accordance with the *Handbook of Semantic Word Norms* (Toglia & Battig, 1978)	Emotion processing deficit in ASPD+P: ASPD+P significantly lower SCR than controls in response to aversive stimuli.

PSYCHOPHYSIOLOGICAL MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Drislane, Vaidyanathan, and Patrick (2013)	United States	Electroencephalography with computer generated stimuli presentation	139 adult male offenders recruited from state prison incl. 46 with ASPD/co-morbid psychopathy, 45 with ASPD only and 48 non-ASPD controls	ASPD/Controls: Visual/hearing impairments	66 digitized static scenes from IAPS (Lang, Bradley, & Cuthbert, 1999) incl. pleasant, unpleasant and neutral presented for 6s and accompanied by 50-ms of 105dB white noise with abrupt (< 10 μs) rise time at SOA latencies of 3-5s after picture onset	Emotion processing deficit in ASPD+/-P: ASPD+/-P significantly less P300 amplitude in response to abrupt noise probes across picture categories than controls. Reduced P300 amplitude not attributable to ASPD+/-P status but specifically associated with presence/absence of interpersonal affective psychopathic traits
Levenston, Patrick, Bradley, and Lang (2000)	United States	Facial EMG, SCR, heart rate, startle reflex paradigm with computer generated stimuli presentation	36 adult male offenders recruited from a federal correctional institution incl. 18 with ASPD and co-morbid psychopathy and 18 non-ASPD controls	ASPD/Controls: Current symptoms of psychosis or mood disorder	66 colour slides from IAPS (Lang et al., 1999) incl. pleasant, neutral and unpleasant - presented for 6s. 50-ms burst of 105 dB white noise at SOA latencies of: 300ms, 800ms, 1800ms, 3000ms, 4500ms	Emotion processing deficits in ASPD+P: ASPD+P exhibited more enhanced heart rate deceleration for pleasant/unpleasant affective picture categories (compared to neutral) than controls; ASPD+P demonstrated no startle inhibition in response to pleasant and unpleasant pictures at early SOA probe intervals (300-800ms) whereas controls demonstrated startle inhibition for both picture categories. ASPD+P linear pattern of startle modulation (unpleasant > pleasant) emergent only at late SOA probe intervals whereas controls emergent across early/late intervals (800-4500ms). ASPD+P exhibited startle inhibition for victim scenes at late SOA probe intervals (1800-4500ms) whereas controls exhibited startle potentiation. ASPD+P exhibited no significant increase in startle potentiation for direct threat scenes (compared to neutral) at late SOA probe intervals whereas controls did. No significant difference in overall EMG reactivity of ASPD+P and control groups; No significant difference in overall SCR of ASPD+P and control groups but ASPD+P demonstrated significantly less SCR for pleasant thrill content (compared to neutral) than controls.

PSYCHOPHYSIOLOGICAL MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Loomans, Tulen, and Van Marle (2015)	The Netherlands	Startle reflex paradigm with computer generated stimuli presentation	53 adult male patients from psychiatric hospital incl. 31 with ASPD and co-morbid psychopathy and 22 with ASPD only 83 adult male controls incl. 50 forensic hospital employees and 33 recruited from community	ASPD: psychosis or primary mood disorder Controls: historical psychiatric disorder, respiratory or cardiovascular diseases, medication that could influence autonomic nervous system, physical condition that could distract from task, poor physical health, substance misuse	48 pictures from IAPS (Lang et al., 1999) incl. pleasant, neutral, and unpleasant - presented for 6s. 50ms of 100 dB white noise at SOA latencies of: 300ms, 800ms, 1300ms, 3800ms	Emotion processing deficits in ASPD+P and ASPD-P: ASPD+P and ASPD-P significantly lower overall startle amplitudes than community controls. Same linear pattern of startle modulation across picture categories for ASPD-P and community controls + increase in potentiation for neutral and aversive versus pleasant stimuli in forensic hospital employees. No linear pattern of startle modulation across picture categories evident for ASPD+P. Same linear pattern of startle modulation over time observed for ASPD-P, community controls and forensic hospital employees but not for ASPD+P.

PSYCHOPHYSIOLOGICAL MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Miranda, Meyerson, Myers, and Lovallo (2003)	United States	Startle reflex paradigm with computer generated stimuli presentation	62 adult males recruited from a large metropolitan area in the mid-western United States incl. 17 alcohol-dependent with ASPD, 24 alcohol-dependent only and 21 non-alcohol-dependent/non-ASPD controls	Alcohol dependent ASPD and non-ASPD: <18 or >39, current or lifetime bi-polar I or II disorder, agoraphobia, psychotic disorder, PTSD, panic disorder, obsessive-compulsive disorder, eating disorder, current mood, generalised anxiety or active substance use disorder, use of alcohol/other substances or central nervous system medication in 30 days prior to participation, history of traumatic brain injury, hearing difficulties, self-reported current or chronic medical conditions, positive urine toxicology at assessment. Controls: same + no lifetime symptoms of substance use (except historical alcohol use), no current/lifetime criteria for conduct disorder/ASPD	60 static slides from IAPS (Lang et al., 1999) incl. pleasant, neutral and unpleasant - presented for 12s. 50ms of 95dB white noise at SOA latencies of 4-7s after slide onset	Emotion processing deficits in alcohol dependent ASPD (AD-ASPD+/-P): AD-ASPD+/-P and AD only exhibited significantly smaller raw startle magnitude than non-AD/non-ASPD controls. No significant difference in raw startle magnitude of AD-ASPD+/-P and AD only groups. AD-ASPD+/-P no significant difference in startle potentiation for unpleasant versus pleasant stimuli in contrast to AD only and non-AD/non-ASPD control groups who demonstrated significantly more startle potentiation in response to unpleasant than pleasant slides

PSYCHOPHYSIOLOGICAL MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Rothemund et al. (2012)	Germany	Electroencephalography, SCR, heart rate with computer generated stimuli presentation	11 adult males with ASPD (PCL-R score range 15-31) awaiting trial and on bail or on parole. 11 adult male controls recruited from the community	ASPD + Controls: aged <18 or >45, history of cardiovascular or mental disorder, history of drug or alcohol dependence, and intake of alcohol or drugs within the previous 12 h, left-handedness	Aversive differential conditioning paradigm involving presentation of two (black and white) neutral male faces which acted as CS+ (paired with Unconditioned Stimulus) and CS- (non-reinforced CS). CS+ and CS- presented for 6s with ITI of 18+2s. Unconditioned stimulus (painful shock) introduced for last 20ms of CS presentation.	Emotion processing deficit in ASPD+/-P: ASPD+/-P significantly lower startle amplitudes for CS+ and CS- during habituation phase, significantly less potentiation of startle reflex for CS+ compared to CS- than controls during acquisition phase and significantly lower startle amplitude than controls in extinction phase. ASPD+/-P significantly lower SCR than controls across all phases; ASPD+/-P significantly less N100 reactivity during habituation + acquisition phases. ASPD +/- significantly more P200 reactivity (frontal and central sites of left hemisphere) during acquisition trials and significantly less P200 reactivity to CS+ versus CS− than controls during extinction phase. ASPD+/-P more iCNV reactivity (left hemisphere), less tCNV reactivity (frontal sites) and more tCNV reactivity (central sites) during acquisition trials. ASPD+/-P less tCNV reactivity during first block and more tCNV reactivity during second block extinction trials (opposite tCNV pattern to controls).
Sedgewick (2017)	See Above	Startle Reflex paradigm with computer generated stimuli	26 adult male patients recruited from high secure hospital incl. 10 with DPD assessed for psychopathy (PCL-R *mean* = 28.3, *sd* = 4.95). 17 adult male controls recruited from hospital employees[f]	See above	72 static slides from IAPS (Lang et al, 1999) incl. pleasant, neutral and unpleasant (4 x 18 image blocks) presented for 6s. 50ms of 100 dB white noise at SOA latencies of 150ms, 3, 3.5 or 4s after slide onset (for 16/18 images)	Emotion processing deficit in DPD+/-P: No significant differences in the habituation or affective modulation of startle response of DPD+/-P and control groups for pleasant, neutral or unpleasant stimuli but both groups exhibited attenuation of startle response for aversive stimuli compared to neutral

PSYCHOPHYSIOLOGICAL MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Vaidyanathan, Hall, Patrick, and Bernat (2011)	USA	Startle Reflex paradigm with computer generated stimuli	108 adult male offenders recruited from a medium security state prison incl. 66 with ASPD (33 with and 33 without co-morbid psychopathy). 41 non-ASPD controls (incl. 2 with co-morbid psychopathy)	ASPD + Controls: Visual or hearing impairments	66 pictures from IAPS (Lang et al., 1999) incl. 18 pleasant, 18 neutral and 18 unpleasant, presented for 6s. 5ms of 105dB white noise with abrupt (<10μs) rise time at SOA latencies of 3-5s after picture onset	Emotion processing deficit in ASPD+/-P: No significant moderating effect of ASPD status on startle modulation (across picture valence categories) or startle potentiation (for aversive scenes). Significant difference in startle modulation of psychopathic (94% with ASPD) and non-psychopathic groups - reduced startle potentiation for aversive stimuli in psychopathic group associated with higher factor 1 (interpersonal/affective) trait and total psychopathy scores

SELF REPORT MEASURES						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Levenston et al. (2000)	See above	Likert scale ratings of arousal, valence and dominance	See above	See above	66 colour slides from IAPS (Lang et al., 1999) incl. pleasant, neutral and unpleasant - presented for 6s + SAM (Bradley & Lang, 1994)	Emotion processing deficits in ASPD+P: ASPD+P participants rated pleasant pictures as more pleasant and aversive pictures as less aversive than controls (reliable effect for erotic content only). ASPD+P significantly higher dominance ratings for pictures with direct threat content than controls. ASPD+P significantly higher dominance ratings for pictures with direct threat content (when compared to neutral) than controls
Miranda et al. (2003)	See above	Likert scale ratings of arousal and valence	See above	See above	60 static slides from IAPS (Lang et al., 1999) incl. pleasant, neutral and unpleasant - presented for 12s + SAM (Bradley & Lang, 1994)	Emotion processing deficit in AD-ASPD+/-P: AD-ASPD+/-P and AD only significantly lower arousal ratings for unpleasant slides than non-AD/non-ASPD controls. No significant group differences in ratings of valence
Rothemund et al. (2012)	See above	Likert scale ratings of CS-US contingency (-100 = "US will absolutely certainly not follow" - +100 "US will absolutely certainly follow"), arousal (1 = arousing – 9 = calm) and valence (1=pleasant-9=unpleasant)	See above	See above	Aversive differential conditioning paradigm involving presentation of two (black and white) neutral male faces which acted as CS+ (paired with Unconditioned Stimulus) and CS- (non-reinforced CS). CS+ and CS- presented for 6s with ITI of 18+2s. Unconditioned stimulus (electric shock) introduced for last 20ms of CS presentation + SAM (Bradley & Lang, 1994)	Emotion processing deficit in ASPD+/-P: ASPD+/-P group arousal ratings demonstrated significantly less differentiation of CS+/CS- during extinction trials when compared to controls. ASPD+/-P significantly lower valence (unpleasantness) ratings for US than controls during habituation trials. No significant group difference in CS-US contingency ratings.

SELF REPORT MEASURES (CONT'D)						
AUTHOR	**LOCATION**	**METHOD**	**SAMPLE CHARACTERISTICS**	**EXCLUSION CRITERIA**	**STIMULUS/ MEASURE**	**DESCRIPTIVE OUTCOME**
Sayar, Ebrinc, and Ak (2001)	Turkey	Psychometric questionnaire with dichotomous response options (true/false)	40 adult male ASPD recruited from a military hospital out-patient dept. 50 randomly selected adult male military controls	ASPD: No exclusion criteria Controls: No known medical or psychiatric disturbance	Toronto Alexithymia Scale (TAS-26; Taylor, Ryan, & Bagby, 1985)	Emotion processing deficit in ASPD+/-P: Alexithymia scores significantly higher in ASPD+/-P than controls
Schiffer et al. (2017)	See above	Psychometric questionnaire with Likert scale ratings (1=does not describe me well – 5=describes me very well);	See above	See above	Shortened 16-item German version of Interpersonal Reactivity Index (IRI; Davis, 1980; Paulus, 2009)	No empathy deficits in ASPD-P: No significant difference in IRI perspective taking, empathic concern or personal distress subscale scores of ASPD-P and control groups
Schonenberg and Jusyte (2014)	See above	Likert scale ratings of emotion intensity (1=not present at all – 10=full emotion)	See above	See above	Morphed pictures of combined emotion expressions of variable intensity (ratio = 90/10, 70/30, 50/50, 30/70) from Radboud Faces database (Langner et al., 2010) incl. fear:anger, anger:happy and happy:fear	Emotion processing deficit in ASPD+/-P: ASPD+/-P significantly higher intensity ratings for angry/happy and angry/fearful dimensions at maximal ambiguity (50:50 ratio)
Shamay-Tsoory, Harari, Aharon-Peretz, and Levkovitz (2010)	Israel	Psychometric questionnaire with Likert scale ratings (1=does not describe me well – 5=describes me very well)	17 adult male ASPD with co-morbid psychopathy (confirmed by a senior psychiatrist), recruited from Israel prison service. 20 adult male controls recruited by advertisement[g]	ASPD: Axis I disorder; active major depressive episode, neurological problems, head trauma involving loss of consciousness, major physical illness, historical/current drug abuse, alcohol abuse Controls: Psychiatric disorder, neurological problems, major physical illness, alcohol/substance abuse	Interpersonal Reactivity Index (IRI; Davis, 1980)	No empathy deficits in ASPD+P: No significant difference in IRI cognitive or affective empathy scores of ASPD+P and control groups

[a] *n* = 20 adult male offenders with psychosis excluded; [b] *n* = 13 adult male violent offenders with schizophrenia and ASPD + *n* = 16 adult male offenders with schizophrenia only + *n* = 18 non-offenders with schizophrenia but no ASPD excluded; [c] *n* = 41 adult male patients with psychotic disorder or psychotic disorder with co-morbid DPD excluded; [d] *n* = 172 female ASPD + control participants excluded; [e] *n* = 28 adult male patients with psychotic disorder or psychotic disorder with co-morbid DPD excluded; [f] *n* = 16 adult male patients with psychotic disorder or psychotic disorder with co-morbid DPD excluded (same sample as [c]); [g] *n* = 27 brain lesion participants excluded. NB: Self report findings from Dinn & Harris (2000) excluded as no data reported/statistical analysis undertaken.

3.4. Narrative Data Synthesis

3.4.1. Behavioural Measures – Facial Emotion Recognition

Basic facial emotion recognition was examined by six studies, all of which employed ASPD+/-P or DPD+/-P groups and reported evidence of impairment. However, results were inconsistent as whilst three studies examined five or more basic emotions, only one reported significantly less accuracy for disgust expressions in ASPD+/-P groups with and without attention deficit hyperactivity disorder (ADHD) when compared to controls (Bagcioglu et al., 2014). Whilst no difference in accuracy was evident for happy, angry, surprised, fearful, sad or neutral expressions, results indicated that participants with ASPD+/-P (without ADHD) had significantly longer response latencies for neutral and disgust expressions whilst those with ASPD+/-P and ADHD had significantly longer response latencies for all basic emotions than controls.

Dolan and Fullam (2006) found that DPD+/-P participants were significantly less accurate when identifying happy and sad expressions at up to 100% intensity and surprised expressions at <100% intensity when compared to controls. They also highlighted significantly longer response latencies for all emotions in those with DPD+/-P and noted that DPD+P participants were significantly less accurate than DPD-P participants when identifying sad emotions. Whilst they found no association between reduced recognition accuracy for sad emotions and any specific psychopathic trait, impaired recognition accuracy for happy emotions was

positively associated with higher psychopathic antisocial/lifestyle trait scores.

The third study found that DPD+/-P and control groups were similar in terms of perception accuracy for happy, sad, angry, fearful and neutral expressions presented at 100% and 50% intensity, reported no group difference in the ability to discriminate the intensity of happy and sad emotions and no group difference in emotion perception or discrimination latencies (Sedgwick, 2017). They did however report that DPD+/-P participants were significantly less accurate when discriminating the intensity of anger and fear emotions than controls when presented with two emotion images (i.e., 2 x fear) displayed simultaneously at different intensities (i.e., 100%, 75%, 50%, 25%, 0%) (Sedgwick, 2017).

Schonenberg et al. (2013) examined identification of threat-related information and found that ASPD+/-P participants required higher levels of emotion intensity to accurately recognise anger but found no differences in the emotion intensity required for accurate identification of fearful or sad expressions However, Schonenberg and Jusyte (2014) assessed hostile response bias in relation to ambiguous facial cues and reported that ASPD+/-P participants identified angry expressions more frequently when presented with ambiguous dimensional expressions of 'happy:angry' or 'angry:fearful' but found no differences in recognition accuracy for combined 'happy:fearful' emotions irrespective of intensity.

Notably, the authors identified no significant associations between Psychopathic Personality Inventory – Revised (PPI-R; Lilienfeld & Widows, 2005) scores and hostile response bias.

Habel et al. (2002) examined the ability of ASPD+/-P and controls to discriminate between happy, sad and neutral expressions and found that those with ASPD+/-P had significantly lower overall accuracy rates than controls for both happy and sad image presentations. However, they highlighted a significant positive correlation between higher PCL-R factor 'emotional detachment' scores/PCL-R total scores >25 and increased emotion discrimination accuracy in their ASPD+/-P group.

A further two studies examined complex emotion recognition, one of which compared ASPD-P and control groups, employed a simplified (dichotomous response option) version of the Reading the Eyes in the Mind Test (RMET; Baron-Cohen et al., 2001) and found no group differences in response error rates (Schiffer et al., 2017). In contrast, the second examined complex facial emotion recognition in ASPD+/-P and control groups, employed the full (four response option) version of the RMET and the Cambridge Mind-reading Face/Voice Battery (CAM; Golan et al., 2006) and found significantly higher error rates in those with ASPD+/-P than controls across both measures (Bertone et al., 2017).

3.4.2 *Behavioural Measures – Other*

Although seven studies employed behavioural measures other than facial emotion recognition, only one examined the response accuracy and latency of ASPD-P, ASPD+P and control groups during a lexical decision-making task (whereby participants are presented with letter strings including pleasant, neutral, unpleasant words and non-words and asked to identify words and non-words as quickly as possible) (Vitale et al., 2018). The authors found no evidence of group differences in response accuracy for pleasant, neutral or negative words and noted no significant correlations between accuracy and latency for any word trials in ASPD-P and control groups. They did however highlight a significant positive correlation between accuracy and latency for negative word-trials that was evident solely in relation to the ASPD+P group.

Lorenz and Newman (2002) also employed a lexical decision task to examine emotion utilisation cues in ASPD+/-P participants and controls and found no group differences in recognition accuracy or latency for positive, neutral or negative words before or after controlling for PCL-R scores. However, they did not examine response latencies for incorrect responses or correlations between response accuracy and latency.

Only one study employed the Joystick Operated Runway Task (JORT) to examine anxiety and fear responses to unpleasant stimuli (Sedgwick,

2017) in DPD+/-P and control groups and results suggested no significant group differences in anxiety or fear.

In contrast, another study combined signal detection and the Self-Assessment Manikin scale (SAM; Bradley & Lang, 1994) to examine emotional sensitivity in ASPD+/-P and control groups (Barbosa et al., 2015) and found that although participants with ASPD+/-P self-reported similar levels of valence to controls, they reported significantly higher levels of arousal, were significantly less accurate when discriminating between all arousal levels and required significantly less change in signal intensity to modify their responses for all arousal/higher levels of valence.

One study employed continuous flash suppression (simultaneous presentation of rapidly changing Mondrian-like images to one eye and emotion expressions to the other eye) to examine early emotion processing in ASPD+/-P and control groups (Jusyte et al., 2015). Results indicated no significant group differences in suppression time for any basic emotion but a significant negative correlation between Inventory of Callous Unemotional Traits (ICU; Essau et al., 2006) unemotional subscale scores and suppression time for fearful facial expressions that was specific to the ASPD+/-P group.

Domes et al. (2013) employed emotional stroop methodology (requiring participants to identify whether the ink colour of a target stimulus

matches a colour word presented in white 200ms later) to examine attentional bias in ASPD+/-P and control groups and results highlighted an attentional bias for congruent (i.e., where target word ink colour and colour word matched) violence related and negative stimuli in ASPD+/-P participants that was not evident in non-offending controls. The authors further noted a significant difference between the violence related and negative attentional bias exhibited by sub-groups of offender participants with high and medium PCL-R scores when compared to controls and highlighted that the congruent violence related bias of those with high PCL-R psychopathy scores (>25) was twice that of their ASPD+/-P group. They also reported a trend for violence related bias and significantly higher content-specific bias in offenders subjected to childhood abuse, maltreatment or neglect but did not extrapolate the influence of this variable on the results of ASPD+P and ASPD-P groups.

Habel et al. (2002) employed mood induction probes to examine emotion processing in ASPD+/-P and control groups and found no between group differences in mood ratings for sad or happy images.

3.4.3 *Psychophysiological Measures*

Eight studies employed psychophysiological measures but only one independently assessed affective modulation of the startle reflex in both ASPD-P and ASPD+P groups (Loomans et al., 2015). Results highlighted significantly lower overall startle reflex amplitude in both ASPD-P and

ASPD+P groups when compared to community controls and no difference in the overall startle amplitudes of ASPD+P and ASPD-P groups. However, the authors highlighted that ASPD-P and community/hospital employee control groups demonstrated the expected pattern of increased startle potentiation across picture categories (community controls = aversive > pleasant; ASPD-P and hospital employee controls = aversive > pleasant, neutral > pleasant) and time (300<800ms; 300<1300ms; 300<3800ms) whereas participants with ASPD+P did not. They further noted that both ASPD+P and hospital employee control groups demonstrated more startle potentiation to aversive compared to neutral stimuli at early interval SOA (300ms) and more startle potentiation for neutral compared to emotion stimuli at late interval SOA (3800ms) in contrast to ASPD-P and community control groups.

Levenston et al. (2000) found that participants with ASPD+P exhibited no startle attenuation in response to pleasant and unpleasant stimuli at early SOA intervals (300ms and 800ms) in contrast to controls. Moreover, they demonstrated startle attenuation for both pleasant and unpleasant stimuli in relation to neutral from early to late SOA intervals (800ms-4500ms) and startle attenuation for unpleasant (victim) stimuli at late SOA intervals (1800ms-4500ms) whereas controls demonstrated startle potentiation for unpleasant stimuli (including victim content) and startle inhibition for pleasant stimuli from early to late SOA intervals (800ms-4500ms). Whilst both ASPD+P and control groups demonstrated startle

potentiation in response to direct threat stimuli (when compared to neutral) across late SOA intervals, only controls demonstrated a significant increase in potentiation. However, participants with ASPD+P exhibited the expected pattern of startle attenuation for both forms of pleasant stimuli (erotic and thrill) in relation to neutral at late SOA intervals in comparison to controls who demonstrated potentiation of the startle reflex purely for pleasant thrill content when compared to neutral.

Vaidyanathan et al. (2011) found that participants with ASPD+/-P exhibited a typical pattern of startle modulation across picture categories and highlighted that ASPD diagnosis had no moderating effect on the expected pattern of startle modulation across pleasant, neutral or aversive picture categories or on startle potentiation for aversive stimuli. They did however highlight a significant negative association between total/factor 1 (interpersonal/affective trait) PCL-R scores and startle potentiation for aversive stimuli and noted that participants who met the cut off criteria for psychopathy (PCL-R total = >30) (*n* = 35, incl. 33 with ASPD) exhibited significantly less potentiation of the startle reflex for aversive stimuli when compared to those who did not (PCL-R total = ≤20) (*n* = 26, proportion of ASPD not reported).

In contrast, another study examined affective startle modulation in ASPD+/-P participants and controls, found no significant group difference in startle reflex habituation or modulation but highlighted atypical

attenuation of startle responses for aversive stimuli (compared to neutral) in both groups (Sedgwick, 2017).

One study compared startle reflex modulation in alcohol dependent ASPD (AD-ASPD+/-P), alcohol dependent only (AD) and control groups and reported significantly lower raw startle magnitudes in both AD-ASPD+/-P and AD only groups when compared to controls. However, whilst they highlighted no significant change in blink magnitude for pleasant and unpleasant stimuli in AD-ASPD+/-P participants, controls and AD only groups exhibited the expected pattern of startle attenuation for pleasant stimuli and startle potentiation for unpleasant stimuli. Added to this, the authors reported no difference in results after controlling for Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) scores but highlighted age of first regular alcohol use and ASPD diagnosis as significant predictors of reduced startle reactivity for unpleasant slides (Miranda et al., 2003).

Another study examined startle reflex potentiation during fear conditioning in ASPD+/-P and control groups and the authors observed that ASPD+/-P participants exhibited significantly less startle potentiation in response to CS+ and CS- than controls during habituation trials, coupled with less startle potentiation increase for CS+ versus CS- during acquisition trials and significantly less startle potentiation during early

extinction trials (Rothemund et al., 2012)[3]. The authors also reported significantly lower SCR in ASPD+/-P participants when compared to controls across all trials but identified no significant group difference in heart rate.

Two studies examined SCR in ASPD+P and control groups during the presentation of affective (pleasant, neutral and unpleasant) stimuli and one reported significantly lower SCR for aversive stimuli (compared to neutral) in ASPD+P participants (Dinn & Harris, 2000) whereas the other found that ASPD+P participants had significantly lower SCR for stimuli with pleasant thrill content (compared to neutral) than controls (Levenston et al., 2000). Levenston et al. (2000) also highlighted that participants with ASPD+P exhibited significantly more heart rate deceleration for both pleasant and unpleasant stimuli (compared to neutral) than controls but found no significant group difference in facial EMG activity.

Two studies examined cortical reactivity in ASPD+/-P and control groups and one found significantly less P300 reactivity in response to abrupt noise probes presented alongside pleasant, neutral and unpleasant images in participants with ASPD+/-P (Drislane et al., 2013). However,

[3] Experiment completed over three phases. Habituation phase involved 12 randomly ordered presentations of CS+, CS- and US (CS+ = neutral male face, CS- = neutral male face, US = painful shock). Acquisition phase involved presentation of 48 CS+ and 48 CS- (US administered after each CS+ but not after CS-). The extinction phase involved presentation of 24 CS+ and 24 CS- trials with no US administered.

when the authors independently examined the effects of ASPD and psychopathy on P300 reactivity, they found that differences were entirely attributable to co-morbid psychopathy and more specifically to interpersonal/affective traits and unrelated to ASPD status. The second study examined ERP (N100, P200, P300, LPC, iCNV, tCNV)[4] reactivity during fear conditioning and found that ASPD+/-P participants demonstrated similar P300 differentiation of CS+/CS- to controls during acquisition trials, significantly less N100 activity during habituation and acquisition trials, significantly more P200 reactivity for CS+ during habituation trials/CS- during early extinction trials and significantly less P200 reactivity to CS+ versus CS- during extinction trials. They also highlighted that ASPD+/-P participants demonstrated larger iCNV in the left hemisphere during acquisition trials, smaller tCNV at frontal sites/larger tCNV at central sites during acquisition trials and smaller tCNV for first as opposed to second block extinction trials, whereas controls demonstrated larger tCNV for first block/smaller tCNV for second block extinction trials (Rothemund et al., 2012).

3.4.4 *Self-Report Measures*

Only one study employed the SAM (Bradley & Lang, 1994) to examine subjective ratings of arousal and valence to pleasant, neutral and unpleasant stimuli in participants with ASPD+/-P and results indicated no

[4] LPC = late positive complex (300-400ms after stimulus onset); iCNV = initial contingent negative variation; tCNV = terminal contingent negative variation

significant group differences in valence ratings but significantly lower arousal ratings for unpleasant stimuli in alcohol dependent groups with and without ASPD+/-P when compared to controls (Miranda et al., 2003).

Another study employed the SAM (Bradley & Lang, 1994) to assess subjective ratings of arousal and valence in response to fear conditioning and found that ASPD+/-P participants had similar valence ratings for CS+/CS- as controls across all trials but demonstrated significantly less differentiation in arousal ratings for CS+/CS- during extinction trials (Rothemund et al., 2012). The authors also examined CS-US contingency ratings to assess participants expectations regarding the likelihood that unconditioned stimulus would follow conditioned stimulus and found no significant group differences. They did however note that ASPD+/-P participants rated US as less unpleasant than controls during habituation trials.

Levenston et al. (2000) were the only authors to employ the SAM (Bradley & Lang, 1994) to examine subjective ratings of dominance, arousal and valence for emotional stimuli in ASPD+P and control groups and they found significantly higher dominance ratings for stimuli with unpleasant (direct threat) content in those with ASPD+P as well as significantly higher ratings of pleasantness for pleasant stimuli and lower ratings of unpleasantness for aversive stimuli.

One study employed Likert scale ratings to examine whether ASPD+/-P and controls differed in the perceived intensity of stimulus and found that ASPD+/-P participants rated ambiguous images incorporating anger as significantly more intense than controls (Schonenberg & Jusyte, 2014).

Sayar et al. (2001) employed the Toronto Alexithymia Scale (TAS-26; Taylor et al., 1985) to examine alexithymia (a personality trait characterised by difficulty in identifying and describing emotions, discriminating between feelings and physical sensations and externally oriented thinking) in ASPD+/-P and control groups and found significantly higher alexithymia scores in participants with ASPD+/-P.

One study employed a shortened version of the IRI (Davis, 1980; Paulus, 2009) to examine cognitive and affective empathy in ASPD-P and control groups and found no significant group differences in cognitive or affective empathy (Schiffer et al., 2017). Similarly, another study utilised the full version of the IRI with ASPD+P and control groups and reported only marginally significant evidence of cognitive empathy deficits in ASPD+P participants when compared to controls (Shamay-Tsoory et al., 2010).

4.0. DISCUSSION

The aim of this review was to synthesise the findings of studies that have examined emotion processing and empathy in adult male ASPD/DPD populations with and without co-morbid psychopathy, to ascertain what

emotion and empathic processing deficits exist in these populations and to identify similarities and differences between them. It aimed to capture all relevant literature, avoiding restrictions related to language or publication bias and to contribute to the existing knowledge base through the employment of a systematic approach not previously applied to this topic.

Emotion processing deficits were reported by 86% (19/22) of reviewed studies and evidenced across all methodological approaches. However, only 14% (*n* = 3) of included studies examined differences between control and ASPD-P groups who were assessed for but did not meet the criteria for co-morbid psychopathy and only 23% (*n* = 5) examined differences between control and ASPD+P populations who satisfied either PCL-R or PCL:SV criteria for co-morbid psychopathy. In contrast, 73% (*n = 16*) examined differences between control and ASPD+/-P or DPD+/-P groups that included some participants with and some without co-morbid psychopathy or ASPD/DPD participants that were not assessed for co-morbid psychopathy. Consequently, the current dearth of research comparing emotion processing and empathy in ASPD/DPD-P and ASPD/DPD+P groups prevents firm conclusions from being drawn about the extent of overlap/differences between them and the contribution of psychopathy as a mediator for emotion processing deficits in ASPD/DPD. Nevertheless, there were some notable differences between groups and whilst only 33% (*n* = 1) of studies that employed ASPD-P groups found

evidence of a significant difference between ASPD-P and control groups, emotion processing deficits were identified by 80% (*n* = 4) of those that employed ASPD+P groups and 94% (*n* = 15) of those that employed ASPD+/-P groups.

Crucially, this review found that ASPD+P groups exhibit atypical patterns of psychophysiological reactivity and increased difficulty when processing negative affective cues whilst ASPD-P groups do not, thereby adding to previous research which identified the need to establish whether deficient affective experience is a hallmark specific to psychopathy or shared with ASPD (Rogstad & Rogers, 2008).

Nonetheless, as all seven studies that examined facial emotion recognition/discrimination or response latencies employed ASPD+/-P or DPD+/-P groups, the degree to which deficits in emotion recognition were attributable to ASPD/DPD or mediated by co-morbid psychopathy is unclear. Whilst two studies found recognition deficits for happy and sad emotions, findings were only partially consistent as one found that impaired recognition of sad affect was more evident in DPD+/-P participants with co-morbid psychopathy than it was in those without (Dolan & Fullam, 2006) whereas the second reported higher discrimination accuracy for sad and happy emotions in ASPD+/-P participants with higher factor 1 (emotional detachment) and total PCL-R scores (>25) (Habel et al., 2002). Although these studies were more

consistent in highlighting a negative association between recognition/discrimination accuracy for happy affect and antisocial traits, happy recognition deficits were not consistently reported by other studies that examined recognition/discrimination or perception accuracy for basic emotions in participants with ASPD+/-P. Consequently, whilst the reason for this discrepancy in findings is unclear, happy and sad recognition deficits may be context dependent and mediated more by methodological approach and/or individual differences other than ASPD and/or co-morbid psychopathy per se.

The finding that ASPD+/-P participants exhibited a hostile response bias that was unrelated to self-reported PPI-R scores (Schonenberg & Jusyte, 2014) suggests that this may be an important target for intervention in ASPD-P populations as hostile response bias is widely associated with and argued to predict aggression (Chen, Coccaro, & Jacobson, 2012; Dodge, Price, Bachorowski, & Newman, 1990). However, anger misattribution is more evident in those with histories of early physical abuse (Pollack, Cicchetti, Hornung, & Reed, 2000) which was not examined and so may have been influential to results. Added to this, subjectivity in self-reported psychopathy scores along with the exclusion of ASPD participants who had committed drug related offences, sexual assault or domestic violence limits the validity of this finding and the generalisability of results to the wider ASPD population.

Notably, Sedgwick (2017) found that participants with DPD+/-P were less accurate when discriminating the intensity of anger and fear emotions than controls but reported no deficits in emotion perception accuracy or latency when required to identify basic emotions (including anger and fear) displayed at either 100% or 50% intensity, which would suggest that difficulties in discriminating the intensity of emotional expression does not mediate impaired perception accuracy in this population. Whilst this finding seems inconsistent with the results of Schonenberg et al. (2013) who reported that ASPD+/-P participants required higher levels of emotion intensity than controls to correctly identify anger, they highlighted group differences in anger recognition at <50% intensity. Furthermore, their findings were based upon an ASPD+/-P sample who had all committed repeated grievous bodily harm and were consistent with wider research which highlighted an association between high offense severity and low intensity anger deficits in antisocial youths (Bowen, Morgan, Moore, & van Goozen, 2014). Still, the authors assessed recognition accuracy for just three emotions (anger, fear and happy) and did not screen or control for co-morbid psychopathy. Consequently, the extent to which low intensity deficits for these and other basic emotions (i.e., sadness, surprise) are evident in ASPD/DPD or mediated by co-morbid psychopathy is again unclear. Moreover, as anger recognition is essential to behavioural suppression/adaptation and reversal learning (Frith, Perrett, Morris, Dolan, & Blair, 1999) and impairment could mediate difficulties in social interaction and lead to an

escalation in violent behaviour, this is an important focus for future research.

Whilst one study (Bagcioglu et al., 2014) found evidence of disgust recognition deficits in populations with ASPD+/-P (with and without ADHD), the authors did not assess or control for differences in IQ which have previously been found to mediate impairment in disgust recognition (Blair, 2005). Furthermore, although ASPD+/-P (with ADHD) participants were found to have longer response latencies for more emotions than those without ADHD and may therefore have been subject to a speed-accuracy trade-off whereby recognition accuracy for some emotions (i.e., happiness, fear, sadness, anger, surprise) was more difficult and dependent on more processing time, Dolan and Fullam (2006) also found significantly longer response latencies for all basic emotions in participants with DPD+/-P but did not assess for ADHD. Consequently, the extent to which ADHD or co-morbid psychopathy mediates slower recognition latencies in ASPD+/-P and DPD+/-P populations is again unclear.

Crucially, the Integrated Emotion Systems (IES) model posits that psychopaths exhibit fear, sadness and happiness specific recognition deficits as a consequence of amygdala dysfunction and impaired stimulus reinforcement learning (Blair, 2013; Blair, Morton, Leonard, & Blair, 2006) and the inconsistency with which these deficits were identified may well

be reflective of the ASPD+/-P samples employed and the fact that not all participants met the criteria for co-morbid psychopathy. However, the lack of evidence for explicit fear recognition deficits in ASPD+/-P populations is nevertheless surprising as meta-analytic research highlighted fear recognition deficits in antisocial populations (Marsh & Blair, 2008). Still, this review focused specifically on adult male populations diagnosed with ASPD/DPD and only five of the reviewed studies assessed fear recognition, which is equivalent to just a quarter of those examined by Marsh and Blair (2008). Furthermore, some evidence suggests that the impact of amygdala dysfunction on emotion processing varies in accordance with aetiological factors and the age of dysfunction onset (Cristinzio, Sander, & Vuilleumier, 2007). Consequently, longitudinal research to elucidate the aetiological and age-related factors that underlie fear specific deficits in ASPD/DPD populations with and without co-morbid psychopathy could help to explain this inconsistency in findings.

No studies examined complex emotion processing in ASPD/DPD+P groups and whilst Bertone et al. (2017) found evidence of complex emotion recognition deficits in participants with ASPD+/-P that were not evident in those with ASPD-P (Schiffer et al., 2017), Schiffer et al. (2017) employed a simplified, dichotomous response version of the RMET which could have increased the likelihood of participants guessing the correct answers by chance. Equally, Bertone et al. (2017) did not examine or control for

potential confounders (i.e., IQ, education) that may have been influential to results. Consequently, further research is required to determine the reliability of these findings and to identify whether complex emotion processing deficits are evident in ASPD+P and ASPD-P groups.

Although six of the seven studies that utilised behavioural measures other than facial emotion recognition employed ASPD+/-P populations, one study did find evidence of impairment in ASPD+P that was not evident in ASPD-P and another suggested that an early fear processing disadvantage identified in ASPD+/-P participants was in fact mediated entirely by psychopathic traits.

Whilst neither of the studies that examined lexical decision making found evidence of significant differences in the word recognition accuracy or latencies (for pleasant or neutral words) of ASPD-P, ASPD+/-P or ASPD+P and control groups (Lorenz & Newman, 2002; Vitale et al., 2018), Vitale et al. (2018) did find evidence of a speed accuracy trade-off for negative word trials in participants with ASPD+P, which suggests that ASPD+P populations find it more difficult and require more time to process negative cues than those with ASPD alone. This finding has important implications for ASPD+P populations because although it indicates that psychopathic populations are responsive to emotional stimuli, the ability to efficiently process negative cues is essential to successful social

information processing and response inhibition and may moderate the risk of violence and aggression (Bowen, Roberts, Kocian, & Bartula, 2014).

Likewise, the finding that early fear processing deficits were predicted by ICU (Essau et al., 2006) unemotional subscale scores but not by ASPD status is not only consistent with research that found evidence of reduced fear sensitivity in psychopathy (Blair et al., 2004) but suggests that early fear processing may be an important target for intervention with ASPD populations who exhibit these traits because the inability to effectively process fear cues is widely associated with antisocial tendencies and one study found evidence that fear recognition ability predicted individual differences in prosocial behaviour (Marsh, Kozak, & Ambady, 2007). Still, the generalisability of this finding to wider ASPD populations is limited due to the narrow age range of the ASPD+/-P sample employed (M = 19.69, *s.d.* = 1.05) and further examination of early emotion processing in more representative ASPD-P and ASPD+P groups is required before firm conclusions can be drawn about the differences between them.

Notably, Domes et al. (2013) found evidence that participants with ASPD+/-P exhibited significantly more attentional bias when processing violence-related and negative stimuli than non-offender controls but found no significant difference between offenders with and without ASPD+/-P. They also noted that the significant difference in attentional bias (for congruent violence-related words) was largely attributable to

differences between a sub-group of ASPD+/-P participants with high psychopathy scores and non-offender controls and highlighted significantly higher levels of content specific bias (for incongruent violence-related words) in offenders with histories of childhood abuse/maltreatment when compared to those with no such history. This finding is concurrent with extant literature that suggests a positive association between childhood trauma and emotion processing deficits (Marusak, Martin, Etkin, & Thomason, 2015) and with the notion that psychopathic populations exhibit emotional responsivity but are subject to a maladaptive coping style (i.e., negative preception mechanism) which inhibits emotion processing and increases the likelihood of attentional bias (Kosson, McBride, Miller, Riser, & Whitman, 2018).

Equally, whilst higher self-reported arousal to emotional stimuli coupled with an impaired ability to discriminate between the arousal levels of stimuli was evidenced in ASPD+/-P participants, emotional insensitivity and hyperarousal are recognised symptoms of early trauma and PTSD (Perry, Pollard, Blakley, Baker, & Vigilante, 1995; Sherin & Nemeroff, 2011; van der Kolk & Fisler, 1994) which were not examined and so cannot be discounted as potential confounders.

Although no significant group differences were identified in relation to the experiential (JORT) fear and anxiety scores or mood induction ratings of DPD+/-P or ASPD+/-P and control groups (Habel et al., 2002; Sedgwick,

2017), Sedgwick (2017) highlighted high levels of attrition which may have led to insufficient power to detect effects in the JORT task and Habel et al. (2002) acknowledged the possibility of a dissociation between subjective self-report ratings and psychophysiological response, thus highlighting the advantage of multi-modal assessment and the limitations of self-report measures.

Eight studies utilised psychophysiological measures to assess emotion processing and whilst one identified reduced affective reactivity in ASPD-P, three highlighted deficits in ASPD+P and two highlighted evidence to suggest that deficits in ASPD+/-P groups were attributable to psychopathy and more specifically to interpersonal/affective psychopathic traits.

Only one study employed both ASPD-P and ASPD+P participants and findings indicated less potentiation of the startle reflex in both groups when compared to controls. However, whilst ASPD-P participants exhibited the same linear pattern of increased startle potentiation over time and picture categories as controls, participants with ASPD+P did not (Loomans et al., 2015). Added to this, Levenston et al. (2000) found an atypical pattern of startle modulation (with less startle potentiation) and heart rate activity in participants with ASPD+P that was similarly indicative of a lack of differentiation between affective picture categories. Whilst they also identified significantly less SCR in response to pleasant

(thrill content) stimuli in those with ASPD+P when compared to controls in contrast to another study which found that ASPD+P participants exhibited significantly less SCR activity when viewing aversive stimuli only, Levenston et al. (2000) highlighted that 'thrill' content stimuli combined elements of danger and excitement and this result could therefore reflect a lack of defensive mobilization in participants with ASPD+P.

Results were less consistent across studies that employed ASPD+/-P groups as one found no evidence to suggest diminished startle potentiation for aversive stimuli in non-psychopathic offenders or startle modulation effects attributable to ASPD status and concluded that the relationship between adult ASPD symptoms and reduced startle potentiation for aversive stimuli was mediated entirely by interpersonal/affective psychopathy traits (Vaidyanathan et al., 2011). In contrast, another found evidence of an atypical startle modulation pattern with less startle potentiation for aversive stimuli in alcohol dependent ASPD+/-P participants that remained evident once self-reported psychopathy scores were controlled for (Miranda et al., 2003). Whilst subjectivity in self-reported psychopathy scores could have reduced the likelihood of detecting psychopathy effects, the authors concluded that age of first alcohol use and ASPD were significant predictors of variance in startle reactivity to aversive stimuli. However, neither of these conclusions was consistent with the findings of Sedgwick (2017) which

suggested no difference in the startle modulation of DPD+/-P participants and no association between startle magnitude, PCL-R total, factor 1 or factor 2 scores but highlighted atypical startle attenuation for aversive stimuli in both groups (Sedgwick, 2017).

Crucially, a range of research suggests that deficient fear processing in psychopathic populations may be moderated by attentional processes and ameliorated when attention is focused specifically on threat-relevant information (Blair & Mitchell, 2009; Larson et al., 2013; Newman, Curtin, Bertsch, & Baskin-Sommers, 2010). However, Rothemund et al. (2012) found an absence of conditioned fear response in participants with ASPD+/-P that they argued was not attributable to deficient attentional processing but consistent with the notion of a fear deficit in psychopathy (Lykken, 1995). In support of this view, they highlighted that although ASPD+/-P participants exhibited significantly less N100 reactivity than controls as would be indicative of reduced attention, P200, P300 and iCNV reactivity suggested equivalent and/or superior attentional processing. Whilst this finding was based on an ASPD+/-P population who were recruited on the basis of high Psychopathy Checklist: Screening Version (PCL:SV; Hart, Hare, & Cox, 1995) factor 1 scores (≥8) and is therefore limited in terms of generalisability to ASPD-P and ASPD+P populations with low levels of interpersonal affective traits, Drislane et al. (2013) reported that ASPD+/-P participants demonstrated significantly less P300 reactivity in response to abrupt noise probes presented alongside

pleasant, neutral and unpleasant stimuli and highlighted that this effect was not attributable to deficient attention/reduced foreground attentional focus according to picture content or ASPD status but specifically to interpersonal/affective traits (Drislane et al., 2013).

Consequently, the findings of studies that employed psychophysiological measures suggested a relatively consistent pattern of impaired emotional reactivity for negative/aversive stimuli in ASPD+P and ASPD/DPD+/-P groups that does not appear attributable to attentional deficits but is consistent with amygdala-based emotion processing impairment (Blair, 2004). Nevertheless, as outlined previously, some theorists (Penney & Kosson, manuscript submitted to Clinical Psychological Sciences, n.d.) contend that maladaptive coping (occurring as a consequence of combined genetic vulnerability to emotional dysregulation and exposure to adverse early experiences that engender high levels of negative affect) may be central to the development of psychopathy and the development of coping strategies which foster automatic avoidance of negative/aversive emotional cues, making the processing of these cues more difficult (Vitale et al., 2018). Consistent with this view, longitudinal research found that individuals scoring higher in psychopathy at age 28 exhibited higher levels of physiological arousal at age three (Glenn, Raine, Venables, & Mednick, 2007). Therefore, although negative early experiences (including poor quality parental care and attachment, childhood abuse/maltreatment) are considered to contribute to the

development of ASPD (Shi, Bureau, Easterbrooks, Zhao, & Lyons-Ruth, 2012), maladaptive coping and emotion dysregulation which promotes automatic attenuation of negative (and in some cases) positive affect could provide an alternative explanation for the deficits in physiological reactivity exhibited by ASPD+P groups.

Notably however, two studies highlighted atypical startle modulation patterns in control groups recruited from psychiatric hospital staff (Loomans et al., 2015; Sedgwick, 2017), which Loomans et al. (2015) speculated may be related to the presence of adaptive personality traits (i.e., self-centred impulsivity) which were more evident in the self-reported PPI-R-II scores of hospital staff than they were in community controls. Consistent with this view, wider research found an association between low harm avoidant traits (i.e., low trait anxiety) and reduced potentiation of the startle reflex to unpleasant stimuli (Corr et al., 1995) and these traits should therefore be examined in future studies that wish to compare startle modulation in ASPD and control groups. Whilst Levenston et al. (2000) also noted startle potentiation in response to pleasant (thrill content) stimuli in offender controls, there was no evidence of potentiation in response to pleasant (erotic content) stimuli and this could therefore indicate heightened sensitivity for the dangerous elements of thrill content stimuli.

Although seven studies employed self-report measures, none reported evidence of significant differences between ASPD-P and control groups and only one reported impairment in ASPD+P whereas four studies identified deficits in ASPD+/-P participants.

Two studies found evidence of significantly higher valence ratings for negative stimuli in participants with ASPD+P and ASPD+/-P, which were consistent with reduced physiological reactivity (Levenston et al., 2000; Rothemund et al., 2012). However, another highlighted lower arousal ratings for negative stimuli in AD-ASPD+/-P and AD only groups that were only partially consistent with reduced startle potentiation in AD-ASPD+/-P and may therefore have been more related to alcohol dependence (Miranda et al., 2003).

The finding that ASPD+/-P participants had higher alexithymia scores than controls (Sayar et al., 2001) is consistent with research which found a positive association between alexithymia and physical violence in males (Kupferberg, 2002) and suggests that alexithymia could be a potential mediator for violence in ASPD+/-P populations. However, this finding has limited validity due to sampling bias and significant group differences in education and socio-economic status and as psychopathy effects were not examined, does not inform the degree to which alexithymia is evident in ASPD or mediated by co-morbid psychopathy.

Equally, whilst neither of the studies that employed the IRI found evidence to support empathy deficits in either ASPD-P or ASPD+P groups (Schiffer et al., 2017; Shamay-Tsoory et al., 2010), both studies were subject to sampling bias and employed small (*n* = <20) ASPD offender groups who may have been biased towards dissimulation. Consequently, future studies should aim to employ a multi-modal approach incorporating more ecologically valid and objective behavioural measures of empathy to determine the reliability of these results in ASPD-P and ASPD+P groups.

5.0 IMPLICATIONS FOR PRACTICE

Although these findings are purely tentative given the limited availability of studies comparing emotion processing and/or empathy in ASPD+P and ASPD-P groups, they do indicate that psychopathy could act as a mediator for emotion processing deficits in ASPD/DPD and more crucially highlight the value of differentiating between ASPD+P and ASPD-P populations when examining these phenomena. It is therefore essential that future research focus more explicitly on identifying the deficits specific to each of these groups as this would not only inform a more comprehensive understanding of the aetiology and developmental factors that contribute to emotion and empathic processing deficits but would also enhance extant knowledge regarding the relationship between these deficits and behaviour and help to promote the application of more divergent and effective approaches to intervention/treatment that are able to account

for differences in the impairments that these populations manifest independently of one another.

The current findings suggest that employing a one size fits all approach to treatment with ASPD+/-P populations would be disadvantageous and from an ethical standpoint, it is essential that consideration is given to the fact that behavioural interventions have the potential to do more harm than good where they are employed indiscriminately (Hare, 2006). For instance, based on the current findings and wider research which suggests that those with psychopathy/high levels of psychopathic traits demonstrate a lack of responsivity to negative/aversive or punishment cues (Hawes, Price, & Dadds, 2014), therapeutic interventions that incorporate punishment (i.e., in the form of sanctions, exclusion from treatment as a response to increased risk) may be less effective in eliciting behavioural change and ironically serve to reinforce inappropriate behaviour in ASPD+P populations because psychopathic populations are more motivated by the perceived reward value of a behaviour than they are by negative/punishment cues (Blair, 2013). Thus, reward focused interventions such as the decompression initiative developed by the Mendota Juvenile Treatment Centre (MJTC; Caldwell & Van Rybroek, 2001) have been found to be particularly effective when employed with adolescent populations who score highly for psychopathic traits (Reidy et al., 2015)

Whilst interventions informed by cognitive behavioural therapy (CBT), schema therapy (ST), dialectical behaviour therapy (DBT) and psychodynamic therapy are recommended and commonly employed with ASPD populations (NICE, 2009 [Updated 2013]), Hare & Neumann (2009) contend that populations with psychopathy appear to derive little benefit from emotion-based, talking or psychodynamic interventions that rely on insight or which aim to engender empathy, conscience or interpersonal skills.

Moreover, a wide range of research suggests that psychopathic populations are less likely to complete and respond to treatment and more likely to re-offend following treatment (Reidy, Kearns, & DeGue, 2013). Consequently, distinguishing between ASPD/ +P and ASPD-P populations could promote greater awareness of factors that have contributed to treatment attrition rates, outcomes and iatrogenic intervention effects and have broader implications in terms of our understanding of interventions that are effective with ASPD/DPD-P populations

6.0 LIMITATIONS AND RECOMMENDATIONS

As all reviewed studies utilised a cross-sectional design, this review can only evaluate the prevalence of emotion processing and empathy deficits in ASPD/DPD groups at the time they were studied and cannot ascertain cause. Consequently, whilst the included studies highlighted a range of

factors including ADHD, alexithymia, childhood maltreatment, early alcohol abuse, socio-economic and educational status and co-morbid psychopathy/psychopathic traits as potential mediators for emotion processing deficits in ASPD/DPD, longitudinal research would be beneficial in providing a more holistic account of the etiological factors and developmental course of emotion processing deficits in ASPD/DPD populations.

The majority of included studies employed ASPD+/-P or DPD+/-P groups, thereby preventing delineation of effects specific to ASPD/DPD and psychopathy and further research comparing emotion processing in ASPD/DPD+P and ASPD/DPD-P groups would be beneficial in establishing the reliability of the current findings.

Furthermore, whilst study selection was based on strict inclusion criteria, small samples and the recruitment of unrepresentative and unmatched ASPD/DPD and control samples inevitably limits generalisability of results to wider ASPD/DPD and control populations and in some cases represented a significant threat to the validity of results. Future studies could therefore aim to recruit more representative (offending and non-offending) ASPD/DPD and control groups as a means of reducing the likelihood of potential confounders (i.e., IQ, education, socio-economic status, histories of childhood maltreatment, criminality) or ensure that

these variables are more consistently addressed and controlled for where group differences do exist.

Added to this, the current findings are based purely on studies with male ASPD/DPD populations and so are unlikely to generalise to female ASPD/DPD groups as research suggests that gender differences exist in relation to empathy and emotion processing, that females are more empathic than males and that they process emotions using different neural pathways to males (Mestre, Samper, Frias, & Tur, 2009; Rueckert & Naybar, 2008; Weisenbach et al., 2012). Moreover, as epidemiological research suggests that males with ASPD are more likely to be involved in illegal and violent actions and more commonly endorse irritability/aggressiveness and reckless disregard for safety of self or others diagnostic criteria than females (Alegria et al., 2013), gender differences in emotion processing and empathy could mediate differences in the manifestation of symptoms and violent behaviour associated with ASPD/DPD. Still, further research examining emotion processing and empathy in male and female ASPD/DPD populations would be useful in establishing the extent of gender differences that exist between these groups.

7.0 CONCLUSION

Emotion processing deficits were reported by 19 of the 22 reviewed studies and identified in ASPD/DPD groups with and without co-morbid

psychopathy/psychopathic traits. Notably however, there was only limited evidence of reduced startle reactivity in ASPD-P participants and the findings of studies that compared emotion processing in ASPD-P, ASPD+P and control groups suggested that atypical patterns of affective reactivity and impaired processing of negative stimuli were evident purely in ASPD+P groups and not in those with ASPD alone. Furthermore, although the majority of included studies employed ASPD+/-P or DPD+/-P populations and did not delineate outcomes for ASPD/DPD+P and ASPD/DPD-P groups, three found evidence to suggest that emotion processing deficits in ASPD were entirely attributable to co-morbid psychopathic (interpersonal/affective) traits.

Still, whilst these findings lend support to the view that ASPD/DPD and psychopathy may be distinguished by emotional dysfunction and indicate that emotion processing deficits are more likely to act as a barrier to prosocial behaviour in populations with ASPD/DPD and co-morbid psychopathy/psychopathic traits, the current findings were limited by a lack of research comparing empathy and emotion processing across ASPD/DPD+P and ASPD/DPD-P groups and further research is required to accurately inform the extent and nature of deficits specific to these populations.

CHAPTER THREE

AN INVESTIGATION TO DETERMINE WHETHER EMOTION AND EMPATHIC PROCESSING DIFFER BETWEEN ADULT MALE PATIENTS WITH ANTISOCIAL PERSONALITY DISORDER OR DISSOCIAL PERSONALITY DISORDER (WITH AND WITHOUT CO-MORBID PSYCHOPATHY) AND NON-PERSONALITY DISORDERED ADULT MALES

ABSTRACT

Background: *Research suggests there may be divergent causal mechanisms for violence in populations with antisocial personality disorder (ASPD) and psychopathy as a consequence of underlying differences in emotion processing and empathy. Whilst studies that have explored these concepts have found evidence of facial emotion recognition deficits, alexithymia and impaired cognitive and affective empathy in psychopathy, further research is warranted as findings have been somewhat inconsistent. Also, very few studies have examined these constructs specifically in relation to ASPD and dissocial personality disorder (DPD) or explored differences between those with ASPD/DPD with and without co-morbid psychopathy. Having a clear understanding of the emotion processing and empathy deficits that exist within these groups is however essential in ensuring that potential causal mechanisms for antisocial behaviour and violence can be effectively addressed.*

Aims: *The aims of this study were to examine facial emotion recognition accuracy and latency, alexithymia and empathy in patients with a diagnosis of ASPD/DPD and non-personality disordered controls, to determine whether patients with ASPD/DPD (combined ASPD) exhibit significant impairment across tasks of emotion and empathic processing when compared to healthy controls and to identify whether patients groups with ASPD/DPD and co-morbid psychopathy (ASPD+P) and ASPD/DPD only (ASPD-P) may be differentiated in terms of impairment when compared to controls and each other.*

Method: *This study employed 15 patients with ASPD/DPD only (ASPD-P), 22 patients with ASPD/DPD + PCL-R assessed co-morbid psychopathy (ASPD+P) as well as 19 healthy controls. Patients were recruited from two high/medium secure hospitals and controls were recruited from hospital staff and a local university. All participants completed a short paper-based test of verbal intellectual functioning followed by a battery of computer-generated tasks of emotion and empathic processing. The results for different groups (i.e., combined ASPD; ASPD+P; ASPD-P; controls) were then compared to determine whether between group differences in emotion and/or empathic processing were evident.*

Results: *Initial analysis comparing outcomes of the combined ASPD and control groups indicated significant deficits in emotion and empathic processing in ASPD. Furthermore, when the analyses was adjusted to account for group differences in age and/or educational status, the combined ASPD group exhibited significantly slower fear recognition response latencies, and significantly more 'difficulty describing feelings' alexithymia traits when compared to controls. However, a comparison of the results for all three groups suggested only minimal evidence of significantly slower response latencies for fear emotions in those with ASPD-P when compared to controls and no significant overall group effect. In addition, results indicated that ASPD+P patients have lower levels of cognitive and affective empathy than ASPD-P patients and that deficits in cognitive empathy and higher levels of alexithymia 'difficulty*

describing feelings' traits manifest in the combined ASPD group were in fact mediated by co-morbid psychopathy.

Conclusion: *This is the first study to compare emotion processing and empathy in patients with ASPD and healthy controls and to specifically identify differences between ASPD-P and ASPD+P groups on such a broad battery of tasks of facial emotion recognition and empathy. Whilst an initial analysis highlighted emotion and empathic processing deficits in a combined ASPD group, delineating between ASPD+P and ASPD-P groups provided valuable information regarding potential differences between these groups, highlighted co-morbid psychopathy as a mediator for emotion processing and empathy deficits in ASPD and the value of differentiating between these groups. Limitations and directions for future research and practice are discussed.*

Keywords: *Facial Emotion Recognition, empathy, alexithymia*

1.0 INTRODUCTION

Emotion processing and empathy are widely considered to play a pivotal role in successful social interactions and adaptive behaviour and are commonly found to be deficient in antisocial and violent offending populations (Jolliffe & Farrington, 2004; Marsh & Blair, 2008). However, evidence from a range of studies suggests that impaired emotion processing and empathy may be less relevant as contributory mechanisms for anti-sociality and violence in some populations than they are in others, with the most prominent high-risk group being those with psychopathy (Herpertz & Sass, 2000).

Consistent with this view, Gregory et al. (2012) contend that although antisocial personality disorder is heterogeneous, separate sub-groups may exist defined by differing patterns of antisocial behaviour and each with its own distinctive aetiology. They suggest that whilst the majority are characterised by impulsivity, emotional lability, co-morbid mood and anxiety disorders as well as engagement in emotionally charged, reactive aggression, a minority sub-group are characterised by a childhood history of conduct disorder with callous-unemotional (CU) traits, emotional dysfunction (an absence of empathy and/or remorse), reactive and instrumental aggression, earlier engagement in a broader and greater density of offending behaviours, less treatment responsivity and meet the criteria for PCL-R assessed psychopathy in adulthood.

Nevertheless, whilst these distinct patterns of emotion processing could underlie different pathways to offending in antisocial individuals with and without high levels of psychopathy or psychopathic traits (Anderson & Kiehl, 2014; Anton, Baskin-Sommers, Vitale, Curtin, & Newman, 2012; Dhingra & Boduszek, 2013; Fanti, Demetriou, & Kimonis, 2013; Viding, Fontaine, & McCrory, 2012), Loomans et al., (2015) found evidence of reduced affective reactivity in ASPD populations and others have found that populations diagnosed with ASPD or antisocial traits exhibit impairment in the recognition of facial affect (primarily in the recognition of fearful facial expressions) (Dolan & Fullam, 2006; Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009; Marsh & Blair, 2008).

However, evidence for emotion processing deficits in ASPD has been largely inconsistent and some research that has compared emotion processing in ASPD populations with and without co-morbid psychopathy/psychopathic traits suggests that impairment is only apparent in those with ASPD and co-morbid psychopathy and not evident in those with ASPD alone (Vaidyanathan et al., 2011; Vitale et al., 2018).

Kosson et al. (2006) found that offenders with ASPD and co-morbid psychopathy exhibited significantly less affective facilitation of emotion words in a lexical decision-making task than those with ASPD only. Moreover, they found no difference in affective facilitation between offenders with ASPD only and offender controls. Similarly, Drislane,

Vaidyanathan, and Patrick (2013) employed electroencephalography to examine affective responsivity in incarcerated adult males with ASPD and found that those with co-morbid psychopathy had a significantly reduced cortical response when subjected to aversive stimuli (an unexpected noise probe) whilst viewing affective pictures whereas those with ASPD alone did not.

Added to this, a range of research has found evidence to suggest an association between Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994) assessed alexithymia traits (difficulty identifying feelings; difficulty describing feelings; externally oriented thinking) and psychopathic traits in offender, clinical and community populations (Kroner & Forth, 1995; Lander, Lutz-Zois, Rye, & Goodnight, 2012; Louth, Hare, & Linden, 1998) and whilst one study reported higher levels of alexithymia in an adult male ASPD population of soldiers recruited from a Turkish military hospital than was evident in a control population of soldiers without ASPD (Sayar, Ebrinc, & Ak, 2001), the authors highlighted a significant association between alexithymia, lower educational and socio-economic status (which were more prevalent in their ASPD group) but did not control for these factors and so were unable to delineate the relationship between alexithymia and ASPD alone.

Notably, a range of studies that have reported emotion processing deficits in ASPD/DPD have based their findings on ASPD/DPD populations with

varying degrees of co-morbid psychopathy (Dinn & Harris, 2000; Sedgewick, 2017) or did not assess ASPD groups for co-morbid psychopathy and were therefore unable to discount the possibility that undetected co-morbid psychopathy/psychopathic traits were influential to their results (Bagcioglu et al., 2014; Sayar, Ebrinc, & Ak, 2001; Schonenberg, Louis, Mayer, & Jusyte, 2013) despite having recruited ASPD groups from offending populations who research suggests have a higher prevalence of psychopathy than is evident in community populations (Werner et al., 2015). This lack of clarity regarding the extent to which ASPD is associated with emotion processing deficits has important implications because emotion processing underpins the generation of empathy (Marshall & Marshall, 2011), which some contend may act to inhibit antisocial behaviour (Castano, 2012; Ellis, 1982).

The Perception-action model (PAM; Preston, 2007; Preston & de Waal, 2002) describes empathy as a shared emotional experience that occurs when we attend to and perceive the emotions of others at which point subjective representations of another's state (influenced by past experiences, similarity, familiarity and interdependence) are generated and autonomic and somatic responses primed. Consistent with this view, empathy is widely regarded as a multi-dimensional construct that incorporates perspective taking and the ability to understand the subjective experience of others (cognitive empathy) as well as the ability to vicariously share with the emotional state of others in response to their

affective cues (affective or emotional empathy) (Marshall & Marshall, 2011; Marshall, Hudson, Jones, & Fernandez, 1995) and is dependent on an individual's ability to effectively distinguish between the perspectives and feelings of the self and others (Lamm, Bukowski, & Silani, 2016).

Crucially, empathy is generally more evident in females than it is in males (Christov-Moore et al., 2014; Stuijfzand et al., 2016) and widely associated with prosocial and helping behaviours (Decety et al., 2016; Schroeder et al., 1988). Conversely, empathy deficits are considered to mediate aggression, hostility and violence (Chialant, Edersheim, & Price, 2016; Dinić, Kodžopeljić, Sokolovska, & Milovanović, 2016; Gantiva, Cendales, Díaz, & González) and associations have been found between psychopathy/CU traits and blunted affective empathic responses to the emotional displays of others as well as impaired perspective taking (Ali, Amorim, & Chamorro-Premuzic, 2009; Blair, 2013; Drayton, Santos, & Baskin-Sommers, 2018; Marsh et al., 2011; Seara-Cardoso, Sebastian, Viding, & Roiser, 2016). Furthermore, some research suggests that cognitive empathy deficits contribute significantly to the prediction of violent recidivism in the two-year period following an offender's release from prison (Lauterbach & Hosser, 2007).

Nevertheless, the extent to which emotion processing and empathy deficits impact upon and differentiate the offending pathways of those with ASPD only and ASPD with co-morbid psychopathy remains unclear as

research examining these constructs in offending populations has focussed primarily on psychopathy whilst comparatively few have examined ASPD specifically or attempted to delineate differences between ASPD groups with and without co-morbid psychopathy. Furthermore, only a minority of studies have investigated multiple dimensions of empathy and emotion processing in ASPD and psychopathic populations leading to ambiguity regarding the extent to which deficits co-exist across multiple domains.

Whilst emotion processing and empathy are purported to play a critical role in the generation of emotions that in turn influence moral judgement and prosocial behaviour (Brewer et al., 2015; Cecchetto, Korb, Rumiati, & Aiello, 2018; Decety et al., 2016; Eisenberg, 2000; Patil & Silani, 2014; Treeby, Prado, Rice, & Crowe, 2016), determining how these constructs differ in ASPD groups with and without co-morbid psychopathy when compared to a control group of adult males (with no history of antisocial behaviour or diagnosis of ASPD) is essential in establishing whether impairments in emotion processing and empathy are equally influential to the aberrant behaviour of these populations. Consequently, this study employed a multi-modal approach involving a battery of self-report and behavioural tasks of facial emotion recognition, alexithymia and cognitive and affective empathy to enable a comprehensive analysis of whether emotion and empathic processing manifest differently across these groups and determine whether adult male patients with ASPD (with and without

co-morbid psychopathy) exhibit deficits in emotion and empathic processing when compared to non-personality disordered adult male controls. More specifically, this study aimed to examine i) whether patients with ASPD would be significantly less accurate and slower in their recognition of morphed facial emotions of fear, sadness, anger and happiness when compared to controls, ii) whether patients with ASPD would self-report significantly lower levels of cognitive and/or affective empathy when compared to controls, iii) whether patients with ASPD would self-report significantly more or less negative/positive valence in response to empathy eliciting facial images portraying sadness, fear, happiness and anger when compared to controls, iv) whether patients with ASPD would self-report significantly more or less negative/positive valence in response to empathy eliciting short stories portraying emotions of sadness, anger and happiness when compared to controls, v) whether patients with ASPD would self-report significantly higher levels of alexithymia traits when compared to controls and vi) whether ASPD+P and ASPD-P patients would differ in terms of emotion recognition accuracy and response latency and vii) whether ASPD+P patients would exhibit significantly less cognitive and affective empathy and significantly higher levels of alexithymia traits than ASPD-P patients

1.1 *Study Hypotheses*

1.1.1 Combined ASPD vs Controls

The primary hypothesis for this study was:

H1: Patients with ASPD will exhibit emotion processing deficits as assessed by their accuracy and speed of emotion recognition when compared to non-personality disordered controls.

Secondary study hypotheses were:

H2: Patients with ASPD will demonstrate significantly less cognitive and affective empathy than controls as assessed by both self-report and behavioural measures.

H3: Patients with ASPD will have significantly higher levels of alexithymia than controls.

1.1.2 Three Groups Comparison

H4: ASPD+P patients will demonstrate significantly less cognitive and affective empathy and significantly higher levels of alexithymia than ASPD-P patients.

2.0 METHOD

2.1 *Participants*

Male patients with an established Diagnostic and Statistical Manual of Mental Disorders – Fourth or Fifth Edition (DSM-IV/V; APA, 2013) diagnosis of antisocial personality disorder (ASPD) or equivalent International Classification of Diseases – Tenth Revision (ICD-10; World Health Organization, 1993) diagnosis of dissocial personality disorder (DPD) were recruited from medium and high secure psychiatric hospitals and divided into groups according to whether or not they met the Psychopathy Checklist-revised criteria for co-morbid psychopathy (see section 2.3), resulting in one group with ASPD/DPD only (ASPD-P) and one group with ASPD/DPD + co-morbid psychopathy (ASPD+P). The control group consisted of healthy adult males with no diagnosis of ASPD or DPD who were recruited from staff and students at the University of Nottingham and staff employed at low, medium and high secure psychiatric hospitals. Participants' suitability for inclusion in the research was assessed through either file review (patient participants) or self-report (control participants) and exclusion criteria were i) current major mental disorder (depressive or bi-polar disorder, schizophrenia), ii) learning disability, iii) history of neuro-degenerative disorder or significant head injury resulting in loss of consciousness for more than one hour, iv) >20 units of alcohol per week/current substance misuse or dependency, v) impaired hearing (due to use of audio stimuli), vi) dyslexia (due to use of visual stimuli/reading tasks). Inclusion criteria for patient and control

groups were: i) adult male aged between 20-65 ii) fluent English speakers. Furthermore, controls were required to have no criminal record and patient participants were required to have a confirmed DSM-IV diagnosis of ASPD or equivalent ICD-10 diagnosis of DPD.

2.2 *Procedure*

2.2.1 *Ethics*

Approval for the study was granted by the local research ethics committee (Approval date: 15th June 2015: Ethics Committee Ref: 15/EM/0213; IRAS ID 167845) (Appendix 9). All participants were provided with a participant information sheet, advised of their right to withdraw at any time and given an opportunity to ask the researcher questions relating to their participation prior to giving informed consent (Appendix 10-13). All participants were compensated £15.00 for their participation.

2.2.2 *Recruitment*

Adult male patients were approached in their respective wards regarding participation and all those who expressed an interest in taking part gave permission for their files to be reviewed in order that the researcher (JM) could determine their suitability for inclusion and obtain information relevant to their participation. Adult male controls were recruited via a poster advertisement which was posted across the University of Nottingham campus and hospital ward offices (Appendix 14).

2.2.3 Assessment Process

Assessments were undertaken in a quiet room located either on patient wards (patients/controls) or within the local university campus (controls only) and largely completed in one session which was pre-arranged to ensure that sufficient time was available (participants were advised in advance that testing would take approximately sixty minutes). However, upon arrival all participants were made aware that they could request to take a break at any time, complete the tasks over more than one session if they preferred or withdraw at any point if they did not wish to continue, without giving a reason. Consequently, one control and two ASPD-P participants completed tasks over two sessions. Once participants confirmed that they were happy to proceed, they were invited to complete a paper-based version of the Ammons Quick Test (QT; Ammons & Ammons, 1962) followed by a battery of computer generated tasks of emotion, empathic and moral processing (for tasks of moral processing – see chapter 4, section 2.3), presented using Psytools software (Delosis Limited). Each participant was presented with a randomly ordered menu of the tasks/questionnaires to be completed to prevent order and fatigue effects and specific written instructions were presented for each task on screen prior to their completion (Appendix 15-16).

2.3 *Measures*

2.3.1 Psychopathy

All patients were rated by a qualified psychologist or PCL-R trained researcher (JM) using the PCL-R and allocated to an ASPD only or ASPD + co-morbid psychopathy group based on their PCL-R score. The PCL-R (Hare, 1991) is a 20-item inventory which measures personality traits characteristic of psychopathy along a scale of 0-2 (0=not present; 1=possibly present; 2=definitely present). The PCL-R has been widely validated as a measure of psychopathy with adult psychiatric populations and whilst 30 is generally acknowledged as the psychopathy cut-off score in the US, a score of 25 is more commonly employed as a cut-off value for psychopathy within European research. Historical PCL-R assessment scores were located through file review for 72% of patient participants (*n* = 27). For those with no historical assessment (*n* = 10), a trained researcher (JM) completed PCL-R assessments using information retrieved from file review/patient observation records (for research purposes only). Scores were then independently checked and verified by an experienced consultant psychiatrist.

2.3.2 Verbal Intellectual Functioning

The Ammons Quick Test (QT; Ammons & Ammons, 1962) is a widely used measure of verbal intellectual functioning that comprises of three forms, each incorporating four pictures with an accompanying list of 50 related words (Appendix 15). Patients were presented with two picture forms and

accompanying word lists (one at a time) and asked to identify from each form, which one of four numbered pictures they felt was related to each word they heard, with words increasing in complexity from easy (i.e., belt) to difficult (i.e., pungent). The QT can be quickly and easily administered in 10-15 minutes, is considered a valid and reliable measure of intellectual functioning suitable for use with both children and adults, including those with mental disorder and learning disability, as highlighted by Zagar et al. (2013) who reported an adult mean Ammons assessed IQ score (*M* = 85.28, *SD* = 16.4) based upon data collected from a broad community, clinical and offending adult population.

2.3.3 Emotion Multi-morph Task

The emotion multi-morph task has been widely used as a measure of facial emotion recognition with both adult and child clinical and community samples (Blair et al., 2004; Rich et al., 2008; Seara-Cardoso, Dolberg, Neumann, Roiser, & Viding, 2013) and was employed to measure participants' sensitivity to changes in emotional facial expressions and their ability to accurately recognize each facial emotion from a series of 21 images that morphed from a neutral affect expression into prototypical emotion expression of either sadness, fear, anger or happiness. Twelve individual stimuli (three for each emotional expression) were presented with each morphed through 20 stages in 5% increments from a neutral expression into one of the prototypical emotional expressions. Each stage was presented for 1 second and the

order of image presentation was randomised across participants. All images were of photographic quality, presented in black and white and taken from the empirically validated Ekman and Friesen Pictures of Facial Affect series (Ekman & Friesen, 1976).

Figure 2. Example of morphed happy expression (0%=stage 1, 65%=stage 14, 85%=stage 18, 100%=stage 21) employed in emotion multi-morph task (Ekman & Friesen, 1976)

Participants were instructed that they would be presented with faces on a computer screen that would start out as a neutral expression before changing in intensity to reveal one of four emotions: angry, happy, fearful or sad. They were asked to decide as quickly as possible, but without guessing which emotion the neutral face was morphing into by pressing the relevant on-screen button. They were advised that the facial

expression would continue to change after their response selection until the full emotion was exposed and that they could change their mind about which expression they believed was being revealed at any time until the next image appeared by pressing a different button (Appendix 16). Patients were given one trial to familiarise themselves with the task before the selected emotion and stage of emotion recognition were recorded for the following 12 trials. Higher emotion recognition accuracy was then utilised as an indication of higher ability to discriminate different facial expressions of emotion and recognition stage score utilised as an indices of whether groups varied in terms of the emotion intensity required for emotion recognition and to identify whether recognition accuracy would vary in accordance with response latency (i.e., indicate a potential speed accuracy trade-off).

2.3.4 Empathy Eliciting Image Task

The empathy eliciting image task (Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012) is a behavioural measure of affective empathy that has previously been utilised to examine the association between affective empathy and psychopathic traits within general adult male and female populations (Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012; Seara-Cardoso, Dolberg, Neumann, Roiser, & Viding, 2013). It employs ratings from the Self-Assessment Manikin (SAM; Bradley & Lang, 1994) – a widely employed and validated non-verbal self-report pictorial assessment tool to measure participants' emotional valence

(positive/negative) in response to 48 images of individuals depicting neutral, sad, fearful, angry or happy facial expressions. SAM ratings are made along five figures for each scale and participants are required to select their current level of affective state along these dimensions on a nine-point scale (1= low spirited – 9 = widely smiling) by clicking on any of the five figures in each scale, or between any two figures. Lower SAM scale ratings indicate a negatively valenced affective response (i.e. sad) and higher indicate a positively valenced affective response (i.e. happy).

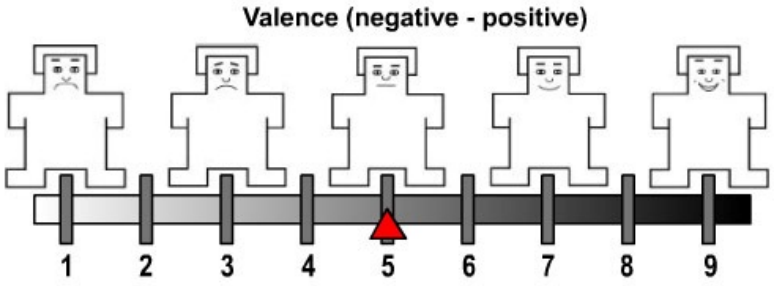


Figure 3. The Self-Assessment Manikin (SAM) used to rate the valence dimension of participants' affective response to emotion eliciting stimuli (Ali et al., 2009)

The empathy image task provides an effective means of measuring the affective empathy construct as it not only measures participants' level of emotion contagion, but also relies on the ability to distinguish between the self and others (i.e., to evaluate how another person feels and how they themselves feel in response to the images presented).

Participants were advised to rate how good or bad they felt in response to each facial expression by selecting the appropriate manikin (i.e., a frowning manikin if they felt unhappy, scared, annoyed, angry etc. or a smiling manikin if they felt happy, glad, satisfied, contented or hopeful). Instructions also explained that they could select rating points between manikins if they felt their response was somewhere in between two of the markers. They were asked to look at the emotion images carefully but not to think too much about their response because the aim was to determine their initial 'gut response' to the emotional expressions presented (Appendix 16).

2.3.5 Empathy-Eliciting Short Stories Task

The empathy eliciting short stories task (Seara-Cardoso et al., 2012; Seara-Cardoso et al., 2013) is a measure of affective empathy which has been utilised to examine the relationship between empathy and psychopathic traits in adult male and female community populations and was employed to determine participants' affective response to either positively or negatively valenced short stories. For example:

"It was the championship final. Alan was biting his nails hard. It was 5 minutes until the end of the game and the game was tied. His team was trying hard and was controlling the ball for most of the second half but the other team's defence seemed impenetrable. Suddenly, 2 minutes before the final whistle, one of the midfielders got possession of the ball,

managed to bypass the defence and passed it to the striker. The striker then headed the ball towards the goal and scored! Alan jumped and punched the air. They won the game and were the champions".

Participants were presented with 12 short stories in total, which were equally divided so that four depicted each emotion of sadness, anger or happiness. Participants were asked to rate their affective response for each story on the SAM self-report rating scale as described above (Appendix 16), with higher ratings indicative of more positive affect (Bradley & Lang, 1994). The presentation of stories was randomised across participants to prevent order effects.

2.3.6 Questionnaire of Cognitive and Affective Empathy

The Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011) was employed as a multidimensional measure of both cognitive and affective empathy. It is a self-report tool that consists of 31 items rated along a 4-point Likert scale (1=strongly disagree – 4=strongly agree) and divided across five subscales. Affective empathy subscales comprise *emotion contagion* (e.g. "*It worries me when others are worrying and panicky*"); *peripheral responsivity* (e.g. "*I often get deeply involved with the feelings of a character in a film, play, or novel*") and *proximal responsivity* (e.g. "*I often get emotionally involved with my friends' problems*") and higher subscale scores indicate a higher level of affective empathy. Cognitive empathy subscales comprise *online simulation* (e.g. "*Before criticizing*

somebody, I try to imagine how I would feel if I was in their place") and *perspective taking* (e.g. "*I can easily work out what another person might want to talk about*") and higher subscale scores indicate a higher level of cognitive empathy. Although a relatively recent addition to empathy assessment, the QCAE has been utilised with both clinical and community samples, has excellent psychometric properties and strong convergent validity with the Basic Empathy scale (BES; Jolliffe & Farrington, 2006; Michaels et al., 2014; Queirós et al., 2018; Reniers, Corcoran, Vollm, et al., 2012).

2.3.7 Interpersonal Reactivity Index

The Interpersonal Reactivity Index (IRI; Davis, 1980) was similarly employed as a multidimensional measure of both cognitive and affective empathy. It consists of 28-items rated along a 5-point Likert scale (0=does not describe me well – 4=describes me very well) and divided across 4 subscales. Cognitive empathy subscales comprise perspective taking items which measure the tendency to spontaneously adopt the psychological point of view of others (e.g. "*I sometimes find it difficult to see things from the "other guy's" point of view*") and *fantasy* items which measure participants tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, films or plays (e.g. "*After seeing a play or movie, I have felt as though I were one of the characters*") and higher subscale scores indicate higher levels of cognitive empathy. Affective empathy subscales comprise *empathic*

concern items which measure "*other-oriented*" feelings of sympathy and concern for unfortunate others (e.g. "*I am often quite touched by things that I see happen"*) and *personal distress* items which measure "*self-oriented*" feelings of personal anxiety and unease in tense interpersonal settings (e.g. "*being in a tense emotional situation scares me*") and higher subscale scores indicate higher levels of affective empathy. The IRI has been employed internationally and is widely considered to be a valid and reliable measure of dispositional empathy that has been found to have excellent psychometric properties when applied to both community and clinical populations (Bonfils, Lysaker, Minor, & Salyers, 2017; Fernandez, Dufey, & Kramp, 2011; Siu & Shek, 2005). However, as some findings suggest that the fantasy and personal distress subscales are less reliable when applied to offender populations (Bevan, O'Brien-Malone, & Hall, 2004), this study examined results for the perspective taking and empathic concern subscales only (Appendix 17).

2.3.8 Toronto Alexithymia Scale

The Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994) was employed as a measure of alexithymia – a condition characterised by difficulty identifying and distinguishing feelings from bodily sensations, difficulty describing/communicating feelings and externally oriented thinking. It consists of 20 items rated along a 5-point Likert scale (1=strongly disagree – 5 = strongly agree) and divided across three subscales. The '*difficulty describing feelings*' subscale measures difficulty

describing emotions (e.g. "*It is difficult for me to find the right words for my feelings*"). The '*difficulty identifying feelings'* subscale measures difficulty identifying emotions (e.g. "*I am often confused about what emotion I am feeling*") and the '*externally oriented thinking*' subscale measures the tendency for individuals to focus their attention externally (e.g. "*I prefer to just let things happen rather than to understand why they turned out that way*"). Whilst there are no established cut-off scores for individual subscales, a sum score of ≥ 61 is recommended by the scale's developers as the cut-off for alexithymia (Parker, Taylor, & Bagby, 2003). The TAS-20 has been employed internationally and the difficulty identifying feelings and difficulty describing feelings subscales are widely considered to have acceptable-good validity and reliability when utilised with community and clinical populations (Parker, Shaughnessy, Wood, Majeski, & Eastabrook, 2005; Parker, Taylor, & Bagby, 2003). In contrast, the externally oriented thinking subscale is purported to be less reliable when employed with non-clinical and psychiatric samples and so was not examined in this study (Preece, Becerra, Robinson, & Dandy, 2017).

2.4 *Data Analysis*

An a priori G-power analysis (Faul, Erdfelder, Lang, & Buchner, 2007) was conducted to inform the sample size required to detect a moderate effect of group on facial emotion recognition, which was considered most appropriate in view of the medium to large effect sizes reported by previous research with similar populations (Blair et al., 2004; Dolan &

Fullam, 2006) and the potential difficulty in recruiting large numbers of psychiatric inpatients within the time frame available. An initial calculation was based on an ANOVA analysis for three groups and indicated that with a moderate effect size of 0.37, an alpha of $p = 0.05$ (two-tailed) and 80% power, a total of 75 participants (25 per group) would be required for a between groups comparison[5].

All statistical analyses were completed with the Statistical Package for Social Sciences – Versions 22-24 (IBM Corp., 2013). Normality of data distribution was determined through skewness and kurtosis z-values of $\leq$ 1.96 (i.e., z-value = skewness and kurtosis values/standard error) as recommended by Field (2013), through Kolmogorov Smirnov and Shapiro Wilks tests ($p = \geq 0.05$) and from a visual inspection of boxplots and histograms (Appendix 18). Univariate ANOVAs were then completed for normally distributed continuous data and where the assumption of homogeneity of variances was met (i.e., $p = \geq 0.05$) as assessed by Levene's test (Levene, 1960). Square root, logarithmic and reflected transformations were employed to correct non-normally distributed continuous data, and the results of analysis with successfully transformed/untransformed data were then compared. As univariate ANOVAs are argued to be robust to violations of normality with little effect on Type 1 error rates (Blanca, Alarcon, Arnau, Bono, & Bendayan, 2017)

[5] The same calculation based on an ANOVA analysis for two groups indicated that a total of 60 participants (30 per group) would be required.

analysis was based on raw data for all cases where there was no difference in the significance of between group effects for untransformed/successfully transformed data[6]. Mean differences and 95% CIs (for unadjusted and adjusted ANOVAs were then obtained through parameter estimates and simple contrasts). Welch's ANOVA was employed for data that violated the assumption of homogeneity of variances and Mann Whitney U or Kruskal Wallis tests (Kruskal & Wallis, 1952) were employed for the analysis of non-normally distributed data where distribution could not be normalised through square root or logarithmic transformations. Bootstrapped General Linear Model (GLM) parameter estimates were employed to determine unadjusted and adjusted post hoc mean differences and 95% CIs for data analysed using either Welch's ANOVA, Kruskal Wallis tests or Mann Whitney U Tests where significant between group differences were evident. Scatterplots and Spearman correlations were employed to assess associations between outcome variables and age (due to age being non-normally distributed across groups). The association between education and outcome variables was also assessed via independent t-tests or Mann Whitney U tests depending on normality of distribution (Appendix 19-20). Analysis of outcome variables was then adjusted to account for age and/or education where significant associations were identified.

[6] The between group effect for empathy eliciting pictures 'sad' ratings (combined ASPD versus controls only) was determined through a Mann Whitney U test because the outcome of a univariate GLM ANOVA based on transformed data was insignificant whereas the outcome of a Welch's ANOVA based on untransformed data was significant.

Bonferroni corrections for multiple tests were not employed as they are widely considered to be overly conservative and to increase the likelihood of Type 2 error (Nakagawa, 2004; Perneger, 1998). Chi-square analysis were undertaken for the examination of categorical data with fisher's exact test values extracted for results with small cell counts. Odds ratios were then calculated through pairwise comparisons.

As the morph facial emotion recognition task was noted to have 25 responses missing from a possible 672 (*n* = 11 ASPD-P, *n* = 10 ASPD+P, *n* = 4 controls), a non-response was counted as an incorrect response for the analysis of emotion recognition accuracy and as a missing response for the analysis of recognition latency (Table 9). All other tasks were fully completed by all groups with no further missing data identified.

3.0 RESULTS

3.1 *Patient Participation/Grouping*

Of the 105 patients approached regarding participation, 75 (71.4%) volunteered to participate and gave permission for their files to be reviewed to determine their suitability for inclusion/information relevant to their participation. Of those who wished to participate, *n* = 19 (25.3%) were deemed unsuitable due to exclusion criteria, *n* = 12 (16.0%) were discharged prior to participation, *n* = 4 (5.3%) withdrew prior to participation, *n* = 1 (1.3%) withdrew having partially completed

the tasks and *n* = 2 (2.7%) were unable to participate due to a deterioration in their mental state.

The remaining 37 patients (combined ASPD) were divided into an ASPD-P group (*n* = 15)[7] comprised of those with a PCL-R score of <25 (*median* = 23.00) and an ASPD+P group (*n* = 22) [8] comprised of those with a PCL-R score ≥ 25 (median = 29.50). A Mann-Whitney U test confirmed that the PCL-R scores of the ASPD+P group were significantly higher than those of the ASPD-P group, (*U* = 330.000, *z* = 5.120, *p* = <.001) (Table 6)

3.2 *Control Participation*

A total of 19 non-personality disordered adult males (*n* = 12 students, *n* = 1 university staff member and *n* = 6 hospital staff) expressed interest in participation through the poster advertisement and all were recruited into the control group. None of the controls withdrew their consent to participate.

3.3 *Demographic Data for Patient and Control Groups*

The age of participants ranged from between 20-65 (controls *median* = 24 years, combined ASPD *median* = 37 years; ASPD-P *median* = 30 years, ASPD+P *median* = 38 years).

[7] ASPD-P group includes 7 ASPD-P and *n* = 8 DPD-P
[8] ASPD+P group includes 13 ASPD+P and *n* = 9 DPD+P

A Mann Whitney U Test indicated that the control group were significantly younger than the combined ASPD group (U = 142.000, p = < .001). Equally, a Kruskal Wallis test highlighted significant between group differences in age *(H*(2) = 13.694, p = .001) and pairwise comparisons confirmed that the control group was significantly younger than both ASPD-P and ASPD+P groups (p = .010; p = < .001). However, there was no significant difference in the ages of the ASPD-P and ASPD+P groups (p = .485).

Chi-square analysis similarly highlighted a significant between group difference in the educational status of the combined ASPD and control group (χ^2(1) = 44.442, p = <.001) as well as distinct ASPD and control groups (χ^2(2) = 44.731, p = <.001). The combined ASPD group had significantly fewer years of education than controls (p = < .001). Furthermore, pairwise comparisons confirmed that both ASPD-P and ASPD+P groups had significantly fewer years of education than the control group (p = <.001; p = <.001). However, there was no significant difference in the educational level of the ASPD-P and ASPD+P groups (p = .554, *fisher's exact*) and no significant between group differences evident in the verbal IQ of combined ASPD, ASPD-P, ASPD+P or control groups as assessed through Ammons quick test scores (*Welch's F* (1,25.703) = 2.397, p = .134; *Welch's F* (2,34.186) = 1.194, p = .315) (Table 6).

In terms of ethnicity, 77% (*n* = 43) of the participants were white British, 2% (*n* = 1) mixed ethnicity, 7% (*n* = 4) white other, 7% (*n* = 4) Asian, 4% (*n* = 2) other and 4% (*n* = 2) not disclosed. Twenty-nine patients but none of the control subjects were prescribed psychotropic medication. However, there were no significant differences between ASPD- and ASPD+ groups in relation to prescribed use of anti-psychotics ($\chi^2(1) = 1.338$, $p = .247$), benzodiazapenes ($p = .633$, *fishers exact*), selective serotonin reuptake inhibitors ($p = 1.00$, *fisher's exact*) or other anti-depressants ($p = 1.00$, *fishers exact*) (Table 6).

Table 6: Demographic and Clinical Characteristics of Patient and Control Groups

Variable	Combined ASPD (*N* = 37)	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Sig. Value
Age[a]	37.00 (29.00-46.00)	30.00 (27.00 – 46.00)	38.00 (29.00 – 45.25)	24.00 (22.00 – 34.00)	.010[*] .485[**] <.001[***] <.001[****]
Ammons Quick Test Score[b]	87.08 (9.64)	87.20 (7.01)	87.00 (11.25)	93.00 (15.16)	.315[b] .134[****]
Education					<.001[*]
Secondary	34 (91.9%)	13 (86.7%)	21 (95.5%)	0	.554[**c]
Further education/graduate/post-graduate	3 (8.1%)	2 (13.3%)	1 (4.5%)	19 (100%)	<.001[***] <.001[****]
Ethnicity					
Not disclosed	1 (2.7%)	1 (6.6%)		1 (5.3%)	
Mixed				1 (5.3%)	
White British	36 (97.3%)	14 (93.3%)	22 (100%)	7 (36.8%)	
White Other				4 (21.1%)	
Asian				4 (21.1%)	
Other				2 (10.5%)	
Medication (Current)					
Antipsychotics	23 (62.2%)	11 (73.3%)	12 (54.5%)		.247[**]
SSRIs[c]	12 (32.4%)	5 (33.3%)	7 (31.8%)		1.000[**]
Other anti-depressants[c]	4 (10.8%)	2 (13.3%)	2 (9.1%)		1.000[**]
Benzodiazapenes	4 (10.8%)	1 (6.6%)	3 (13.6%)		.633[**]
PCL-R Total Score[d]	26.70 (24.00-30.00)	23.00 (18.00 – 24.00)	29.50 (27.00 – 30.13)		<.001[**]

[*]= ASPD-P vs controls, [**] = ASPD+P vs ASPD-P, [***] = ASPD+P vs controls, [****]Combined ASPD vs Controls
Chi-square employed for all except [a-d]; *P*-value = 0.05 (two tailed) employed for all analyses.
[a] Kruskal Wallis test employed for three groups comparison due to non-normal distribution - median + interquartile ranges (25^{th} + 75^{th} percentiles) reported
[b]Welch's ANOVA employed for three groups comparison due to violation of assumption of homogeneity of variances – between group significance value reported
[c]Fisher's Exact Test employed due to small cell counts
[d]Mann Whitney U Test employed due to non-normal distribution

3.4 *Emotion Multi-morph Task - Recognition Accuracy*

3.4.1 *Combined ASPD vs Controls*

The results of a 2 x 2 chi-square analysis indicated no statistically significant between group effect on 100% recognition accuracy for anger ($\chi^2(2) = 2.692$, $p = .101$), sadness ($\chi^2(2) = .291$, $p = .589$) or happiness ($p = .139$, F*isher's Exact*) and whilst the ASPD group appeared significantly less likely to achieve 100% accuracy than controls when identifying fear ($\chi^2(2) = 3.877$, $p = .049$), an age adjusted binary logistic regression suggested that this effect was purely attributable to group differences in age ($p = .231$) (Table 7). Likewise, although a Mann Whitney U Test indicated that the ASPD group was significantly less accurate in their overall emotion recognition accuracy than controls ($U = 481.50$, $p = .021$), a review of adjusted bootstrapped GLM parameter estimates suggested this effect was in fact attributable to group differences in age and educational status ($p = .979$) (Tables 7 and 9).

3.4.2 *Three Groups Comparison*

A comparison of results across all three groups indicated no statistically significant effect of group on 100% recognition accuracy for either fear ($\chi^2(2) = 4.799$, $p = .091$), anger ($\chi^2(2) = 3.772$, $p = .152$), sadness ($\chi^2(2) = .400$, $p = .819$) or happiness ($p = .164$, *fisher's exact*). Whilst there was evidence to suggest that the odds of patients with ASPD+P achieving 100% fear recognition accuracy were significantly lower (albeit only marginally) than those of the control group (OR 0.17, 95% CI 0.03,

0.92) an adjusted analysis accounting for differences in age and/or education was not undertaken given the insignificant unadjusted between group effect (Table 7). Furthermore, although a Kruskal Wallis test indicated a borderline significant group effect on total emotion recognition accuracy rates, ($H(2) = 5.902$, $p = .052$), age and education adjusted bootstrapped parameter estimates suggested no significant group effects (Tables 8 and 10).

Table 7: Emotion Multi-morph Task Emotion Recognition Accuracy (Combined ASPD vs Controls)

Emotion	ASPD Combined (*N* = 37)	Controls (*N* = 19)	Odds ratios (Unadjusted)	95% CIs		Sig. Value (Unadjusted)	Odds Ratios (Adjusted)	95% CIs		Sig. Value (Adjusted)
				Lower Bound	Upper Bound			Lower Bound	Upper Bound	
Fear (100% accuracy)	24 (64.9%)	17 (89.5%)	0.22	0.04	1.09	.049	0.35	0.06	1.97	.231
Sadness (100% accuracy)	11 (29.7%)	7 (36.8%)	0.73	0.23	2.34	.589	1.19	0.32	4.48	.794
Anger (100% accuracy)	21 (56.8%)	15 (78.9%)	0.35	0.10	1.26	.101	0.35	0.08	1.45	.653
Happiness[a] **(100% accuracy)**	28 (75.7%)	18 (94.7%)	0.17	0.02	1.48	.139[a]	0.16	0.02	1.53	.111

Chi-square analysis employed for all analysis except[a]
[a] = Fisher's exact test employed due to small cell counts
p-value = 0.05 (two tailed)
Age adjusted odds ratios, 95% CIs and significance values obtained through binary logistic regression. No adjustment for education completed due to homogeneity in educational status of ASPD and control groups

Table 8: Emotion Multi-morph Task Emotion Recognition Accuracy (Three Groups)

Emotion	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Odds ratios	95% CIs		Sig. Value
					Lower Bound	Upper Bound	
Fear (100% accuracy)	11 (73.3%)	13 (59.1%)	17 (89.5%)	0.32* 0.53** 0.17***	0.05 0.13 **0.03**	2.07 2.19 **0.92**	.091
Sadness (100% accuracy)	4 (26.7%)	7 (31.8%)	7 (36.8%)	0.62* 1.28** 0.80***	0.14 0.30 0.22	2.72 5.49 2.92	.819
Anger (100% accuracy)	10 (66.7%)	11 (50%)	15 (78.9%)	0.53* 0.50** 0.27***	0.11 0.13 0.07	2.49 1.95 1.06	.152
Happiness[a] **(100% accuracy)**	12 (80%)	16 (72.7%)	18 (94.7%)	0.22* 0.67** 0.15***	0.02 0.14 0.02	2.40 3.22 1.36	.164

*= ASPD-P vs controls, ** = ASPD+P vs ASPD-P, *** = ASPD+P vs controls
Chi-square analysis employed for all analysis except ***
[a] = Fisher's exact test employed due to small cell counts
P-value = 0.05 (two-tailed)
Odds ratios obtained through pairwise comparisons. No analysis of adjusted odds ratios, 95% CIs or significance values due to non-significant unadjusted outcomes

Table 9: Emotion Multi-morph Task Total Recognition Accuracy (Combined ASPD vs Controls)

	Combined ASPD (*N* = 37)	Controls (*N*= 19)	Mean Diff Unadjusted	95% CIs Unadjusted		Sig. Value Unadjusted	Mean Diff Adjusted[1]	95% CIs Adjusted	
				Lower Bound	Upper Bound			Lower Bound	Upper Bound
Total recognition accuracy[a]	10 (9.00-11.00)	11.00 (10.00-12.00)	-1.38	-2.29	-0.26	.021	-0.04	-2.01	1.72

[a] = Mann Whitney U test analysis (+ sig. value) employed due to non-normal distribution; *P*-value = 0.05 (two-tailed); median + interquartile range (25th and 75th percentiles) of raw data reported. Mean differences + 95% CIs obtained through bootstrapped GLM parameter estimates but adjusted significance value unobtainable;
[1] = adjustments for age + education

Table 10: Emotion Multi-morph Task Total Recognition Accuracy (Three Groups)

	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N*= 19)	Mean Diff Unadjusted	95% CIs Unadjusted		Sig. Value Unadjusted	Mean Diff Adjusted[1]	95% CIs Adjusted	
					Lower Bound	Upper Bound			Lower Bound	Upper Bound
Total recognition accuracy[a]	10 (9.00-12.00)	10 (8.75-11.00)	11 (10.00-12.00)				.052[a]			
				-1.24*	-2.70	0.04		-0.01*	-2.03	1.87
				-0.24**	-1.64	1.27		-0.07**	-1.78	1.32
				-1.48***	-2.58	-0.58		-0.09***	-2.81	1.95

*= ASPD-P vs controls, ** = ASPD+P vs ASPD-P, *** = ASPD+P vs controls
[a] = Kruskal Wallis analysis (+ sig. value) employed due to non-normal distribution; *P*-value = 0.05 (two-tailed); median + interquartile range (25th and 75th percentiles) of raw data reported. Mean differences + 95% CIs obtained through bootstrapped GLM parameter estimates; [1] = adjustments for age + education

3.5 *Emotion Multi-morph Task Recognition Latency*

3.5.1 *Combined ASPD vs Controls*

Univariate ANOVAs highlighted no significant group effects on recognition latency (i.e., recognition stage of last response option selected) for emotions of sadness ($F(1,54) = 0.098$, $p = .755$, $\eta_2^p = .002$) or anger ($F(1,54) = .1.731$, $p = .194$, $\eta_2^p = .031$). Moreover, whilst an unadjusted univariate ANOVA suggested that the ASPD group took significantly longer than controls to recognise happy emotions ($F(1,54) = 11.462$, $p = .001$, $\eta_2^p = .175$), no significant group difference in happy recognition latency was evident following adjustments to account for group differences in educational status ($F(1,53) = 0.547$, $p = .463$, $\eta_2^p = .010$). Likewise, although the ASPD group took significantly longer than controls to identify fear emotions ($F(1,54) = 5.670$, $p = .021$, $\eta_2^p = .095$) (Table 11), a supplementary analysis undertaken to control for group differences in antipsychotic use indicated no significant group difference ($F(1,53) = 1.538$, $p = .220$, $\eta_2^p = .028$) (Appendix 19-21).

3.5.2 *Three Groups Comparison*

Univariate ANOVAs highlighted no significant group effects on recognition latency for emotions of sadness ($F(2,53) = .340$, $p = .713$, $\eta_2^p = .013$) or anger ($F(2,53) = 1.138$, $p = .328$, $\eta_2^p = .041$). In contrast, there was a significant effect of group on recognition latency for happy emotions

($F(2,53) = 5.774$, $p = .005$, $\eta_2^p = .179$) and parameter estimates indicated that the ASPD-P and ASPD+P groups both took significantly longer to identify happy emotions than controls ($p = .017$; $p = .002$). However, there was no difference in the recognition latency of ASPD-P and ASPD+P groups ($p = .623$). Moreover, when the analysis was adjusted to account for differences in education, no significant group effect was evident ($F(2,52) = .333$, $p = .718$, $\eta_2^p = .013$) (Table 12) (Appendix 20).

There was only a borderline significant group effect for fear ($F(2,53) = 3.024$, $p = .057$, $\eta_2^p = .102$) and whilst parameter estimates did indicate that the ASPD-P group took significantly longer to identify fear emotions than controls ($p = .024$) there were no significant differences in fear recognition latency for the ASPD+P and control groups ($p = .070$) or ASPD-P and ASPD+P groups ($p = .512$) (Table 9). Moreover, when a supplementary analysis was completed to examine the effects of antipsychotics on fear recognition latency, the significant difference between ASPD-P and control groups was no longer evident ($p = .209$) (see section 3.11) (Table 12) (Appendix 21).

Table 11: Emotion Multi-morph Task Group Mean Response Latency (Combined ASPD vs Controls)

Morphed Emotion	Combined ASPD (*N = 37)*	Controls (*N* = 19)	Mean Diff Unadjusted	95% CIs		Sig Value Unadjusted	Mean Diff Adjusted[1]	95% CIs Adjusted		Sig value adjusted
				Lower Bound	Upper Bound			Lower Bound	Upper Bound	
Sad	14.14 (3.51)	13.82 (4.09)	-0.33	-1.77	2.43	.755	N/A	N/A	N/A	N/A
Anger	13.05 (3.91)	11.67 (3.28)	1.38	-0.72	3.48	.194	N/A	N/A	N/A	N/A
Happy	11.79 (3.76)	8.33 (3.32)	3.46	1.41	5.51	**.001**	1.67	-2.85	6.19	.463[1]
Fear	13.67 (3.48)	11.49 (2.71)	2.18	0.35	4.02	**.021**	N/A	N/A	N/A	N/A

GLM univariate ANOVA employed for all analyses, *P*-value = 0.05 (two-tailed). Mean differences + 95% CIs obtained via parameter estimates
Means inclusive of response latencies for incorrect answers across all emotion categories; Missing response latencies - *Sad* = ASPD x 9, Controls x 4; *Anger* = ASPD x 7; *Happy* = ASPD x 3; *Fear* = ASPD x 2
[1] = education analysed as co-variate; N/A = no repeated analysis undertaken as independent T-tests/Mann Whitney U tests and Spearman's correlations indicated no significant associations between variable + age and/or education.

Table 12: Emotion Multi-morph Task Group Mean Response Latency (Three Groups)

Morphed Emotion	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Mean Diff Unadjusted	95% CIs		Sig Value Unadjusted	Mean Diff Adjusted[1]	95% CIs Adjusted		Sig value adjusted
					Lower Bound	Upper Bound			Lower Bound	Upper Bound	
Sad							.713				
	13.58 (4.17)	14.53 (3.02)	13.82 (4.09)	-0.24*	-2.82	2.34		N/A	N/A	N/A	N/A
				-0.95**	-1.55	3.46					
				0.72***	-1.63	3.06					
Anger							.328				
	13.60 (3.50)	12.67 (4.20)	11.67 (3.28)	1.93*	-0.65	4.52		N/A	N/A	N/A	N/A
				-0.93**	-3.44	1.57					
				1.00***	-1.34	3.34					
Happy							**.005**				.718[1]
	11.43 (3.73)	12.04 (3.85)	8.33 (3.32)	3.10*	**0.57**	**5.63**		1.52*	-3.12	6.15	
				0.61**	-1.84	3.05		0.44**	-2.05	2.93	
				3.71***	1.41	6.00		1.96***	-2.89	6.82	
Fear							.057				
	14.10 (2.84)	13.38 (3.90)	11.49 (2.71)	2.61*	**0.35**	**4.87**		N/A	N/A	N/A	N/A
				-0.72**	-2.91	1.47					
				1.89***	-0.16	3.94					

GLM univariate ANOVA employed for all analyses, *P*-value = 0.05 (two-tailed). Mean differences + 95% CIs obtained via parameter estimates and simple contrasts
* = ASPD-P vs controls, ** = ASPD+P vs ASPD-P, *** = ASPD+P vs controls
Means inclusive of response latencies for incorrect answers across all emotion categories; Missing response latencies - *Sad* = ASPD-P x 6, ASPD+P x 3, Controls x 4; *Anger* = ASPD-P x 3, ASPD+P x 4; *Happy* = ASPD-P x 1, ASPD+P x 2; *Fear* = ASPD-P x 1, ASPD+P x 1
[1] = education analysed as co-variate;
N/A = no repeated analysis undertaken as independent T-tests/Mann Whitney U tests and Spearman's correlations indicated no significant associations between variable + age and/or education.

3.6 *Interpersonal Reactivity Index*

General linear model univariate ANOVAs, parameter estimates and simple contrasts were employed to examine group differences in affective and cognitive empathy with and without adjustments for group differences in educational status.

3.6.1 *Combined ASPD vs Controls*

Univariate ANOVAs were completed and highlighted a statistically significant between group effect for the perspective taking subscale ($F(1,54) = 17.413$, $p = <.001$, $\eta_2^{par} = .244$) with the ASPD group significantly less likely to spontaneously adopt the psychological perspective of others than controls. However, this effect was not evident once analysis was adjusted to account for group differences in educational status ($F(1,53) = 1.452$, $p = .234$, $\eta_2^{par} = .027$). Similarly, whilst an unadjusted analysis highlighted a statistically significant between group effect for the empathic concern subscale ($F(1,54) = 5.524$, $p = .022$, $\eta_2^{par} = .093$), with the ASPD group significantly less likely to feel empathic concern than the control group, this effect was not evident once group differences in education were accounted for ($F(1,53) = 0.504$, $p = .481$, $\eta_2^{par} = .009$) (Table 13) (Appendix 20).

3.6.2 *Three Groups Comparison*

Univariate ANOVAs were completed and results highlighted a statistically significant group effect for the perspective taking subscale ($F(2, 53) = 17.383$, $p = <.001$, $\eta_2^{par} = .396$). However, post hoc analysis of parameter estimates and simple contrasts revealed that whilst the ASPD+P group was significantly less likely to spontaneously adopt the psychological perspective of others than either the control or ASPD-P groups ($p = <.001$, $p = .001$), there was no significant difference between the ASPD-P and the control group ($p = .100$). Equally, when the analysis was repeated with adjustments for group differences in educational status, the significant group effect remained evident ($F(2,52) = 7.130$, $p = .002$, $\eta_2^{par} = .215$) with the ASPD+P group scores significantly different from those of both control and ASPD-P groups ($p = .017$; $p = .001$) (Table 14) (Appendix 20).

There was a statistically significant group effect for the empathic concern subscale ($F(2, 53) = 3.974$, $p = .025$, $\eta_2^{par} = .130$) and a review of parameter estimates and simple contrasts indicated that the ASPD+P group was significantly less likely to feel empathic concern than the control group ($p = .007$). However, there were no significant differences between the ASPD-P and control groups ($p = .289$) or between the ASPD+P and ASPD-P groups ($p = .136$). Furthermore, when the analysis was adjusted to account for group differences in educational status, the

significant group effect was no longer evident, (F(2,52) = 1.316, p = .277, η_2^{par} = .048) (Table 14) (Appendix 20).

3.7 *Questionnaire of Cognitive and Affective Empathy*

General linear model univariate ANOVAs, parameter estimates and simple contrasts and general linear model bootstrapped parameter estimates were employed to examine group differences in affective and cognitive empathy with and without adjustments for group differences in age and/or educational status.

3.7.1 *Combined ASPD vs Controls*

A univariate ANOVA was employed and indicated a significant between group effect for the online simulation subscale (F(1,54) = 15.601, p = <.001, η_2^{par} = .224) with the ASPD group significantly less likely to imagine how they would feel in another's situation than the control group. However, a review of age and education adjusted bootstrapped GLM parameter estimates (employed to account for violation of the assumption of homogeneity of variances) suggested that this effect was no longer evident once group differences in age and educational status were accounted for (p = .208) (Table 13) (Appendix 19-20).

There was no statistically significant between group effect evident in relation to the peripheral responsivity subscale (F(1,54) = 0.385, p =

.537, η_2^{par}= .007) or emotion contagion subscale (F(1,54) = 0.152, p = .698, η_2^{par}= .003). Whilst there was a significant between group effect for the proximal responsivity subscale (F(1,54) = 7.286, p = 009, η_2^{par}= .119) and the ASPD group appeared significantly less likely to become affectively involved when observing the feelings of another in a close social context than the control group, this effect was not evident once the analysis was adjusted to account for group differences in educational status (F(1,53) = 1.057., p = .309, η_2^{par}= .020). Similarly, although initial analysis indicated a statistically significant between group effect for the perspective taking subscale (F(1,54) = 14.754, p = <.001, η_2^{par}= .215) with the ASPD group significantly less likely to see things from another's perspective than the control group, this effect was not evident following adjustments to account for group differences in age and educational status (F(1,52) = 0.140, p = .710, η_2^{par}= .003) (Table 13) (Appendix 19-20)

3.7.2 *Three Groups Comparison*

Univariate ANOVAs were employed and highlighted a significant effect of group for the online simulation subscale (F(2,53) = 13.520, p = <.001, η_2^{par}= .338). Analysis of parameter estimates and simple contrasts revealed that the ASPD+P group were significantly less likely to imagine how they would feel in another's situation than the control or ASPD-P

group (p = <.001; p = .004). However, there was no significant difference between the scores of the ASPD-P and control groups (p = .091) and whilst the between group effect remained significant when the analysis was repeated with adjustments to account for group differences in age and educational status, (F(2,51) = 4.080, p = .023, η_2^{par} = .138), the significant difference between ASPD+P and control groups was no longer evident (p = .120) and only that between ASPD-P and ASPD+P groups remained (p = .008) (Table 14) (Appendix 19-20).

There was a significant group effect for the peripheral responsivity subscale (F(2,53) = 3.707, p = .031, η_2^{par} = .123) and analysis of parameter estimates and simple contrasts revealed that the ASPD+P group were significantly less likely to become affectively involved when observing the feelings of another in a detached context than the ASPD-P group (p = .011). However, there were no significant differences between the ASPD-P and control groups (p = .327) or the ASPD+P and control groups (p = .089). As a spearman's correlation and independent t-test indicated no significant associations between age or educational status and peripheral responsivity subscale scores the analysis was not repeated with adjustments (Table 14) (Appendix 19-20).

There was a significant group effect for the proximal responsivity subscale (F(2, 53) = 6.871, p = .002, η_2^{par} = .206) and a review of parameter

estimates and simple contrasts indicated that the ASPD+P group were significantly less likely to become affectively involved when observing the feelings of another in a close social context than the control group (p = .001) or ASPD-P group (p = .019). However, there was no difference between the scores of the ASPD-P and control groups (p = .365) and whilst the significant group effect remained evident once the analysis was adjusted to account for group differences in educational status, (F(2,52) = 3.414, p = .040, η_2^{par} = .116), this was purely attributable to differences between ASPD+P and ASPD-P groups (p = .021) as there was no significant difference between the ASPD+P and the control group (p = .074) (Table 14) (Appendix 20).

There was a significant group effect for the perspective taking subscale (F(2,53) = 8.247, p = .001, η_2^{par} = .237) and parameter estimates and simple contrasts revealed that the ASPD+P and ASPD-P groups were significantly less likely to see things from another's perspective than the control group (p = <.001; p = 0.18). However, there was no significant difference between the ASPD-P and ASPD+P groups (p = .214). Furthermore, a repeated analysis with adjustments to account for group differences in age and educational status indicated no significant group effects (F(2,51) = 0.554, p = .578, η_2^{par} = .021). There was no significant group effect for the emotion contagion subscale (F(2,53) = 0.241, p = .787, η_2^{par} = .009) (Table 14) (Appendices 19-20).

3.8 *Toronto Alexithymia Scale*

General linear model univariate ANOVAs, parameter estimates and simple contrasts were employed to examine group differences in affective and cognitive empathy with and without adjustments for group differences in age and/or educational status.

3.8.1 *Combined ASPD vs Controls*

There was a statistically significant group effect for the difficulty describing feelings subscale ($F(1,54) = 25.599$, $p = <.001$, $\eta_2^p = .322$) with the ASPD group significantly less able to describe their feelings than the control group and this effect remained evident following adjustments to account for group differences in age and educational status ($F(1,52) = 5.023$, $p = .029$, $\eta_2^p = .088$). In contrast, despite initial analysis highlighting a statistically significant between group effect for the difficulty identifying feelings subscale ($F(1,54) = 14.706$, $p = <.001$, $\eta_2^p = .214$) with the ASPD group significantly less able to identify their feelings than the control group, a repeated analysis undertaken to account for group differences in age and educational status indicated no significant between group differences ($F(1,52) = 0.036$, $p = .851$, $\eta_2^p = .001$) (Table 13) (Appendix 19-20)

3.8.2. *Three Groups Comparison*

There was a statistically significant group effect for the difficulty describing feelings subscale ($F(2,53) = 14.279$, $p = <.001$, $\eta_2^p = .350$) and a review of parameter estimates and simple contrasts indicated that both ASPD-P and ASPD+P groups felt significantly less able to describe their feelings than the control group ($p = .002$; $p = <.001$). However, there was no significant difference between the ASPD-P and ASPD+P groups ($p = .133$). Whilst the between group effect remained significant when the analysis was repeated with adjustments for age and educational status ($F(2,51) = 3.712$, $p = .031$, $\eta_2^p = .127$), the difference between ASPD-P and control groups was only marginally significant ($p = .051$) in contrast to that evident between the ASPD+P and control groups ($p = .011$) (Table 14) (Appendix 19-20).

There was a statistically significant group effect for the difficulty identifying feelings subscale ($F(2,53) = 8.836$, $p = <.001$, $\eta_2^p = .250$) and parameter estimates and simple contrasts revealed that the ASPD+P and ASPD-P groups felt significantly less able to identify their feelings than the control group ($p = <.001$; $p = .028$). However, there was no significant difference between ASPD+P and ASPD-P groups ($p = .117$) and a repeated analysis with adjustments to account for group differences in age and educational status indicated no significant group effect ($F(2,51) = 0.846$, $p = .435$, $\eta_2^p = .032$) (Table 14) (Appendix 19-20).

Table 13: Mean Subscale Scores from Psychometric Tests of Cognitive/Affective Empathy and Alexithymia (Combined ASPD vs Controls)

Outcome Variable	Combined ASPD Mean (SD) (*N* = 37)	Controls Mean (SD) (*N* = 19)	Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value unadjusted	Mean Difference Adjusted	95% CIs Adjusted		Sig Value Adjusted
				Lower Bound	Upper Bound			Lower Bound	Upper Bound	
IRI Perspective Taking	13.86 (6.25)	20.68 (4.73)	-6.82	-10.10	-3.54	**< .001**	-4.35	-11.59	2.89	.234[1]
IRI Empathic Concern	17.70 (6.19)	21.63 (5.36)	-3.93	-7.28	-0.58	**.022**	-2.63	-10.07	4.81	.481[1]
QCAE Online Simulation	23.22 (6.11)	29.42 (4.27)	-6.21	-9.35	-3.06	**< .001**	-2.18	-7.13	0.64	.201[2]
QCAE Perspective Taking	27.92 (6.60)	34.37 (4.36)	-6.45	-9.82	-3.08	**< .001**	-1.37	-8.74	6.00	.710[2]
QCAE Peripheral Responsivity	10.27 (2.82)	10.74 2.33)	-0.47	-1.97	1.04	.537	N/A	N/A	N/A	N/A
QCAE Proximal Responsivity	10.70 (2.76)	12.63 (2.01)	-1.93	-3.36	-0.50	**.009**	-1.63	-4.82	1.55	.309[1]
QCAE Emotion Contagion	10.76 (2.70)	11.05 (2.66)	-0.30	-1.82	1.22	.698	N/A	N/A	N/A	N/A
TAS-20 Difficulty Describing Feelings	17.16 (4.40)	11.32 (3.40)	5.85	3.53	8.16	**< .001**	5.92	0.62	11.22	.029[2]
TAS-20 Difficulty Identifying Feelings	20.19 (6.90)	13.32 (5.07)	6.87	3.28	10.47	**< .001**	-0.74	-8.65	7.17	.851[2]

GLM univariate ANOVA employed for all analyses, *P*-value = 0.05 (two-tailed). Adjusted mean difference, 95% CIs and sig. value for QCAE OS subscale obtained through bootstrapped parameter estimates as Levene's test sig. value for adjusted UA = <0.05. All remaining mean differences + 95% CIs and sig. values obtained through GLM parameter estimates.
1 = education as co-variate, 2 = age + education as co-variates
N/A = no repeated analysis undertaken as t-test/mann whitney u test and spearman's correlations indicated no significant associations between variable + age and/or education

Table 14: Mean Subscale Scores from Psychometric Tests of Cognitive/Affective Empathy and Alexithymia (Three Groups)

Outcome Variable	ASPD-P Mean (SD) (*N* =15)	ASPD+P Mean (SD) (*N* = 22)	Controls Mean (SD) (*N* = 19)	Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value unadjusted	Mean Difference Adjusted	95% CIs Adjusted		Sig Value Adjusted
					Lower Bound	Upper Bound			Lower Bound	Upper Bound	
IRI Perspective Taking	17.67 (4.86)	11.27 (5.82)	20.68 (4.73)	-3.02*	-6.64	-0.60	<.001	-2.25*	-8.92	4.43	**.002[1]**
				-6.39**	**-9.90**	**-2.89**		**-6.32****	**-9.90**	**-2.73**	
				-9.41***	**-12.69**	**-6.13**		**-8.56*****	**-15.55**	**-1.57**	
IRI Empathic Concern	19.47 (6.62)	16.50 (5.71)	21.63 (5.36)	-2.17*	-6.22	1.89	.025	-1.66*	-9.15	5.83	.277[1]
				-2.97**	-6.90	0.96		-2.92**	-6.94	1.10	
				-5.13***	**-8.81**	**-1.46**		-4.58***	-12.41	3.26	
QCAE Online Simulation	26.33 (5.05)	21.09 (5.94)	29.42 (4.27)	-3.09*	-6.68	0.51	<.001	-0.68*	-7.47	6.12	**.023[2]**
				-5.24**	**-8.73**	**-1.76**		**-4.96****	**-8.54**	**-1.38**	
				-8.33***	**-11.59**	**-5.07**		-5.64***	-12.79	1.52	
QCAE Perspective Taking	29.40 (5.78)	26.91 (7.06)	34.37 (4.36)	**-4.97***	**-9.07**	**-0.87**	.001	-0.79*	-8.26	6.69	.578[2]
				-2.49**	-6.47	1.48		-1.93**	-5.87	2.01	
				-7.46***	**-11.18**	**-3.74**		-2.72***	-10.59	5.15	
QCAE Peripheral Responsivity	11.60 (2.16)	9.36 (2.89)	10.74 (2.33)	0.86*	-0.89	2.61	.031	N/A	N/A	N/A	N/A
				-2.24**	**-3.93**	**-0.54**					
				-1.37***	-2.96	0.21					
QCAE Proximal Responsivity	11.87 (2.50)	9.91 (2.69)	12.63 (2.01)	-0.77*	-2.45	0.92	.002	-0.97*	-4.08	2.13	**.040[1]**
				-1.96**	**-3.59**	**-0.33**		**-1.98****	**-3.65**	**-0.31**	
				-2.72***	**-4.25**	**-1.20**		-2.95***	-6.19	0.31	
QCAE Emotion Contagion	11.07 (3.17)	10.55 (2.39)	11.05 (2.66)	0.01*	-1.86	1.89	.787	N/A	N/A	N/A	N/A
				-0.52**	-2.34	1.29					
				-0.51***	-2.21	1.19					
TAS-20 Difficulty Describing Feelings	15.93 (4.18)	18.00 (4.44)	11.32 (3.40)	**4.62***	**1.82**	**7.42**	<.001	5.28*	-0.02	10.59	**.031[2]**
				2.07**	-0.65	4.78		2.10**	-0.70	4.90	
				6.68***	**4.14**	**9.23**		**7.38*****	**1.80**	**12.97**	
TAS-20 Difficulty Identifying Feelings	18.20 (5.86)	21.55 (7.35)	13.32 (5.07)	**4.88***	**0.55**	**9.22**	<.001	-1.56*	-9.52	6.41	.435[2]
				3.35**	-0.86	7.55		2.69**	-1.51	6.89	
				8.23***	**4.30**	**12.16**		1.13***	-7.26	9.52	

GLM univariate ANOVA employed for all analyses, *P*-value = 0.05 (two-tailed). Mean Differences + 95% CIs obtained via parameter estimates and simple contrasts.
*= ASPD-P vs controls, ** = ASPD+P vs ASPD-P, *** = ASPD+P vs controls
1 = education as co-variate, 2 = age + education as co-variates
N/A = no repeated analysis undertaken as t-test/mann whitney u test and spearman's correlations indicated no significant associations between variable + age and/or education

3.9 *Empathy-Eliciting Short Stories Task*

3.9.1 *Combined ASPD vs Controls*

There were no significant group differences in the combined mean valence ratings for stories depicting either anger (U = 312.50, p = .497), happiness (U = 356.00, p = .938) or sadness (U = 289.00, p = .270). Moreover, both groups demonstrated the same linear pattern of valence, giving sad stories the lowest (least positive) and happy stories the highest (most positive) valence ratings (Table 15) (Appendix 18-20).

3.9.2 *Three Groups Comparison*

There were no significant group differences in the combined mean valence ratings for stories depicting either anger (H(2) = .554, p = 758), happiness (H(2) = 0.18, p = .991) or sadness (H(2) = 1.379, p = .502) and all groups demonstrated the same linear pattern of valence, giving happy stories the highest valence ratings and sad stories the lowest. Nevertheless, the ASPD+P group had the highest valence ratings of all groups for sad and angry content stories and the lowest valence ratings for happy content stories. In contrast, the ASPD-P group had the highest valence ratings for happy stories when compared to both ASPD+P and control groups (Table 16) (Appendix 18-20).

3.10 *Empathy Eliciting Image Task*

3.10.1 *Combined ASPD vs Controls*

There was no statistically significant between group difference in mean valence ratings for images depicting 'happiness' ($F(1,54) = .736$, $p = .395$, $\eta_2^p = .013$) and this outcome did not change following adjustments to account for group differences in age ($F(1, 53) = .374$, $p = .543$, $\eta_2^p = .007$). Added to this, there were no significant between group differences in mean valence ratings for 'anger' (Welch's $F(1,53.560) = .561$, $p = .457$), 'neutral' ($U = 329.50$, $p = .694$) 'fear' (Welch's $F(1,53.096) = .108$, $p = .744$) or 'sadness' ($U = 255.50$, $p = .096$) and both groups gave the highest valence ratings to happy images and the lowest to sad images (Table 15) (Appendix 18-20).

3.10.2 *Three Groups Comparison*

A univariate ANOVA suggested no significant group differences in mean valence ratings for images depicting 'happiness' ($F(2,53) = .461$, $p = .633$, $\eta_2^p = .017$) and a repeated adjusted analysis accounting for group differences in age similarly indicated no significant between group effect ($F(2,52) = 0.441$, $p = .646$, $\eta_2^p = .017$). Likewise, there were no significant group differences in mean valence ratings for images depicting 'sadness' ($F(2,53) = 1.907$, $p = .159$, $\eta_2^p = .067$), 'neutral' ($H(2) = .177$, $p = .916$), 'anger' (Welch's $F(2,30.145) = .270$, $p = .765$) or 'fear' (Welch's $F(2,28.119) = .068$, $p = .935$). Moreover, all groups gave the

highest ratings of valence to happy images and the lowest to sad images (Table 16) (Appendix 18-20).

Table 15: Group Mean Affect Ratings from Empathy Eliciting Image and Story Tasks (Combined ASPD vs Controls)

Outcome Variable	Combined ASPD (*N* = 37)		Controls (*N* = 19)		Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value Unadjusted
	Mean (SD)	Median (Interquartile Range)	Mean (SD)	Median (Interquartile Range)		Lower Bound	Upper Bound	
SAM STORIES								
Anger[a]		3.75 (3.00-5.00)		3.75 (3.00-4.50)				.497[a]
Sad[a]		2.00 (1.00-2.50)		1.25 (1.00-2.25)				.270[a]
Happy[a]		8.00 (6.38-9.00)		8.00 (7.25-8.50)				.938[a]
SAM PICTURES								
Neutral[a]		5.13 (5.00-5.50)		5.13 (5.00-5.38)				.694
Sad[b]		2.63 (2.00-3.56)		2.13 (1.38-2.13)				.096
Anger[b]	3.33 (1.93)		3.63 (1.07)		-0.30	-1.04	0.50	.457[b]
Happy[c]	7.73 (1.00)		7.49 (0.93)		0.24	-0.32	0.79	.395
Fear[b]	3.26 (2.03)		3.13 (0.89)		0.13	-0.55	0.91	.744

[a] = Mann Whitney U Test employed due to non-normal distributions; *P*-value = 0.05 (two tailed) – median + interquartile range (25th and 75th percentiles) of raw data reported
[b] = Welch's ANOVA employed - mean difference and 95% CIs obtained through bootstrapped GLM parameter estimates
[c] = unadjusted sig. value. Univariate ANOVA adjusted for age differences sig. value indicated no change in significance of outcome $p = .543$
NB: Mann Whitney U Test employed for analysis of between group effect for 'sad' pictures as significance of outcome for UA with transformed data different to that of outcome for Welch's Anova with untransformed data.

Table 16: Group Mean Affect Ratings from Empathy Eliciting Image and Story Tasks (Three Groups)

Outcome Variable	ASPD-P (*N* = 15)		ASPD+P (*N* = 22)		Controls (*N* = 19)		Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value Unadjusted
	Mean (SD)	Median (Interquartile Range)	Mean (SD)	Median (Interquartile Range)	Mean (SD)	Median (Interquartile Range)		Lower Bound	Upper Bound	
SAM STORIES										
Anger[a]		3.50 (3.00-4.25)		4.00 (2.94-5.00)		3.75 (3.00-4.50)				.758
Sad[a]		1.75 (1.00-2.50)		2.00 (1.00-2.50)		1.25 (1.00-2.25)				.502[a]
Happy[a]		8.25 (6.25-9.00)		7.88 (6.50-8.81)		8.00 (7.25-8.50)				.991[a]
SAM PICTURES										
Neutral[a]		5.00 (5.00-5.50)		5.13 (5.00-5.50)		5.13 (5.00-5.38)				.916[a]
Sad	3.09 (1.91)		3.06 (1.47)		2.30 (0.72)		0.80[*] -0.03[**] 0.77[***]	-0.18 -0.98 -0.12	1.77 0.92 1.65	.159
Anger[b]	3.32 (1.99)		3.34 (1.93)		3.63 (1.07)		-0.32[*] 0.02[**] -0.29[***]	-1.32 -1.12 -1.23	0.87 1.17 0.70	.765[c]
Happy	7.82 (1.09)		7.67 (0.95)		7.49 (0.93)		0.32[*] -0.15[**] 0.18[***]	-0.36 -0.81 -0.44	1.00 0.51 0.80	.633[c]
Fear[b]	3.34 (2.13)		3.20 (2.00)		3.13 (0.89)		0.21[*] -0.14[**] 0.07[***]	-0.89 -1.49 -0.81	1.31 1.27 1.04	.935[b]

[*]= ASPD-P vs controls, [**] = ASPD+P vs ASPD-P, [***] = ASPD+P vs controls

Univariate ANOVA employed for all unless [a] or [b] indicated. *P*-value = 0.05 (two tailed). Mean unadjusted differences + 95% CIs obtained through parameter estimates and simple contrasts.

[a] = Kruskal Wallis employed due to non-normal distribution, *P*-value = 0.05 (two tailed) – median + interquartile range (25^{th} and 75^{th} percentiles) of raw data reported

[b] = Welch's ANOVA employed due to violation of assumption of homogeneity of variances – mean difference + 95% CIs obtained through bootstrapped parameter estimates

[c] = unadjusted sig. value. SAM Pictures 'happy' GLM UA sig. value (adjusted for age) indicated no change in significance of between group differences; SAM Pictures 'anger' bootstrapped GLM parameter estimates (adjusted for age) indicated no change in significance of between group differences.

3.11 *Supplementary Analyses*

Following a review of scatterplot data, a Pearson product-moment correlation coefficient was computed to examine the relationship between TAS-20 'difficulty describing feelings' subscale scores and IRI perspective taking scores. Results indicated a significant negative correlation between the two variables (r = -.526, p = <.001) and a repeated analysis was therefore employed to examine whether the significant between group effects identified for the IRI perspective taking subscale remained once the analysis was adjusted to account for alexithymia 'difficulty describing feelings' traits. Independent t-tests and Mann Whitney U Tests were also employed to examine the relationship between anti-psychotic and SSRI medication on variables and where significant correlations were found, analyses were repeated with adjustments for medication (by type) and education/age where appropriate (Appendix 19-21). The relationship between benzodiazepines or anti-depressants other than SSRIs and outcome variables was not examined due to the limited number of patients taking these medications.

3.11.1 *Combined ASPD vs Controls*

The significant between group effect apparent for the non-adjusted IRI perspective taking scores of the combined ASPD and control group (F (1,54) = 17.413, p = <.001, η_2^{par} = .244) remained evident when a repeated analysis was completed to adjust for differences in alexithymia 'difficulty describing feelings' traits (F(1, 53) = 4.469, p = .039, η_2^{par} =

.078). However, as there was no significant group difference evident once group differences in either educational status ($F(1,53) = 1.452$, $p = .234$, $\eta_2^{par} = .027$) or education and 'difficulty describing feelings' traits were accounted for ($F(1,52) = 0.116$, $p = .735$ $\eta_2^{par} = .002$), the significant between group effect appeared more attributable to differences in educational status than to ASPD or alexithymia traits.

Adjusting analyses to account for group differences in antipsychotic and/or SSRI use made no difference to the significance of between group effects for any variable except multi-morph fear recognition latency. Whilst an unadjusted ANOVA analysis of morph fear recognition latency suggested a significant between group effect ($F(1,54) = 5.670$, $p = .021$, $\eta_2^{par} = .095$) this was no longer evident when the analysis was repeated with adjustment to account for group differences in antipsychotic use ($F(1,53) = 1.538$, $p = .220$, $\eta_2^{par} = .028$).

3.11.2 *Three Groups Comparison*

In contrast to the two group, education adjusted analysis, the significant between group effect evident in the three-group, education adjusted analysis of IRI perspective taking scores ($F(2,52) = 7.130$, $p = .002$, $\eta_2^{par} = .215$) remained evident when the analysis was repeated to account for group differences in both education and alexithymia 'difficulty describing feelings' traits ($F(2,51) = 4.913$, $p = .011$, $\eta_2^{par} = .162$). Furthermore, a

review of adjusted GLM parameter estimates and simple contrasts revealed that whilst the scores of the ASPD+P group were significantly different to those of both the control and the ASPD-P group (p = .023; p = .001), there was no significant difference evident between the ASPD-P and the control group (p = .694).

Adjusting analyses to account for group differences in antipsychotic and/or SSRI use made no difference to the significance of between group effects for variables relating to empathic processing and alexithymia. However, ANOVA analyses adjusting for group differences in antipsychotic use did ameliorate the significant difference in morph fear recognition latency that was initially evident between the Combined ASPD and the control group/ASPD-P and control groups.

4.0 DISCUSSION

This study employed a battery of psychometric and behavioural tasks to compare emotional and empathic processing in patients with ASPD and non-personality disordered controls. It is unique in comparing both a combined ASPD (with and without co-morbid psychopathy) group as well as distinct ASPD-P and ASPD+P groups against controls and in employing such a broad battery of questionnaires and tasks to identify the differences that exist between these groups.

4.1 *Facial Emotion Recognition*

The hypothesis that patients with ASPD would exhibit emotion processing deficits as assessed by their accuracy and speed of emotion recognition when compared to controls was not met despite the fact that all ASPD groups (combined ASPD, ASPD-P and ASPD+P) were less accurate and slower to respond when identifying emotions compared to controls. Whilst a comparison of the combined ASPD and control group suggested that ASPD patients were significantly less likely to accurately identify fear emotions and significantly less accurate in their overall emotion recognition accuracy than controls, there were no significant group differences evident when distinct ASPD-P, ASPD+P groups and the control group were compared. Equally, whilst the possibility that smaller sample sizes may have inhibited the likelihood of finding a significant effect cannot be discounted, post-hoc analysis of results for the combined ASPD and control group suggested that group differences in fear and total emotion recognition accuracy were in fact attributable to differences in age or age and educational status. Similarly, in support of research by Pham and Philippot (2010) who highlighted education as a potential moderator for emotion recognition accuracy, a borderline significant difference in the overall emotion accuracy rates of ASPD+P and control groups was ameliorated after accounting for group differences in educational status. Moreover, whilst the odds of patients with ASPD+P achieving 100% fear recognition accuracy were marginally lower than those of controls, there was no significant overall between group effect.

Although the combined ASPD group were significantly slower to recognise fear emotions than controls irrespective of group differences in age and educational status, there was no significant between group effect evident after accounting for group differences in antipsychotic use. Moreover, whilst a comparison of the fear recognition response latencies of distinct ASPD groups and the control group highlighted significantly longer fear response latencies in patients with ASPD-P when compared to controls, the overall between group effect was not significant and there were no significant differences evident in the fear recognition latencies of ASPD-P and control groups once antipsychotic use was accounted for.

Added to this, education adjusted two and three group analyses of happy recognition response latencies suggested that the significant differences initially evident between the response latencies of ASPD groups (combined ASPD, ASPD-P and ASPD+P) and the control group were in fact attributable to differences in educational status.

Furthermore, all groups demonstrated the same pattern of recognition accuracy (highest to lowest accuracy order = happy>fear>anger>sad) and were quicker to identify happy emotions. Consequently, in contrast to research which employed an affective lexical decision-making task to compare the processing of emotion words in psychopathic and control participants (Vitale, Kosson, Resch, & Newman, 2018) results were not indicative of a speed/accuracy trade off.

The current findings would therefore appear to present a challenge to Blair's (2005) Integrated Emotion Systems (IES) model which posits that amygdala dysfunction in psychopathy acts as a mechanism for impairment in stimulus reinforcement associations and recognition of punishment and reward cues. They are also incongruous with a substantial body of evidence that suggests specific impairment in the recognition of negative affect in antisocial and/or psychopathic populations (Blair et al., 2004; Dolan & Fullam, 2006; Kosson, Suchy, Mayer, & Libby, 2002; Marsh & Blair, 2008), global emotion recognition deficits or an association between alexithymia and pervasive emotion recognition deficits in psychopathy (Jongen et al., 2014; Lane, Sechrest, Riedel, Shapiro, & Kaszniak, 2000).

This may be due in part to diversity in methodological approach and task difficulty as Olderbak, Mokros, Nitschke, Habermeyer, and Wilhelm (2018) contend that emotion perception deficits in psychopathy are in fact entirely attributable to differences in general mental ability and highlight how methodological shortcomings in existing research (i.e., use of small samples; single and unreliable measures; lack of attention to potential confounders) may have been more influential to the identification of recognition deficits than impaired emotion perception.

Added to this, a recent study reported an association between alexithymia and impairment in the recognition of static but not dynamic images

(Starita, Borhani, Bertini, & Scarpazza, 2018) and some argue that dynamic facial emotions promote emotion recognition to a greater degree than static emotions (Alves, 2013). Consequently, studies that have employed static slides of either equal or varying intensity and found evidence to support emotion recognition deficits in ASPD populations (with and without co-morbid psychopathy) may have detected effects attributable to undetected alexithymia traits or alternatively subtle impairments that are only apparent when less discriminative information is available (Bagcioglu et al., 2014; Habel, Kühn, Salloum, Devos, & Schneider, 2002; Kosson et al., 2002; Sedgewick, 2017). However, there is a general lack of consensus on this topic as others contend that dynamic facial emotions are more complex and useful in detecting subtle emotion recognition deficits than static stimuli (Pera-Guardiola et al., 2016). Moreover, a study that compared emotion recognition using both static and dynamic images concluded that neither approach was advantageous (Fiorentini & Viviani, 2011)

Added to this, the emotion multi-morph task employed in this study had fewer trials and/or a longer period of stimuli exposure than had been employed in previous studies (Dolan & Fullam, 2006; Vasconcellos, Salvador-Silva, Gauer, & Gauer, 2014) and so may not have detected deficits that manifest either inconsistently across multiple exposures or specifically at brief exposure intervals. This does however seem unlikely as impaired emotion recognition accuracy in psychopathy has been

reported in studies with the same or similar numbers of trials and/or length of stimuli exposure (Blair et al., 2004; Pera-Guardiola et al., 2016). Moreover, whilst Blair et al. (2004) employed the US PCL-R cut-off for their psychopathic population (i.e. ≥30) and so may have detected deficits that are only apparent in those with very high PCL-R scores, wider research that employed the same PCL-R cut-off criteria reported no evidence of recognition deficits (Glass & Newman, 2006).

Crucially, the results of this study are far from unique (Glass & Newman, 2006; Künecke, Mokros, Olderbak, & Wilhelm, 2018) and could be viewed as further support for the notion that emotion recognition impairment is situation specific and mediated by top-down attentional mechanisms rather than emotional deficits (Newman & Lorenz, 2003). Nevertheless, whilst the influence of attentional mechanisms on emotion recognition was clearly illustrated by Dadds et al. (2006) when they found that recognition deficits in psychopathy could be ameliorated through the manipulation of attention, Glass and Newman (2006) found no differences in emotion recognition for psychopathic and non-psychopathic offenders irrespective of whether conditions promoted attention to emotion cues. Likewise, although the current findings could indicate that ASPD+P populations are characterised more by an inability (or unwillingness) to effectively utilise emotional cues and modify their behaviour than emotion perception deficits, methodological limitations mean this view is purely speculative and wider examination of the individual factors that contribute

towards impaired emotion recognition in populations with ASPD and co-morbid psychopathy is required.

4.2 *Empathy and Alexithymia*

The hypotheses that patients with ASPD would exhibit significant impairment in cognitive and affective empathy along with higher levels of alexithymia when compared to controls was only partially met as there was no evidence of affective empathy deficits in ASPD patients based on either two or three group analyses. Whilst cognitive empathy deficits were identified in ASPD patients, the value of distinguishing between ASPD-P and ASPD+P groups was illustrated as whilst an adjusted analysis of results for the combined ASPD and control group indicated that cognitive empathy deficits in ASPD were in fact mediated by group differences in age and/or educational status, analysis of results for distinct ASPD+P, ASPD-P groups and the control group indicated impaired cognitive empathy (perspective taking) in ASPD+P patients irrespective of adjustments.

Moreover, concordant with the hypothesis that ASPD+P patients would demonstrate significantly less cognitive and affective empathy and higher levels of alexithymia than ASPD-P patients, an education adjusted analysis of results for distinct ASPD and control groups suggested the ASPD+P group felt significantly less able to spontaneously adopt the perspective of others than either the control or ASPD-P groups. Their

mean score (*M* = 11.27) was also more than one standard deviation below that recorded in a normative male sample (*m* = 16.78*, SD* = 4.72*)* (Davis, 1980). Although this finding was not consistently replicated for the QCAE perspective taking subscale following adjustments for age and education and would therefore need to be interpreted with caution, the mean QCAE perspective taking score of the ASPD+P group was lower than that of either the control or ASPD-P group and their combined mean QCAE cognitive empathy score (*M* = 48.00) considerably lower than that reported for a normative sample of adult male undergraduates (*M* = 56.12) (Reniers, Corcoran, Drake, Shryane, & Völlm, 2011). In contrast, the combined mean QCAE cognitive empathy score of the ASPD-P group was relatively comparable to that of the normative population (*M* = 55.73) and that of the control group considerably higher (*M* = 63.79). Added to this, results for the QCAE online simulation subscale suggested the ASPD+P group remained significantly less likely to imagine how they would feel if they were in someone else's shoes than the ASPD-P group irrespective of adjustments for age and education.

Whilst the current findings contradict those of previous studies that found either no difference in the IRI empathy scores of psychopathic and control populations (Dolan & Fullam, 2004; Louise von Borries et al., 2012; Mayer et al., 2018; Shamay-Tsoory et al., 2010) or no association between psychopathy and impaired cognitive empathy irrespective of measures (Domes, Hollerbach, Vohs, Mokros, & Habermeyer, 2013;

Lockwood, Bird, Bridge, & Viding, 2013) numerous studies have found similar evidence for a negative association between cognitive empathy and psychopathy in adult males (Brook & Kosson, 2013; Decety, Chen, Harenski, & Kiehl, 2013; Díaz-Galván et al., 2015; Drayton et al., 2018) and an unwillingness (as opposed to inability) to understand the perspectives of others could arguably provide an adaptive strategy for psychopathic populations in situations where an appreciation of other's perspectives presents an obstacle to goal focussed behaviour (Drayton et al., 2018).

Added to this, inconsistent findings could be attributable to individual differences in the ability to 'fake good' as Dadds et al. (2009) contend that childhood deficits in cognitive empathy can be overcome by those with high levels of psychopathy and psychopathic traits as they enter puberty and learn to 'talk the talk'.

Moreover, whilst Yavuz, Sahin, Ulusoy, Ipek, and Kurt (2016) found evidence of cognitive empathy deficits in an ASPD sample that were not evident for the ASPD-P group employed in the current study, they utilised different ASPD assessment measures and did not control for co-morbid psychopathy so may therefore have been subject to undetected psychopathy effects in their ASPD group.

Although some argue that empathy deficits may be mediated by alexithymia (Bird et al., 2010; Schwenck et al., 2014; Valdespino, Antezana, Ghane, & Richey, 2017) and the combined ASPD group did have a significantly higher mean score on the TAS-20 difficulty describing emotions sub-scale (*M* = 17.16) than the control group (*M* = 11.32), a comparison of distinct ASPD groups and the control group suggested that alexithymia traits in ASPD are in fact mediated by co-morbid psychopathy. The ASPD+P group in this study not only had a significantly higher mean score on the TAS-20 difficulty describing emotions subscale (*M* = 18.00) when compared to the control group (despite adjustments) but were also on the upper boundary of the range reported for male psychiatric patients (*M* = 13.88, *SD* = 4.26). In contrast, the mean score of the ASPD-P group (*M* = 15.93) was not significantly different to that of the control group following adjustments. It was also within the range reported for a normative population of male students (*M* = 12.27, *SD* = 4.04) (Kooiman, Spinhoven, & Trijsburg, 2002).

Furthermore, whilst an exploratory three group analyses that controlled for alexithymia 'difficulty describing feelings' traits indicated that the significant group difference in IRI perspective taking scores was not purely attributable to alexithymia, the finding that ASPD+P patients had significantly higher levels of alexithymia 'difficulty describing feelings' traits than controls coupled with impaired cognitive empathy is consistent with wider research which found a negative association between

alexithymia and cognitive empathy (Jonason & Krause, 2013; Moriguchi et al., 2006) and supports the notion of a shared emotional network whereby empathy for others may be influenced by emotional self-awareness (Winter et al., 2017).

The absence of a significant difference in affective empathy of ASPD groups (combined ASPD, ASPD-P and ASPD+P) when compared to the control group (following adjustments for age and education) not only contradicted the hypothesis that there would be significant differences between these groups but it was unexpected given that the majority of extant research in this field supports impaired affective empathy in psychopathic populations (Dadds et al., 2009; Herpertz & Sass, 2000; Jones, Happé, Gilbert, Burnett, & Viding, 2010; Lockwood et al., 2013). Equally, results from the empathy eliciting short stories and empathy eliciting image tasks were in direct contradiction to those of previous research that has employed these tasks with mixed gender and female only adult community samples and found evidence of affective empathy deficits in those with psychopathic traits when compared to healthy controls (Lockwood et al., 2013; Seara-Cardoso et al., 2013).

This inconsistency in findings could be attributable to differences in the populations assessed, insensitivity in the measures employed and/or dissimulation in self-report responses as identified by Domes et al. (2013) when they found no evidence to support an association between

psychopathy and impaired emotional (or cognitive) empathy but highlighted a significant positive correlation between empathy facets, education and social desirability and the need for more sensitive empathy measures.

However, the results of empathy eliciting tasks were corroborated by a lack of significant differences between ASPD (combined ASPD, ASPD+P and ASPD-P) groups and the control group on the QCAE affective empathy subscales as well as the IRI EC subscale which has been validated with violent offender populations (Bevan et al., 2004). Added to this, when Lishner et al. (2012) explored the relationship between psychopathy and affective empathy in two separate studies that employed mixed gender community and male forensic samples independently, they concluded that higher psychopathy scores were in fact associated with increased affective empathy.

Nevertheless, Patrick, Cuthbert, and Lang (1994) employed psychophysiological and self-report measures to examine fear image processing in psychopaths and non-psychopaths and reported reduced physiological reactions to fearful stimuli in those with psychopathy but no group differences in self-report ratings of valence or arousal. They subsequently concluded that non-affective memory processes may have been influential in enabling psychopaths to self-report emotional affect despite impairments in emotion processing.

Notably however, by comparing distinct ASPD+P and ASPD-P groups, this study was able to identify that the ASPD+P group exhibited less affective empathy than the ASPD-P group. Whilst this finding is inconsistent with research by Dolan and Fullam (2004), it is congruent with a range of evidence that suggests ASPD and psychopathy may be differentiated by their emotional pathology and emotion processing (Dolan & Fullam, 2006; Drislane et al., 2013; Kosson et al., 2006; Loomans, Tulen, & Van Marle, 2015). Nevertheless, as patient group differences in affective empathy were evidenced solely through QCAE subscale scores and not corroborated by IRI EC subscale scores or empathy eliciting tasks, these results should again be interpreted with caution.

5.0 IMPLICATIONS FOR PRACTICE

Emotion processing and empathy deficits are widely associated with an absence of prosocial behaviour as well as increased likelihood of anti-sociality and violence and cognitive empathy (perspective-taking) training has therefore become widely employed within violent offender rehabilitation programs (Braham, Jones, & Hollin, 2008; Díaz-Galván et al., 2015; Zhou, Gan, Hoo, Chong, & Chu, 2018).

In support of this approach, this study did find evidence of emotion processing and empathy deficits in ASPD. Crucially however, a comparison of task outcomes for combined ASPD and control groups was less informative than that which distinguished between ASPD+P, ASPD-P

and control groups, as although it highlighted impaired emotion processing in ASPD, it did not yield evidence of significant group differences in empathy and did not inform the extent to which psychopathy mediated emotion processing deficits manifest in ASPD.

Only by comparing distinct ASPD-P, ASPD+P and control groups was this study able to identify significant group differences in both emotion processing and cognitive empathy. Moreover, by comparing distinct ASPD groups it was also possible to identify that ASPD+P and ASPD-P groups were distinguishable in terms of emotion and empathic processing and that it is co-morbid psychopathy which acts as a mediator for emotion processing and empathy deficits in ASPD, rather than ASPD per se.

Consequently, the findings of this study suggest that empathy and emotion processing deficits are less likely to act as a contributory mechanism for violence and offending behaviour in adult males with ASPD-P than they are in those with ASPD+P. Adult male ASPD-P patients would therefore be expected to derive little benefit from treatment that is heavily focussed on facilitating emotion processing and empathy. That being said, this study was subject to a number of limitations (see section 6) and further research to establish the reliability of the current findings would be beneficial.

The fact that the current results suggest that ASPD+P patients have significant deficits in cognitive but not affective empathy not only illustrates the value of a multi-dimensional approach when assessing empathy or designing interventions to facilitate increased empathy but highlights the need for interventions that can address specific deficits across different empathy dimensions where appropriate. Although cognitive empathy deficits were not consistently apparent, it should be acknowledged that self-report measures may be particularly vulnerable to dissimulation when employed with psychopathic populations for whom deceit and manipulation are core characteristics (Hare, 2003, 2007). A multi-faceted approach involving both self-report and behavioural measures could help to address this issue, enable a more comprehensive account of individual differences in specific dimensional impairment and provide a more reliable means of determining treatment efficacy where interventions are geared towards enhancing empathic processing.

Importantly however, ASPD+P patients also self-reported significantly more 'difficulty describing feelings' alexithymia traits and this is an important consideration as whilst controlling for these traits did not ameliorate the significant group effect observed for the IRI perspective taking scores, alexithymia is argued to act as a precursor to empathy deficits and more specifically impaired perspective taking (Bird et al., 2010; Schwenck et al., 2014; Valdespino, Antezana, Ghane, & Richey, 2017). Therefore, where empathic dysfunction is identified as a target for intervention, clinicians should also aim to determine whether co-morbid

alexithymia traits exist and if so, ensure that these are taken into account and addressed appropriately through treatment in advance of empathy training.

6.0 LIMITATIONS AND FUTURE DIRECTIONS

A primary limitation of this study related to sample size as, whilst every effort was made to recruit both patient and control participants and sufficient patient participants were recruited for the combined ASPD versus controls comparison, this study did not meet the sample requirements identified through a priori power analysis.

As low power increases the likelihood of Type II error, or finding no effect where one actually exists, this study cannot exclude the possibility that group effects may not have been detected. Equally, as the control group all had higher educational status and were significantly younger than combined ASPD, ASPD+P and ASPD-P groups, education and age adjusted results could have been reflective of effects related to patient/control group differences as well as educational/age status and subsequently increased the likelihood of Type II error. Consequently, the current findings should be interpreted with caution and future studies should aim to examine their reliability with larger, age and education matched ASPD+P, ASPD-P and control populations.

Added to this, violence reduction programmes have historically included modules which specifically target empathy deficits and aim to increase

empathic awareness and in particular perspective taking (Braham et al., 2008). Whilst there is currently a lack of clarity regarding the long-term effects of these interventions (Day, Casey, & Gerace, 2010), the possibility that treatment effects were influential in the current results cannot be discounted and further research to examine whether empathic processing differs between ASPD groups who either have or have not completed interventions designed to enhance empathic processing would be beneficial in establishing the degree to which treatment history is influential to outcomes on these tasks.

Whilst ASPD-P and ASPD+P groups were distinguished by the PCL-R cut off score for psychopathy (≥25), having an ASPD-P group who scored below the cut-off score for non-psychopaths (PCL-R score <20) may have been more effective in delineating the effect of co-morbid psychopathy on empathy and emotion processing in ASPD. Similarly, whilst research estimates suggest that only 1.2% of the general population are psychopathic (Neumann & Hare, 2008), screening the control group for psychopathic traits using measures such as the Hare Psychopathy Checklist: Screening Version (PCL: SV; Hart et al., 1995) or Psychopathic Personality Inventory – Revised (PPI-R; Lilienfeld & Widows, 2005) would have ensured that results were not confounded by undetected psychopathic traits.

In addition to the aforementioned points, it should also be noted that ASPD-P and ASPD+P groups consisted purely of adult males recruited from two secure psychiatric hospitals and therefore the generalisability of results to wider community, non-offending and female ASPD populations is limited. Furthermore, whilst the differences identified between patient groups would suggest that criminality alone does not in itself predict deficits in emotion and empathic processing, future research may wish to compare the outcomes of offender controls against offender ASPD groups with and without co-morbid psychopathy to overcome the introduction of criminality as a potential confounder.

A further limitation of this research is that the multi-morph emotion recognition task did not allow for the assessment of disgust recognition. This would have been beneficial in exploring the reliability of evidence which suggests that disgust recognition is in fact relatively intact when compared to fear recognition in antisocial and psychopathic populations (Marsh & Blair, 2008; Pera-Guardiola et al., 2016). It would also have helped to inform the relationship between emotion recognition accuracy and moral reasoning as whilst fear recognition and conditioning deficits are widely considered to contribute to impaired moral decision making and judgements in psychopathy, populations with psychopathy or high levels of psychopathic traits have been found to exhibit similar levels of endorsement for disgust-based norms and so would be expected to exhibit intact disgust-based moral reasoning (Blair, 2007; 2017).

Added to this, the measures employed did not allow for assessment of dissimulation in responses. Whilst the use of multiple self-report empathy measures enabled an evaluation of score consistency, self-report outcomes may nevertheless have been subject to response bias and combining self-report with more objective measures (i.e., psychophysiological/behavioural measures or neurological testing) of affective reactivity would have enabled a more comprehensive account of differences between groups. Added to this, the cross-sectional design employed by this study was limited in being able to identify group differences in emotion and empathic processing at only one point in time. As emotion and empathic processing deficits are argued to manifest in early childhood, longitudinal research would enable a more comprehensive account of the factors that underlie emotional and empathic dysfunction in ASPD+P populations and better inform early intervention strategies.

7.0 CONCLUSION

This study highlights the importance of distinguishing between those with ASPD who do or do not have co-morbid psychopathy as whilst analysis of the results for combined ASPD and control groups highlighted emotion processing deficits in ASPD, a comparison of outcomes for ASPD+P, ASPD-P groups and a control group further highlighted cognitive empathy deficits in ASPD that were not evident when outcomes for the combined

ASPD and control group were compared. More importantly, the three group comparison indicated that it is psychopathy which mediates emotion processing and cognitive empathy deficits in ASPD. This finding has clear implications for those wishing to identify the contributory factors for violence and offending behaviour in these populations and emphasises the importance of differentiating between these groups.

Nevertheless, the current findings provide only limited evidence to support Cleckley's notion of a '*general poverty of affect*' (Cleckley, 1988; pg. 349) in psychopathy as ASPD+P patients demonstrated no significant impairment in their ability to accurately distinguish facial expressions of emotion or vicariously share the emotional experiences of others when compared to controls once group differences in educational status were accounted for. Furthermore, whilst the ASPD+P group did exhibit significant deficits in cognitive empathy and more specifically perspective taking, these were not consistently evidenced across self-report measures. Results did however indicate that ASPD+P patients have significant difficulty in describing their feelings and they were found to exhibit consistently lower empathy scores and higher levels of inaccuracy coupled with slower response latencies than controls when identifying facial emotions, which is not only congruous with the notion of a shared emotional network but suggests that psychopaths may experience a degree of global impairment in processing and utilising internal and external emotion cues to moderate their behaviour. In contrast, the

ASPD-P group exhibited no significant deficits in emotion recognition or empathy and no significant difficulty in either identifying or describing feelings when compared to controls following adjustments for age and education. Whilst evidence for differences in the affective empathy of patient groups was somewhat inconsistent across measures, the current study did find that ASPD-P patients had significantly higher levels of both cognitive and affective empathy than ASPD+P patients. Consequently, these findings lend support to the notion that distinctive patterns of emotional and empathic processing could underlie divergency in the offending pathways of these groups and highlight the need for interventions that can effectively target differences in the causal mechanisms for their violence and offending behaviour.

CHAPTER FOUR

AN INVESTIGATION TO DETERMINE WHETHER MORAL EMOTIONS AND DECISION MAKING DIFFER IN ADULT MALE PATIENTS WITH ANTISOCIAL PERSONALITY DISORDER (ASPD) OR DISSOCIAL PERSONALITY DISORDER (DPD) WITH AND WITHOUT CO-MORBID PSYCHOPATHY AND NON-PERSONALITY DISORDERED ADULT MALES

ABSTRACT

Background: *A multitude of research suggests that deficits in moral processing may contribute to the violent and antisocial behaviour that is characteristic of psychopathy but few studies have examined moral processing in antisocial personality disordered (ASPD) or dissocial personality disordered (DPD) populations, explored whether moral processing differs between patients with ASPD/DPD and controls or between patients with ASPD/DPD only (ASPD-P) and those with ASPD/DPD + co-morbid psychopathy (ASPD+P).*

Aim: *The primary aim of this study was therefore to examine the extent to which adult male ASPD/DPD patient groups differ from adult male non-personality disordered controls in their identification with moral emotions (i.e., self-anger, other-anger, guilt, compassion) and endorsement of utilitarian solutions for sacrificial moral dilemmas. A second aim was to determine whether adult male ASPD+P patients would differ from ASPD-P patients in terms of their identification with moral emotions (as above) and/or endorsement of utilitarian solutions.*

Method: *37 adult male patients with ASPD were recruited from high and medium secure psychiatric facilities* (*N = 15 ASPD-P and N = 22 ASPD+P*) *along with 19 healthy controls who were recruited from staff at the same hospitals as well as staff and students from the local University campus. All groups completed two computer-based tasks (as part of a larger*

battery of tasks examining emotion processing and empathy), one of which involved the presentation of a range of vignettes designed to elicit moral emotions of guilt, compassion, self-anger or other-anger. Following each vignette, participants were asked to rate their level of identification with a specified target emotion and group ratings were then compared. The moral dilemmas task involved the presentation of eight stories that portrayed sacrificial moral dilemmas whereby the life of one individual could be sacrificed to save many. Following each dilemma, participants were asked to decide whether they would endorse sacrificing the individual (Yes/No) and how difficult it was for them to make their decision. Group endorsements of utilitarian solutions, difficulty ratings and decision response latencies were then compared.

Results: *Whilst an initial two-group analysis of results for the moral emotions tasks indicated significantly less guilt and compassion in ASPD patients when compared to controls, delineating between ASPD-P and ASPD+P groups highlighted that this effect was in fact specifically attributable to co-morbid psychopathy as the ASPD+P group reported significantly less compassion and guilt than the control and ASPD-P group and there was no significant difference in the compassion and guilt ratings of the ASPD-P and control groups. However, there were no significant group effects evident for moral emotions of self or other anger based on analysis of either combined or distinct ASPD and control groups. Equally, although an initial comparison of combined ASPD and control groups yielded evidence that ASPD may act to mediate a higher rate of utilitarian*

endorsements and less difficulty in utilitarian decision making for personal moral dilemmas, there was no significant group difference in endorsement of utilitarian solutions for personal moral dilemmas combined or difficulty ratings for personal moral dilemmas after accounting for co-variates. Equally, an analysis of distinct ASPD and control groups indicated no significant group effects on utilitarian decision making or decision difficulty ratings for personal moral dilemmas once group differences in age, education and medication were accounted for. In contrast, the results of both two and three group analyses indicated significantly faster responses to all types of moral dilemmas across ASPD groups and this effect was not attributable to group differences in age, education or medication.

Conclusion: *This is the first study to compare moral emotions and decision making in patients with ASPD and healthy controls and more specifically to identify differences between ASPD+P and ASPD-P groups. Whilst an initial analysis highlighted significantly less compassion and guilt in patients with ASPD when compared to controls, delineating between ASPD-P and ASPD+P groups indicated that it is co-morbid psychopathy which acts as a mediator for compassion and guilt deficits in ASPD. However, significantly lower levels of compassion and guilt in those with ASPD+P did not mediate increased utilitarian decision making or significantly less difficulty in moral decision making as there were no significant group differences evident in relation to either utilitarian decision making or decision difficulty ratings for impersonal or personal*

moral dilemmas (combined) after controlling for group differences in age, educational status and medication. Nevertheless, as ASPD groups had a higher rate of endorsement for utilitarian action in relation to personal moral dilemmas, reported less difficulty in their decision making and were significantly quicker to respond to both types of moral dilemmas, lower harm aversion and increased reliance on cognitive strategies may play a role in the moral decision making of ASPD populations. Limitations and directions for future research and practice are discussed.

***Keywords**: Moral emotions, moral dilemma, utilitarian decision making*

1.0 INTRODUCTION

As early as in the 19th century, terms such as '*moral insanity*' (Pinel, 1806) and '*manie sans delire*' were employed to describe individuals who exhibited a disorder of the mind that manifested as abnormal emotions and behaviour in the absence of delusions and intellectual impairment. These terms were subsequently superseded following the seminal works of Koch (1891), whose reference to '*psychopathic inferiority*' was influential to contemporary conceptualisations of psychopathy and ASPD as diagnoses characterised by immoral behaviour (Blackburn, 2012; Raine & Yang, 2006) which some contend represents a diversity of conduct ranging from social insensitivity to violent offending (Roberts, Henry, & Molenberghs, 2018) but is largely recognised as harmful behaviour within westernised societies (Buchtel et al., 2015)

Nevertheless, whilst the moral processing of those with psychopathy has long been a key area of interest for researchers wishing to examine the mechanisms that underlie their violent offending (Blair, 1997; Spiecker, 1988; Vitacco, Erickson, & Lishner, 2013), ASPD has received significantly less attention than psychopathy despite the fact that callousness (a lack of concern for the feelings or problems of others and a lack of guilt or remorse about the harmful effect of one's actions on others) is identified as one of the key diagnostic criteria for ASPD in the diagnostic and statistical manual of mental disorders – 5th edition (DSM-V; APA, 2013; O'Kane, Fawcett, & Blackburn, 1996; van Vugt et al., 2012).

Crucially however, psychopathy is commonly associated with emotional dysfunction, shallow emotional affect and significant deficits in empathy (Lockwood et al., 2013) and whilst moral behaviour was historically argued to be dependent on the development of rational and reasoned processes (Kohlberg, 1971), this perspective has since been challenged by research evidence which indicates that moral behaviour is in fact determined through a complex interaction of cognition and emotion (Decety, Michalska, & Kinzler, 2012; Gibbs, 2014; Greene et al., 2001; Reniers, Corcoran, Völlm, et al., 2012).

A common approach employed by researchers exploring moral decision making involves the use of sacrificial moral dilemmas, which were developed by Greene et al. (2001) and require participants to decide whether they would endorse a utilitarian solution (i.e., whether they would sacrifice the life of one individual to save the lives of many) following the presentation of an ethical dilemma. A key finding from these studies is that patients with damage to the ventromedial prefrontal cortex (VMPFC) (a brain region commonly associated with emotion processing) make significantly more utilitarian moral decisions when presented with personal moral dilemmas involving direct physical contact than patients with no neurological damage but respond similarly to controls when presented with low conflict/impersonal moral dilemmas that involve no direct physical contact and are generally considered less aversive (Koenigs et al., 2007). Likewise, individuals with alexithymia (a

condition characterised by emotion processing and empathy deficits) have been found to make a significantly higher number of utilitarian moral decisions when presented with personal moral dilemmas than healthy controls (Patil & Silani, 2014).

Notably, the dual process model (Greene, 2001) contends that moral decisions are influenced by the interaction of competing emotional and cognitive processes. Consequently, deontological, non-utilitarian moral decisions (i.e., those where harm is considered unacceptable irrespective of the consequences) are thought to be motivated by automatic negative emotional reactions whilst utilitarian moral decisions are argued to involve slower controlled cognitive processes which are generated through the dorsolateral prefrontal cortex (DLPFC). These conflict with and can countervail pre-potent emotional reactions and so commonly incur a slower response. However, as automatic emotional and slower cognitive processing systems operate independently of each other, some contend that utilitarian decision making could also reflect low levels of harm aversion (Conway & Gawronski, 2013).

Consistent with this view and findings from research with patients who have either VMPFC damage, psychopaths have been found to exhibit less activation of the MPFC and amygdala during the presentation of moral dilemmas which indicates less emotional responsivity at the prospect of harming others. They have also been found to endorse more utilitarian

solutions to personal moral dilemmas in contrast to control populations who commonly view the prospect of direct physical harm as more emotionally aversive (Gao & Tang, 2013; Tassy, Deruelle, Mancini, Leistedt, & Wicker, 2013). Nevertheless, when Cima, Tonnaer, and Hauser (2010) employed moral dilemmas to compare the moral judgements of psychopaths against those of non-psychopathic delinquents and controls they found that all groups judged non-personal harm (i.e., involving no direct contact) as more permissible than personal harm (i.e., involving direct contact) despite there being no difference in utilitarian gain. They subsequently concluded that emotional processing was not essential for judgements of moral dilemmas and that psychopaths know right from wrong but simply do not care.

In contrast, Haidt (2003) proposes that moral emotions are "*emotions that respond to moral violations or that motivate moral behaviour*" (pg. 853) and others contend that moral emotions (i.e., guilt, compassion, self-anger, other-anger) act as a barometer for moral behaviour (Baumeister & Lobbestael, 2011; Blair, 2018; Kédia, Berthoz, Wessa, Hilton, & Martinot, 2008; Patil & Silani, 2014; Tangney, Stuewig, & Mashek, 2007). Crucially however, moral emotions are differentiated according to whether they are self-conscious or other conscious, with self-conscious emotions (i.e. guilt, self-anger, embarrassment) prompted through self-evaluation and thought to provide rapid feedback on the social acceptability of either actual or anticipated behaviour which then

promotes either punishment or reinforcement of that behaviour according to whether the consequences of it are considered inherently good or bad (Tangney et al., 2007). In contrast, other-conscious moral emotions (other-anger, compassion) are directed towards others and may prompt the desire to either punish/seek revenge or help and alleviate the suffering of those towards whom the emotion is directed (Moll, de Oliveira, Zahn, & Grafman, 2008).

Crucially, Spiecker (1988) argues that psychopaths lack the capacity to feel moral emotions and numerous studies have reported evidence to support this view (Lee & Gibbons, 2017; Prado, Treeby, & Crowe, 2016). Furthermore, Blair et al. (1995) found that psychopaths were significantly less likely than non-psychopaths to attribute feelings of guilt to protagonists when presented with vignettes designed to elicit guilt and suggested that this was reflective of their own inability to experience guilt. Notably however, whilst ASPD is similarly associated with immoral behaviour, a structural MRI study by Gregory et al. (2012) found that offenders with ASPD and co-morbid psychopathy had significantly lower grey matter volumes in the anterior rostral prefrontal cortex (a brain region associated with the processing of moral emotions) whilst those with ASPD only did not. This finding suggests that the immoral behaviour of those with ASPD and psychopathy may be differentiated in terms of underlying causal mechanisms.

However, as few studies have examined moral emotions in ASPD and no studies to date (to the author's knowledge) have examined moral decision making in ASPD or compared the moral decision making of ASPD-P and ASPD+P groups, research comparing the moral processing of these groups would be beneficial as the issue of whether or not a disorder is associated with impaired moral understanding has far reaching implications in terms of both criminal responsibility and intervention strategies aimed at reducing immoral behaviour (Aharoni, Sinnott-Armstrong, & Kiehl, 2012; Malatesti, 2010; Shaw, 2016).

Therefore, a multi-faceted approach involving both moral emotions and moral dilemmas tasks was employed to identify i) whether adult male patients with ASPD would identify significantly less or more with moral emotions of guilt, compassion, self-anger and other anger when compared to adult male non-personality disordered controls, ii) whether adult male patients with ASPD would endorse significantly more utilitarian moral decisions in response to personal moral dilemmas when compared to adult male non-personality disordered controls, iii) whether adult male patients with ASPD would find decisions on whether or not to endorse utilitarian action for impersonal and personal moral dilemmas significantly less difficult than non-personality disordered controls, iv) whether adult ASPD+P patients would differ significantly from adult male ASPD-P patients in their identification with moral emotions of guilt, compassion, self-anger or other anger and v) whether adult male ASPD+P patients

would differ significantly from adult male ASPD-P patients in their endorsement of utilitarian solutions when presented with personal (direct) and impersonal (indirect) moral dilemmas.

1.1 *Study Hypotheses*

While the primary hypothesis for this study related to facial emotion recognition (chapter 3 – section 1.1), moral emotions and dilemmas tasks were employed to test the following secondary hypotheses:

1.1.1 Combined ASPD vs Controls

H1. Patients with ASPD will self-report significantly lower mean ratings for moral emotions of guilt, compassion and self-anger when compared to controls.

H2. Patients with ASPD will self-report significantly higher mean ratings for the moral emotion of other anger when compared to controls.

H3. Patients with ASPD will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for both impersonal and personal moral dilemmas when compared to controls

1.1.2. Three Groups Comparison

H4. ASPD+P patients will self-report significantly lower mean ratings for moral emotions of guilt, compassion and self-anger when compared to either ASPD-P patients or controls.

H5. ASPD-P and ASPD+P patient groups will self-report significantly higher mean ratings for the moral emotion of other anger when compared to controls.

H6. ASPD+P patients will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for both impersonal and personal moral dilemmas when compared to ASPD-P patients and controls.

2.0 METHOD

2.1 *Participants*

See chapter three – section 2.1

2.2 *Procedure*

2.2.1 *Ethics*

See chapter three – section 2.2.1 (Appendix 9-13)

2.2.2 *Recruitment*

See chapter three – section 2.2.2 (Appendix 14)

2.2.3 *Assessment Process*

See chapter three – section 2.2.3 (Appendix 15-16)

2.3 *Measures*

Measures employed to assess psychopathy, verbal intellectual functioning, emotion and empathic processing are outlined in chapter 3 (section 2.3)

2.3.1 *Moral Emotions Task*

First employed by Kédia et al. (2008), the moral emotions task was adapted by Seara-Cardoso et al. (2013) and requires participants to read thirty-six brief stories (based on twelve different scenarios, each with three distinct endings) that depict prototypical moral situations, during which an agent harms a victim. Each story elicits one of four moral emotions: guilt, compassion, self-anger and other-anger, which vary according to whether the agent/victim is the self or another (Appendix 23).

The first sentence of each story depicts a social situation, in which both the self and another person are present. In the second sentence, endings vary according to whether the 'self' or 'other' is the agent or victim and are expected to elicit different target emotions: guilt ("I harm someone"), compassion ("someone harms himself"), self-anger ("I harm myself"), and other-anger ("someone harms me"). However, all harmful actions are performed unintentionally and there are two additional emotionally

neutral endings that involve no harmful actions and in which the story's primary character is either the self (neutral-self) or someone else (neutral-other). For example, the scenario "*You park at the same time as your boss outside your office*" would have a neutral ending "*He gets out of his car and after greeting you, you start discussing the day's workload*" (neutral-other) and two endings portraying a harmful action: "*You misjudge your steering and you ram the front of your boss's new car*" (Guilt); "*Your boss misjudges his steering and rams the front of his new car against a pole*" (compassion). Participants were instructed to read each story carefully and try to imagine how they would feel in the described situation. They were then asked to rate the degree to which they would feel guilt, compassion, self-anger or other-anger on a 7-point scale (1=not at all; 4=fairly; 7=extremely) (Appendix 23).

2.3.2 *Moral Dilemmas Task*

Based on research by Greene et al. (2001), the moral dilemmas task requires participants to make decisions in relation to eight moral dilemmas, which are portrayed as situations that require a choice regarding whether to sacrifice the life of one individual to save the lives of many. The situations differ in terms of the level of involvement of the individual, with personal scenarios requiring direct physical contact with the potential victim and impersonal scenarios indirect contact . An example of an indirect scenario is: "*You are returning home from a kayaking trip when you see that the dam has broken upstream and is*

about to flood the river. You know that anyone who is still on the water when the flood comes will die. *There are five people downstream on a large raft and one person fishing in a nearby drainage canal. There is a floodgate nearby that can be opened to divert the flow of the water into the drainage canal. If you do nothing, the water will flood the main river and the five people on the raft will die. If you open the floodgate to divert the water into the drainage canal, the one person who is fishing will die. Would you open the floodgate to divert the water?".* An example of a direct scenario is: "*You are a doctor. You have five patients, each of whom is about to die due to a failing organ of some kind. You have another patient who is healthy. The only way that you can save the lives of the first five patients is to transplant five of this young man's organs (against his will) into the bodies of the other five patients. If you do this, the young man will die, but the other five patients will live. Would you perform this transplant in order to save five of your patients?"*

For each scenario, participants were advised to imagine themselves as the story character before indicating (yes=y/no=n) whether they would take the specified action and sacrifice the life of an individual to save the lives of a group. They were then asked to rate the difficulty of their decision along a 10-point Likert scale (1=very easy – 10=very difficult) (Appendix 23).

2.4 *Data Analysis*

Procedures for determining sample size, normality of data distribution, homogeneity of variances, method of analysis for continuous/categorical data (i.e, Univariate ANOVA, Welch's ANOVA, Kruskal Wallis, Mann Whitney U, Chi-Square and Fisher's Exact tests), unadjusted/adjusted mean differences and 95% CIs as well as associations between age/education and outcome variables were the same as those outlined in chapter three (chapter three – section 2.4) (Appendix 18-21).

Binary logistic regression was also employed to enable calculation of odds ratios and examination of group, age and education effects on the endorsement of utilitarian decisions in response to moral dilemmas and the Box Tidwell procedure (Box & Tidwell, 1962) utilised to ensure that the assumption of linearity between age and the logit of the dependent variables was satisfied. A Bonferroni correction was applied to account for five terms in the analysis (p = .05/5) resulting in statistical significance being accepted as p = <.01 (Tabachnick & Fidell, 2014). Based on this assessment, age was found to be linearly related to the logit of all dependent variables.

A univariate ANOVA was employed to examine between group differences for personal moral dilemmas combined mean difficulty ratings despite unsuccessful data transformation because skewness, kurtosis and Kolmogorov Smirnov values indicated normality of distribution and the Shapiro Wilks significance value was just below that indicative of normal

distribution (p = .037). Added to this, the significance of the between group effect did not change irrespective of whether Kruskal Wallis or univariate ANOVA analysis was employed.

3.0 RESULTS

3.1 *Patient Participation/Grouping*

See chapter three – section 3.1

3.2 *Control Participation*

See chapter three – section 3.2

3.3 *Demographic data for Patient and Control Groups*

See chapter three – section 3.3 (Table 6).

3.4 *Moral Emotions Task*

Univariate and Welch's ANOVAs were employed to examine group differences in identification with moral emotions of compassion, guilt, self-anger and other-anger. However, ratings for neutral scenarios were not analysed due to a software design error, which resulted in the participants being presented with different neutral scenarios.

3.4.1 *Combined ASPD vs Controls*

A Welch's ANOVA highlighted a significant between group effect for compassion ratings (Welch's $F(1, 52.386) = 13.527$, p = .001) and a

review of bootstrapped general linear model (GLM) parameter estimates indicated that the combined ASPD group reported significantly less compassion in response to compassion scenarios than controls. Whilst no adjusted between groups *p*-value was obtainable through Welch's ANOVA, a review of education adjusted GLM bootstrapped parameter estimates suggested this effect was not attributable to group differences in educational status ($p = .018$) (Table 17) (Appendix 18-21). Nevertheless, there was no evident group difference after controlling for group differences in medication use (see supplementary analysis - pg. 247)

A Welch's ANOVA highlighted a similarly significant between group effect for guilt ratings (Welch's $F(1, 49.496) = 7.272$, $p = .010$) and analysis of bootstrapped GLM parameter estimates indicated that the ASPD group self-reported significantly less guilt in response to guilt scenarios than controls. In contrast, univariate ANOVAs indicated no significant between group effects for either self-anger ($F(1,54) = .770$, $p = .384$; $\eta_2^{par} = .014$) or other anger ($F(1,54) = 3.821$, $p = .056$; $\eta_2^{par} = .066$). Moreover, when the analysis for other-anger was repeated with adjustments to control for group differences in educational status, bootstrapped GLM parameter estimates (employed to account for violation of the assumption of homogeneity) indicated no change in the significance of the between group effect ($p = .857$) (Table 17) (Appendix 18-21). Nevertheless, there

was no evident group difference after controlling for group differences in medication use (see supplementary analysis - pg. 247)

3.4.2 Three Groups Comparison

A Welch's ANOVA highlighted a significant between group effect for compassion ratings (Welch's $F(2, 33.149) = 8.305$, $p = .001$) and post-hoc analysis of bootstrapped general linear model (GLM) parameter estimates revealed that the ASPD+P group felt significantly less compassion in response to compassion scenarios than control or ASPD-P groups ($p = .001$; $p = .014$). However, there was no significant difference in the compassion ratings of the ASPD-P and control groups ($p = .150$). Whilst no adjusted p-value was obtainable through Welch's ANOVA, a review of education adjusted GLM bootstrapped parameter estimates indicated that the compassion ratings of the ASPD+P and control group remained significantly different with education as a co-variate ($p = .020$). The significant difference between ASPD+P and ASPD-P groups also remained evident ($p = .015$) (Table 18) (Appendix 18-21).

A univariate ANOVA highlighted a similarly significant between group effect for guilt ratings ($F(2, 53) = 7.561$, $p = .001$, $\eta_2^{par} = .222$) and post-hoc analysis of parameter estimates and simple contrasts indicated that the ASPD+P group felt significantly less guilt in response to guilt scenarios than either the control or ASPD-P groups ($p = .001$; $p = .005$). However,

there was no significant difference in the responses of the ASPD-P and control group (p = .692) (Table 18) (Appendix 18-21).

There were no significant between group differences in self-anger (F(2, 53) = .434, p = .650, η_2^p= 0.16) or other anger (Welch's F(2, 35.174) = 2.705, p = .081) despite the fact that bootstrapped GLM parameter estimates indicated that the ASPD+P group had significantly higher ratings of other-anger than controls (p = .027). Furthermore, when the analysis for other-anger was repeated and adjusted to control for differences in education, GLM bootstrapped parameter estimates highlighted no significant differences between ASPD and control groups (Table 18) (Appendix 18-21).

Table 17: Moral Emotions Task - Group Means (SD), Mean Differences and 95% CIs (Combined ASPD vs Controls)

Variable	Combined ASPD (*N* = 37)	Controls (*N* = 19)	Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value Unadjusted	Mean Difference Adjusted[1]	95% CIs Adjusted	
				Lower Bound	Upper Bound			Lower Bound	Upper Bound
Compassion[a]	3.95 (1.42)	5.07 (0.86)	-1.12	-1.71	-0.56	.001	**-1.18**	**-2.29**	**-0.27**
Guilt[a]	4.73 (1.52)	5.67 (1.04)	-0.93	**-1.59**	**-0.29**	**.010**	N/A	N/A	N/A
Self-Anger	4.56 (1.35)	4.22 (1.41)	0.34	-0.44	1.11	.384	N/A	N/A	N/A
Other Anger[a]	4.56 (1.39)	3.83 (1.17)	0.73	-0.02	1.48	.056	-0.06	-0.65	0.88

UA analysis employed unless [a] specified. Adjusted and unadjusted mean differences + 95% CIs obtained through GLM parameter estimates where UA analysis employed

[a]Welch's ANOVA employed due to violation of assumption of homogeneity of variances. Adjusted and unadjusted mean differences + 95% CIs obtained through bootstrapped GLM parameter estimates.

Adjusted mean difference + 95% CIs for 'other anger' obtained through bootstrapped GLM parameter estimates due to violation of assumption of homogeneity of variances

[1]= analysis adjusted to account for group differences in educational status

N/A = no repeated analysis undertaken as t-test/Mann Whitney u tests and Spearman's correlations indicated no significant associations between variable + age and/or education

Table 18: Moral Emotions Task - Group Means (SD), Mean Differences and 95% CIs (Three Groups)

Variable	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Mean Difference Unadjusted	95% CIs Unadjusted		Sig Value Unadjusted	Mean Difference Adjusted[1]	95% CIs Adjusted	
					Lower Bound	Upper Bound			Lower Bound	Upper Bound
Compassion[a]							<.001[a]			
	4.57 (1.05)	3.52 (1.51)	5.07 (0.86)	-0.50*	-1.14	0.12		-0.82*	-.2.36	0.99
				-1.04**	-1.93	-0.24		**-1.08****	**-1.96**	**-0.25**
				-1.55***	-2.27	-0.88		**-1.90*****	**-3.82**	**-0.38**
Guilt							**.001**			
	5.49 (1.17)	4.22 (1.55)	5.67 (1.04)	-0.18*	-1.07	0.72				
				-1.27**	**-2.14**	**-0.40**		N/A	N/A	N/A
				-1.45***	**-2.26**	**-0.64**				
Self-Anger							.650			
	4.47 (1.19)	4.62 (1.47)	4.22 (1.41)	0.25*	-0.71	1.20				
				0.16**	-0.77	1.08		N/A	N/A	N/A
				0.40***	-0.47	1.27				
Other Anger[a]							.081[a]			
	4.16 (0.97)	4.84 (1.58)	3.83 (1.17)	0.32*	-0.41	1.07		-0.26*	-1.04	0.57
				0.69**	-0.15	1.51		0.63**	-0.16	1.46
				1.01***	0.17	1.84		0.36***	-0.36	1.46

*= ASPD-P vs controls, **= ASPD+P vs ASPD-P, *** = ASPD+P vs controls
Univariate ANOVA employed for analysis of guilt and self-anger ratings
[a] = Welch's ANOVA employed. Mean difference + 95% CI's obtained via GLM bootstrapped adjusted parameter estimates - no adjusted significance value obtainable
[1]Adjusted mean differences + 95% CIs = adjusted for education
N/A = no repeated analysis undertaken as independent t-tests/Mann-Whitney U tests and Spearman's correlations showed no significant associations between variable + age and/or education

3.5 Moral Dilemmas Task (Decisions to Act)

3.5.1 *Impersonal Moral Dilemmas*

3.5.1.1 Combined ASPD vs Controls

Fisher's Exact Tests indicated no significant between group effect on decisions to endorse utilitarian action for impersonal moral dilemmas one (Fisher's Exact Test, p = 1.000), two (Fisher's Exact Test, p = .481), three (Fisher's Exact Test, p = .195) or four (Fisher's Exact Test, p = .403) and no significant effect on the likelihood of ≥ 50% decisions to endorse action for impersonal dilemmas (Fisher's Exact Test, p = 1.000). Equally, when adjusted binary logistic regressions were employed to account for group differences in age, there were no significant between group differences in the endorsement of utilitarian solutions for impersonal moral dilemmas (Table 19).

3.5.1.2. Three Groups Comparison

Fisher's Exact tests similarly indicated no significant group effect on decisions to endorse utilitarian action for impersonal moral dilemmas one (Fisher's Exact Test, p = .750), two (Fisher's Exact Test, p = .638), three (Fisher's Exact Test, p = .392) or four (Fisher's Exact Test, p = .266) and no significant group effect on the likelihood of ≥ 50% decisions to endorse action for impersonal dilemmas (Fisher's Exact Test, p = .872). Furthermore, binary logistic regressions employed to enable adjustments

for group differences in age and educational status also suggested no significant between group effects (Table 20).

3.5.2 *Personal Moral Dilemmas*

3.5.2.1 Combined ASPD vs Controls

Fisher's Exact tests indicated no significant group effect on decisions to endorse utilitarian solutions for personal dilemmas five (Fisher's Exact Test, p = .338) or seven (Fisher's Exact Test, p = .518). However, chi-square analysis revealed a significant between group difference in endorsement of utilitarian action for moral dilemma six ($\chi^2 1$) = 6.476, p = .011) and odds ratios indicated that the odds of the combined ASPD group endorsing utilitarian action were significantly higher than those of the control group (OR 4.93, 95% CI 1.37-17.86). Furthermore, an adjusted binary logistic regression suggested that this significant effect remained evident despite controlling for group differences in age (OR 4.78, 95% CIs 1.17-19.54, p = .029).

Whilst a chi-square analysis revealed a significant between group difference in the endorsement of utilitarian action for moral dilemma eight ($\chi^2 1$) = 5.783, p = .016) and odds ratios suggested that the odds of the combined ASPD group endorsing utilitarian action were significantly higher than those of the control group (OR 5.05, 95% CI 1.26-20.41), this effect was no longer evident when an adjusted binary logistic regression was employed to control for group difference in age (OR 3.62,

95% CIs 0.81-16.25, p = .093) (Table 19). In contrast, chi square analysis highlighted a significant between group effect in the ≥50% rate of decisions to endorse utilitarian solutions for personal moral dilemmas combined ($\chi^2$1) = 6.579, p = .010) with the odds of the combined ASPD group endorsing utilitarian action significantly higher than those of the control group (OR 4.50, 95% CIs 1.38-14.71). Whilst this effect remained significant when an adjusted binary logistic regression was employed to control for group differences in age (OR 4.37, 95% CIs 1.16-16.51, p = .030) (Table 19), supplementary analysis adjusted to account for differences in age, antipsychotic and SSRI medication use indicated no significant between group difference in the odds of endorsing utilitarian solutions for personal moral dilemmas combined (OR 4.63, 95% CIs 0.88 – 24.56, p = .071) (see Section 3.8).

3.5.2.2 Three Groups Comparison

Fisher's Exact tests indicated no significant group effect on decisions to endorse utilitarian solutions for personal dilemmas five (Fisher's Exact Test, p = .339) or seven (Fisher's Exact Test, p = .464). Whilst a chi-square analysis highlighted a significant group difference in the endorsement of utilitarian action for personal moral dilemma six (χ^2(2) = 7.515, p = .023) and odds ratios indicated that the odds of patients with ASPD+P endorsing utilitarian action were significantly higher than those of controls (OR 6.58, 95% CI 1.6-27), there was no significant difference in the odds of ASPD+P and ASPD-P patients endorsing utilitarian action

(OR 2.00, 95% CI 0.5-7.6) and no significant difference in the odds of patients with ASPD-P endorsing utilitarian action when compared to controls (OR 3.28, 95% CI 0.7-14.7). Added to this, a binary logistic regression adjusted for age and education indicated no significant group differences (p = .605). Likewise, although a chi-square analyses highlighted a significant difference in the endorsement of utilitarian action for moral dilemma eight ($\chi^2(2) = 7.170$, p = .028) and odds ratios indicated that the odds of patients with ASPD-P endorsing utilitarian action were significantly higher than those of controls (OR 8.00, 95% CI 1.60-40.00), there was no significant difference in the odds of patients with ASPD-P endorsing utilitarian action when compared to patients with ASPD+P (OR 0.4, 95% CI 0.1-1.8) and no significant difference in the odds of patients with ASPD+P endorsing utilitarian action when compared to controls (OR 3.69, 95% CI 0.8-16.4). Furthermore, a binary logistic regression adjusted for age and education indicated no significant between group differences (p = .282). Equally, whilst a chi-square analysis highlighted a significant group difference in the ≥ 50% rate of decisions to endorse utilitarian solutions for personal moral dilemmas combined ($\chi^2(2) = 6.587$, p = 0.37) and odds ratios suggested that the odds of both ASPD-P and ASPD+P groups endorsing utilitarian action were significantly higher than those of controls (OR = 4.35, 95% CI 1.0-18.5; OR = 4.64, 95% CI 1.2-17.2), no group differences were evident once binary logistic regression was employed to control for differences in age and educational status (p = .992). Supplementary analysis adjusted to

account for differences in age, education, antipsychotic and SSRI medication similarly indicated no significant between group difference in the odds of groups endorsing utilitarian decisions for moral dilemmas six, eight or personal moral dilemmas combined (see Section 3.8) (Table 20).

Table 19: Endorsement of Utilitarian Solutions for Moral Dilemmas (Combined ASPD vs Controls)

Variable	Combined ASPD (*N* = 37)	Controls (*N* = 19)	Unadjusted Odds ratio	Unadjusted 95% CIs		Sig. value	Adjusted odds ratio	Adjusted 95% CIs		Adjusted sig. value
				Lower Bound	Upper Bound			Lower Bound	Upper Bound	
MD1 (Impersonal)[a]	30 (81.1%)	16 (84.2%)	0.80	0.18	3.53	1.000	0.43	0.08	2.29	.324
MD2 (Impersonal)[a]	31 (83.8%)	14 (73.7%)	1.85	0.48	7.09	.481	1.52	0.33	6.94	.586
MD3 (Impersonal)[a]	30 (81.1%)	12 (63.2%)	2.50	0.72	8.70	.195	2.71	0.64	11.38	.174
MD4 (Impersonal)[a]	31 (83.8%)	18 (94.7%)	0.29	0.03	2.58	.403	0.19	0.02	1.96	.162
Impersonal Dilemmas (≥ 50% decisions to act)[a]	33 (89.2%)	17 (89.5%)	0.97	0.16	5.85	1.000	0.55	0.08	4.07	.561
MD5 (Personal)[a]	11 (29.7%)	3 (15.8%)	2.26	0.55	9.35	.338	1.68	0.35	8.08	.519
MD6 (Personal)	21 (56.8%)	4 (21.1%)	4.93	1.37	17.86	.011	4.78	1.17	19.54	**.029**
MD7 (Personal)[a]	29 (78.4%)	13 (68.4%)	1.67	0.48	5.81	.518	1.70	0.41	7.01	.463
MD8 (Personal)	18 (48.6%)	3 (15.8%)	5.05	1.26	20.41	.016	3.62	0.81	16.25	.093
Personal Dilemmas (≥ 50% decisions to act)	25 (67.6%)	6 (31.6%)	4.50	1.38	14.71	.010	4.37	1.16	16.51	**.030**

[a] = Fisher's exact test significance value reported due to small cell counts (two-tailed). Age adjusted odds ratio, 95% CIs and significance value obtained through binary logistic regression;
NB: age and education adjusted odds ratios, 95% CIs and significance values unobtainable due to homogeneity in group educational status

Table 20: Endorsement of Utilitarian Solutions for Moral Dilemmas (Three Groups)

Variable	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Odds ratio	95% Cis		Sig. value	Adjusted odds ratio	Adjusted 95% CIs		Adjusted sig. value
					Lower Bound	Upper Bound			Lower Bound	Upper Bound	
MD1 (Impersonal)[a]	13 (86.7%)	17 (77.3%)	16 (84.2%)	1.22*	0.18	8.40	.750	-	-	-	.716
				0.52**	0.09	3.14					
				0.64***	0.13	3.12					
MD2 (Impersonal)[a]	12 (80%)	19 (86.4%)	14 (73.7%)	1.43*	0.28	7.25	.638	0.54*	0.03	8.55	.874
				1.58**	0.27	9.17		1.38**	0.23	8.43	
				2.26***	0.46	11.11		0.74***	0.04	15.32	
MD3 (Impersonal)[a]	12 (80%)	18 (81.8%)	12 (63.2%)	2.33*	0.48	11.24	.392	-	-	-	957
				1.13**	0.21	5.95					
				2.62***	0.63	10.99					
MD4 (Impersonal)[a]	14 (93.3%)	17 (77.3%)	18 (94.7%)	0.78*	0.04	13.51	.266	-	-	-	.448
				0.24**	0.03	2.33					
				0.19***	0.02	1.79					
Impersonal Dilemmas (≥ 50% decisions to act)[a]	14 (93.3%)	19 (86.4%)	17 (89.5%)	1.65*	0.13	20.00	.872	-	-	-	.759
				0.45**	0.04	4.82					
				0.75***	0.11	5.00					
MD5 (Personal)[a]	3 (20.0%)	8 (36.6%)	3 (15.8%)	1.33*	0.23	7.81	.339	-	-	-	.692
				2.29**	0.49	10.61					
				3.05***	0.67	13.70					
MD6 (Personal)	7 (46.6%)	14 (63.6%)	4 (21.1%)	3.28*	0.73	14.71	.023	1.49*	0.09	23.74	.605
				2.00**	0.53	7.60		1.87**	0.48	7.27	
				6.58***	1.61	27.03		2.79***	0.16	49.14	
MD7 (Personal)[a]	13 (86.6%)	16 (72.7%)	13 (68.4%)	3.00*	0.51	17.86	.464	-	-	-	.686
				0.41**	0.07	2.38					
				1.23***	0.32	4.74					
MD8 (Personal)	9 (60%)	9 (40.9%)	3 (15.8%)	8.00*	1.60	40.00	.028	-	-	-	.282
				0.46**	0.12	1.76					
				3.69***	0.83	16.39					
Personal Dilemmas (≥ 50% decisions to act)	10 (66.7%)	15 (68.2%)	6 (31.6%)	4.35*	1.02	18.52	.045	1.08*	0.07	15.97	.992
				1.07**	0.26	4.34		0.91**	0.21	3.95	
				4.64***	1.24	17.24		0.99***	0.06	17.06	

*= ASPD-P vs controls, **= ASPD+P vs ASPD-P, *** = ASPD+P vs controls

[a] = Fisher's exact test significance value reported due to small cell counts (two-tailed). Odds ratios + 95% CIs obtained through pairwise comparisons.

Adjusted odds ratio, 95% CIs and significance value obtained through binary logistic regression (adjusted for age + education); - figures unobtainable due to limited sample size

3.6 Moral Dilemmas Task - Decision Difficulty Ratings

3.6.1 *Impersonal Moral Dilemmas*

3.6.1.1 Combined ASPD vs Controls

Mann Whitney U tests indicated a statistically significant group effect for impersonal moral dilemmas one (U = 506.00, p = .006), two (U = 556.00, p = < .001), three (U = 540.00, p = .001) four (U = 566.50, p = <.001) and impersonal moral dilemmas combined (U = 570.00, p = < .001), with the combined ASPD group reporting significantly less difficulty in their decision making than the control group. However, as Mann Whitney U tests highlighted a significant association between difficulty ratings for impersonal moral dilemmas and education, bootstrapped univariate ANOVAs were employed to enable adjustments to account for group differences in educational status and the adjusted analysis indicated no significant group effects (Table 21-22) (Appendix 18-21).

3.6.1.2 Three Groups Comparison

Kruskal Wallis tests indicated a statistically significant group effect for impersonal moral dilemmas one (H(2) = 10.794, p = .005), two (H(2) = 14.534, p = .001), three (H(2) = 14.890, p = .001) and four (H(2) = 18.115, p = <.001). For moral dilemma one, post hoc analysis of pairwise comparisons indicated that the ASPD+P group found it significantly easier to decide whether to endorse utilitarian action than the control group (p = .001). However, there was no significant difference in

the difficulty ratings of the ASPD+P and ASPD-P groups (p = .068) or the ASPD-P and control groups (p = .239) (Table 23) (Appendix 18-21).

For moral dilemma two, pairwise comparisons revealed that the ASPD-P and ASPD+P groups found it significantly easier to decide whether to endorse utilitarian action than controls (p = .029; p = < .001) but there was no significant difference between the decision difficulty ratings of ASPD+P and ASPD-P groups (p = .194) (Table 23) (Appendix 18-21).

For moral dilemma three, pairwise comparisons highlighted that the ASPD+P group found it marginally easier to make decisions on whether to endorse action than the ASPD-P group (p = .050) and significantly easier than the control group (p = <.001) but there was no significant difference in the difficulty ratings of the ASPD-P and control groups (p = .112) (Table 23) (Appendix 18-21).

Similarly, for moral dilemma four, pairwise comparisons indicated that the ASPD+P group found decisions on whether to endorse action significantly easier to make than the control group (p = <.001) and marginally easier to make than the ASPD-P group (p = .050). The ASPD-P group also found decisions on whether to endorse action marginally easier than the control group (p = .051). Moreover, when the difficulty ratings for all four impersonal dilemmas were combined, there was a significant group effect (H(2) = 18.115, p = <.001) and pairwise comparisons revealed that both ASPD-P and ASPD+P groups found it significantly easier to make decisions on whether to endorse utilitarian action for impersonal

dilemmas than the control group (p = 0.47; p = <.001). In contrast, there was only a borderline significant difference in the impersonal dilemma difficulty ratings of the ASPD-P and ASPD+P groups (p = .054) (Table 23) (Appendix 18-21).

Moreover, when bootstrapped univariate ANOVAs were employed to enable adjustments for education, results indicated that for moral dilemma four, the significant difference in difficulty ratings of the ASPD+P and ASPD-P groups remained irrespective of adjustment (Table 24) (Appendix 18-21).

3.6.2 *Personal Moral Dilemmas*

3.6.2.1 Combined ASPD vs Controls

Mann Whitney U tests indicated no significant between group effect on difficulty ratings for moral dilemma five (U = 432.50, p = .145). However, there was a significant between group difference in difficulty ratings for moral dilemmas six (U = 489.50, p = .015), seven (U = 513.00, p = .004) and eight (U = 471.50, p = .036). A review of bootstrapped parameter estimates suggested that the combined ASPD group found it significantly less difficult than controls to make decisions on whether or not to endorse action for moral dilemmas six to eight. Equally, a univariate ANOVA highlighted a significant between group difference in difficulty ratings for personal moral dilemmas combined (F(1,54) = 7.311, p = .009, η_2^{par} = .119) and a review of GLM parameter

estimates and simple contrasts revealed that the combined ASPD group found it significantly less difficult to make decisions on whether or not to endorse action in response to personal moral dilemmas than controls. Nevertheless, as Mann Whitney U tests highlighted a significant association between difficulty ratings for personal moral dilemmas 6-8 and education, education adjusted GLM bootstrapped parameter estimates were examined to determine whether these effects were attributable to group differences in education and indicated no significant between group differences in the difficulty ratings of combined ASPD and control groups for personal moral dilemmas six to eight. Similarly, when an education adjusted univariate ANOVA was completed for personal dilemmas combined, the initial between group effect was no longer evident (p = .444) (Table 22) (Appendix 18-21).

3.6.2.2 Three Groups Comparison

There was no significant between group effect on difficulty ratings for moral dilemma five ($H(2) = 2.853$, p = .240) but a significant group effect for moral dilemma six ($H(2) = 6.268$, p = .044) and pairwise comparisons revealed that the ASPD+P group found it significantly easier to make decisions on whether to endorse action for moral dilemma six than the control group (p = .014). However, there was no significant difference in the difficulty ratings of the ASPD+P and ASPD-P groups (p = .552) or ASPD-P and control groups (p = .100) (Table 23) (Appendix 18-21) (also see Section 3.8 for supplementary analysis).

There was a similarly significant group effect for moral dilemma seven ($H(2) = 10.333$, $p = .006$) and pairwise comparisons revealed that the ASPD+P group found it significantly easier to make decisions on whether to endorse action than the control group ($p = .001$). However, there were no significant differences between the ASPD+P and ASPD-P groups ($p = .137$) or ASPD-P and control groups ($p = .141$). Likewise, the significant group effect for moral dilemma eight ($H(2) = 7.398$, $p = .025$) was specifically related to differences between the ASPD+P and control groups, with the former rating decisions on whether to endorse action significantly easier than the latter ($p = .008$). There was no significant difference between the ASPD+P and ASPD-P groups ($p = .084$) or ASPD-P and control groups ($p = .471$). A univariate ANOVA highlighted a significant group effect for personal moral dilemma difficulty ratings combined ($F(2,53) = 5.132$, $p = .009$, $\eta_2^{par} = .162$), and parameter estimates and simple contrasts indicated that the ASPD+P group found decisions relating to endorsement of action for personal dilemmas significantly easier to make than the control group ($p = .002$). However, there was no significant difference in the ratings of the ASPD+P and ASPD-P groups ($p = .105$) or the ASPD-P and control groups ($p = .201$) (Table 23) (Appendix 18-21).

As Mann Whitney U tests highlighted a significant association between difficulty ratings for personal moral dilemmas 6-8 and education, bootstrapped univariate ANOVAs were employed to enable adjustment and results suggested that the significant group effects observed for moral dilemmas 6-8 and personal moral dilemmas combined were no longer evident once differences in educational status were accounted for (Table 24) (Appendix 18-21).

Table 21: Moral Dilemmas Difficulty Ratings
Combined ASPD vs Controls

Variable	Combined ASPD (*N* = 37)	Controls (*N* = 19)	Sig Value
MD1[a]	2.00 (1.00-7.00)	8.00 (2.00-10.00)	.006
MD2[a]	3.00 (1.00-6.00)	8.00 (5.00-10.00)	<.001
MD3[a]	2.00 (1.00-6.00)	7.00 (4.00-9.00)	.001
MD4[a]	3.00 (1.00-6.00)	8.00 (5.00-10.00)	<.001
Impersonal Dilemmas - Combined[a]	3.25 (1.00-5.25)	7.25 (5.25-9.00)	<.001
MD5[a]	1.00 (1.00-5.50)	3.00 (2.00-6.00)	.145
MD6[a]	2.00 (1.00-8.00)	7.00 (3.00-9.00)	.015
MD7[a]	4.00 (1.00-7.50)	8.00 (4.00-10.00)	.004
MD8[a]	4.00 (1.00-6.50)	5.00 (4.00-8.00)	.036
Personal Dilemmas Combined	3.92 (2.38)	5.72 (2.33)	.009

[a] = Mann Whitney U tests employed due to non-normal distribution. Median + interquartile range (25^{th}+75^{th} percentiles) reported;
Personal moral dilemmas combined – adjusted (for education) sig value, *p* = .444

Table 22: Moral Dilemmas Difficulty Ratings - Mean Difference+95% CIs
Combined ASPD vs Controls

Variable	Mean Difference	95% CIs Un Adjusted		Mean Difference Adjusted	95% CIs Adjusted	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
MD1[a]	-2.66	-4.44	-0.84	-0.75	-4.91	4.13
MD2[a]	-3.40	-4.87	-1.78	-1.88	-4.26	1.22
MD3[a]	-2.96	-4.49	-1.45	-1.81	-4.87	2.00
MD4[a]	-3.59	-5.09	-1.86	-0.65	-4.22	2.17
Impersonal Dilemmas - Combined	-3.15	-4.54	-1.73	-1.27	-4.32	2.32
MD5[a]	-0.80	-2.55	0.98	N/A	N/A	N/A
MD6[a]	-2.14	-3.93	-0.42	-1.00	-4.58	2.59
MD7[a]	-2.65	-4.32	-0.77	-0.95	-5.59	2.73
MD8[a]	-1.63	-3.24	-0.23	-0.35	-2.68	2.67
Personal Dilemmas - Combined	-1.81	-3.14	-0.47	-1.14	-4.11	1.83

[a]= Mann Whitney U tests employed – mean differences + 95% CIs (adjusted for education) obtained via bootstrapped GLM parameter estimates;
Personal moral dilemmas combined – unadjusted and adjusted mean differences + 95% CIs obtained via GLM parameter estimates + simple contrasts;
N/A = no adjusted analysis as Spearman correlations and Independent t-tests/Mann Whitney U tests indicated no association between variable and age or education

Table 23: Moral Dilemmas Difficulty Ratings - Three Groups

Variable	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Sig Value
MD1[a]	5.00 (1.00-9.00)	1.50 (1.00-4.00)	8.00 (2.00-10.00)	.005
MD2[a]	5.00 (1.00-8.00)	2.50 (1.00-5.00)	8.00 (5.00-10.00)	.001
MD3[a]	4.00 (1.00-8.00)	1.00 (1.00-4.00)	7.00 (4.00-9.00)	.001
MD4[a]	6.00 (1.00-8.00)	2.00 (1.00-4.25)	8.00 (5.00-10.00)	<.001
Impersonal Dilemmas - Combined[c]	5.00 (2.00-8.25)	2.38 (1.00-4.13)	7.25 (5.25-9.00)	<.001
MD5[a]	3.00 (1.00-8.00)	1.00 (1.00-4.25)	3.00 (2.00-6.00)	.240
MD6[a]	2.00 (1.00-8.00)	2.00 (1.00-8.00)	7.00 (3.00-9.00)	.044
MD7[a]	6.00 (1.00-8.00)	1.50 (1.00–6.25)	8.00 (4.00-10.00)	.006
MD8[a]	5.00 (1.00-8.00)	2.50 (1.00-5.25)	5.00 (4.00-8.00)	.025
Personal Dilemmas Combined*	4.68 (2.64)	3.40 (2.10)	5.72 (2.33)	.009

[a] = Kruskal Wallis employed due to non-normal distribution - median + interquartile range (25^{th} + 75^{th} percentiles) reported
*Personal Dilemmas Combined - adjusted (for education) sig. value, p = .223

Table 24: Moral Dilemmas Difficulty Ratings - Mean Difference+95% CIs Three Groups

Variable	Mean Difference	95% CIs		Mean Difference Adjusted	95% CIs Adjusted	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
MD1[a]	-1.29*	-3.80	1.27	-0.03*	-3.92	4.27
	-2.32**	-4.32	-0.02	-2.19**	-4.62	0.07
	-3.60***	-5.44	-1.60	-2.21***	-5.40	2.67
MD2[a]	-2.48*	-4.59	-0.21	-1.40*	-4.05	1.52
	-1.55**	-3.47	0.57	-1.44**	-3.49	0.70
	-4.03***	-5.76	-2.16	-2.84***	-5.51	0.57
MD3[a]	-1.81*	-3.86	0.33	-1.18*	-3.91	1.84
	-1.94**	-3.81	-0.07	-1.88**	-3.96	0.27
	-3.75***	-5.24	-2.11	-3.06***	-5.72	0.52
MD4[a]	-2.25*	-4.38	-0.23	0.02*	-2.94	2.29
	-2.25**	-4.13	-0.31	**-2.02****	**-3.81**	**-0.19**
	-4.50***	-6.19	-2.81	-1.99***	-4.75	1.02
Impersonal Dilemmas - Combined	-1.96*	-3.84	0.05	-0.65*	-3.41	2.45
	-2.01**	-3.84	-0.28	-1.88**	-3.69	0.13
	-3.97***	-5.29	-2.49	-2.53***	-4.92	1.02
MD5[a]	-0.13*	-2.40	2.23	N/A	N/A	N/A
	-1.13**	-3.28	1.24			
	-1.26***	-3.19	0.58			
MD6[a]	-1.87*	-4.21	0.39	-0.88*	-4.45	3.66
	-0.45**	-2.70	1.77	-0.35**	-2.93	1.91
	-2.32***	-4.25	-0.30	-1.23***	-6.01	2.38
MD7[a]	-1.55*	-3.84	0.77	-0.37*	-4.18	2.56
	-1.86**	-3.89	0.37	-1.74**	-3.91	0.70
	-3.40***	-5.35	-1.25	-2.10***	-5.40	1.79
MD8[a]	-0.62*	-2.68	1.38	0.19*	-2.33	2.77
	-1.70**	-3.62	0.25	-1.62**	-3.67	0.51
	-2.32***	-3.82	-0.69	-1.43***	-4.36	1.56
Personal Dilemmas - Combined	-1.04*	-2.65	0.57	-0.72*	-3.70	2.25
	-1.29**	-2.85	0.28	-1.25**	-2.85	0.35
	-2.33***	-3.79	-0.86	-1.98***	-5.09	1.14

* = ASPD-P vs controls, ** = ASPD+P vs ASPD-P, ***= ASPD+P vs controls
[a]=Kruskal Wallis employed – mean differences + 95% CIs (adjusted for education) obtained via bootstrapped GLM parameter estimates; Personal Moral dilemmas – mean differences + 95% CIs obtained via GLM parameter estimates + simple contrasts; N/A = no adjusted analysis as Spearman's correlations/t-test/Mann Whitney U tests indicated no association between variable and age/education

3.7 Moral Dilemmas – Decision Response Latency

3.7.1 *Impersonal Moral Dilemmas*

3.7.1.1 Combined ASPD vs Controls

Mann Whitney U tests indicated statistically significant between group differences in decision response latency for moral dilemmas one (U = 466.00, p = .048), two (U = 544.00, p = .001), three (U = 522.00, p = .003), four (U = 525.00, p = .003) and impersonal moral dilemmas combined (U = 526.00, p = .003). Examination of median response times and group percentiles (25^{th} and 75^{th}) indicated that the combined ASPD group were significantly quicker to make decisions on whether or not to endorse action in response to all impersonal moral dilemmas than controls (Table 23). Moreover, a review of education adjusted bootstrapped GLM parameter estimates suggested that the significant group effects evident for moral dilemmas two to four and impersonal moral dilemmas combined remained irrespective of controlling for group differences in educational status (Tables 25-26) (Appendix 18-21).

3.7.1.2 Three Groups Comparison

Kruskal Wallis tests indicated no statistically significant group effect for response latencies relating to moral dilemma one (H(2) = 4.777, p = .092) but there was a significant group effect for moral dilemmas two (H(2) = 11.163, p = .004), three (H(2) = 10.057, p = .007) four (H(2) = 10.062, p = .007) and impersonal moral dilemmas combined (H(2) = 10.913, p = .004) (Table 27) (Appendix 18-21).

For moral dilemma two, pairwise comparisons revealed that both ASPD+P and ASPD-P groups were significantly quicker to respond than controls when asked to decide whether they would endorse sacrificing one individual to save the lives of many (p = .002; p = .010). However, there was no significant difference in response latency for the ASPD+P and ASPD-P groups (p = .797). For moral dilemma three, the ASPD+P group were significantly quicker to respond than controls (p = .002). However, there was no significant difference between the ASPD-P and control groups (p = .082) or the ASPD+P and ASPD-P groups (p = .245). Similarly, for moral dilemma four there was a significant difference in the response latency of the ASPD+P and control groups (p = .002) but no significant difference in the response latencies of ASPD-P and control groups (p = .062) or ASPD+P and ASPD-P groups (p = .306). With regards to the significant group effect observed for impersonal moral dilemmas combined, pairwise comparisons indicated this was specifically related to differences between the ASPD+P and control groups (p = .001). When bootstrapped univariate ANOVAs were employed to enable adjustments for education, the significant group effects observed for moral dilemmas two, three, four and impersonal moral dilemmas combined remained evident. Unadjusted and education adjusted bootstrapped GLM parameter estimates also indicated that the ASPD-P group were significantly quicker to respond to impersonal moral dilemmas three and four than the control group. However, as no significant differences were observed between the ASPD-P and control groups in the

initial between groups Kruskal Wallis analysis for moral dilemmas three and four, this result should be interpreted with caution (Tables 27-28) (Appendix 18-21).

3.7.2 *Personal Moral Dilemmas*

3.7.2.1 Combined ASPD vs Controls

Mann Whitney U tests indicated a statistically significant group effect for moral dilemmas five (U = 480.50, p = .026), six (U = 478.00, p = .029), seven (U = 540.00, p = .001), eight (U = 524.00, p = .003) and personal moral dilemmas combined (U = 502.00, p = .009). Examination of median response times and group percentiles (25^{th} and 75^{th}) highlighted that the combined ASPD group made decisions significantly more quickly when asked whether or not to endorse action in response to all personal moral dilemmas than controls (Table 25). Furthermore, a review of education adjusted bootstrapped GLM parameter estimates suggested that these significant group differences remained despite adjustment to control for group differences in educational status (Table 26) (Appendix 18-21).

3.7.2.2 Three Groups Comparison

Kruskal Wallis tests suggested no statistically significant group effect for moral dilemmas five ($H(2)$ = 5.525, p = .063) or six ($H(2)$ = 5.104, p = .078) but there was a significant group effect for dilemmas seven ($H(2)$ = 10.667, p = .005) and eight ($H(2)$ = 9.900, p = .007) as well as for

personal moral dilemmas combined ($H(2) = 6.978$, $p = .031$) (Table 27) (Appendix 18-21).

For moral dilemma seven, analysis of pairwise comparisons revealed that both ASPD+P and ASPD-P groups were significantly quicker to decide whether or not to endorse sacrificing one individual to save the lives of many ($p = .003$; $p = .010$). However, there was no significant difference in response times for ASPD+P and ASPD-P groups ($p = .871$). For moral dilemma eight, the ASPD+P group were significantly quicker to respond than the control group ($p = .002$) but there was no significant difference in response times for the ASPD-P and control groups ($p = .062$) or the ASPD+P and ASPD-P groups ($p = .320$). There was a significant group effect for personal moral dilemma reaction times combined ($H(2) = 6.978$, $p = .031$) which pairwise comparisons indicated was specifically related to differences between the ASPD+P and control groups ($p = .011$) (Table 27) (Appendix 18-21).

When bootstrapped univariate ANOVAs were employed to enable adjustments for education, the significant group effects previously observed for moral dilemmas seven and eight and personal moral dilemmas combined remained evident. Whilst adjusted bootstrapped GLM parameter estimates also indicated that both patient groups were significantly quicker to respond to personal moral dilemmas five and six than the control group and that the ASPD-P group were significantly

quicker to respond to moral dilemma eight and had a significantly shorter response latency than controls for personal dilemmas combined, these results should be interpreted with caution as they were not evident during the initial analysis (Table 28).

Table 25: Moral Dilemmas Response Latency (Seconds) – Combined ASPD vs Controls

Variable	Combined ASPD (*N* = 37)	Controls (*N* = 19)	Sig Value
MD1[a]	1.16 (0.59-2.75)	33.10 (0.62-34.79)	.048
MD2[a]	1.97 (0.73-4.69)	43.11 (1.69-45.86)	.001
MD3[a]	1.81 (0.73-4.54)	24.54 (0.99-42.76)	.003
MD4[a]	1.82 (0.59-2.79)	34.63 (1.12-35.63)	.003
Impersonal Dilemmas Combined[a]	2.12 (1.12-4.06)	34.66 (1.18-40.14)	.003
MD5[a]	1.16 (0.58-3.19)	22.51 (0.58-30.61)	.026
MD6[a]	1.30 (0.49-3.13)	35.22 (0.52-39.86)	.029
MD7[a]	2.44 (0.88-4.16)	46.25 (1.41-48.32)	.001
MD8[a]	1.61 (0.67-4.13)	37.85 (0.92-41.49)	.003
Personal Dilemmas Combined[a]	2.05 (1.08-4.23)	36.26 (1.17-40.16)	.009

[a] = Mann Whitney U tests employed due to non-normal distributions - median + interquartile range (25^{th} + 75^{th} percentiles) reported

Table 26: Moral Dilemmas Response Latency - Mean Differences+95% CIs Combined ASPD vs Controls

Variable	Mean Difference Unadjusted	95% CIs Unadjusted		Mean Difference Adjusted	95% CIs Adjusted	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
MD1	N/A	N/A	N/A	N/A	N/A	N/A
MD2	-22.78	-33.33	-12.63	-23.95	**-33.12**	**-13.46**
MD3	-20.54	-29.74	-11.07	-23.04	**-31.80**	**-14.18**
MD4	-17.02	-25.37	-9.24	-18.82	**-26.73**	**-10.86**
Impersonal Dilemmas Combined	-19.35	-27.35	-10.44	-18.01	**-28.77**	**-7.56**
MD5	-14.75	-21.04	-7.47	-16.14	**-22.82**	**-9.10**
MD6	-19.79	-28.71	-11.25	-19.76	**-28.76**	**-11.32**
MD7	-23.78	-33.71	-13.72	-23.10	**-34.32**	**-12.54**
MD8	-20.98	-29.70	-11.47	-22.01	**-30.81**	**-12.06**
Personal Dilemmas Combined	-19.83	-28.66	-11.01	-20.25	**-28.04**	**-11.09**

[a] = Unadjusted + adjusted mean differences + 95% CIs (adjusted for education) obtained via bootstrapped GLM parameter estimates; N/A = no adjusted analysis as Spearman's correlations and Mann-Whitney U tests indicated no association between variable and age/education

Table 27: Impersonal/Personal Moral Dilemmas Response Latency (Seconds) Three Groups Comparison

Variable	ASPD-P (*N* = 15)	ASPD+P (*N* = 22)	Controls (*N* = 19)	Sig Value
MD1[a]	1.68 (0.49-4.32)	1.10 (0.61-2.03)	33.10 (0.62-34.79)	.092
MD2[a]	2.28 (0.55-5.33)	1.40 (0.77-4.67)	43.11 (1.69-45.86)	.004
MD3[a]	3.04 (1.29-4.58)	1.22 (0.68-4.15)	24.54 (0.99-42.76)	.007
MD4[a]	2.35 (0.70-4.64)	1.54 (0.58-2.73)	34.63 (1.12-35.63)	.007
Impersonal Dilemmas Combined[a]	2.70 (1.47-4.42)	1.58 (0.91-4.00)	34.66 (1.18-40.14)	.004
MD5[a]	1.31 (0.64-3.70)	1.12 (0.49-2.79)	22.51 (0.58-30.61)	.063
MD6[a]	1.27 (0.37-1.93)	1.32 (0.51-3.79)	35.22 (0.52-39.86)	.078
MD7[a]	2.41 (0.80-7.88)	2.62 (0.89-3.50)	46.25 (1.41-48.32)	.005
MD8[a]	3.00 (1.06-5.84)	1.48 (0.47-3.09)	37.85 (0.92-41.49)	.007
Personal Dilemmas Combined[a]	2.43 (1.08-4.79)	1.85 (1.02-4.19)	36.26 (1.17-40.16)	.031

[a] = Kruskal Wallis employed due to non-normal distributions - median + interquartile range (25th + 75th percentiles) reported

Table 28: Moral Dilemmas Response Latency - Mean Differences+95% CIs Three Groups Comparison

Variable	Mean Difference Unadjusted	95% CIs Unadjusted		Mean Difference Adjusted	95% CIs Adjusted	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
MD1	N/A	N/A	N/A	N/A	N/A	N/A
MD2	-21.81*	-32.28	-11.50	-23.35*	**-33.75**	**-12.73**
	- 1.64**	- 5.58	0.93	- 1.79**	- 5.87	0.99
	-23.45***	-33.37	-13.35	-25.14***	**-35.31**	**-14.73**
MD3	-19.09*	-28.32	-7.84	-22.12*	**-31.44**	**-11.49**
	- 2.45**	-10.45	3.75	-2.75**	-10.18	3.51
	-21.53***	-30.13	-12.23	-24.87***	**-36.13**	**-13.83**
MD4	-14.17*	-24.01	-2.26	-17.13*	**-25.79**	**-7.53**
	- 4.78**	-15.60	1.30	- 5.08**	-18.03	1.48
	-18.95***	-26.01	-11.57	-22.21***	**-33.65**	**-13.21**
Impersonal Dilemmas Combined	-17.33*	-26.89	- 7.58	-16.89*	**-27.77**	**- 5.77**
	- 3.40**	- 9.26	0.53	- 3.35**	- 9.26	0.95
	-20.72***	-29.14	-12.21	-20.24***	**-30.83**	**- 9.31**
MD5	-13.00*	-20.68	-4.68	-15.09*	**-21.76**	**-7.31**
	-2.94**	-9.04	1.15	-3.15**	-9.11	1.51
	-15.94***	-22.86	-9.26	-18.24***	**-26.74**	**-10.77**
MD6	-20.09*	-29.04	-11.01	-19.93*	**-28.19**	**-11.17**
	0.49**	-1.18	2.16	0.51**	- 1.27	2.14
	-19.60***	-28.81	-10.59	-19.43***	**-27.82**	**-10.30**
MD7	-22.50*	-33.50	-11.13	-22.39*	**-34.08**	**-11.34**
	- 2.15**	-6.77	1.36	- 2.14**	-7.79	1.66
	-24.66***	-35.80	-14.04	-24.53***	**-36.15**	**-13.17**
MD8	-20.38*	-29.65	-10.65	-21.63*	**-30.81**	**-13.16**
	-1.02**	-6.49	4.03	-1.14**	-6.83	4.10
	-21.40***	-30.94	-11.38	-22.78***	**-32.72**	**-13.12**
Personal Dilemmas Combined	-18.99*	-27.18	-9.17	-19.76*	**-28.06**	**-11.04**
	- 1.41**	- 5.21	1.50	- 1.48**	- 5.48	1.63
	-20.40***	-28.39	-11.48	-21.24***	**-30.06**	**-12.40**

[a] = Unadjusted + adjusted mean differences + 95% CIs (adjusted for education) obtained via bootstrapped GLM parameter estimates;
* ASPD-P vs controls, ** = ASPD+P vs ASPD-P, *** = ASPD+P vs controls
N/A = no adjusted analysis as Spearman's correlations and Mann-Whitney U tests indicated no no association between variable and age or education

3.8 *Supplementary Analyses*

More than half of patients with ASPD (62%) were taking prescribed anti-psychotics which some research suggests can lead to negative subjective effects on emotions and cognition (Moritz, Andreou, Klingberg, Thoering, & Peters, 2013). Furthermore, a third of patients with ASPD (32%) were prescribed selective serotonin reuptake inhibitors (SSRIs), specific types of which (i.e. Citalopram) have been found to lead to increased harm aversion bias and deontological moral decision-making (Crockett, Clark, Hauser, & Robbins, 2010) (Table 6).

Consequently, independent t-tests, Mann Whitney U Tests and binary logistic regression were employed to examine the relationship between anti-psychotic and/or SSRI medication and outcome variables and where significant relationships were identified, analyses were repeated with adjustments for medication (by type) and education/age where appropriate (Appendix 21).

3.8.1 *Combined ASPD vs Controls*

A bootstrapped GLM ANOVA indicated no significant between group difference in group ratings for the moral emotions of compassion or guilt once group differences in both education and/or antipsychotic use were accounted for (p = .073; p = .204*)*. Equally, binary logistic regression indicated no significant group effects evident in relation to the endorsement of action for personal moral dilemmas combined further to

controlling for group differences in age, antipsychotic and SSRI medication use (p = .071). There were no changes in the significance of outcomes for other variables attributable to group differences in antipsychotic and SSRI use (20-21).

3.8.2 *Three Groups Comparison*

Controlling for group differences in anti-psychotic and SSRI use as well as age and education (where significant associations between variables was identified) did not change the significance of between group effects observed in relation to moral emotions ratings, the endorsement of utilitarian action for moral dilemmas, moral dilemmas difficulty ratings or response latencies (Appendix 21).

No analysis was completed to examine the relationship between other anti-depressant or benzodiazepines use and outcome variables due to the limited numbers of patients who were prescribed these medications.

4.0 DISCUSSION

The present study employed moral emotions and moral dilemma tasks as part of a wider battery of questionnaires/tasks of empathy and emotion processing (see chapter two – section 2.2.4) to examine whether combined ASPD, ASPD-P and ASPD+P groups would differ from non-personality disordered adult male controls in a) their identification with moral emotions of self-anger, other-anger, guilt and compassion when

presented with morally emotive vignettes and b) their endorsement of utilitarian solutions for impersonal and personal sacrificial moral dilemmas or difficulty ratings for decisions relating to the endorsement of utilitarian action. It is the only study to date to examine such a wide range of moral emotions and utilitarian decision making and to compare the outcomes of combined ASPD, ASPD-P and ASPD+P groups against those of controls. Furthermore, it is the first study to explore whether ASPD-P and ASPD+P groups differ in their responses to these tasks.

4.1 *Moral Emotions*

The hypothesis that patients with ASPD would report significantly lower mean ratings for moral emotions of guilt, compassion and self-anger than controls was partially confirmed as whilst a comparison of combined ASPD and control groups suggested no significant between group effect for compassion and guilt ratings following adjustments to account for group differences in antipsychotic use (and educational status where appropriate), this was not the case when distinct ASPD groups were delineated. A comparison of results for ASPD-P patients, ASPD+P patients and the control group indicated that the ASPD+P group had significantly lower compassion and guilt ratings than controls despite controlling for extraneous variables. Furthermore, by comparing distinct ASPD groups, this study found partial support for the hypothesis that ASPD+P patients have lower mean ratings for moral emotions of guilt, compassion and self-anger than ASPD-P patients, as they identified

significantly less with moral emotions of compassion and guilt than patients with ASPD-P and this effect remained evident further to adjustments.

Nevertheless, contrary to expectations, there were no significant differences in the self-anger ratings of combined ASPD, ASPD-P or ASPD+P groups when compared to controls and no significant differences in the self-anger ratings of ASPD+P and ASPD-P patient groups.

In a similar vein and contrary to the hypothesis that patients with ASPD would self-report significantly higher mean ratings for the moral emotion of other-anger, there was no significant difference between the other-anger ratings of the combined ASPD group when compared to the control group. Moreover, whilst an unadjusted analysis of results for distinct ASPD patient groups and the control group suggested that ASPD+P patients exhibited significantly higher other-anger ratings than the control group, this difference was not evident following adjustments for education and there was no significant difference in the results of ASPD-P and ASPD+P groups.

These findings are consistent with those of previous research which reported significantly less guilt and compassion in adult male psychopathic populations (across both community and forensic settings) when compared to non-psychopathic populations (Johnsson et al., 2014; Lee & Gibbons, 2017; Link, Scherer, & Byrne, 1977). In contrast, the

finding that ASPD+P patients reported similar levels of self-anger as controls was surprising in view of evidence which suggests that psychopaths feel fewer self-conscious moral emotions (Mullins-Nelson, Salekin, & Leistico, 2006; Prado et al., 2016), that they are characterised by grandiosity and a lack of responsibility (Hare, 1991; Prado et al., 2016; Walker & Jackson, 2017) and are more likely to employ external attributions to justify their actions/behaviour (Batson, Gudjonsson, & Gray, 2010; Hauser, 2006; Prado et al., 2016).

Still, as self-anger vignettes were focussed purely on actions that had repercussions for the self, it could be that self-anger in this population is context specific, influenced by situational factors and/or more apparent when the repercussions of actions impact upon the self as opposed to others.

The absence of a significant difference in group ratings for other anger was equally unexpected because anger is argued to be a primary characteristic of ASPD and a common response to threat or frustration in populations with psychopathy (Blair, 2010; Cale & Lilienfeld, 2006; Hawes et al., 2016; Kolla, Meyer, Bagby, & Brijmohan, 2017; Lobbestael, Cima, & Arntz, 2013; Serin, 1991; Vitale, Newman, Serin, & Bolt, 2005).

Furthermore Haidt (2003) contends "*anger may be most frequently triggered by perceived injustices against oneself"* (pg. 854) and some findings suggest that populations with ASPD and/or psychopathy are more

likely to exhibit hostile attribution bias than populations without these disorders (Blackburn & Lee-Evans, 1985; Vitale et al., 2005).

Nevertheless, when Lobbestael, Arntz, Cima, and Chakhssi (2009) examined the effects of induced anger in patients with ASPD and found no difference in the self-reported anger levels of ASPD and control groups they highlighted that those with ASPD exhibited a significantly reduced physiological response (i.e., lower heart rate and systolic blood pressure) and heightened cognitive vigilance as would be expected if they were orienting towards rather than fighting an attack. The authors subsequently concluded that the strength and imminence of anger stimuli dictates the nature of anger responses in ASPD and consistent with this view, it is possible that the hypothetical stimulus employed in the moral emotions task may have been insufficiently sensitive to detect the true extent of self or other-anger exhibited by patient and control groups in real-life settings.

Whilst analysis of distinct ASPD-P and ASPD+P groups highlighted differences that were not identified when comparing a combined ASPD and control group and which suggest that psychopathy mediates compassion and guilt deficits in ASPD, combining self-report with psychophysiological measures would have provided a more comprehensive means of assessment. More importantly, it would have helped to identify potential dissimulation in self-report ratings which is arguably more common in forensic settings where patients may be more

concerned about the potential repercussions of their responses. Whilst patients were provided with reassurance about the confidentiality of their data and significant group effects were observed for other moral emotions, dissimulation was not assessed and cannot therefore be ruled out as a potential confounder.

However, the finding that ASPD+P patients reported significantly less guilt than either ASPD-P or control groups was consistent with predictions and evidence from wider research (Prado et al., 2016; Seara-Cardoso, Sebastian, McCrory, et al., 2016). It also suggests that the underlying mechanisms for immoral behaviour may differ between ASPD+P and ASPD-P populations because guilt is commonly regarded as an adaptive emotion that promotes reparative action and negatively predicts recidivism in offending populations (Tangney, Stuewig, & Martinez, 2014).

Whilst remorse is argued to be central to the experience of guilt (Tangney, Stuewig, & Hafez, 2011) and an absence of remorse is included among the criteria for an ASPD diagnosis (DSM-V; APA, 2013), the findings of previous studies which have examined guilt in ASPD populations have been heterogeneous in terms of whether deficits exist (Dolan & Staff Team., 1995; Johnsson et al., 2014).

Furthermore, some studies suggest that a lack of remorse is in fact generally evident in only the most severe and violent forms of ASPD (Goldstein et al., 2006; Goldstein et al., 1996). Equally, a study which explored the relationship between psychopathy and ASPD as assessed via

the PCL-R (Hare, 1991), PCL-SV (Hart et al., 1995) and DSM-IV-TR criteria (APA, 2000) concluded that ASPD was only weakly associated with interpersonal/affective traits and largely characterised by behavioural traits (i.e., criminal versatility/poor behavioural control) (Ogloff et al., 2016). Still, it is acknowledged that identification with guilt emotions may have been more forthcoming in the present study than it would in a real-world setting where admissions of culpability are more likely to incur negative consequences.

The absence of significant differences in the compassion ratings of the ASPD-P and control groups is similarly in keeping with the conclusions drawn by Ogloff et al. (2016). However, as this is the first study to examine state compassion in adult males with ASPD (to the author's knowledge) further research to test the reliability of this finding would be beneficial.

Likewise, although the finding that the ASPD+P group reported significantly less compassion than ASPD-P patients and the control group is in keeping with the PCL-R (Hare, 1991) diagnostic criteria for psychopathy (i.e., shallow affect; callousness and a lack of empathy) and findings reported by Lee and Gibbons (2017) and Seara-Cardoso et al. (2012) found no association between the two in a community sample which could indicate that compassion deficits are more related to criminality than psychopathy. However, this seems unlikely given that

significant differences were observed between patient groups as well as between patient and control groups.

4.2 *Moral Dilemmas*

All groups were more willing to endorse utilitarian action for impersonal moral dilemmas than they were for personal moral dilemmas and there were no significant group differences in the endorsement of utilitarian actions for impersonal moral dilemmas or consistent evidence of higher endorsement of utilitarian action in combined ASPD, ASPD+P or ASPD-P groups when compared to controls. This was as expected because whilst utilitarian solutions elicit the same outcome for both personal and impersonal moral dilemmas, the endorsement of indirect harm is generally considered to be less emotionally aversive than endorsement of direct harm. Furthermore, whilst the finding that the ASPD-P group had the highest rate of endorsement for utilitarian action in response to impersonal dilemmas (93.3%) and the ASPD+P group the lowest (86.4%) was contrary to expectations, differences were relatively minimal.

A different picture emerged with respect to decision difficulty ratings as the control group consistently rated decisions on whether to endorse utilitarian solutions for impersonal moral dilemmas as more difficult than combined ASPD, ASPD-P and ASPD+P groups. However, an education adjusted analysis ameliorated significant between group differences in decision difficulty ratings and whilst the results of a three group analysis

indicated that ASPD+P patients found the decision on whether or not to endorse utilitarian action for impersonal moral dilemma four significantly easier to make than ASPD-P patients (irrespective of adjustments), the difference was only marginally significant. In contrast, all ASPD groups (combined ASPD, ASPD-P and ASPD+P) were significantly quicker to make decisions on whether to endorse utilitarian solutions for impersonal dilemmas than controls irrespective of adjustments for education and analyses of adjusted outcomes for delineated ASPD groups indicated no significant differences in the response latencies of patient participants.

The prediction that patients with ASPD would endorse significantly more utilitarian decisions in response to personal dilemmas than controls was partially confirmed as analyses comparing the combined ASPD and control group indicated that the ASPD group were significantly more likely to endorse utilitarian action for moral dilemma six and had a significantly higher ≥ 50% rate of decisions to endorse utilitarian solutions for personal moral dilemmas combined than the control group irrespective of adjustments to account for group differences in age. Crucially however, there was no significant group effect for personal moral dilemmas combined once the two group analysis controlled for group differences in both age and medication use. Furthermore, when the results for distinct ASPD groups and the control group were compared, there were no significant group effects once the analysis was adjusted to control for group differences in both age and education.

Likewise, findings did not support the prediction that patients with ASPD would have significantly lower mean decision difficulty ratings than controls as there were no significant between group differences in decision difficulty ratings for personal dilemmas after controlling for group differences in educational status. Moreover, whilst an initial comparison of distinct ASPD groups and the control group suggested that the ASPD+P group found decisions relating to personal moral dilemmas significantly easier to make than the control group, the results of an education adjusted analysis did not support the hypothesis that patients with ASPD+P would have significantly lower mean decision difficulty ratings than the control and ASPD-P group.

However, the combined ASPD group had significantly shorter response latencies for impersonal and personal moral dilemmas combined when compared to controls and whilst an initial three group analysis suggested this effect was attributable to co-morbid psychopathy, an education adjusted three group analyses suggested that both ASPD groups had significantly shorter response latencies for decisions relating to impersonal and personal moral dilemmas than controls.

Although analyses comparing the combined ASPD and control group suggested that patients with ASPD were more likely to endorse utilitarian action for personal moral dilemmas irrespective of group differences in age, the fact that there were no significant group differences evident between ASPD+P or ASPD-P groups and the control group after

adjustments for age and education could indicate that lower educational status mediates utilitarian decision making for personal moral dilemmas or be attributable to insufficient power and type II error. In particular, because a substantial body of research which has examined the association between utilitarian moral decision making in both clinical and non-clinical populations with psychopathy/psychopathic traits found evidence to the contrary (Balash & Falkenbach, 2018; Bartels & Pizarro, 2011; Kahane, Everett, Earp, Farias, & Savulescu, 2015; Koenigs, Kruepke, Zeier, & Newman, 2012; Koenigs et al., 2007; Patil, 2015; Patil & Silani, 2014; Tassy et al., 2013).

However, Takamatsu and Takai (2017) found that empathic concern deficits mediated the association between psychopathy and utilitarian decision making and empathic concern deficits were not evident in the ASPD+P group employed by this study following adjustments for education (see chapter 3 – section 3.6). Added to this, other studies that employed clinical and community populations have reported similar evidence to suggest no association between psychopathy and utilitarian decision-making (Cima et al., 2010; Seara-Cardoso et al., 2012).

Whilst some contend that this inconsistency in findings may be attributable to variation in methodological approach and/or heterogeneity in the populations studied and Tassy et al. (2013) suggest that differences between psychopathic/non-psychopathic populations may be less apparent in studies that require participants to make evaluative

judgements (i.e., "*Is it moral for you to..*") rather than behavioural decisions (i.e., "*Would you……in order to …?*"), this argument does not explain the current findings. Equally, whilst Koenigs et al. (2012) posit that an absence of significant group effects may be attributable to lenient psychopathy classification, the current study found no significant differences between the endorsements of ASPD-P patients (with PCL-R scores <25) and ASPD+P patients (with PCL-R scores ≥25) for impersonal or personal dilemmas. Consequently, higher psychopathy scores do not appear to be a reliable predictor of utilitarian decision making.

Likewise, whilst some findings suggest that utilitarian decision making is positively associated with primary (low anxious) but not secondary (high anxious) psychopathic traits, a meta-analysis examining the relationship between psychopathy and moral judgement found no evidence to support a relationship between specific psychopathy facets and utilitarian decision making (Marshall, Watts, & Lilienfeld, 2018). However, the authors did highlight that an over-reliance on total psychopathy as opposed to dimensional psychopathy scores in research with forensic populations prevented conclusions being drawn about the nature and direction of the relationship between these two factors.

Nevertheless, the absence of a significant difference in the frequency of endorsements for utilitarian actions between ASPD+P and ASPD-P patients for personal moral dilemmas despite ASPD+P patients reporting

significantly lower levels of compassion, guilt and perspective taking ability, coupled with higher alexithymia, i.e., difficulty describing feelings traits than ASPD-P patients or control groups (See chapter 3 – sections 3.6 and 3.8; chapter 4 – section 3.2) presents a challenge to the notion that the emotion deficits widely associated with psychopathy promote increased utilitarian decision making.

Added to this, the fact that all patient groups were significantly quicker than controls to make decisions relating to personal moral dilemmas but endorsed consistently more utilitarian decisions than controls contradicts the notion that deontological decisions occur more quickly as a result of rapid and automatic aversive emotional reactions and is inconsistent with the argument that utilitarian decisions take longer because they are informed by slower, controlled cognitive processing (Greene, Nystrom, Engell, Darley, & Cohen, 2004; Greene et al., 2001).

Whilst this finding was unexpected, it is not unique as other studies with healthy community populations have found either longer response latencies or no difference in response latencies for deontological as opposed to utilitarian decisions, despite the fact that they were associated with higher levels of arousal, leading some to conclude that longer response latencies are in fact related to moral reasoning, conflict resolution and counter-intuitive moral judgements and decisions (Christensen, Flexas, Calabrese, Gut, & Gomila, 2014; Kahane, 2012; Manfrinati, Lotto, Sarlo, Palomba, & Rumiati, 2013).

Equally, from a social intuitionist perspective (Haidt, 2001; Haidt & Bjorklund, 2008), moral decision making occurs quickly because it is driven largely by automatic evaluations or partially innate intuitions (i.e., relating to harm, fairness) which may be enhanced, modified or suppressed depending on peer and cultural influences. Whilst moral reasoning is acknowledged to play a role in moral decision making, it is viewed more as a process for justifying intuitions than a process for inhibiting and over-riding them. Consequently, whilst longer response latencies for moral decision making might be regarded as evidence for increased moral reasoning, they would not be anticipated to promote higher endorsement of utilitarian solutions.

Crucially however, as all patient groups reported less difficulty in their decision making and endorsed more utilitarian responses for personal moral dilemmas than controls, the speed of their responses did not appear to be motivated by high levels of harm aversion or moral conflict. On the contrary, they appeared more consistent with evidence which suggests that low harm/harmful action aversion and antisocial disposition may act as a mechanism for utilitarian decision making (Conway & Gawronski, 2013; Patil, 2015; Rota et al., 2016).

Whilst the view that patient groups exhibited lower levels of harm aversion is purely speculative given that this study did not assess for arousal or valence and did not employ psychophysiological assessment

measures to examine affective reactivity, Kahane (2014) similarly contends that utilitarian judgements may in fact be relatively fast and effortless when the deontological desire to avoid direct harm is absent.

Crucially however, the fact that this study found no significant differences in the moral emotions of the ASPD-P and control group suggests that reduced harm aversion and increased utilitarian endorsement was not mediated purely by moral emotions deficits.

Bandura's theory of Moral Disengagement (2002; 2016) may offer one explanation for this as it argues that good people do harm despite their capacity to exhibit guilt and compassion through a process whereby self-regulatory processes and negative self-evaluative emotions (i.e., guilt and shame) which serve to inhibit immoral behaviour or otherwise promote reparative action may in some situations and contexts be circumvented. This may be through cognitive restructuring of such behaviour by moral justification, advantageous comparisons, displacement and diffusion of responsibility, minimisation of harm, dehumanization of victims and/or externalised attributions of blame. In accordance with this perspective,. some contend that utilitarian logic is commonly employed to justify decisions that involve harm to others (Lee & Gino, 2015). Furthermore, others propose that antisocial lifestyle may impact upon an individual's moral beliefs where increased reliance on justifications is required to

reduce cognitive dissonance associated with frequent antisocial acts (Raine & Yang, 2006).

Equally, whilst the Integrated Emotions System model (IES; Blair, 2004) argues that individuals with psychopathy exhibit impaired affect representations which manifest as difficulties with reinforcement learning and the processing of reward and punishment cues (Blair, Morton, Leonard, & Blair, 2006; Blair, 2013), Gray and MacNaughton's (2000) revised reinforcement sensitivity theory (RST) can be applied more broadly to understand why the ASPD-P group may have exhibited reduced harm aversion in the absence of moral emotions deficits.

The RST suggests that individual differences in the sensitivity of basic brain systems to punishment and reward stimuli may not only underlie an individual's level of anxiety and impulsivity but also their behaviour. Whilst the behavioural activation system (BAS) is considered sensitive to appetitive reward signals and the FFS system (Fight/Flight/Freeze) argued to mediate responses to aversive stimuli or punishment cues, the behavioural inhibition system (BIS) is proposed to resolve conflict between BAS (approach) and FFS (avoidance) motivations and inhibit the response of either the BAS or FFS according to whether the perceived reward outweighs the perceived threat or vice versa. Based upon this approach, a range of research has found evidence to suggest that higher reward sensitivity and/or lower punishment sensitivity may act to inform

moral decision making and mediate antisocial behaviour (Bacon, Corr, & Satchel, 2018; Morgan, Bowen, Moore & van Goozen, 2014; Platje et al., 2018). For example, Amiri and Nava (2019) examined the relationship between reinforcement sensitivity and moral judgments and found that behavioural activation positively predicted utilitarianism. Whilst this finding was based on a male community population and some evidence suggests that males are more likely to make utilitarian decisions than females (Armstrong, Friesdorf, & Conway, 2018; Friesdorf, Conway, & Gawronski, 2015), another study which employed a largely female (adolescent) population to examine the impact of reinforcement sensitivity on endorsement of utilitarian decisions for moral dilemmas similarly found that higher reward sensitivity correlated positively with willingness to sacrifice one individual to save multiple others (Moore, Stevens & Conway, 2011). Likewise, whilst research by Bacon et al., (2018) acknowledged gender differences in the relationship between reward sensitivity and antisocial behaviour, the authors concluded that male antisocial behaviour in particular appeared related to *"means to an end"* thought processing (Bacon et al., 2018, pg. 92).

Consequently, whilst both ASPD-P and ASPD+P appeared to experience less harm aversion than controls, their willingness to endorse utilitarian solutions may have been differentially determined through increased reward sensitivity and/or reduced conflict inhibition or punishment sensitivity.

Nevertheless, from a developmental perspective, Decety and Cowell (2018) posit that early sensitivity to interpersonal harm promotes the development of third party harm aversion and complex moral judgements only when combined with socialisation and other processes (empathic concern, theory of mind, executive functioning and metacognition) which are informed by social practices, cultural values and normative evaluations. In support of this view, a range of research suggests that these processes may independently contribute to undermine an individual's moral sensitivity, judgement and behaviour (Hannah, Avolio, & May, 2011; Lievaart, van der Veen, Huijding, Hovens, & Franken, 2018; Patil & Silani, 2014; Spenser, Betts, & Das Gupta, 2015). Moreover, whilst this study found no evidence of empathy deficits in the ASPD-P group (see chapter 3 - sections 3.6-3.10), a substantial body of literature suggests that ASPD populations demonstrate difficulties with metacognition, theory of mind, executive functioning and more specifically with cognitive and inhibitory control (Baliousis, Duggan, McCarthy, Huband, & Völlm, 2019; Dolan & Fullam, 2004; Verona, Sprague, & Sadeh, 2012; Zeier, Baskin-Sommers, Hiatt Racer, & Newman, 2012).

It is therefore possible that these difficulties may have inhibited the development or activation of third party harm aversion in the ASPD-P group and served to reduce the level of moral conflict they felt in

response to personal moral dilemmas, irrespective of their moral emotions and knowledge of morally acceptable behaviour.

Equally, the current study did not assess for the presence of adverse childrearing experiences or historical trauma and a multitude of studies have found that early trauma and in particular physical abuse and neglect may be a contributory factor for both antisocial personality and impaired moral decision making (Battle et al., 2004; Bierer et al., 2003; Krastins, Francis, Field, & Carr, 2014; Music, 2011). For example, Zuchelli and Ugazio (2019) highlight how early exposure to modelled violence may contribute to antisocial behaviour through its influence on a child's understanding of what constitutes morally acceptable behaviour, by increasing the likelihood of desensitization and difficulties with inhibitory control which in turn increase reliance on automatic and impulsive as opposed to reflective and controlled processing of affective stimuli. In a similar vein, research which examined the relationship between neglect and moral decision making found higher levels of utilitarian decision making in participants with histories of physical and emotional neglect (Larsen et al., 2015). The authors subsequently concluded that individuals subjected to childhood physical neglect in particular may learn to adapt so that they are less reliant on affective systems and may therefore be less likely to experience deontological impulses.

In short, the current findings not only present a challenge to the dual process model's argument that moral reasoning promotes increased endorsement of utilitarian solutions but indicate that a more integrated and longitudinal approach is required to understand how disparities in the complex interplay of cognitive and affective processes that guide moral decision making may arise and inform moral behaviour in ASPD populations.

5.0 IMPLICATIONS FOR PRACTICE

By delineating between and comparing the results of combined adult male ASPD, ASPD-P, ASPD+P and control groups on moral emotions and decision making tasks, this study was not only able to explore the relationship between moral emotions and decision making but to examine the degree to which ASPD-P, ASPD+P groups and the control group differed from each other in terms of their identification with moral emotions and willingness to endorse utilitarian solutions in response to moral dilemmas.

Crucially, it was only by delineating ASPD-P and ASPD+P groups that this study was able to identify that guilt and compassion deficits in ASPD are mediated by co-morbid psychopathy. Moreover, whilst independent examination of ASPD-P and ASPD+P groups did not highlight psychopathy effects in relation to moral decision-making, the current results build upon those of Cima et al., (2010) as all ASPD groups were able to discriminate

between impersonal and personal harm and more likely to endorse harm for impersonal than personal moral dilemmas, despite the fact that ASPD+P patients exhibited deficits in moral emotions of guilt and compassion when compared to healthy controls.

This notable absence of significant group differences in moral decision making (following adjustments to account for group differences in age and/or education) has important implications in terms of moral responsibility as it suggests that neither ASPD nor psychopathy mediate an inability to judge what constitutes morally acceptable behaviour. Thus, based on the current findings, ASPD groups (with and without co-morbid psychopathy) have the knowledge and ability to distinguish what is morally acceptable and act in accordance with moral norms but do not always apply it.

Notably however, as all ASPD groups had significantly shorter response latencies coupled with lower perceived decision difficulty ratings and were more willing (albeit not significantly more willing) to endorse utilitarian solutions for personal moral dilemmas when compared to the control group, the current results contradict the dual process model's view that aversive emotions drive rapid deontological decision making whereas slower cognitive processing mediates utilitarian decision making. On the contrary, they suggest that longer response latencies (indicative of higher levels of moral reasoning and moral conflict) may arise as the result of

higher levels of harm aversion and lead to deontological decision making irrespective of increased cognitive processing.

Whilst psychopathy is commonly characterised by emotion deficits and findings from neuroimaging research have led some to contend that psychopathic populations demonstrate less amygdala activity and rely more heavily on abstract reasoning when processing emotionally salient moral stimuli (Glenn, Raine, & Schug, 2009; Glenn, Raine, Schug, Young, & Hauser, 2009), the fact that both patient groups demonstrated similar patterns of moral decision making despite evident differences in their identification with moral emotions could be viewed as evidence that moral emotions are in fact superfluous to moral decision making. However, by adopting a more holistic and integrated approach, it would appear that differences in harm aversion, moral reasoning, decision making and behaviour may arise as the result of impaired emotional or cognitive processing and through the complex and dynamic interplay between emotional and cognitive mechanisms which evolve, are shaped by a multitude of internal and external factors and may enable individuals with ASPD to *know* but not *feel* morally acceptable behaviour irrespective of co-morbid psychopathy.

Still, whilst a range of psychological interventions have been employed to address the anomalous and harmful behaviour characteristic to antisocial personality disordered populations, research undertaken to examine the

efficacy of these interventions concluded that there was limited evidence of significant improvements. Moreover, that significant improvements identified were primarily related to substance misuse (Gibbon et al., 2010; Gibbon, Khalifa, Cheung, Völlm, & McCarthy, 2020).

Thus, there is a clear need for clinicians to identify alternative approaches that can more sensitively address the distal and proximal factors which precipitate morally aberrant behaviour in adult male ASPD populations with and without co-morbid psychopathy. It is also essential that interventions acknowledge this behaviour may occur irrespective of moral emotions deficits and are able to distinguish and respond to individual differences that determine the influence of emotion and cognition in moral decision making.

Notably however, some contend that strategies designed to address moral disengagement, victimization, social and emotional competencies, moral emotions deficits, low empathy, problem solving and early trauma should be employed in childhood and adolescence (Barton & Garvis, 2019; Bustamante, & Chaux, 2014; Cigala, Mori, & Fangareggi, 2015; Espejo-Siles, Zych, Farrington, & Llorent, 2020; Hasking 2007; Helmond, Overbeek, & Brugman, 2012; Prather & Golden, 2009). In accordance with this view, an increased focus on early and multi-faceted interventions undertaken within families, schools, wider communities and with young offenders could enable clinicians to more effectively and wholly target the

diversity of mechanisms which inhibit the generation of harm aversion and encourage reliance on cognitive strategies to guide moral decision making.

6.0 LIMITATIONS AND FUTURE DIRECTIONS

Whilst the current results suggest that co-morbid psychopathy may mediate moral emotion deficits in ASPD and provide some support for the argument that the influence of moral emotions on moral decision making may have been overestimated (Horne & Powell, 2016), this study was subject to a number of limitations. Firstly, the study samples were smaller than anticipated and the study may therefore have been insufficiently powerful to detect the true extent of effects apparent between groups. Future studies should therefore aim to test the reliability of these results with larger ASPD and control populations.

Furthermore, whilst the similarity between patient groups (i.e., in verbal IQ, age, educational and medication status) means that the likelihood of patient group differences being attributable to potential confounders was minimised, both patient groups in this study were recruited from secure psychiatric settings and all participants were male. Consequently, results may not be generalisable to the wider male ASPD population or to females with ASPD as some research suggests that healthy female populations are less likely to endorse utilitarian decisions than males. Further research to examine the replicability of these results in a study comparing community and forensic populations with ASPD (with and

without co-morbid psychopathy) or female ASPD populations would therefore be beneficial in informing how moral processing manifests across the wider ASPD population. Added to this, the control group were not assessed for co-morbid psychopathy and the possibility that undetected psychopathic traits could have confounded results cannot be discounted.

As the focus of this study was to examine moral processing in ASPD and to identify potential differences in the moral emotions and decision making of ASPD-P and ASPD+P populations, the manifestation of moral processing deficits across psychopathy sub-dimensions was not examined. However, as some evidence suggests that moral processing deficits may differ depending on the presence of higher primary or secondary psychopathic traits, future research could also aim to determine whether differences exist in the moral emotions and decision making of ASPD-P vs ASPD+P populations with higher levels of primary (affective/interpersonal) versus secondary (lifestyle/antisocial) psychopathic traits.

Lastly, ethical considerations meant that the tasks employed in this study were limited in assessing responses to hypothetical scenarios, which may not be equivalent to those that would occur outside of a research setting.

Combining behavioural tasks with psychophysiological measures (i.e., skin conductance response) would help to inform the ecological validity of these measures (i.e., to identify whether they do in fact promote an

emotional response as might be expected outside of a research setting). Furthermore, the use of moral scenarios that are more representative of the moral situations that ASPD individuals are likely to encounter could help to provide a more nuanced understanding of the relationship between emotional processes, moral emotions and moral decision-making in ASPD populations with and without co-morbid psychopathy and non-personality disordered controls.

7.0 CONCLUSION

Whilst the current study found no evidence of moral emotions deficits in a combined ASPD group when compared to non-personality disordered controls (following adjustments to account for group differences in educational status and medication use), analysis delineating between ASPD-P, ASPD+P patients and a control group did indicate that psychopathy acts as a mediator for moral emotions deficits in ASPD. As moral emotions are commonly regarded as motivators for prosocial behaviour and argued to moderate the likelihood of violence, deficits in these emotions could have important implications in terms of risk.

However, the absence of moral emotions deficits and co-morbid psychopathy did not mediate reduced endorsement of utilitarian decisions in the ASPD-P group when compared to the ASPD+P group and there were no differences in how these groups discriminated between the moral acceptability of personal and impersonal harm as a solution to moral

dilemmas. Consequently, neither moral emotions deficits nor psychopathy mediated increased endorsement of utilitarian solutions. Still, whilst there were no significant group differences in utilitarian endorsement or decision difficulty ratings for impersonal or personal moral dilemmas combined, all ASPD patient groups reported less difficulty in their decision making, endorsed more utilitarian solutions for personal moral dilemmas than controls and were significantly quicker when deciding whether or not to endorse action in response to personal moral dilemmas. Consequently, the moral decision making of ASPD groups may have been less informed by the desire to maximise the aggregate welfare of others than it was by an absence of harm aversion and complex moral reasoning coupled with an increased reliance on cognitive strategies to inform moral behaviour (Christensen, Flexas, Calabrese, Gut, & Gomila, 2014; Kahane, 2012; Manfrinati, Lotto, Sarlo, Palomba, & Rumiati, 2013).

CHAPTER FIVE

A PSYCHOMETRIC CRITIQUE OF THE INTERPERSONAL REACTIVITY INDEX (IRI; Davis, 1980, 1983a)

ABSTRACT

***Background**: The effective measurement of empathy has proven elusive as whilst traditional empathy measures were criticised on the basis that they either assessed empathy as a unitary construct, lacked precision or had inadequate construct validity, contemporary measures have produced inconsistent findings leading some to argue that more valid and reliable measures are needed.*

***Aim:** The aim of this chapter is therefore to provide a critique and review of the Interpersonal Reactivity Index – a self-report measure that is internationally recognised as a multi-dimensional empathy assessment tool and employed for examining both cognitive and affective empathy across a range of adult and adolescent populations. The purpose, design, structure and administration of the IRI are outlined and followed by an explanation of the rationale behind the tool's development and a review of its psychometric properties when employed as a measure of empathy within the general population. This is then followed by an examination of the tool's utility, validity and reliability when employed with violent offender populations and more specifically with psychopathic and antisocial personality disordered (ASPD) offenders, who are widely recognised for disproportionate levels of violent behaviour.*

***Results:** Whilst a range of studies have found support for the validity and reliability of the IRI when employed with non-offending community*

populations, some have nevertheless challenged the construct validity of the measure and the validity of specific subscales, thus highlighting that the psychometric properties of the measure may vary across populations. Crucially, research that has examined the psychometric properties of the IRI with violent offenders found evidence of poor construct validity and low internal consistencies across subscales and suggests that difficulties with the readability of negatively worded items, poor insight and dissimulation are more likely to lead to inaccurate outcomes when the IRI is employed with this population.

Conclusion: *The IRI is subject to a range of limitations which have a negative impact upon the psychometric properties of the measure when it is employed with violent offenders and thus make it unsuitable for use as a research or assessment tool with this population.*

Keywords: *Empathy, self-report, multidimensional, violent offenders*

1.0 INTRODUCTION

As the positive relationship between empathy and prosocial behaviour has been widely established (Decety et al., 2016; Williams, O'Driscoll, & Moore, 2014) and a multitude of evidence suggests that impaired empathy contributes to the risk of antisocial behaviour, violence and recidivism (Harris & Picchioni, 2013; Jolliffe & Farrington, 2004), it is hardly surprising that empathy has long been a primary focus for research and interventions with offending populations.

Nevertheless, the effective measurement of empathy has proven challenging because conceptualisations of empathy have changed broadly since the term was first introduced in the early 1900s. Whilst empathy is currently viewed as a multi-dimensional construct that involves the integration of both cognitive and affective processes, traditional empathy measures commonly employed a unidimensional approach and did not distinguish between multiple facets of empathy or evaluate both cognitive and affective empathy dimensions (Feshbach, 1976; Hoffman, 1977).

The IRI (Davis, 1980) was thus developed to address these shortcomings and enable the simultaneous assessment of distinct facets of empathy. Now widely employed in empathy assessment across a range of settings with both offending and non-offending adult and adolescent populations (Bonfils et al., 2017; Curwen, 2003; Harari, Shamay-Tsoory, Ravid, & Levkovitz, 2010; Hawk et al., 2013; Schiffer et al., 2017; Seara-Cardoso

et al., 2012; Shamay-Tsoory et al., 2010), the IRI (Davis, 1980; 1983) was however developed on the basis of results obtained from undergraduate student populations and designed to be utilised as a measure of empathy within the general population. Therefore, some argue that it may be less effective as a measure of empathy with offender populations in its current form (Bevan et al., 2004; Domes et al., 2013).

Moreover, evidence from studies that have utilised the IRI to examine whether violent offenders exhibit deficient empathy when compared to controls has been largely inconsistent. This critique will therefore examine the Interpersonal Reactivity Index in terms of its development and psychometric properties within the general population before exploring its relevance and utility as an assessment and research tool with violent offenders, with specific reference to ASPD and psychopathic populations who are characterised by a lack of empathy and remorse (APA, 2013; Hare, 1991).

2.0 OVERVIEW

2.1 *Purpose, Design and Structure of IRI*

The Interpersonal Reactivity Index is a 28-item self-report tool comprised of four subscales which measure separable but inter-related components of dispositional empathy, which Davis (1980; pg. 113) broadly defined as *'the reactions of one individual to the observed experiences of another'*. The fantasy (FS) subscale assesses the extent to which individuals can

identify with the feelings and actions of fictional characters in books, films or plays; the perspective taking (PT) subscale measures an individual's capacity to spontaneously adopt another's point of view; the empathic concern (EC) subscale assesses an individual's ability to feel sympathy and concern for others and the personal distress (PD) subscale measures the extent to which an individual spontaneously feels anxiety and discomfort in response to tense interpersonal situations. Each scale consists of 7 items which are rated along a 5-point Likert scale (A- does not describe me well – E-describes me very well) with item score endpoints of 0-4) (Appendix 17).

2.2 *Administration and Scoring*

The IRI can be administered and completed in either written (paper and pencil) form or electronically (i.e., computer generated) and takes approximately 10-15 minutes to complete. Administration and scoring does not require formal qualification, training or manual guidance as scoring procedures (along with the mean scores of the normative samples employed in the development of the IRI) are readily accessible along with the full version of the questionnaire which is free to use and openly available at https://www.eckerd.edu/psychology/iri/ (Appendix 17).

As the IRI was intended as a continuous measure of separable cognitive and emotional empathy facets, subscale scores do not provide a categorical indication of empathy (i.e., yes/no, low/medium/high) and

should not be employed as a measure of global empathy, but rather interpreted independently. Whilst the IRI does not employ clinical cut-off points, it can be employed to compare empathy across different populations with higher subscale scores indicative of higher levels of empathy, albeit higher PD is noted to reflect a self-oriented as opposed to other-oriented emotional reaction to another's distress (Davis, 1980, 1983b).

3.0 DEVELOPMENT AND PSYCHOMETRIC PROPERTIES OF THE IRI

International test commission guidelines for test use emphasise that psychometric tests should only be employed where there is sufficient evidence to support their validity and reliability for their intended purpose (ITC; 2013). In keeping with this requirement, Davis (1980) challenged the validity of measures such as Cassell's Test of Social Insight (1959) and highlighted that greater precision in the measurement of empathy as opposed to other constructs was required. He also argued that existing measures did not approach empathy as a multi-dimensional construct (Feshbach, 1976; Hoffman, 1977) and were limited in their capacity to measure different facets of empathy due to their reliance on single outcome scores (Hogan, 1969; Mehrabian & Epstein, 1972). Subsequently, he developed the IRI to enable the assessment of distinct cognitive and affective components of empathy and more effectively inform the individual and interactive contribution of these components to human behaviour.

As test validity is defined as the degree to which a test measures what it is intended to measure (Kelley, 1927; pg. 14), it is a primary consideration during test construction and ensures that test outcomes are a meaningful reflection of the phenomenon under assessment.

3.1 *Internal Validity*

The internal validity of a self-report measure is determined during its development, provides a critical indication of whether the inferences, outcomes or results it produces will be accurate and can be assessed in a variety of ways.

3.1.1 *Content Validity*

Content validity is established when the items of a measure assess all the components of a specified construct and they are considered relevant to the construct in question. As content validity is subjective and open to interpretation, it is commonly evaluated through use of a content validity index (CVI), whereby expert reviewers are employed to rate the relevance of proposed items in order that only those that score above a specified threshold of agreement are retained (Lawshe, 1975).

The preliminary version of the IRI consisted of approximately 50-items which were selected on the basis that they assessed either cognitive (perspective taking) or affective (emotional) components of empathy. Whilst a minority were copied or adapted from the Emotional Empathy

Scale (EES; Mehrabian & Epstein, 1972) and Fantasy-Empathy Scale (FES; Stotland, Mathews, Sherman, Hansson, & Richardson, 1978), the majority were written specifically for the IRI. However, as no evaluation (i.e., use of a CVI) of their relevance to cognitive or affective empathy was described, the basis for the initial selection of these items remains unclear.

3.1.2 *Construct Validity*

Construct validity is determined by the extent to which a measure assesses what it is designed to assess and informs whether a hypothetical construct has been operationalised or conceptualised in a way that reflects the theoretical framework on which it is based. Construct validity can be established through evaluation of internal criteria (using exploratory/confirmatory factor analysis and examination of intercorrelations between subscales) or external criteria, which is commonly informed by convergent validity (i.e., the extent to which the outcomes of a measure correlate with those of other measures that assess constructs which should be theoretically related) and discriminant validity (i.e., the extent to which outcomes of a measure correlate with those of other measures that should theoretically be unrelated).

Whilst many researchers have employed a rule of thumb subject to item ratio of 10:1 as a means of ensuring precision in exploratory factor analysis (EFA), there is currently a lack of consensus regarding the exact

sample size needed for EFA as some contend that sample size should be determined through the strength of data (with higher communality of items, strong factor loadings and less cross loading of items indicative of stronger data) (Osborne, Costello, & Kellow, 2008). The initial 50-item version of the IRI was trialled with a sample of 451 volunteers (*n* = 201 male and *n* = 250 female; mean ages not reported) which is consistent with recommendations that EFA should be based on a minimum sample of 300 subjects (Tabachnick, Fidell, & Ullman, 2007) and Joreskog factor analysis with oblique rotation employed to examine how the measure should be structured. Results suggested four primary factors (i.e., fantasy, perspective taking, empathic concern and personal distress) for both groups and these subsequently became the primary focus for a revised version. Consequently, items that were related to less interpretable secondary factors were omitted or revised and new items added that were considered to be more consistent with the four factors identified. When the revised 45-item version was trialled with male (*n* = 221) and female (*n* = 206) psychology undergraduates, an additional 17 items were excluded on the basis that they loaded heavily onto more than one factor and the final 28-item version was trialled on a third group of psychology undergraduates (*n* = 579 males; *n* = 582 females). The factor analysis was then repeated and attested to the current four-factor structure with all items loading heavily onto one factor for both sexes (with the exception of item 10 which loaded similarly onto both PD and EC subscales for male respondents).

Intercorrelations between IRI subscale scores were noted to be similar for male and female respondents and highlighted low-moderate positive associations between EC and FS (males - *r* = .30, females – *r* = .31), EC and PT (males – *r* = .33, females – *r* = .30), FS and PT (males – *r* = .10, females – *r* = .12) and FS and PD (males – *r* = .16, females – *r* = .04) but low-moderate negative associations between PT and PD (males – *r* = -.16*,* females – *r* = -.29). Consequently, whilst the positive associations between subscales indicated that subscales were in fact measuring the same latent construct, the strength of these associations confirmed that each related to a different and distinct facet of empathy.

Outcomes were also concordant with research which suggested significant gender differences in empathy (Hoffman, 1977) as female participants achieved higher scores across all subscales than males (Table 18).

3.1.2.1 *Discriminant and Convergent Validity*

Further verification for the construct validity of the IRI was highlighted by Davis (1983b) in a follow-up study which employed a large mixed sample of university students (*n* = 677 male; *n* = 667 female), a proportion of whom completed the IRI along with a range of measures of interpersonal functioning, self-esteem, emotionality, sensitivity to others and intelligence[9] (minimum participation for all measures except the Weschler

[9] Validation measures included: Masculinity (M) and Femininity (F_{VA} - and Fc-) subscales from the Extended Personal Attributes Questionnaire (EPAQ; Spence, Helmreich, & Holahan, 1979); Shyness and Sociability Assessment (Cheek & Buss, 1981); Loneliness Assessment (Russell, Peplau, & Cutrona, 1980); Social Anxiety subscale of Self-Consciousness Scale (Fenigstein, Scheier, & Buss, 1975); Extraversion items from Self-Monitoring Scale (Snyder, 1974); Texas Social

Adult Intelligence Scale - *n* = 225 males and *n* = 204 females). Correlations between IRI sub-scale scores with each measure was then examined independently for males and females and crucially, IRI PT scores demonstrated a largely negative association with measures of social dysfunction (*r* = -.30 to .05*)* and self-oriented sensitivity to others (*r* = -.07 to -.30) but were positively associated with extraversion (*r* = .05 to .12) self-esteem (*r* = .20 to .26*)* and other-oriented sensitivity (*r* = .33 to .37)[10]. In contrast, PD scores demonstrated a largely positive association with social dysfunction (*r* = -.11 to .49) and self-oriented sensitivity towards others (*r* = .12 to .35) but were negatively associated with extraversion (*r* = -.30 for males and females), self-esteem (*r* = -.38 to -.45) and emotional invulnerability (*r* = -.41 to -.54). EC and FS scores demonstrated a weaker negative association with emotional invulnerability (*r* = -.19 to -.23 for EC and -.21 to -.22 for FS) and a modest positive association with fearfulness (*r* = .10 to .16 for EC and *r* = .15 to .18 for FS). Whilst both subscales demonstrated a largely positive association with measures of sensitivity to others (*r* = -.07 to .58), EC scores demonstrated a stronger positive association with other-directed sensitivity (*r* = .55 to .58) than with self-oriented sensitivity (*r* = -.07 to .21) whilst FS demonstrated similar positive relationships with both (*r* = .15 to .29 versus *r* = .14 to .25).

Behaviour Inventory (TSBI; Helmreich, Stapp, & Ervin, 1974); Self-Esteem Scale (Briggs, Cheek, & Buss, 1980); (M-F) and (F) subscales of Personality Attributes Questionnaire (PAQ; Spence , Helmreich, & Stapp, 1974); Fearlessness subscale from Emotionality, Activity, Sociability and Impulsivity Survey (EASI; Buss & Plomin, 1975); Public Self-Consciousness Scale (Fenigstein et al., 1975); Vocabulary Portion of Weschler Adult Intelligence Scale (WAIS; Wechsler, 1955); Scholastic Aptitude Test Scores – Quantitative and Verbal (aquired from University records)

[10] Correlations of .10 or higher significant beyond the .05 level for all variables except the WAIS. WAIS correlation co-efficients of .23 or higher significant beyond the .05 level

Whilst evidence for the relationship between Weschler Adult Intelligence Scale (vocabulary portion) scores (WAIS; Wechsler, 1955) and IRI sub-scale scores was based on only a quarter of this sample (*n* = 60 males; *n* = 54 females), scholastic aptitude test (SAT) data (quantitative and verbal) was acquired from the university files of the majority of participants (minimum *n* = 225 males; *n* = 204 females) and whilst results highlighted a small but significant positive association between SAT-quantitative and PT subscale scores (*r* = .13), along with small but significant negative associations between SAT-quantitative and EC subscale scores (*r* = -.10) and SAT-verbal and PD subscale scores for female participants, no further significant associations were identified between IRI PT, PD or EC subscale scores and SAT-quantitative, SAT-verbal or WAIS vocabulary measures. In contrast, significant positive associations were evident between SAT-verbal and FS subscale scores irrespective of gender, with the association more evident for males (*r* = .24) than females (*r* = .12). Whilst a small but insignificant positive association was also found between the WAIS vocabulary and FS subscale scores of male participants (*r* = .11), a significant positive association was identified between the WAIS vocabulary and IRI FS subscale scores of female participants (*r* = .28). Consequently, these findings indicated that those with higher levels of verbal intelligence/vocabulary are more likely to achieve higher scores on the FS sub-scale and that potential differences in verbal IQ should therefore be an important consideration in the interpretation of results from this subscale.

3.1.3 *Criterion Validity*

Criterion validity is determined when the outcomes of a measure accurately reflect the criterion upon which they are based and when the outcomes from a measure can predict the outcome of another measure. It is generally evaluated in terms of concurrent and predictive validity.

3.1.3.1 *Concurrent Validity*

Concurrent validity is established when the outcomes from a measure correlate with those of a previously established, valid and reliable tool that purports to assess the same construct.

Davis (1983b) examined correlations between IRI subscale scores and those of other cognitive and emotional empathy measures including Hogan's Empathy Scale (HES; Hogan, 1969) and the Questionnaire Measure of Emotional Empathy (QMEE; Mehrabian & Epstein, 1972). Results indicated that IRI PT subscale scores correlated more positively with scores from the HES (a measure of cognitive empathy) than the QMEE (a measure of affective empathy) (r = .40 vs r = .20) whilst EC, FS and PD scores were more highly correlated with those from the QMEE than the HES (r = .60, .52, .24 vs r = .18, .15, -.33), which suggests that the IRI subscales were effectively measuring both cognitive and emotional empathy components.

3.1.3.2. *Predictive Validity*

Predictive validity is informed by a measure's utility for predicting outcomes on a given criterion measure and is commonly assessed through regression or correlation coefficients. Davis (1983a) employed hierarchical multiple regression to examine the utility of IRI subscale scores as predictors of empathic emotions (sympathy and concern) and personal distress in a mixed undergraduate sample (n = 84 males; n = 74 females) following an emotive charity appeal.

The combination of EC and PT subscale scores (at step 2 of the regression analysis) contributed significantly to the prediction of empathic emotions (R^2 = .23 > R^2 = .17, p = < .01) and personal distress (R^2 = .16 > R^2 = .11, p = < .05)[11]. However, whilst EC demonstrated a significant positive association with empathic emotion and personal distress (p = <.01), PT alone was not significantly related to either (p = > .10). This finding suggests that individual differences in emotional but not cognitive empathy are influential to the experience of empathic emotions and personal distress. Supplementary analysis also suggested that FS and PD subscale scores demonstrated a significant association with empathic emotions (p = .05) but only a marginally significant association with personal distress and therefore had limited utility as predictors of other rather than self-oriented emotional responses with this population.

[11] Step 1 hierarchical regression predictors included baseline mood scores, instructional set and sex of subject

Whilst EC and PT subscale scores did not contribute significantly to the prediction of helping behaviour[12], significant two-way interactions between instructional set and PT/EC subscale scores revealed that PT scores contributed to the prediction of helping behaviour when participants were instructed to take another's perspective rather than just observe whereas EC scores contributed towards the prediction of helping behaviour when participants were instructed to observe only (Davis, 1983a).

3.2 *Reliability*

The reliability of a self-report measure is determined through its ability to produce consistent results and is evaluated in a number of different ways.

3.2.1 *Internal Consistency*

The internal consistency of a measure informs the degree to which items that are intended to assess the same construct reliably produce consistent scores and is generally evaluated through examination of Cronbach's co-efficient alpha which increases in line with the correlations between subscale items although may also vary as a function of test length (Cronbach, 1951). As a rule of thumb, an alpha co-efficient of $\geq$0.70 is considered to indicate an acceptable level of internal consistency (Kline, 2000; pg. 13). However, high alpha coefficients (> .90) are regarded as an indication of item redundancy because they are indicative of item

[12] Step 1 hierarchical regression predictors included instructional set and sex of subject

similarity. Alternatively, low alpha coefficients can indicate that a test is too short and that additional items need to be added. Alternatively, inter-item correlations (IICs) and corrected item total correlations (CITCs) with a value below the recommended cut off of $r = \leq .30$ (Nunnally & Bernstein, 1994) may be used as a means of identifying items that are not contributing to internal consistency and which should be omitted to improve the reliability of a measure.

Davis (1980) reported alpha coefficients that ranged between 0.70 – 0.78, which suggests that all subscales have acceptable levels of internal consistency (Table 29).

3.2.2 *Test-Retest Reliability*

Test-retest reliability is achieved when a measure produces similar results with the same participants under the same conditions and over a relatively brief time-lapsed testing period (Aldridge, Dovey, & Wade, 2017; Drost, 2011). It is particularly relevant for tests that measure dispositional traits because it informs the representativeness and stability of results and indicates that they are an accurate reflection of the phenomenon being assessed rather than attributable to irrelevant artefacts (i.e., methodological processes, environmental conditions). Correlation coefficients of $\geq .70$ are commonly regarded as an indication of acceptable test-retest reliability (Kline, 2000; pg. 15) and IRI FS, EC and PD subscale test-retest reliability coefficients ranged between .68 –

.81 which is considered acceptable to good whereas the test-retest reliability of the PT subscale fell below the recommended threshold and suggests that results for this subscale are less likely to be reliably replicated over time (Davis, 1980) (Table 29).

Table 29: IRI Mean Subscale Scores, Internal Consistency Coefficients and Test-Retest Reliability Correlation Coefficients (Davis, 1980)

SUBSCALE	Mean Subscale Scores (SD)		Internal Consistency (standardised alpha coefficients)		Test-Retest Reliability (60-75 day interval) correlation coefficients**	
	MALES* *N* = 579	FEMALES* *N* = 582	MALES* *N* = 579	FEMALES* *N* = 582	MALES* *N* = 56	FEMALES* *N* = 53
Fantasy	15.73 (5.60)	18.75 (5.17)	0.78	0.75	0.79	0.81
Perspective -Taking	16.78 (4.72)	17.96 (4.85)	0.75	0.78	0.61	0.62
Empathic Concern	19.04 (4.21)	21.67 (3.83)	0.72	0.70	0.72	0.70
Personal Distress	9.46 (4.55)	12.28 (5.01)	0.78	0.78	0.68	0.76

*mean ages not reported

3.3 *External Validity*

External validity is equally as important as internal validity but is evaluated after a measure's development and informed by the degree to which outcomes from a measure can be generalised to wider populations, settings and periods in time.

Since the IRI's development, a range of studies have found support for the validity and reliability of the IRI as a multidimensional measure of empathy with both adult and adolescent populations cross culturally (De

Corte et al., 2007; Fernandez et al., 2011; Hawk et al., 2013). Nonetheless, the FS subscale has been found to demonstrate poor convergent validity, leading some to argue that it is more a measure of imagination and emotional self-control than it is of empathy (Baron-Cohen & Wheelwright, 2004; Batchelder, Brosnan, & Ashwin, 2017). Similarly, some contend that the PD subscale conflates empathy with sympathy (Jolliffe & Farrington, 2004) and when Baldner and McGinley (2014) examined commonalities between outcomes from a range of self-report empathy measures completed by 497 undergraduate university students, they found no evidence of intercorrelations between the PD subscale and other empathy measures and concluded that PD should not be interpreted as a facet of empathy.

Whilst a range of findings have verified the four-factor structure of the IRI (Carey, Fox, & Spraggins, 1988; Chrysikou & Thompson, 2016; Gilet, Mella, Studer, Grühn, & Labouvie-Vief, 2013; Lucas-Molina, Perez-Albeniz, Ortuno-Sierra, & Fonseca-Pedrero, 2017) with either single or mixed gender populations from a range of nationalities, a number of cross cultural studies with undergraduate and adolescent populations have found evidence for an alternative, second order global empathy factor (Cliffordson, 2002; Fernández, Dufey, & Kramp, 2011; Hawk et al., 2013) or in the case of Pulos, Elison, and Lennon (2004), two hierarchical second-order orthogonal factors, including a general empathy factor onto

which PT, EC and FS loaded positively and an emotional control factor onto which PT was positively loaded and FS and PD negatively loaded.

When De Corte et al. (2007) examined the psychometric properties of a Dutch version of the IRI employed with a large community population of Belgian adults (*n* = 299 males and *n* = 352 females), findings suggested acceptable internal consistencies and goodness of fit indices for the four-factor structure but also highlighted that modifications to address semantic overlap between FS items led to improvements in model fit.

Added to this, research that examined IRI assessed empathy in methadone maintenance patients suggested an alternative 18-item three factor solution, including an empathy factor incorporating nine empathic concern/perspective taking items, a fantasy factor comprised of four fantasy items and a personal distress factor comprised of five personal distress items (Alterman, McDermott, Cacciola, & Rutherford, 2003).

Consequently, these studies highlight the importance of re-evaluating the psychometric properties of tests when they are applied with populations that differ from that for which the test was originally developed because the validity and reliability of a measure can vary across populations and contexts (Cooper, Gonthier, Barch, & Braver, 2017).

4.0 THE UTILITY AND PSYCHOMETRIC PROPERTIES OF THE IRI WITH VIOLENT OFFENDER POPULATIONS

The IRI has been widely employed as a research and assessment tool with offending populations (including those with ID) and is commonly utilised as a pre and post assessment measure in violent offender rehabilitation programmes. The rationale for this is that a substantial body of research suggests offending populations exhibit empathy deficits when compared to non-offending populations (Burke, 2001; Jolliffe & Farrington, 2004; van Langen, Wissink, van Vugt, Van der Stouwe, & Stams, 2014), that empathy may act as protective factor which inhibits violence and promotes prosocial behaviour (Chialant et al., 2016; de Vries Robbé, de Vogel, & de Spa, 2011; Miller & Eisenberg, 1988; Swick, 2005) and because empathy deficits are commonly associated with an increased risk of violence (Blair, 2005; Harris & Picchioni, 2013; Seidel et al., 2013).

Added to this, the IRI is advantageous for empathy research and assessments in forensic settings because it not only enables the simultaneous assessment of multiple components of empathy and an overview of how each of these may be related to behaviour but is a cost-effective and time-efficient method which is an important consideration when resources are limited and/or large numbers of assessments need to be completed.

4.1 Validity of the IRI with Violent Offenders

Whilst the IRI was not developed for use with offenders, some studies have found support for the criterion/predictive validity of the measure with this population as lower FS, PT and EC subscale scores have been found to differentiate between offending versus non-offending and violent offending versus non-violent offending populations (Edwards, 2005; Lauterbach & Hosser, 2007). Furthermore, when Rogstad (2011) examined the relationship between empathy and ASPD/psychopathy in a mixed sample of adult male and female offenders (*n* = 103), they found that PT and EC mean subscale scores were lower in those with ASPD than those without (PT - *M* = 14.43, *SD* = 5.46 versus *M* = 17.19, *SD* = 3.21; EC – *M* = 20.81, *SD* = 5.37 versus *M* = 22.80, *SD* = 3.92) and lower still in offenders with ASPD and co-morbid psychopathy (PT – *M* = 12.65, *SD* = 5.10; EC – *M* = 18.40, *SD* = 5.95), which is not only consistent with the inclusion of deficient empathy as an assessment criteria for psychopathy (Hare, 1991) and ASPD (APA, 2013) but also with research which suggests that deficient empathy increases the likelihood of antisocial behaviour and aggression (Marshall & Marshall, 2011).

However, Ireland (1999) reported higher mean IRI PD, PT and EC subscale scores for a mixed sample of 284 young and adult male/female offenders than were reported for the normative sample employed by Davis (1980) (Table 30). Furthermore, a range of studies have found that adult male offenders with ASPD and/or psychopathy have either

higher IRI assessed empathy than non-offending controls or have identified no significant differences between groups (Table 31).

Higher levels of Personal Distress in violent or aggressive offender populations is perhaps not surprising given that this subscale reflects a self-oriented empathic reaction and that higher scores are in fact indicative of empathic over-arousal which may be more evident in offenders who commonly exhibit ego-centrism and emotion dysregulation (Gillespie & Beech, 2018; Zlotnick, 1999). Moreover, some contend that psychopath's ability to selectively represent another's perspective in goal relevant situations could provide an adaptive function which enables them to achieve their own ends (Drayton et al., 2018). Nevertheless, it appears counter-intuitive for antisocial and violent offenders to have more empathic concern than non-offending controls given the callous disregard they display towards their victims. Consequently, some critics argue that the IRI is vulnerable to impression management and unsuitable for use with offending populations due to their proclivity for dissimulation (Curwen, 2003; Domes et al., 2013; Jolliffe & Farrington, 2004). Moreover, Robinson (2013) examined the ability of psychopathic offenders to 'fake good' and found that the IRI was more susceptible to dissimulation when employed with offenders higher in factor 1 (interpersonal/affective) psychopathy traits than other self-report empathy questionnaires.

Table 30: IRI Mean Subscale Scores of Male/Female Violent Offender Populations

Author	Mean Personal Distress Subscale Score (SD)				Mean Empathic Concern Subscale Score (SD)				Mean Fantasy Subscale Score (SD)				Mean Perspective Taking Subscale Score (SD)			
	Young Females	Adult Females	Young males	Adult Males	Young Females	Adult Females	Young males	Adult Males	Young Females	Adult Females	Young males	Adult Males	Young Females	Adult Females	Young males	Adult Males
Ireland (1999)	19.4 (4.6)	19.2 (4.7)	17.6 (5.4)	17.1 (10.6)	25.7 (4.1)	25.8 (4.1)	22.3 (4.2)	24.0 (4.1)	20.3 (5.3)	18.4 (4.7)	18.7 (6.3)	17.6 (5.1)	22.9 (4.7)	24.6 (3.9)	19.8 (6.3)	23.7 (4.6)
(Bevan et al., 2004)				10.14 (4.46)				12.83 (4.71)				9.28 (5.44)				12.99 (5.0)

Both studies employed the original 28-item version of the IRI
Ireland (1999) - population includes: *N* = 20 young female offenders (mean age = 18.7 yrs) + *N* = 74 young male offenders (mean age = 18.9 years), *N* = 50 adult female offenders (mean age = 34.2 years) + *N* = 140 adult male offenders (mean age = 33.2 years)
Bevan et al (2004) – population includes: *N* = 88 adult male offenders (mean age = 34 years)

Table 31: IRI Mean Subscale Scores of ASPD and/or Psychopathic Offender Groups and Controls[13]

Authors	Mean Perspective Taking Score (SD)		*P* = < *0.05*	Mean Fantasy Score (SD)		*P* = < *0.05*	Mean Empathic Concern Score (SD)		*P* = < *0.05*	Mean Personal Distress Score (SD)		*P* = < *0.05*
	Violent Offenders	**Controls**		**Violent Offenders**	**Controls**		**Violent Offenders**	**Controls**		**Violent Offenders**	**Controls**	
Dolan and Fullam (2004)[14]	16.87 (5.08)[a]	16.70 (3.29)	No	13.33 (5.07)[a]	13.35 (5.07)	No	17.98 (4.92)[a]	17.88 (2.89)	No	11.56 (5.12)[a]	9.35 (5.23)	No
	16.21 (6.43)[b]		No	14.25 (6.65)[b]		No	17.64 (6.06)[b]		No	10.82 (4.60)[b]		No
Domes et al. (2013)	17.40 (4.60)[c]	19.50 (3.40)	No	16.30 (5.20)[c]	14.60 (5.00)	No	20.20 (4.10)[c]	19.40 (4.40)	No	12.50 (3.80)[c]	11.90 (2.80)	No
	17.40 (4.30)[d]		No	14.70 (4.00)[d]		No	19.60 (3.50)[d]		No	12.30 (4.40)[d]		No
	18.70 (4.10)[e]		No	15.00 (4.20)[e]		No	19.70 (3.20)[e]		No	14.30 (4.60)[e]		No
Pfabigan et al. (2015)	14.56[f]	15.60	No	13.63[f]	12.07	No	14.44[f]	13.80	No	12.25[f]	8.00	Yes
	13.71[g]		No	12.29[g]		No	14.79[g]		No	10.14[g]		Yes
von Borries et al. (2012)	17.82 (1.12)[h]	19.13 (1.00)	No	13.18 (1.71)[h]	13.60 (0.81)	No	15.82 (1.28)[h]	17.33 (0.85)	No	9.94 (0.99)[h]	8.60 (0.89)	No

Dolan and Fullam (2004) – participants included: *n* = 20 adult male controls, *n* = 59 adult males prisoners/psychiatric patients with ASPD[a] (mean PCL-SV score = 14.16, SD = 2.37), *n* = 30 adult male prisoners/psychiatric patients with ASPD + co-morbid psychopathy[b] (mean PCL-SV score = 19.23, SD = 1.06); **Domes et al. (2013) -** participants included: *n* = 28 adult male controls, *n* = 29 adult male offenders with PCL-R score <15[c], *n* = 33 adult male offenders with PCL-R score 15-21[d], *n* = 28 adult male offenders with PCL-R score > 21[e]; **Pfabigan et al. (2015**) – participants included: *n* = 15 adult male controls, *n* = 16 adult male offenders with low psychopathic traits (mean PCL-R score = 16.31, SD = 5.55)[f], *n* = 14 adult male offenders with high psychopathic traits (mean PCL-R score 27.43, SD = 3.55)[g], standard deviations not reported; **von Borries et al. (2012)** - participants included: *n* = 15 adult male controls, *n* = 17 adult male offenders with psychopathy (PCL-R score >26)[h].

[13] All studies employed adult male offenders who met criteria for ASPD and/or psychopathy + non-offending controls, employed PCL-R or PCL-SV psychopathy assessments and/or DSM IV/V diagnostic criteria for recruitment of ASPD populations

[14] Study excluded from systematic review (chapter one) due to sample overlap

Whilst research with a group of adult and adolescent male offenders (*n* = 839; age range 15-28 years; 48% convicted for violent offences) found that PT was a significant contributor to the prediction of violent recidivism in the 24-month period following release and concluded that a one standard deviation increase in PT score reduced the probability of committing a violent crime by 5 percentage points (Lauterbach & Hosser, 2007), this finding was not substantiated in a later study with young offenders (*n* = 748) aged between 15-28 (Bock & Hosser, 2014). However, the authors did find that PT and FS were both significant predictors of recidivism within a five-year period following release.

Evidence for the convergent validity of the IRI with offending populations has been similarly mixed as when Bevan et al. (2004) explored the psychometric properties of the measure with a population of *n* = 88 violent adult male offenders aged 21-64, PT was positively associated with socialisation ($r = .40$, $p = <.05$) and negatively associated with impulsivity ($r = -.41$, $p = <.05$). PT and EC were both positively associated with positive attitudes towards the criminal justice system ($r = .53$, $p = <.01$; $r = .59$, $p = <.01$) but inversely related to tolerance for law violations ($r = -.53$, $p = <.01$; $r = -.49$, $p = <.05$) and identification with criminal others ($r = -.59$, $p = <.01$; $r = -.50$, $p = <.01$)[15]. However,

[15] Validation measures included: Law, Courts, Police, Tolerance for Law Violations and Identification with Criminal Others subscales of Criminal Sentiments Scale (CSS; Andrews & Wormith, 1984); Socialisation and Impulsivity subscales of Karolinska Scales of Personality (KSP; Schalling & Edman, 1987)

the authors reported no evidence of an association between PD and FS subscales and other measures.

In contrast, Lauterbach and Hosser (2007) found that all IRI subscales demonstrated appropriate relationships with other measures[16] as EC, PT and FS were negatively associated with aggression (r = -.33, p = <.001; r = -.25, p = <.001; r = -.10, p = <.01), PD and FS were both positively associated with loneliness (r = .20, p = <.001; r = .14, p = <.001) and PD was negatively associated with self-esteem (r = .29, p = <.001) and self-efficacy (r = -.17, p = <.001).

Nevertheless, when the same studies examined the construct validity of the IRI using Principal Components Analysis (PCA) and varimax rotation (Bevan et al., 2004; Lauterbach & Hosser, 2007), neither attested to the four-component structure proposed by Davis (1980) and whilst the findings of Bevan et al. (2004) were based on a population that was relatively small for PCA analysis and may therefore have been more subject to inference error (Osborne & Costello, 2004), both studies found that negatively worded (reverse scored) items loaded (largely) onto a single factor and were not aligned with a specific construct. When Lauterbach and Hosser (2007) subsequently omitted these items (along

[16] Validation measures included: Subscale from Multidimensional Personality Questionnaire (Tellegen, 1982), 10-item German translated version of Rosenberg Self-Esteem Scale (Ferring & Filipp, 1996), 10-item Generalized Self-Efficacy Scale (Jerusalem & Schwarzer, 1986) and 12 items from UCLA Loneliness Scale (Russell et al., 1980)

with reverse scored items that had item-total correlations < .30), they were able to replicate the four-component structure with minimal component overlap (between FS item 1 and PD items).

4.2 *Reliability of the IRI with Violent Offenders*

Whilst evidence from studies with violent offender groups suggests that none of the subscales is consistently reliable, the PD subscale has been found to demonstrate particularly poor internal consistencies (Bevan et al., 2004; Ireland, 1999), thereby substantiating the view that this subscale may measure a construct that is distinct from empathy (Jolliffe & Farrington, 2004).

However, Bevan et al. (2004) found that negatively worded items from all subscales had CITC values below the recommended cut-off (r = >.30), noted unacceptably low reliability for PD but highlighted that the internal consistency of PT and EC was also inadequate. Based on these findings, they highlighted that limited insight along with verbal/literacy skills deficits could impact negatively upon the reliability indices of IRI subscales when employed with offender populations and that adaptations should be made to improve the IRI's readability. Rogstad (2011) similarly found that PT demonstrated poor reliability (α = 0.40) until the removal of one item[17], after which the subscale's internal consistency was noted to improve to an acceptable level (α = 0.74).

[17]Alpha coefficient reported for PT subscale following removal of item '*I sometimes try to understand my friends better by imagining how things look from their perspective'*

Ireland (1999) noted low internal consistencies for FS, EC and PD subscales (α = .64, .52 and .43 respectively) and found only a marginal improvement in the reliability of EC and PD subscales following the removal of two items with negative item total correlations[18], (α = .60). However, the author did not identify which of the remaining items met the recommended item-total correlation threshold ($r = \geq .30$) and it is therefore difficult to determine whether readability (of negatively worded items) was a factor in the low internal consistencies observed.

Lauterbach and Hosser (2007) verified the reliability of PT and EC subscales (α = .77 and α = .77) but found poor internal consistencies for FS and PD (α = .66 and α = .63) and so removed negatively worded items, after which internal consistencies for FS and EC were noted to improve (FS - α = .74 > α = .66; EC - α = .81 > α = .77). When they subsequently examined the reliability of subscales for high/low verbal skills and IQ groups, they found that the internal consistency for FS was significantly lower in those with fewer verbal skills and that the internal consistency for EC was significantly lower in those with lower IQ.

Although negatively worded items have traditionally been included in questionnaires as a means of maximising the accuracy of response

[18] Revised alpha co-efficient for PD subscale following removal of item no. 6, '*In emergency situations I feel apprehensive and ill at ease'*; Revised alpha co-efficient for EC subscale following removal of item no. 14, '*Other people's misfortunes do not usually disturb me a great deal'*

patterns, some evidence suggests they have an adverse effect on factor structure and internal consistencies because they commonly incur responses that are inconsistent with those given for positively worded items due to difficulties with readability and interpretation (van Sonderen, Sanderman, & Coyne, 2013; Zhang, Noor, & Savalei, 2016). Notably, this effect is more prevalent among adults with lower levels of education and cognitive ability and therefore, in view of research which suggests an inverse association between cognitive ability and violent criminality as well as disproportionately poor literacy skills within prison populations (Creese, 2016; Frisell, Pawitan, & Långström, 2012), the construct validity and reliability of the IRI is more likely to be compromised when employed with forensic populations. Consequently, this review concludes that the IRI is unsuitable as a measure of empathy with forensic populations in its current form and that further research to inform the validity and reliability of an adapted version of the IRI or alternative self-report empathy assessments for use in forensic contexts is required.

5.0 ALTERNATIVE SELF-REPORT EMPATHY ASSESSMENTS

Since the development of the IRI, a range of self-report measures have been designed to specifically address the limitations outlined and improve upon the validity and reliability of empathy assessments.

The Brief Interpersonal Reactivity Index (B-IRI; Ingoglia, Lo Coco, & Albiero, 2016) for instance consists of 16 items which are rated across a

5-point Likert scale (1 = does not describe me at all - 5 = describes me very well) and divided equally between four subscales that measure either affective empathy (Personal Distress, Empathic Concern) or cognitive empathy (Perspective Taking, Fantasy). It was developed with the specific aim of improving the readability of the original measure and contains no negatively worded items. Nevertheless, trials with an Italian community population of young adults and adolescents highlighted inadequate reliabilities for EC and PT subscales and measurement indices which the authors concluded would need to be addressed through further research.

The Basic Empathy Scale (BES; Jolliffe & Farrington, 2006) consists of 20 items rated along a 5-point Likert scale (strongly disagree - strongly agree) and divided across affective (*n* = 9 items) and cognitive empathy subscales (*n* = 11 items). It was developed with a diverse population of adolescents because the authors wanted it to be more accessible than the IRI, generalisable to offender populations and less vulnerable to impression management. Initial trials confirmed the validity and reliability of the BES as a measure of empathy for adolescents and indicated that it was less subject to social desirability than the IRI (Jolliffe & Farrington, 2006). Moreover, whilst the BES is less commonly employed with adults and has not been fully validated with adult offenders, Rogstad (2011) found that BES total, cognitive empathy and affective empathy scales demonstrated acceptable to excellent internal

consistencies when employed with a mixed-sex sample of adult offenders with psychopathy and/or ASPD.

The Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011) consists of 31 items which are rated across a 4-point Likert scale (1=strongly disagree - 4=strongly disagree) and divided across 5 subscales which measure either affective empathy (i.e. Proximal responsivity, Peripheral Responsivity and Emotion Contagion) or cognitive empathy (Perspective Taking, Online Simulation). It was developed to provide a more precise working definition of empathy than that provided by Davis (1980) and to improve upon the construct validity of existing empathy measures, including the IRI. Designed to assess '*the ability to construct a working model of the emotional states of others'* (cognitive empathy) and '*the ability to be sensitive to and vicariously experience the emotions of others'* (affective empathy), the QCAE was trialled online with adult university students/employees and found to have sound psychometric properties, which have since been substantiated by a range of studies with adult populations cross culturally (Di Girolamo, Giromini, Winters, Serie, & de Ruiter, 2017; Lockwood, Seara-Cardoso, & Viding, 2014; Queirós et al., 2018). However, the psychometric properties of the QCAE when employed with violent offenders have yet to be examined.

The Empathy Quotient (EQ; Baron-Cohen, & Wheelwright, 2004) consists of 60-items, each of which is rated along a 4-point Likert scale (1=strongly disagree - 4 = strongly agree). In contrast to the aforementioned assessments, it is measure of global empathy that does not distinguish between cognitive and affective empathy dimensions but could nevertheless provide a useful alternative empathy measure for research with violent offenders as it was developed and trialled on mixed community control groups and populations with high functioning autism [HFA] or Asperger Syndrome, who are commonly characterised by empathy deficits (Jones et al., 2010; Shah, Livingston, Callan, & Player, 2019). It has also since proved to be a valid and reliable tool for the assessment of empathy in both general and clinical populations cross-culturally (Berthoz, Wessa, Kedia, Wicker, & Grèzes, 2008; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). Whilst the EQ has not been fully validated with offender populations, it was found to demonstrate high internal consistency (a = .81) when employed with a male offender population and to distinguish between violent and non-violent offenders as highlighted by research which employed the EQ to examine experiences of empathy in violent and non-violent young male offenders (age range 18-21 years) and found that violent offenders were significantly less empathic than their non-violent counterparts (Owen, & Fox, 2011).

Equally, the Toronto Empathy Questionnaire (TEQ; Spreng, McKinnon, Mar, & Levine, 2009) may be advantageous as a tool for research with forensic populations because although it was designed as a unidimensional measure that could capture commonalities between the different conceptualisations of empathy employed by earlier self-report assessments such as the IRI (Davis, 1980; 1983), QMEE (Mehrabian & Epstein, 1972) and HES (Hogan, 1969) the authors aimed to devise an assessment that would complement rather than replace existing multi-factorial approaches. Similar to the B-IRI (Ingoglia et al., 2016), it is a relatively brief assessment as it consists of just 16 items, each of which is rated along a 5-point Likert scale (1=never - 5 = always). Moreover, whilst it was based on an EFA of male/female undergraduate responses to items taken from existing assessments of empathy, dysexecutive syndrome and emotion comprehension along with research on empathic dysfunction, initial validation studies (Spreng et al., 2009) concluded that the TEQ was a psychometrically sound assessment tool that had strong convergent validity with pre-existing measures, including the IRI (Davis, 1980; 1983). Added to this, research which examined the relationship between empathy and psychopathy in a mixed adult community population (n = 461, inc. 300 females) found a negative correlation (r = -.40) between TEQ total and Self Report Psychopathy Scale III (SRP-III; Paulhus, Neumann, & Hare, 2011) scores and reported significantly lower empathy scores in those with higher versus lower levels of self-reported psychopathy (Luckhurst, 2014). Still, in a similar vein to other

assessments described, this tool has yet to be validated with forensic populations.

5.1 *Recommended Alternative Assessment*

In view of the fact that the IRI was developed with a community graduate population and found to cause particular difficulties when employed with violent offender populations due to negative wording and its vulnerability to dissimulation, the BES (Jolliffe & Farrington, 2006) would currently appear to offer the most promising existing alternative for use in research with violent offender/forensic populations based on the fact that it is multidimensional, was developed with a younger population reading and comprehension age in mind, is less subject impression management, relatively short (and therefore less likely to cause respondent fatigue) and demonstrated excellent internal consistencies when employed with ASPD/psychopathic populations (Rogstad, 2011). However, full validation of this measure with adult offender populations is nevertheless required before conclusions can be drawn about its suitability for use with this population.

6.0. IMPLICATIONS FOR PRACTICE

Whilst the IRI is advantageous as a method of empathy assessment within forensic settings because it is straightforward to use, enables the multi-dimensional assessment of empathy and can inform the relationship between multiple facets of empathy and behaviour, it is essential that

self-report measures are both valid and reliable because inaccurate inferences about the relationship between empathy and antisocial or violent behaviour could have deleterious consequences for risk management and intervention strategies. Consequently, in view of the limitations outlined and evidence which suggests that the IRI is neither valid or reliable when it is employed with violent offenders, the IRI should not be employed with this population in its current form.

Equally, although a range of alternative multi-dimensional assessment measures have been designed to overcome the limitations of the IRI, the psychometric properties of these tools when employed with violent offender groups have not been fully explored and further research is required to determine their suitability for use with this population.

Still, whilst the readability of assessments can be improved through the removal of negatively worded or ambiguous/complex items and dissimulation monitored through the addition of items designed to specifically identify response bias, the subjectivity of self-report measures means that they are reliant on the ability to self-evaluate and as offender populations commonly exhibit a lack of insight, outcomes from self-report measures should be objectively corroborated (i.e., through observer assessments) when they are employed with offenders and utilised to inform risk.

7.0 CONCLUSION

The aim of this critique was to outline the development and psychometric properties of the IRI and to evaluate its utility, validity and reliability as a research and assessment tool with general community and violent offender populations.

Although the IRI is currently the most popular self-report method for evaluating cognitive and affective empathy and has been validated by a range of studies with community populations, there is mixed evidence regarding the construct validity of the measure when employed with community groups and PD and FS subscales in particular have demonstrated unacceptable levels of reliability and external validity, leading some to challenge their relevance to empathy.

However, research with violent offenders suggests that the IRI demonstrates inadequate psychometric properties when employed with this population, has highlighted difficulties with the readability of subscale items and suggests that verbal skills/literacy deficits, a lack of insight and dissimulation are more likely to compromise the validity and reliability of outcomes when the IRI is employed with violent offenders and lead to inaccurate inferences about the relationship between empathy and antisocial or violent behaviour.

Consequently, in accordance with guidelines on good practice for psychological testing (British Psychological Society, 2017 ;pg. 22) which highlight that factors including special needs, educational background and ability are appropriately addressed when using and interpreting psychological tests, the IRI should not be employed as a measure of empathy with violent offender populations and further research to determine the suitability of an adapted version or alternative self-report empathy measures for use with violent offenders is required.

CHAPTER SIX

GENERAL DISCUSSION AND THESIS CONCLUSION

1.0 THESIS AIMS

The aims of this thesis were to provide a more comprehensive understanding of the relationship between emotional dysfunction, antisocial behaviour and violence in ASPD/DPD populations and delineate the nature of emotional, empathic and moral processing deficits that exist in adult male ASPD/DPD groups with and without co-morbid psychopathy (ASPD+/-P or combined ASPD), with ASPD/DPD only (ASPD-P) and with ASPD and co-morbid psychopathy (ASPD+P) when compared to non-personality disordered controls, to explore the relationship between emotion, empathic and moral processing in these populations and to examine the validity and reliability of a self-report empathy measure when employed with violent offender populations. The rationale for this topic was based upon the need to provide greater clarity regarding the extent to which these groups may be distinguished by emotional, empathic and moral processing deficits, to inform the precise nature of emotional dysfunction in these groups, to extend current knowledge (outlined in chapter one) regarding the extent to which emotional, empathic and moral processing deficits may contribute as a risk factor for antisocial behaviour and violence and to increase awareness of the limitations of measures employed to examine empathy in these populations.

To address these issues, this thesis incorporated a systematic review of extant literature which examined what evidence exists regarding the

nature of emotion processing and empathy deficits in ASPD+/-P, ASPD-P and ASPD+P populations (chapter 2), cross-sectional research to examine and compare emotional, empathic and moral processing in adult male ASPD groups (combined ASPD, ASPD-P, ASPD+P) and non-personality disordered adult male controls (Chapters 3-4) along with a critical evaluation of the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983b) (Chapter 5). The aims for each chapter were pre-specified and are outlined in the summary of results that follows.

2.0 SUMMARY OF FINDINGS

2.1 *Chapter Two*

Systematic reviews involve the collation, critical assessment and evaluation of empirical research that has reported findings relevant to a pre-defined research question. They are advantageous because they follow a fixed and transparent process which ensures that they are replicable and free from bias. Whilst commonly employed to synthesise the findings of randomised controlled trials which have examined whether populations differ as a consequence of a particular treatment or intervention, systematic reviews are equally useful in the evaluation of cross-sectional research employed to examine whether a particular phenomenon (i.e., empathy/emotional dysfunction) is present in pre-specified populations at a given point in time.

The aims for chapter 2 were therefore to employ a systematic approach that would enable a rigorous and robust synthesis of findings from studies which have examined emotion processing or empathy in ASPD-P, ASPD+P or ASPD+/-P groups and healthy controls, to determine the nature of emotion and empathic processing deficits evident in each group and clarify whether emotional deficits differentiate those with ASPD-P from those with ASPD+P. This was considered to be an important topic because there is currently a lack of consensus regarding the distinction between psychopathy and ASPD and ambiguity regarding the extent to which these disorders may be differentiated in terms of emotional dysfunction. However, as emotion processing and empathy deficits are commonly associated with an increased risk of violence, ascertaining the nature of deficits that exist in these groups could have important implications in terms of risk management and the effectiveness of interventions implemented to reduce the risk of violence.

A total of 22 cross-sectional studies were reviewed and assessed in terms of their methodological rigour and quality and whilst variation in the methodological quality of reviewed studies was evident, a key finding was that all studies were subject to either potential or high risk of sampling bias. None of the studies reported having conducted a power analysis to determine sample size and a large proportion of findings were based upon relatively small ASPD groups recruited from either prison or psychiatric populations. Whilst it is acknowledged that the recruitment of ASPD

populations for research is particularly challenging and that convenience samples enable the collection of data that might otherwise be difficult to access, findings based purely on offending ASPD populations may not generalise to the wider ASPD community. Added to this, potential confounders were inconsistently addressed and commonly overlooked in terms of their potential contribution to between group differences.

Still, the synthesis of evidence from these studies incorporated careful consideration of extraneous factors which could contribute to emotion processing or empathy deficits in ASPD populations and thus confound results. For instance, in view of evidence that approximately 10% of those diagnosed with ASPD would also meet the criteria for co-morbid psychopathy (Coid et al., 2009; Motz et al., 2015), ASPD groups were not assumed to be non-psychopathic unless they had been assessed for and did not meet the criteria for co-morbid psychopathy. If studies did not specify the implementation of psychopathy assessments, ASPD groups were classified as ASPD+/-P and ASPD groups who were assessed and did meet the criteria for co-morbid psychopathy were classified as ASPD+P.

Whilst the review found no evidence of significant group differences in empathic processing, nineteen studies identified emotion processing deficits in ASPD. Surprisingly however, results were not consistent with those of a meta-analysis which suggested that antisocial populations have a specific deficit in fear recognition (Marsh & Blair, 2008). Moreover,

whilst there was some evidence to support the notion that ASPD+P groups could be differentiated from ASPD-P groups in terms of emotional deficits, only two studies directly compared the results of both ASPD-P and ASPD+P groups against those of controls and one of these found evidence of reduced startle reactivity in both populations.

The second study examined lexical decision making and found no evidence of impaired recognition accuracy for emotion words in offenders with ASPD-P or ASPD+P but noted a speed-accuracy trade-off for negatively valenced words specific to offenders with ASPD+P (Vitale et al., 2018). Consequently, whilst co-morbid psychopathy appeared to mediate increased difficulty in processing negative affective stimuli, with sufficient time, ASPD+P offenders were able to accurately recognise negatively valenced words.

The main limitation of this systematic review was that it was unable to conclusively delineate the extent and nature of emotion deficits specific to ASPD-P and ASPD+P groups because the majority of reviewed studies employed ASPD+/-P groups and did not extrapolate results for ASPD-P and ASPD+P participants. However, findings did identify the need for improvements to the quality of research with ASPD populations and for more effective discrimination between ASPD-P and ASPD+P populations. They also identified a range of factors that could act to mediate emotion processing deficits in ASPD populations (i.e., alexithymia, ADHD) and

which should therefore be considered as potential confounders in future research and in clinical practice. Crucially however, they highlighted that further research to examine and compare emotion processing and empathy in ASPD-P and ASPD+P populations would be beneficial in not only determining the extent to which these populations are differentiated by emotion deficits but in informing the relevance of emotion deficits as a contributory mechanism for the antisocial behaviour and violence that is characteristic to these populations.

2.2 *Chapter Three*

Chapter three aimed to build upon the results of chapter 2 and to expand upon and further inform extant literature through the provision of empirical evidence related to emotion processing and empathy in ASPD populations. The rationale for this research was to determine whether an adult male combined ASPD patient group would exhibit emotion processing and empathy deficits when compared to non-personality disordered adult male controls and whether ASPD+P patients would exhibit emotion and empathic processing deficits that were not apparent in ASPD-P patients. Thus, an empirical research study was conducted utilising a multi-modal approach that incorporated a battery of tests of facial emotion recognition, empathy and alexithymia which were completed by 37 psychiatric patients with ASPD (n = 15 ASPD-P and n = 22 ASPD+P) and 19 non-personality disordered controls. As previous research has failed to distinguish and delineate ASPD groups with and

without co-morbid psychopathy, between groups analysis was utilised to examine whether combined ASPD, ASPD-P and ASPD+P groups exhibited deficits in facial emotion recognition and empathy along with higher levels of alexithymia when compared to controls and to determine whether ASPD+P patients would exhibit more emotion and empathic processing deficits when compared to ASPD-P patients. A summary of the study hypotheses and outcomes is outlined below (also see Appendix 22).

Table 32: Hypotheses and Outcomes – Chapter Three

Hypothesis 1	**Patients with ASPD will exhibit emotion processing deficits as assessed by their accuracy and speed of emotion recognition when compared to controls**
Outcome	Null hypothesis accepted • The odds of the combined ASPD achieving 100% fear recognition accuracy were significantly lower than those of the control group but there was no significant group difference once a binary logistic regression was employed to account for group differences in age • A three group comparison indicated that the odds of ASPD+P patients achieving 100% fear recognition accuracy were significantly lower than those of the control group but no significant overall between group effect was evident for fear recognition accuracy • There was no significant difference in the 100% recognition accuracy of the combined ASPD and control group for sad, happy or angry emotions • A three group comparison indicated no significant between group differences in recognition accuracy for sad, happy or angry emotions • The combined ASPD group appeared significantly less accurate in their total emotion recognition accuracy than the control group. but there was no significant group difference evident after controlling for group differences in age and educational status. • A three group comparison indicated no significant between group differences in total emotion recognition accuracy • The combined ASPD group appeared significantly slower when identifying happy emotions than the control group but there were no significant group differences evident following adjustments to account for group differences in educational status • A three group comparison indicated ASPD+P and ASPD-P patients were significantly slower than controls when identifying happy emotions but there were no group differences in happy recognition latencies following adjustments to account for group differences in educational status • The combined ASPD group appeared significantly slower when identifying fear emotions than the control group but there were no significant group differences evident following adjustments to account for group differences in antipsychotic use • A three group comparison indicated that the ASPD-P group were significantly slower than the control group when identifying fear emotions but the overall between group effect was not significant. • There was no significant difference in the recognition latency of the combined ASPD and control group for sad or angry emotions • A three group comparison indicated no significant between group difference in recognition latency for sad or angry emotions

Table 32: Hypotheses and Outcomes – Chapter Three (Cont'd)

Hypothesis 2	**Patients with ASPD will demonstrate significantly less cognitive and affective empathy than controls as assessed by both self-report and behavioural measures**
Outcome	Partially met - null hypothesis rejected *Cognitive Empathy* • The combined ASPD group had significantly lower IRI perspective taking scores than the control group but there were no significant between group effects evident after controlling for group differences in educational status. • **A three group comparison indicated ASPD+P patients had significantly lower mean IRI perspective taking scores than controls** • The combined ASPD group had significantly lower QCAE online simulation scores than the control group but there were no significant between group effects evident after controlling for group differences in age and educational status • A three group comparison indicated ASPD+P patients had significantly lower QCAE online simulations scores than the control group but there was no significant group effect evident once group differences in age and educational status were accounted for • The combined ASPD group had significantly lower QCAE perspective taking scores than the control group but there were no significant between group effects evident after controlling for group differences in age and educational status • A three group comparison indicated that ASPD+P and ASDP-P patients had significantly lower QCAE perspective taking scores than controls but there were no significant group differences evident following adjustments to account for group differences in education *Affective Empathy* • The combined ASPD group had significantly lower IRI empathic concern scores than the control group but there were no significant between group effects evident after controlling for group differences in educational status • A three group comparison indicated that ASPD+P patients had significantly lower IRI empathic concern scores than controls but there were no significant group effects evident after controlling for group differences in educational status • There was no significant difference evident in the QCAE peripheral responsivity or emotion contagion scores of the combined ASPD and control group • A three group comparison indicated no significant between group effects for the QCAE peripheral responsivity or emotion contagion subscales

Table 32: Hypotheses and Outcomes – Chapter Three (Cont'd)

Hypothesis 2 (Cont'd)	**ASPD patients will demonstrate significantly less cognitive and affective empathy than controls as assessed by both self-report and behavioural measures**
Outcome	*Affective Empathy*. • The combined ASPD group had significantly lower QCAE proximal responsivity scores than the control group but there were no significant between group effects evident after controlling for group differences in educational status • A three group comparison indicated that ASPD+P patients had significantly lower QCAE proximal responsivity scores than the control group but there were no significant group effects evident after controlling for group differences in educational status • There were no significant group differences evident in the empathy eliciting short stories task/empathy eliciting image task affect ratings of combined ASPD patients and controls • A three group comparison indicated no significant between group differences in empathy eliciting short stories or image task ratings
Hypothesis 3	**Patients with ASPD will have significantly higher levels of alexithymia than controls**
Outcome	Partially met – null hypothesis rejected • **The combined ASPD group had significantly higher TAS-20 'difficulty describing feelings' scores than the control group irrespective of adjustments to control for group differences in age and educational status** • **A three group comparison indicated that ASPD-P and ASPD+P patients had significantly higher TAS-20 'difficulty describing feelings' scores than the control group. However, there was no significant difference between the ASPD-P and control groups following adjustments to control for group differences in age and educational status** • The combined ASPD group had significantly higher TAS-20 'difficulty identifying feelings' scores than the control group but there were no significant between group effects evident after controlling for group differences in age and educational status • A three group comparison indicated ASPD+P patients had significantly higher TAS-20 'difficulty identifying feelings' scores then controls but this difference was not evident following adjustments to control for group differences in age and educational status • There was no significant difference in the TAS-20 'difficulty describing feelings' scores of ASPD+P and ASPD-P patients

Table 32: Hypotheses and Outcomes – Chapter Three (Cont'd)

Hypothesis 4	**ASPD+P patients will demonstrate significantly less cognitive and affective empathy and significantly higher levels of alexithymia than ASPD-P patients**
Outcome	Partially met - null hypothesis rejected *Cognitive Empathy* • **A three group comparison indicated that ASPD+P patients had significantly lower mean IRI perspective taking scores than ASPD-P patients** • **A three group comparison indicated ASPD+P patients had significantly lower mean QCAE online simulation scores than ASPD-P patients** • A three group comparison indicated no significant difference in the QCAE perspective taking scores of ASPD+P and ASPD-P patients *Affective Empathy* • A three group comparison indicated no significant difference in the IRI empathic concern scores of ASPD-P and ASPD+P groups • **A three group comparison indicated that ASPD+P patients had significantly lower mean QCAE proximal responsivity scores than ASPD-P patients** • **A three group comparison indicated that ASPD+P patients had significantly lower mean QCAE peripheral responsivity scores than ASPD-P patients** • A three group comparison indicated no significant difference in the QCAE emotion contagion scores of ASPD-P and ASPD+P groups *Alexithymia* • A three group comparison indicated no significant difference in the TAS-20 'Difficulty describing feelings' scores of ASPD+P and ASPD-P patient groups • A three group comparison indicated no significant difference in the TAS-20 'difficulty identifying feelings' scores of ASPD+P and ASPD-P patient groups

Consistent with chapter two, results did not support the findings from a meta-analysis which highlighted fear recognition deficits in antisocial populations (Marsh & Blair, 2008). Moreover, there was no evidence of significant between group differences in recognition accuracy or latency

for any emotion after controlling for group differences in age/education and medication use. However, whilst an analysis comparing the combined ASPD and control group highlighted no significant group differences in empathic processing after adjusting for the presence of confounding variables, analysis which delineated ASPD-P and ASPD+P groups suggested that ASPD+P patients exhibited deficits in cognitive empathy (perspective taking) that were not apparent in ASPD-P patients.

Whilst this outcome may have been attributable to the fact that ASPD-P and ASPD+P groups were better matched in terms of their educational status, meaning there was less variability in scores after controlling for confounders and perspective taking deficits were not consistently evidenced across measures, combined ASPD and ASPD+P groups reported significantly higher levels of 'difficulty describing feelings' alexithymia traits than non-personality disordered controls and these group effects remained significant when data analysis was adjusted to account for age and/or educational status.

ASPD+P patients also demonstrated significantly lower levels of both cognitive and affective empathy than ASPD-P patients but there were no significant group differences between ASPD-P patients and non-personality disordered controls for any of the empathy measures employed following adjustments for age and/or education. Consequently, findings indicated that ASPD+P patients could be differentiated from

ASPD-P patients in terms of empathic dysfunction, that co-morbid psychopathy mediates cognitive empathy deficits in ASPD and that cognitive empathy deficits are more relevant as a contributory mechanism for antisocial behaviour and violence in ASPD populations with co-morbid psychopathy than they are in those without.

2.2.1 *Strengths and Weaknesses*

A notable strength of this study was that patient groups were similar in terms of verbal IQ, age, educational and medication status. Consequently, the possibility that differences between patient groups were attributable to the influence of confounders was minimised. Furthermore, whilst significant differences in age, educational and medication status were observed between patient and control groups, these differences were controlled for during data analysis to minimise the likelihood of a type I error. A limitation of this study was the size of the study population, which was smaller than anticipated due to difficulties with patient and control recruitment and did not satisfy the numbers recommended for a three group analysis through a-priori power analysis. As small samples can reduce power and increase the likelihood of type II error, the possibility that the study was insufficiently powerful to detect small-moderate effects cannot be discounted and should be considered in the interpretation of results. An additional limitation was that some of those in the ASPD-P group scored above the threshold for non-

psychopaths (i.e. PCL-R score ≥ 20) and whilst none scored above the European cut-off criteria for co-morbid psychopathy (i.e., PCL-R scores ≥ 25), this could nevertheless have obscured the true extent of between group effects. Likewise, the possibility that undetected psychopathic traits may have been influential to the results of the control population could not be discounted because control participants were not assessed for co-morbid psychopathy. Crucially, the fact that the study sample were relatively unique and consisted purely of adult male ASPD groups recruited from secure psychiatric facilities also prevents the generalisability of results to wider community and female ASPD groups and means that further research is required to examine the reliability of these results with these populations.

2.3 *Chapter Four*

As a range of studies suggest that emotion and empathic processing is influential to moral processing (Gleichgerrcht & Young, 2013; Hoffman, 2000), the focus for chapter four turned to moral processing and outlined empirical research which employed behavioural measures to examine moral emotions and decision making in the same study populations. The aims of this study were to determine whether ASPD groups (combined ASPD, ASPD+P and ASPD-P) would demonstrate fewer self-conscious moral emotions and more other anger than the control group and whether ASPD+P patients would demonstrate fewer moral emotions than ASPD-P patients. It also aimed to explore whether a combined ASPD group would

be more willing to endorse utilitarian solutions for sacrificial moral dilemmas involving direct (personal) harm and rate decisions relating to moral dilemmas as significantly easier to make than a control group. Equally, whether ASPD+P patients specifically would endorse more utilitarian solutions when presented with personal moral dilemmas and rate decisions relating to moral dilemmas as significantly easier to make than controls and ASPD-P patients. Decision response latencies were also recorded and analysed in order to corroborate self-reported difficulty ratings and to provide an indication of the degree to which complex moral reasoning had been employed in decision making. A summary of the study hypotheses and outcomes is outlined below (also see Appendix 24).

Table 33: Hypotheses and Outcomes – Chapter Four

Hypothesis 1	**Patients with ASPD will self-report significantly lower mean ratings for moral emotions of guilt, compassion and self-anger when compared to controls**
Outcome	Null hypothesis accepted • The combined ASPD group self-reported significantly lower mean ratings for moral emotions of guilt and compassion than the control group, irrespective of adjustments to control for group differences in education**.** However, there were no significant group differences evident following adjustments to account for group differences in both education and/or antipsychotic use • There was no significant between group difference evident in the self-report ratings of the combined ASPD and control groups for the moral emotion of self-anger
Hypothesis 2	**Patients with ASPD will self-report significantly higher mean ratings for the moral emotion of other anger when compared to controls**
Outcome	Null hypothesis accepted • There was no significant between group difference evident in the self-report ratings of the combined ASPD and the control group for the moral emotion of other anger
Hypothesis 3	**Patients with ASPD will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for impersonal and personal moral dilemmas when compared to controls**
Outcome	Partially met - Null hypothesis rejected • **The odds of the combined ASPD group endorsing utilitarian action for moral dilemma six were significantly higher than those of the control group, irrespective of adjustments to account for group differences in age/medication use** • The odds of the combined ASPD group endorsing utilitarian action for moral dilemma eight were significantly higher than those of the control group. However, this effect was no longer evident following adjustments to control for group differences in age • There was no significant between group difference in the odds of utilitarian endorsement for personal moral dilemmas five or seven

Table 33: Hypotheses and Outcomes – Chapter Four (Cont'd)

Hypothesis 3 (cont'd)	**Patients with ASPD will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for impersonal and personal moral dilemmas when compared to controls**
Outcome	Partially met - Null hypothesis rejected • The odds of the combined ASPD group endorsing >50% utilitarian decisions for personal moral dilemmas were significantly higher when compared to the control group and this effect remained evident after controlling for group differences in age. However, there were no significant between group effects after controlling for age, SSRI and antipsychotic medication use • The combined ASPD group had significantly lower mean decision difficulty ratings for impersonal dilemmas 1-4 when compared to the control group but there were no significant between group effects evident after analysis was adjusted to account for group differences in educational status. • There was no significant between group difference in the decision difficulty ratings of the combined ASPD and control group for personal moral dilemma 5 • The combined ASPD group had significantly lower decision difficulty ratings for moral dilemmas 6-8 and a significantly lower decision difficulty rating for personal moral dilemmas combined. However, there were no significant between group effects evident for personal dilemmas 6-8 or personal moral dilemmas combined after controlling for group differences in educational status
Hypothesis 4	**ASPD+P patients will self-report significantly lower mean ratings for moral emotions of guilt, compassion and self-anger when compared to either ASPD-P patients or controls**
	Partially met - Null hypothesis rejected • **A three group comparison indicated significantly lower mean guilt and compassion ratings in ASPD+P patients when compared to controls and ASPD-P patients irrespective of adjustments for education and/or medication use** • A three group comparison indicated no significant differences in the self-anger ratings of ASPD+P patients when compared to controls or ASPD-P patients

Table 33: Hypotheses and Outcomes – Chapter Four (Cont'd)

Hypothesis 5	**ASPD-P and ASPD+P patient groups will report significantly higher mean ratings for the moral emotion of other anger when compared to controls.**
Outcome	• A three group comparison indicated no significant difference in the other anger ratings of ASPD-P patients when compared to controls • A three group comparison indicated significantly higher ratings of other anger in ASPD+P patients when compared to controls but there was no significant overall group effect. Furthermore, this difference was not evident following adjustments to account for group differences in educational status
Hypothesis 6	**ASPD+P patients will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for both impersonal and personal moral dilemmas when compared to ASPD-P patients and controls**
	• A three group comparison indicated that the odds of ASPD+P patients endorsing utilitarian action for personal dilemma 6 were significantly higher than those of controls. However, this difference was not evident following adjustments to account for group differences in age and educational status • A three group comparison indicated that the odds of ASPD+P patients endorsing ≥50% utilitarian decisions for personal moral dilemmas were significantly higher when compared to controls. However, this difference was not evident following adjustments to control for group differences in age and educational status • A three group comparison indicated no significant difference in the odds of ASPD+P patients endorsing utilitarian action for personal moral dilemmas 5, 7 or 8 when compared to controls or ASPD-P patients • A three group comparison indicated no significant difference in the odds of ASPD+P patients endorsing utilitarian action for personal moral dilemma 6 • There was no significant difference in the odds of ASPD+P patients endorsing ≥50% utilitarian decisions for personal moral dilemmas when compared to ASPD-P patients

Table 33: Hypotheses and Outcomes – Chapter Four (Cont'd)

Hypothesis 6 Cont'd	**ASPD+P patients will endorse significantly more utilitarian decisions when presented with personal moral dilemmas and have significantly lower mean decision difficulty ratings for both impersonal and personal moral dilemmas when compared to ASPD-P patients and controls**
Outcome	• ASPD+P patients reported significantly lower mean decision difficulty ratings for impersonal moral dilemmas 1-4 and impersonal moral dilemmas combined when compared to controls. However, no significant group differences were evident following adjustments to control for group differences in educational status • There was no significant difference in the decision difficulty ratings of ASPD+P patients and ASPD-P patients for moral dilemmas 1 or 2 • ASPD+P patients reported significantly lower mean decision difficulty ratings when deciding whether to endorse utilitarian action for impersonal moral dilemma 3 and impersonal moral dilemmas combined when compared to ASPD-P patients. However, these significant differences were no longer evident following adjustments to account for group differences in educational status • **ASPD+P patients self-reported significantly lower mean decision difficulty ratings when deciding whether to endorse utilitarian action for impersonal moral dilemma 4 than ASPD-P patients** • There was no significant difference in the mean decision difficulty ratings of ASPD+P patients and controls for personal moral dilemma 5 • ASPD+P patients self-reported significantly lower mean decision difficulty ratings when deciding whether to endorse utilitarian action for personal moral dilemmas 6-8 and for personal moral dilemmas combined when compared to controls. However, no significant group differences were evident following adjustments to control for group differences in educational status • There were no significant differences in the mean decision difficulty ratings of ASPD+P and ASPD-P patients for personal moral dilemmas 5-8

Unexpectedly, results highlighted no significant group differences in moral emotions of either self or other anger and no significant between group differences in relation to the combined ASPD and control participants for any moral emotion following adjustments to account for group differences in educational status and medication use. Whilst ASPD+P patients were found to identify significantly less with moral emotions of compassion and guilt than either ASPD-P or control groups and the combined ASPD group did have a higher rate of utilitarian endorsement for personal moral dilemma six irrespective of adjustments for group differences in age, educational status and/or medication use, all groups endorsed more utilitarian decisions for impersonal than personal moral dilemmas and there were no group differences in the endorsement of utilitarian solutions for personal moral dilemmas combined after controlling for co-variates. Equally, although all patient groups endorsed more utilitarian decisions for personal moral dilemmas than controls, the ASPD-P group had the highest rate of utilitarian decision making for impersonal moral dilemmas and a similar rate of utilitarian decision making for personal moral dilemmas as the ASPD+P group, despite exhibiting no moral emotions deficits. Consequently, whilst moral emotions are widely regarded to act as a moral barometer that promotes prosocial behaviour and moderates the likelihood of harm against others, results indicated that neither psychopathy nor moral emotion deficits mediated higher utilitarian decision making in ASPD, that moral emotions deficits did not impede the capacity of ASPD+P patients in their discrimination of what constitutes

morally appropriate behaviour and do not therefore absolve them from taking moral responsibility for their actions. Nevertheless, despite limited evidence for a significant group effect on utilitarian endorsement, the fact that all ASPD groups reported lower decision difficulty ratings and significantly faster responses for impersonal and personal moral dilemmas suggested that they were less conflicted in their decision making and that absent or reduced harm aversion coupled with a lack of complex moral reasoning could act as a contributory mechanism for their characteristically antisocial and violent behaviour.

2.3.1 *Strengths and Limitations*

Crucially however and consistent with the findings from chapter three, the generalisability of results from this study is limited due to the fact that ASPD populations were recruited purely from secure psychiatric facilities and because all participants were male. Equally, whilst accounting for co-variates and the inclusion of well-matched patient groups may have reduced the likelihood of potential confounders, larger and better matched ASPD and control groups would have improved the statistical power of this research. Thus, as the recruitment of an equivalent number of matched ASPD and controls might have highlighted differences that were not evident based on findings from this study, the possibility of a type II error attributable to unmatched groups, small sample size and a lack of statistical power for the three group comparison cannot be discounted. Moreover, the potential that outcomes were confounded by

a lack of insight or dissimulation in participants' responses to behavioural tasks must also be acknowledged and whilst ethical considerations must always be a primary concern, hypothetical vignettes employed to simulate real life scenarios may not elicit moral emotions or moral decisions reflective of those exhibited outside of a research setting.

2.4 *Chapter Five*

To address the potential limitations of empathy measures, chapter five provided a psychometric critique of the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983b) – a multi-dimensional self-report measure of cognitive and affective empathy that was employed as part of the battery of assessments described in chapter three. The aims of this chapter were to examine the rationale for the development of the IRI, to determine what processes were involved in its development and to evaluate the reliability, validity and utility of the measure with community and violent offender populations.

Whilst the IRI was designed to provide a comprehensive empathy assessment tool that could inform individual differences in cognitive and affective empathy and enable more insight into the relationship between these distinct facets of empathy and behaviour, it was trialled and validated with an undergraduate population and initially intended for use within the community. However, it has since become increasingly popular as a research and assessment tool with violent offenders and whilst

extant literature is largely supportive of the validity and reliability of the IRI as an empathy assessment tool with community adult and adolescent populations, evidence from studies that have examined the psychometric properties of the IRI with violent offenders suggest that it is neither valid nor reliable when employed with this population. Whilst one study found evidence that IRI perspective taking subscale scores contribute to the prediction of violence over a two-year period following release from prison (Lauterbach & Hosser, 2007), this finding was not replicated in a later study. Furthermore, consistent with evidence from research with community populations, another study found that personal distress and fantasy subscale scores of violent offender groups demonstrated a lack of convergent validity with measures of prosocial and antisocial beliefs, attitudes and sentiments as well as socialisation and impulsivity. Notably however, a key finding reported by both of these studies was that subscale scores for negatively worded items had an adverse effect upon the factor structure of the IRI and the internal consistencies of subscales, potentially as a result of difficulties in their interpretation and readability. Equally, findings from wider research suggest that dissimulation and a lack of insight are more likely to lead to inaccuracy in IRI subscale scores when it is employed with violent offender groups. In view of these findings and the fact that inaccurate inferences from IRI scores could have deleterious consequences for the management and implementation of interventions designed to address antisocial behaviour and violence, this chapter concluded that the IRI is unsuitable for use with forensic

populations in its current form and that further research to explore how the IRI might be adapted for use with violent offenders or to examine whether alternative self-report empathy assessments (and in particular the BES; Joliffe & Farrington, 2006) have adequate psychometric properties when employed with violent offenders would be beneficial.

Crucially, this finding also has implications for the accuracy of evidence presented in chapter three as the perspective taking deficits identified in ASPD+P patients were based purely on responses to the IRI and not evidenced through other measures. Caution in their interpretation is therefore advised and further research with an appropriately validated self-report empathy measure required to examine the replicability of this finding.

3.0 IMPLICATIONS AND FUTURE DIRECTIONS

This thesis has outlined a range of evidence which indicates that adult male ASPD populations exhibit impaired emotion and empathic processing as well as moral emotions deficits when compared to adult male non-personality disordered controls. Crucially however, it has also been demonstrated that it is in fact co-morbid psychopathy which acts as a mediator for these deficits in ASPD and to highlight that differences between these groups could contribute to divergency in the pathways that underlie the deleterious antisocial and violent behaviour characteristic to

adult male ASPD-P and ASPD+P populations. Consequently, it is essential that these groups are appropriately differentiated by researchers and treatment providers aiming to effectively explore and address the mechanisms which contribute to the behaviour manifest by ASPD populations in the future.

Whilst chapter two was unable to draw conclusions about whether ASPD-P and ASPD+P populations differ with regards to emotion recognition and empathic processing due a dearth of extant literature exploring these phenomena with delineated ASPD groups, it did highlight consistent evidence of impaired emotion processing in ASPD+P populations and thereby offer some support to the 'low fear' hypothesis (Lykken, 1995) and Integrated Emotion Systems model (Blair, 2004). Notably however, chapter two also highlighted that emotion deficits and reduced affective reactivity may be specifically evident in those with high levels of interpersonal/affective psychopathic traits and found less consistent evidence for reduced affective reactivity in ASPD-P and control groups (Jusyte et al., 2015; Loomans et al., 2015; Sedgwick, 2017; Vaidyanathan et al., 2011). Consequently, the potential for heterogeneity in the deficits manifest by ASPD+P groups and importance of addressing extraneous factors (i.e., early trauma and/or childhood maltreatment, adaptive personality traits, substance misuse) that could mediate impairment in these populations were highlighted as primary considerations for future research.

Equally, as evidence relating to facial emotion recognition outlined in chapter three did not support the findings of meta-analytic research (Marsh & Blair, 2008) or cross-sectional studies which have identified emotion recognition deficits or impaired recognition of distress cues in antisocial and/or psychopathic populations (Bagcioglu et al., 2014; Dawel, O'Kearney, McKone, & Palermo, 2012; Dolan & Fullam, 2006; Hastings, Tangney, & Stuewig, 2008) and was inconsistent with the IES model (Blair, 2004), the relevance of emotion/distress recognition deficits and impaired stimulus reinforcement associations as contributory mechanisms for the behaviour manifest by ASPD populations remains unclear.

However, whilst the current findings were concurrent with the view that disparities in the emotion recognition deficits identified by existing studies may in fact have been attributable to differences in methodological approach, and/or the presence of co-variates rather than psychopathy (Olderbak et al., 2018), the fact that non-adjusted analysis of emotion recognition data highlighted specific evidence of impaired fear recognition accuracy in ASPD warrants further investigation. Thus, in view of the limitations outlined in relation to chapter three, future studies wishing to examine these phenomena could aim to test the reliability of these findings with larger, delineated ASPD and matched control groups or more broadly explore the relationship between pre-specified extraneous

variables (i.e., adverse childhood experiences; ADHD; offence history) and facial emotion recognition in ASPD.

The finding that ASPD+P patients self-reported significantly higher rates of alexithymia (difficulty describing feelings) traits coupled with significantly less cognitive empathy when compared to controls was consistent with the Perception Action Model (PAM; Preston, 2007, Preston & de Waal, 2002) and shared network hypothesis (Singer & Lamm, 2009; Preston, 2007; Preston & de Waal, 2002) as it indicated that the capacity of ASPD+P patients to understand the emotional experiences of others may be inhibited by difficulties in their ability to form and reference subjective representations of their own emotional experiences. Equally, the fact that ASPD+P patients exhibited significantly less affective and cognitive empathy than ASPD-P patients lends support to the notion that there may be diversity in the mechanisms that underlie the offending pathways of these groups and highlights the need for interventions that can directly target the impairment specific to each.

Whilst chapter three found no evidence of affective empathy deficits in ASPD as might be expected based on the presence of emotion processing and cognitive empathy deficits in ASPD+P patients, prior research has observed an apparent discord between linguistic and psychophysiological expressions of emotion in psychopathy (Ellis, Schroder, Patrick, & Moser, 2017), which, based on the current findings, could be attributable to the

presence of co-morbid alexithymic traits. Consequently, the possibility that 'difficulty describing feelings' alexithymia traits may have inhibited the ability of ASPD+P patients to accurately introspect upon their emotional experiences must be acknowledged (Valdespino et al., 2017). Future research with this population should therefore not only aim to account for the presence of alexithymic traits but adopt a multi-modal approach (i.e., incorporating psychophysiological, electrophysiological and/or behavioural measures) to ensure a more objective account of affective empathy than that which can be achieved purely through self-report measures.

Still, in accordance with the negative preception hypothesis (Lykken, Macindoe, & Tellegen, 1972) some contend that reduced arousal, inhibited emotion processing and attentional bias may in fact emerge during development as a consequence of adaptive coping strategies that enable individuals with higher levels of emotional sensitivity to minimise or tune out from distress associated with negatively valenced or emotionally aversive stimuli and in some cases, to become desensitised and disconnected from emotional experience altogether (Kosson et al., 2018; 1972; Lykken & Tellegen, 1974; Weiler & Widom, 1996).

This view would therefore suggest that affective empathy deficits may manifest purely in a specific sub-group of those with psychopathy whose developmental histories have inhibited their capacity for emotional

experience. However, further longitudinal research to explore the relationship between hyperemotionality in childhood, adverse childhood experiences, ASPD, psychopathy and empathy in adulthood is required before firm conclusions can be drawn about the contribution of these strategies to empathic deficits in ASPD+P populations.

As chapter four highlighted evidence that moral emotions (i.e., guilt and compassion) deficits in ASPD were in fact attributable to co-morbid psychopathy, the fact that these were identified in conjunction with cognitive empathy deficits lends support to the view that a relationship exists between empathic and moral processing (Gleichgerrcht & Young, 2013; Hoffman, 2000). However, the absence of emotion, empathic and moral emotions deficits evident in ASPD-P patients and lack of consistent group differences in utilitarian decision making (after accounting for co-variates) contradicts the view that psychopathy and/or emotion deficits mediate increased utilitarian decision making (Koenigs et al., 2012) and the notion that moral emotions act as a barometer for moral behaviour (Tangney et al., 2007).

Equally, the fact that all patient groups reported less difficulty and were significantly quicker in their moral decision making than controls despite endorsing more utilitarian decisions for personal moral dilemmas contradicts the dual process model's notion that deontological decisions occur more quickly because they are generated in response to automatic

negative emotions. Still, whilst the current findings appear more consistent with the view that endorsement of utilitarian decisions may occur more quickly than the endorsement of deontological decisions when harm aversion and moral conflict are reduced or absent (Bakker, Greven, Buitelaar, & Glennon, 2017), methodological limitations (i.e., controls not assessed for psychopathy) require that further research to explore the relationship between these phenomena in delineated ASPD and control populations is undertaken before firm conclusions can be drawn.

Equally, whilst emotion, empathic and moral emotions deficits are commonly considered to underlie the increased risk of antisocial behaviour, high levels of violence, violent recidivism, and aberrant patterns of moral behaviour observed in offender populations who meet the criteria for ASPD and psychopathy (Herpertz et al., 2001; Kiehl, & Hoffman, 2011), chapter four concluded that individual differences (i.e., in reinforcement sensitivity, inhibitory control, executive function and metacognition) may inhibit the influence of emotions on moral decision making. Moreover, that early developmental experiences (i.e., exposure to early trauma and abuse; socialisation; cultural values and norms) and moral disengagement could inform the use of adaptive cognitive strategies that enable ASPD populations to exhibit morally aberrant behaviour irrespective of emotion deficits and without negative emotional repercussions.

Still, as chapter five concluded that the Interpersonal Reactivity Index (IRI) is unsuitable for use with forensic populations in its current form, evidence related to empathic processing in ASPD outlined in chapters two and three should be interpreted with caution and the potential limitations of self-report measures considered and addressed.

Whilst similarity in the verbal reasoning scores of groups detailed in chapter three may have reduced the likelihood that problems with readability would impact upon the accuracy of self-reported IRI cognitive and affective empathy ratings outlined in this thesis, chapter five highlighted that difficulties with insight and social desirability are more common in forensic populations and therefore more likely to confound IRI scores when the measure is employed to assess offender populations. Thus, it is essential that alternative or suitably adapted empathy assessments be developed and/or validated for use with these populations before the reliability of the current findings and those reported by wider research with offender populations can be confidently explored. Equally, from an ethical standpoint, the use of an invalid/inaccurate assessment could incur negative repercussions due to the deleterious impact of misguided and ineffective interventions with ASPD populations and wider costs for society more generally should our understanding of the factors which underlie antisocial behaviour and violence be misinformed.

In the same vein, whilst this thesis has outlined evidence which suggests that interventions designed to target emotion and empathic processing or moral emotions deficits are likely to be ineffective in addressing the antisocial and violent behaviour of ASPD-P patients and more relevant to ASPD+P patients, the fact that these deficits did not appear to impact upon their ability to differentiate between impersonal and personal moral dilemmas or their endorsement of utilitarian solutions is consistent with the view that the role of moral emotions in moral decision making may have been overestimated (Horne & Powell, 2016) and suggests that moral emotions may in fact be irrelevant as a treatment target. Notably however, this thesis has also highlighted how the relationship between moral emotions and decision making is far from straightforward, may be determined through a complex interplay between emotion and cognition and be context dependent.

Equally, whilst it has been argued that interventions employed with psychopathic populations should not require them to address their emotional states when these may in fact be inaccessible to them (Hesse, 2010), this thesis does not support the view that psychopathy is synonymous with an absence of emotion and has highlighted that emotion deficits manifest differentially within psychopathic populations. Consequently, it is imperative that treatment providers not only account for potential diversity in the relationship between moral emotions and moral decision making in ASPD but also for heterogeneity in the

manifestation of emotion, empathic and/or moral emotions deficits in ASPD+P populations.

Whilst populations with ASPD and psychopathy are commonly considered to be highly treatment resistant and there is currently limited evidence to support the effectiveness of psychological interventions focused on reducing their offending behaviour (Gibbon et al., 2010; Gibbon, Khalifa, Cheung, Völlm, & McCarthy, 2020; Johnson, 2019; Salekin, Worley & Grimes, 2010), a review which explored the effects of psychological treatments completed with ASPD populations did find that contingency management had been employed successfully to reduce substance misuse in ASPD (Gibbon et al., 2010). Added to this, contingency management plus standard maintenance (SM) was found to be more effective in improving social functioning in ASPD than TAU alone (Gibbon, Khalifa, Cheung, Völlm, & McCarthy, 2020).

Equally, whilst treatments which utilise punishment (i.e., in the form of sanctions or withdrawal from treatment) may be less effective and more likely to lead to iatrogenic effects in those who meet the criteria for psychopathy due to their difficulties processing negative/punishment cues (Blair, 2013), Risk Needs Responsivity (RNR) informed programs which differentially address the impact of interpersonal and antisocial facets of psychopathy on offending behaviour have been effective in reducing violent recidivism in psychopathic populations (Olver, 2016).

Nevertheless, as the behaviours observed in adult ASPD populations may be less retractable and more ingrained than those observed in antisocial/conduct disordered youth (with and without callous unemotional traits), intensive early interventions would appear to be better placed to address the developmental origins and behaviours exhibited by those with ASPD when they are more amenable to change and before changes to the structure and functionality of brain regions that contribute to emotion, empathic and moral processing deficits evident in ASPD+P populations fully manifest (Blair, 2013; Caldwell et al., 2019; Gregory et al., 2012).

Whilst evidence to support the effectiveness of early interventions with antisocial youth is similarly limited (Gatti, Grattagliano, & Rocca, 2018), meta-analytic research did find evidence of a small but significant reduction in conduct disorder problems when they examined the effectiveness of psychosocial interventions with conduct-disordered youth based on parent and teacher ratings (Bakker, Greven, Buitelaar, & Glennon, 2017). Likewise, programmes specifically designed to address the difficulties that youths with psychopathic traits may have with the processing of punishment cues have been found to successfully reduce institutional misconduct and recidivism in adolescents with psychopathic traits (Caldwell, 2011; Reidy et al., 2013).

Still, there is a clear need for further methodologically rigorous research and increased transparency regarding the application of therapeutic approaches utilised with antisocial youth and adult ASPD populations. Not only would this enable clinicians to determine the effectiveness of these approaches in addressing antisocial and violent behaviour but it would also help to inform variation in the responsivity of ASPD-P and ASPD+P groups and potentially inform improvements to treatment that would reduce the likelihood of iatrogenic treatment effects and attrition.

Moreover, in view of the heterogeneity in deficits manifest by ASPD populations, it is essential that researchers and clinicians also address the ambiguity and *'psychopathy creep'* (Raine, 2018, pg. 279) evident in relation to the current DSM-V diagnostic representation of ASPD and desist from interventions that are informed by these diagnostic criteria (Hesse, 2010). Instead, it would seem that the adoption of a more flexible, holistic and person-centred approach to research and treatment with ASPD populations would not only enable treatment providers to more effectively address diversity in the origins and mechanisms which underlie and may differentiate the offending pathways of ASPD-P and ASPD+P populations but could also ensure that interventions are appropriately tailored and able to respond to heterogeneity in the deficits that exist within ASPD+P populations more specifically (Hicks, Clark, & Durbin, 2017).

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APPENDICES

APPENDIX 1

CLECKLEY 'MASK OF SANITY' (1941)
PSYCHOPATHY CRITERIA

1. Superficial charm and good intelligence.
2. Absences of delusions and other signs of irrational thinking.
3. Absence of ‘nervousness’ or psychoneurotic manifestations.
4. Unreliability.
5. Untruthfulness and insincerity.
6. Lack of remorse or shame.
7. Inadequately motivated antisocial behaviour.
8. Poor judgement and failure to learn from experience.
9. Pathological egocentricity and incapacity for love.
10. General poverty in major affective reactions.
11. Specific loss of insight.
12. Unresponsiveness in general interpersonal relations.
13. Fantastic and uninviting behaviour, with drink and sometimes without.
14. Suicide rarely carried out.
15. Sex life impersonal, trivial and poorly integrated.
16. Failure to follow any life plan.

APPENDIX 2

TABLE 1: PSYCHOPATHY CLASSIFICATION CRITERIA: PSYCHOPATHY CHECKLIST (PCL; HARE, 1980) AND PSYCHOPATHY CHECKLIST-REVISED (PCL-R; HARE, 1991)

Item No.	Original Psychopathy Checkist (Hare, 1980)	Psychopathy Checklist Revised (Hare, 1991, 2003)*
1.	Glibness/Superficial Charm	Glibness/Superficial Charm
2.	Previous diagnosis as psychopath (or similar)	Grandiose sense of self-worth
3.	Egocentricity/grandiose sense of self-worth	Need for stimulation/proneness to boredom
4.	Proneness to boredom/low frustration tolerance	Pathological lying
5.	Pathological lying and deception	Conning/manipulative
6.	Conning/lack of sincerity	Lack of remorse or guilt
7.	Lack of remorse or guilt	Shallow affect
8.	Lack of affect and emotional depth	Callous/lack of empathy
9.	Callous/lack of empathy	Parasitic Lifestyle
10.	Parasitic Lifestyle	Poor behavioural controls
11.	Short tempered/poor behavioural controls	Promiscuous sexual behaviour
12.	Promiscuous sexual relations	Early behavioural problems
13.	Early behaviour problems	Lack of realistic long-term goals
14.	Lack of realistic, long-term plans	Impulsivity
15.	Impulsivity	Irresponsibility
16.	Irresponsible behaviour as parent	Failure to accept responsibility for own actions
17.	Frequent marital relationships	Many short-term marital relationships
18.	Juvenile delinquency	Juvenile delinquency
19.	Poor probation or parole risk	Revocation of conditional release
20.	Failure to accept responsibility for own actions	Criminal versatility
21.	Many types of offence	
22.	Drug or alcohol abuse not direct cause of antisocial behaviour	

*Item 2 of original PCL omitted in revised version due to lack of reliable information and because it was considered to have limited relevance to assessment; Item 6 of revised version less specific than original PCL item 16; Item 22 of PCL omitted from revised version due to difficulties in scoring; Wording for original items 3, 4, 5, 6, 8, 11, 12, 14, 17, 19, 21 modified in revised version.

APPENDIX 3

TABLE 1: Overlap Between Criteria for PCL-R Assessed Psychopathy, DSM IV/V ASPD and ICD-10 DPD Diagnosis

PCL-R Psychopathy	DSM-IV Antisocial PD	ICD-10 Dissocial PD	DSM-V Antisocial PD
Glibness/Superficial Charm[1]	N/A	N/A	Use of seduction, charm, glibness or ingratiation to achieve one's ends
Grandiose Sense of Self Worth[1]	N/A	N/A	Misrepresentation of self; embellishment or fabrication when relating events
Need for stimulation/ Proneness to Boredom[2]	Reckless disregard for safety of self or others	N/A	Risk-taking
Pathological Lying[1]	Deceitfulness (repeated lying, use of aliases	N/A	Deceitfulness; dishonesty and fraudulence
Conning/manipulative[1]	Conning others for personal profit or pleasure	N/A	Manipulativeness; Frequent use of subterfuge to influence or control others
Lack of remorse/guilt[1]	Lack of remorse (being indifferent to or rationalising)	Incapacity to experience guilt or to profit from adverse experience, particularly punishment	Lack of guilt or remorse about negative effects of one's actions on others
Shallow affect[1]	N/A	N/A	N/A
Callous lack of empathy[1]	N/A	Callous unconcern for the feelings of others	Lack of concern for feelings or problems of others
Parasitic lifestyle[2]	N/A	N/A	Exploitation as primary mean of relating to others including by deceit, coercion, dominance or intimidation
Poor Behavioural Controls[2]	Repeated physical fights or assaults	Low threshold for discharge of aggression including violence	Failure to conform to lawful or culturally normative ethical behaviour.

PCL-R Psychopathy	DSM-IV Antisocial PD	ICD-10 Dissocial PD	DSM-V Antisocial PD
Promiscuous sexual Behaviour	N/A	N/A	N/A
Early Behavioural Problems[2]	Evidence of conduct disorder before age of 15[a]	N/A	N/A
Lack of realistic long-term goals[2]	N/A	N/A	Lack of concern for limitations; goal setting based on personal gratification; difficulty establishing and following plans
Impulsivity[2]	Impulsivity or failure to plan ahead	N/A	Impulsivity -acting on the spur of the moment in response to immediate stimuli
Irresponsibility[2]	Consistent irresponsibility (repeated failure to sustain consistent work behaviour or honour financial obligations)	Gross and persistent attitude of irresponsibility and disregard for social norms, rules and obligations	Irresponsibility – disregard for and failure to honour financial or other obligations and commitments; lack of respect for agreements and promises
Failure to accept responsibility for own actions[1]	N/A	Marked proneness to blame others or to offer plausible rationalisations for behaviour bringing subject into conflict with society	N/A
Many short-term marital relationships	N/A	Incapacity to maintain enduring relationships though having no difficulty in establishing them	N/A
Juvenile delinquency[2]	Pervasive pattern of disregard for and violation of rights of others occurring since age of 15	N/A	N/A
Revocation of conditional release[2]	N/A	N/A	N/A
Criminal versatility[2]	N/A	N/A	N/A

[1] 1= F1 Psychopathy traits; [2] = F2 Psychopathy traits

APPENDIX 4

SEARCH SYNTAX FROM ELECTRONIC DATABASE SEARCHES

DATABASE – PSYCHINFO – CONDUCTED ON 06.07.16

mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (5611)
2. limit 1 to yr="1980-Current" (5043)
3. dissocial personality disorder.mp. (45)
4. limit 3 to yr="1980 -Current" (45)
5. 2 OR 4 (5063)
6. empath$.mp. or exp empath$/ (26335)
7. limit 6 to yr="1980 -Current" (23961)
8. emotion$.mp. or exp emotion$/ (335219)
9. limit 8 to yr="1980 -Current" (286322)
10. affect$.mp. or exp affect$/ (9404628)
11. limit 10 to yr="1980-Current" (369458)
12. 7 OR 9 OR 11 (603523)
13. (fac$ and (expression$ or recogni$)).mp. (98146)
14. limit 13 to yr="1980-Current" (89621)
15. ("interpersonal reactivity index" or IRI).mp. (1746)
16. limit 15 to yr="1980-Current" (1734)
17. ("empathy quotient" or EQ).mp. (2314)
18. limit 17 to yr="1980-Current" (2281)
19. ("Hogan Empathy Scale" or HES).mp. (517)
20. limit 19 to yr="1980-Current" (491)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (72)
22. limit 21 to yr="1980-Current" (72)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp. (24)
24. limit 23 to yr="1980-Current" (24)
25. ("toronto empathy questionnaire" or TEQ).mp. (72)
26. limit 25 to yr="1980-Current" (70)
27. ("Basic Empathy Scale" or BES).mp. (371)
28. limit 27 to yr="1980-Current" (355)
29. ("Skin conductance response$" or SCR).mp. (1804)
30. limit 29 to yr="1980-Current" (1620)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (420)
32. limit 31 to yr="1980-Current" (403)
33. (startle and (blink$ or reflex$)).mp. (3452)
34. limit 33 to yr="1980-Current" (3208)
35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (29079)

DATABASE – PSYCHINFO – CONDUCTED ON 06.07.16

36. limit 35 to yr="1980-Current"	(26808)
37. electrocardiogram.mp. or exp electrocardiogram/	(1106)
38. limit 37 to yr="1980-Current"	(1020)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 30 or 32 or 34 or 36 or 38	(125628)
40. 5 AND 12	(1338)
41. 5 AND 39	(207)
42. 40 OR 41	(1404)

DATABASE – MEDLINE – CONDUCTED ON 06.07.16

mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (9165)
2. limit 1 to yr="1980-Current" (6846)
3. dissocial personality disorder.mp. (29)
4. limit 3 to yr="1980 -Current" (29)
5. 2 OR 4 (6863)
6. empath$.mp. or exp empath$/ (19035)
7. limit 6 to yr="1980 -Current" (18010)
8. emotion$.mp. or exp emotion$/ (268549)
9. limit 8 to yr="1980 -Current" (233244)
10. affect$.mp. or exp affect$/ (1302855)
11. limit 10 to yr="1980-Current" (1250694)
12. 7 OR 9 OR 11 (1436367)
13. (fac$ and (expression$ or recogni$)).mp. (867295)
14. limit 13 to yr="1980-Current" (860138)
15. ("interpersonal reactivity index" or IRI).mp. (3465)
16. limit 15 to yr="1980-Current" (3050)
17. ("empathy quotient" or EQ).mp. (6824)
18. limit 17 to yr="1980-Current" (6699)
19. ("Hogan Empathy Scale" or HES).mp. (4284)
20. limit 19 to yr="1980-Current" (4175)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (6)
22. limit 21 to yr="1980-Current" (6)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp (5)
24. limit 23 to yr="1980-Current" (5)
25. ("toronto empathy questionnaire" or TEQ).mp. (2027)
26. limit 25 to yr="1980-Current" (2026)
27. ("Basic Empathy Scale" or BES).mp. (945)
28. limit 27 to yr="1980-Current" (913)
29. ("Skin conductance response$" or SCR).mp. (5052)
30. limit 29 to yr="1980-Current" (4972)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (1946)
32. limit 31 to yr="1980-Current" (1918)
33. (startle and (blink$ or reflex$)).mp. (6398)
34. limit 33 to yr="1980-Current" (5694)

DATABASE – MEDLINE – CONDUCTED ON 06.07.16 (CONT'D)

35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (414067)
36. limit 35 to yr="1980-Current" (364089)
37. electrocardiogram.mp. or exp electrocardiogram/ (196038)
38. limit 37 to yr="1980-Current" (137482)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 30 or 32 or 34 or 36 or 38 (1354742)
40. 5 AND 12 (1824)
41. 5 AND 39 (294)
42. 40 OR 41 (1921)

DATABASE - EMBASE – CONDUCTED ON 06.07.16

mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (3173)
2. limit 1 to yr="1980-Current" (3077)
3. DISSOCIAL PERSONALITY DISORDER.mp. (63)
4. limit 3 to yr="1980-Current" (63)
5. 2 or 4 (3122)
6. EMPATH$.mp. or exp EMPATH$/ (23595)
7. limit 6 to yr="1980 -Current" (22909)
8. EMOTION$.mp. or exp EMOTION$/ (534309)
9. limit 8 to yr="1980-Current" (505663)
10. affect$.mp. or exp affect$/ (1747961)
11. limit 10 to yr="1980-Current" (1726508)
12. 7 or 9 or 11 (2114192)
13. (fac$ and (expression$ or recogni$)).mp. (1141024)
14. limit 13 to yr="1980-Current" (1138243)
15. ("interpersonal reactivity index" or IRI).mp. (5625)
16. limit 15 to yr="1980 -Current" (5503)
17. ("EMPATHY QUOTIENT" or EQ).mp. (12625)
18. limit 17 to yr="1980 -Current" (12571)
19. ("HOGAN EMPATHY SCALE" or HES).mp. (8161)
20. limit 19 to yr="1980 -Current" (8087)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (9)
22. limit 21 to yr="1980 -Current" (9)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp. (15)
24. limit 23 to yr="1980 -Current" (15)
25. ("toronto empathy questionnaire" or TEQ).mp. (2480)
26. limit 25 to yr="1980 -Current" (2479)
27. ("Basic Empathy Scale" or BES) (1766)
28. limit 27 to yr="1980 -Current" (1745)

DATABASE - EMBASE – CONDUCTED ON 06.07.16 (CONT'D)

29. ("skin conductance response$" or SCR).mp. (9096)
30. limit 29 to yr="1980 -Current" (9057)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (2709)
32. limit 31 to yr="1980 -Current" (2699)
33. (startle and (blink$ or reflex$)).mp. (7140)
34. limit 33 to yr="1980 -Current" (6892)
35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (766350)
36. limit 35 to yr="1980 -Current" (738493)
37. electrocardiogram.mp. or exp electrocardiogram/ (164898)
38. limit 37 to yr="1980-Current" (160969)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 32 or 34 or 36 or 38 (2008208)
40. 5 and 12 (1062)
41. 5 and 39 (139)
42. 40 or 41 (1111)

DATABASE – EMBASE - CONDUCTED ON 14.07.17

1.exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp.	(3595)
2. limit 1 to yr="1980 - 2016"	(3376)
3. DISSOCIAL PERSONALITY DISORDER.mp.	(66)
4. limit 3 to yr="1980 – 2016"	(64)
5. 2 OR 4	(3421)
6. ("skin conductance response$" or SCR).mp.	(10295)
7. limit 6 to yr="1980 - 2016"	(9851)
8. 5 AND 7	(5)

Search results backdated to 06.07.16 to correct error in original search line 39

1 paper discounted due to 2017 entry onto Embase
3 papers discounted due to previous Embase entry (06/07/16)
1 additional paper located (with entry date prior to 06/07/16) - added to duplicates

DATABASE - Applied Social Sciences Index & Abstracts (ASSIA) – conducted on 08.07.16

Search limit applied: After 31/12/79

1.	(antisocial personality disorder) OR ASPD	(875)
2.	Dissocial personality disorder	(24)
3.	1 OR 2	(889)
4.	Empath*	(3255)
5.	Emotion*	(35686)
6.	Affect*	(51,900)
7.	4 OR 5 OR 6	(83,093)
8.	3 AND 7	(198)
9.	(fac* AND (expression* OR recogni*))	(9697)
10.	("interpersonal reactivity index" OR IRI)	(59)
11.	("Empathy Quotient" OR EQ)	(414)
12.	("Hogan Empathy Scale" OR HES)	(59)
13.	("Questionnaire Measure of Emotional Empathy" OR QMEE)	(2)
14.	("Questionnaire of Cognitive and Affective Empathy" OR QCAE)	(2)
15.	("Toronto Empathy Questionnaire" OR TEQ)	(2)
16.	("Basic Empathy Scale" OR BES)	(38)
17.	(Skin conductance response* OR SCR)	(298)
18.	(electrodermal (activit* OR response*)) OR EDA	(168)
19.	(startle AND (blink* OR reflex*))	(89)
20.	(cardiovascular AND (effect* OR response* OR reflex*))	(2140)
21.	electrocardiogram	(218)
22.	9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21	(13039)
23.	3 AND 22	(23)
24.	8 OR 23	(203)

DATABASE – WEB OF SCIENCE - conducted on 06.07.16

Search Restrictions: *Indexes=SCI-EXPANDED, SSCI Timespan=1980-2016*

1.	("antisocial personality disorder" OR ASPD)	(2465)
2.	(Dissocial Personality Disorder)	(124)
3.	1 OR 2	(2568)
4.	(empath*)	(15,901)
5.	(emotion*)	(185,311)
6.	(affect*)	(1,813,923)
7.	#6 OR #5 OR #4	(1,968,023)
8.	#7 AND #3	(616)
9.	(fac* AND (expression* OR recogni*))	(984,038)
10.	("interpersonal reactivity index" OR IRI)	(4,931)
11.	("empathy quotient" OR EQ)	(16,554)
12.	("hogan empathy scale" or HES)	(4,496)
13.	("questionnaire measure of emotional empathy" or QMEE)	(7)
14.	("questionnaire of cognitive and affective empathy" OR QCAE)	(8)
15.	("toronto empathy questionnaire" or TEQ)	(2743)
16.	("basic empathy scale" OR BES)	(2380)
17.	(skin conductance response* OR SCR)	(12,669)
18.	(electrodermal AND (activit$ OR response$))	(2,046)
19.	(startle and (blink* or reflex*))	(3,740)
20.	(cardiovascular and (effect* or response* or reflex*))	(165,335)
21.	(electrocardiogram)	(28,482)
22.	#21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10 OR #9	(1208,944)
23.	#22 AND #3	(141)
24.	#23 OR #8	(657)

DATABASE – PROQUEST DISSERTATIONS AND E-THESES (07.07.16)

SEARCH RESTRICTION: >31/12/79-Current; ab=abstract

1. ab(("ANTISOCIAL PERSONALITY DISORDER" OR ASPD)) (285)
2. "DISSOCIAL PERSONALITY DISORDER" (73)
3. 1 OR 2 (349)
4. ab(EMPATH*) (8,852)
5. ab (EMOTION*) (69,372)
6. ab (AFFECT*) (324,010)
7. 4 OR 5 OR 6 (383,386)
8. 3 AND 7 (95)
9. (FAC* AND (EXPRESSION* OR RECOGNI*)) (1178192)
10. ("INTERPERSONAL REACTIVITY INDEX" OR IRI) (51,653)
11. ("EMPATHY QUOTIENT" OR EQ) (214471)
12. ("HOGAN EMPATHY SCALE" OR HES) (119309)
13. ("QUESTIONNAIRE MEASURE OF EMOTIONAL EMPATHY" OR QMEE) (258)
14. ("QUESTIONNAIRE OF COGNITIVE AND AFFECTIVE EMPATHY" OR QCAE) (39)
15. (TORONTO EMPATHY QUESTIONNAIRE" OR TEQ) (4018)
16. ("BASIC EMPATHY SCALE" OR BES) (15,663)
17. (SKIN CONDUCTANCE RESPONSE* OR SCR) (45,646)
18. (ELECTRODERMAL (ACTIVIT* OR RESPONSE*)) (3,626)
19. (STARTLE AND (BLINK* OR REFLEX*)) (12162)
20. (CARDIOVASCULAR AND (EFFECT* OR RESPONSE* OR REFLEX*)) (122967)
21. ELECTROCARDIOGRAM (11835)
22. 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 (1323297)
23. 3 AND 22 (231)
24. 8 OR 23 (263)

DATABASE – SCOPUS – conducted on 07.06.17

Search restrictions: >1979-Current (Title-Abs-Key = Title, Abstract and keywords)

(((TITLE-ABS-KEY ("antisocial personality disorder" OR aspd) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (dissocial personality disorder) AND PUBYEAR > 1979)) AND ((TITLE-ABS-KEY ((fac* AND (expression* OR recogni*))) AND PUBYEAR > 1979) OR ((TITLE-ABS-KEY (("INTERPERSONAL REACTIVITY INDEX" OR iri)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("EMPATHY QUOTIENT" OR eq)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("HOGAN EMPATHY SCALE" OR hes)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("QUESTIONNAIRE MEASURE OF EMOTIONAL EMPATHY" OR qmee)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("QUESTIONNAIRE OF COGNITIVE AND AFFECTIVE EMPATHY" OR qcae)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("TORONTO EMPATHY QUESTIONNAIRE" OR teq)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("BASIC EMPATHY SCALE" OR bes)) AND PUBYEAR > 1979)) OR ((TITLE-ABS-KEY ((skin conductance response* OR scr)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (("ELECTRODERMAL (ACIVIT* OR RESPONSE*)" OR eda)) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY ((startle AND (blink* OR reflex*))) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY ((cardiovascular AND (effect* OR response* OR reflex*))) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (electrocardiogram) AND PUBYEAR > 1979)))) OR (((TITLE-ABS-KEY ("antisocial personality disorder" OR aspd) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (dissocial personality disorder) AND PUBYEAR > 1979)) AND ((TITLE-ABS-KEY (empath*) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (emotion*) AND PUBYEAR > 1979) OR (TITLE-ABS-KEY (affect*) AND PUBYEAR > 1979)))

(2124)

UPDATED SEARCHES – FEBRUARY 2019

DATABASE – PSYCHINFO – CONDUCTED ON 05.02.19

mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (5933)
2. limit 1 to yr="1980-Current" (5365)
3. dissocial personality disorder.mp. (51)
4. limit 3 to yr="1980 -Current" (51)
5. 2 OR 4 (5387)
6. empath$.mp. or exp empath$/ (31197)
7. limit 6 to yr="1980 -Current" (28824)
8. emotion$.mp. or exp emotion$/ (384491)
9. limit 8 to yr="1980 -Current" (335587)
10. affect$.mp. or exp affect$/ (473389)
11. limit 10 to yr="1980-Current" (438194)
12. 7 OR 9 OR 11 (710614)
13. (fac$ and (expression$ or recogni$)).mp. (115875)
14. limit 13 to yr="1980-Current" (107343)
15. ("interpersonal reactivity index" or IRI).mp. (2378)
16. limit 15 to yr="1980-Current" (2366)
17. ("empathy quotient" or EQ).mp. (3105)
18. limit 17 to yr="1980-Current" (3072)
19. ("Hogan Empathy Scale" or HES).mp. (603)
20. limit 19 to yr="1980-Current" (577)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (82)
22. limit 21 to yr="1980-Current" (82)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp. (47)
24. limit 23 to yr="1980-Current" (47)
25. ("toronto empathy questionnaire" or TEQ).mp. (114)
26. limit 25 to yr="1980-Current" (112)
27. ("Basic Empathy Scale" or BES).mp. (516)
28. limit 27 to yr="1980-Current" (500)
29. ("Skin conductance response$" or SCR).mp. (2121)
30. limit 29 to yr="1980-Current" (1937)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (505)
32. limit 31 to yr="1980-Current" (488)
33. (startle and (blink$ or reflex$)).mp. (3707)
34. limit 33 to yr="1980-Current" (3463)
35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (33475)
36. limit 35 to yr="1980-Current" (31204)
37. electrocardiogram.mp. or exp electrocardiogram/ (1315)

38. limit 37 to yr="1980-Current"	(1229)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 30 or 32 or 34 or 36 or 38	(149873)
40. 5 AND 12	(1441)
41. 5 AND 39	(236)
42. 40 OR 41	(1515)
43. Limit 42 to yr = “2016 -Current”	(113)

DATABASE – MEDLINE – CONDUCTED ON 07.02.19

mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (9808)
2. limit 1 to yr="1980-Current" (7491)
3. dissocial personality disorder.mp. (31)
4. limit 3 to yr="1980 -Current" (31)
5. 2 OR 4 (7508)
6. empath$.mp. or exp empath$/ (22733)
7. limit 6 to yr="1980 -Current" (21710)
8. emotion$.mp. or exp emotion$/ (310271)
9. limit 8 to yr="1980 -Current" (275180)
10. affect$.mp. or exp affect$/ (1486582)
11. limit 10 to yr="1980-Current" (1434606)
12. 7 OR 9 OR 11 (1653750)
13. (fac$ and (expression$ or recogni$)).mp. (991392)
14. limit 13 to yr="1980-Current" (984271)
15. ("interpersonal reactivity index" or IRI).mp. (4129)
16. limit 15 to yr="1980-Current" (3714)
17. ("empathy quotient" or EQ).mp. (8963)
18. limit 17 to yr="1980-Current" (8839)
19. ("Hogan Empathy Scale" or HES).mp. (5533)
20. limit 19 to yr="1980-Current" (5424)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (7)
22. limit 21 to yr="1980-Current" (7)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp (9)
24. limit 23 to yr="1980-Current" (9)
25. ("toronto empathy questionnaire" or TEQ).mp. (2282)
26. limit 25 to yr="1980-Current" (2281)
27. ("Basic Empathy Scale" or BES).mp. (1207)
28. limit 27 to yr="1980-Current" (1176)
29. ("Skin conductance response$" or SCR).mp. (6142)
30. limit 29 to yr="1980-Current" (6062)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (2282)
32. limit 31 to yr="1980-Current" (2254)
33. (startle and (blink$ or reflex$)).mp. (6755)
34. limit 33 to yr="1980-Current" (6321)

DATABASE – MEDLINE – CONDUCTED ON 07.02.19 (CONT'D)

35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (469712)
36. limit 35 to yr="1980-Current" (419601)
37. electrocardiogram.mp. or exp electrocardiogram/ (207037)
38. limit 37 to yr="1980-Current" (148725)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 30 or 32 or 34 or 36 or 38 (1545532)
40. 5 AND 12 (2068)
41. 5 AND 39 (343)
42. 40 OR 41 (2180)
43. Limit 42 to yr = "2016 to Current" (299)

DATABASE - EMBASE – CONDUCTED ON 07.02.19

mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]

1. exp antisocial personality disorder/ or antisocial personality disorder.mp. or ASPD.mp. (4097)
2. limit 1 to yr="1980-Current" (4042)
3. DISSOCIAL PERSONALITY DISORDER.mp. (69)
4. limit 3 to yr="1980-Current" (68)
5. 2 or 4 (4089)
6. EMPATH$.mp. or exp EMPATH$/ (29142)
7. limit 6 to yr="1980 -Current" (29093)
8. EMOTION$.mp. or exp EMOTION$/ (637338)
9. limit 8 to yr="1980-Current" (635026)
10. affect$.mp. or exp affect$/ (2118969)
11. limit 10 to yr="1980-Current" (2113213)
12. 7 or 9 or 11 (2593877)
13. (fac$ and (expression$ or recogni$)).mp. (1442981)
14. limit 13 to yr="1980-Current" (1441184)
15. ("interpersonal reactivity index" or IRI).mp. (7269)
16. limit 15 to yr="1980 -Current" (7235)
17. ("EMPATHY QUOTIENT" or EQ).mp. (18748)
18. limit 17 to yr="1980 -Current" (18698)
19. ("HOGAN EMPATHY SCALE" or HES).mp. (10014)
20. limit 19 to yr="1980 -Current" (9985)
21. ("Questionnaire Measure of Emotional Empathy" or QMEE).mp. (11)
22. limit 21 to yr="1980 -Current" (11)
23. ("Questionnaire of Cognitive and Affective Empathy" or QCAE).mp. (22)
24. limit 23 to yr="1980 -Current" (22)
25. ("toronto empathy questionnaire" or TEQ).mp. (2720)
26. limit 25 to yr="1980 -Current" (2701)
27. ("Basic Empathy Scale" or BES) (2248)
28. limit 27 to yr="1980 -Current" (2243)

DATABASE - EMBASE – CONDUCTED ON 07.02.19 (CONT'D)

29. ("skin conductance response$" or SCR).mp. (11960)
30. limit 29 to yr="1980 -Current" (11927)
31. ("electrodermal (activit$ or response$))" or EDA).mp. (3451)
32. limit 31 to yr="1980 -Current" (3437)
33. (startle and (blink$ or reflex$)).mp. (7745)
34. limit 33 to yr="1980 -Current" (7700)
35. cardiovascular.mp. or exp cardiovascular effect$/ or exp cardiovascular response$/ or exp cardiovascular reflex$/ (903067)
36. limit 35 to yr="1980 -Current" (900260)
37. electrocardiogram.mp. or exp electrocardiogram/ (192688)
38. limit 37 to yr="1980-Current" (192132)
39. 14 or 16 or 18 or 20 or 22 or 24 or 26 or 28 or 32 or 34 or 36 or 38 (2505147)
40. 5 and 12 (1452)
41. 5 and 39 (231)
42. 40 or 41 (1539)
43. Limit 42 to yr=2016 to Current" (440)

DATABASE - Applied Social Sciences Index & Abstracts (ASSIA) – conducted on 11.02.19

Search limit applied: After 06.07.16-Current

((((antisocial personality disorder) OR ASPD AND pd(>20160706)) OR (dissocial personality disorder AND pd(>20160706))) AND ((empath* AND pd(>20160706)) OR (emotion* AND pd(>20160706)) OR (affect* AND pd(>20160706)))) OR ((((antisocial personality disorder) OR ASPD AND pd(>20160706)) OR (dissocial personality disorder AND pd(>20160706))) AND (((fac* AND (expression* OR recogni*)) AND pd(>20160706)) OR (("interpersonal reactivity index" OR IRI) AND pd(>20160706)) OR (("empathy quotient" OR EQ) AND pd(>20160706)) OR (("Hogan Empathy Scale" OR HES) AND pd(>20160706)) OR (("Questionnaire Measure of Emotional Empathy") AND pd(>20160706)) OR (("Questionnaire of Cognitive and Affective Empathy") AND pd(>20160706)) OR (("Toronto Empathy Questionnaire" OR TEQ) AND pd(>20160706)) OR (("Basic Empathy Scale" OR BES) AND pd(>20160706)) OR ((skin conductance response* OR SCR) AND pd(>20160706)) OR ((electrodermal (activity OR response)) OR EDA AND pd(>20160706)) OR ((startle AND (blink* OR reflex*)) AND pd(>20160706)) OR (Cardiovascular AND (effect* OR response* OR reflex*) AND pd(>20160706)) OR (Electrocardiogram AND pd(>20160706))))

777 HITS IN TOTAL (776 LOCATED)

DATABASE – WEB OF SCIENCE - conducted on 12.02.19

Search Restrictions: *Indexes=SCI-EXPANDED, SSCI Timespan=2016-2019*

1. TS=("antisocial personality disorder" OR ASPD) (384)
2. TS=”Dissocial Personality Disorder” (4)
3. 1 OR 2 (386)
4. TS=empath* (6,126)
5. TS=emotion* (59,051)
6. TS=affect* (464,947)
7. #6 OR #5 OR #4 (512,807)
8. TS=(fac* AND expression* OR recogni*) (347,336)
9. TS=("Interpersonal reactivity index" OR “Empathy Quotient” or “Hogan Empathy Scale” or “Questionnaire Measure of Emotional Empathy” OR “Questionnaire of Cognitive and Affective Empathy” OR “Toronto Empathy Questionnaire” or “Basic Empathy Scale”) (274)
10. TS=(“skin conductance response” OR SCR or “electrodermal activity” OR EDA OR (“startle blink” and reflex* OR modulation*) OR (cardiovascular AND activit* OR response*) or electrocardiogram OR EDA) (684,599)
11. #10 OR #9 OR #8 (951,447)

12. #7 AND #3 (115)
13. #11 AND #3 (98)
14. #13 OR #12 (163)

DATABASE – PROQUEST DISSERTATIONS AND E-THESES (13.02.19)

SEARCH RESTRICTION: >31/12/15-Current; ab=abstract

1.	ab(("ANTISOCIAL PERSONALITY DISORDER" OR ASPD))	(30)
2.	"DISSOCIAL PERSONALITY DISORDER"	(14)
3.	1 OR 2	(42)
4.	ab(EMPATH*)	(1,497)
5.	ab (EMOTION*)	(10,598)
6.	ab (AFFECT*)	(37,577)
7.	4 OR 5 OR 6	(46,591)
8.	(FAC* AND (EXPRESSION* OR RECOGNI*))	(190,886)
9.	("INTERPERSONAL REACTIVITY INDEX" OR IRI)	(1,952)
10.	("EMPATHY QUOTIENT" OR EQ)	(28,278)
11.	("HOGAN EMPATHY SCALE" OR HES)	(20,978)
12.	("QUESTIONNAIRE MEASURE OF EMOTIONAL EMPATHY" OR QMEE)	(42)
13.	("QUESTIONNAIRE OF COGNITIVE AND AFFECTIVE EMPATHY" OR QCAE)	(17)
14.	(TORONTO EMPATHY QUESTIONNAIRE" OR TEQ)	(418)
15.	("BASIC EMPATHY SCALE" OR BES)	(1,611)
16.	(SKIN CONDUCTANCE RESPONSE* OR SCR)	(5,856)
17.	(ELECTRODERMAL (ACTIVIT* OR RESPONSE*))	(532)
18.	(STARTLE AND (BLINK* OR REFLEX*))	(1,525)
19.	(CARDIOVASCULAR AND (EFFECT* OR RESPONSE* OR REFLEX*))	(24,685)
20.	ELECTROCARDIOGRAM	(2,005)
21.	8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20	(201,267)
22.	3 AND 21	(39)
23.	3 AND 7	(20)
24.	22 OR 23	(40)

DATABASE – SCOPUS – conducted on 13.02.19

Search restrictions: >2015-Current (Title-Abs-Key = Title, Abstract and keywords)

1.	TITLE-ABS-KEY ("Antisocial Personality Disorder" OR ASPD) AND PUBYEAR > 2015	(1,249)
2.	TITLE-ABS-KEY (Dissocial AND personality AND disorder) AND PUBYEAR > 2015	(23)
3.	1 OR 2	(1,261)
4.	TITLE-ABS-KEY (empath*) AND PUBYEAR > 2015	(11,311)
5.	TITLE-ABS-KEY (emotion*) AND PUBYEAR > 2015	(96,106)
6.	TITLE-ABS-KEY (affect*) AND PUBYEAR > 2015	(690,610)
7.	4 OR 5 OR 6	(772,054)
8.	3 AND 7	(446)
9.	TITLE-ABS-KEY ("fac* AND (expression* or recogni*)) AND PUBYEAR > 2015	(324,849)
10.	TITLE-ABS-KEY ("interpersonal reactivity index" OR IRI) AND PUBYEAR > 2015	(2,018)
11.	TITLE-ABS-KEY ("empathy quotient" or EQ) AND PUBYEAR > 2015	(6,833)
12.	TITLE-ABS-KEY ("Hogan Empathy Scale" OR HES) AND PUBYEAR > 2015	(2,259)
13.	TITLE-ABS-KEY ("questionnaire measure of emotional empathy" OR QMEE) AND PUBYEAR > 2015	(4)
14.	TITLE-ABS-KEY ("questionnaire of cognitive and affective empathy" or QCAE) AND PUBYEAR > 2015	(7)
15.	TITLE-ABS-KEY ("Toronto Empathy Questionnaire" OR TEQ) AND PUBYEAR > 2015	(677)
16.	TITLE-ABS-KEY ("Basic Empathy Scale" OR BES) AND PUBYEAR > 2015	(2,387)
17.	TITLE-ABS-KEY ("electrodermal (ACTIVIT* OR RESPONSE*) OR EDA) AND PUBYEAR > 2015	(2,686)
18.	TITLE-ABS-KEY ("startle AND (blink* or reflex*) AND PUBYEAR > 2015	(966)
19.	TITLE-ABS-KEY (cardiovascular AND (effect* OR response* OR reflex*)) AND PUBYEAR > 2015	(64,133)
20.	TITLE-ABS-KEY (electrocardiogram) AND PUBYEAR > 2015	(15,898)
21.	TITLE-ABS-KEY ("skin conductance response" OR SCR) AND PUBYEAR > 2015	(5,616)
22.	9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21	(419,478)
23.	3 AND 22	(119)
24.	8 OR 23	(500)

APPENDIX 5

DATA EXTRACTION FORM

General information

Date of data extraction:

Author:

Article title: Source (e.g. journal, conference) year/volume/pages/country of origin:

Identification of the reviewer:

Specific information

Re-verification of study eligibility (tick if correct)

Population	intervention	outcome	study design
( )	( )	( )	( )

POPULATION CHARACTERISTICS AND EXPOSURE CONDITIONS

1. Inclusion criteria

   population:

   measure:

   outcome:

   Design:

2. Exclusion criteria

3. Recruitment procedures (participation rates if available)

4. Characteristics of participants

   Age (Mean + SD):

   Ethnicity

   Nationality/Geographical region

   Other information

   Co-morbid diagnosis

5. Number of participants in each group

MEASURE

1. Type of empathy/emotion processing measure

2. Focus of measure (e.g. cognitive/affective empathy/emotion processing)

3. Intervention setting (e.g. research lab, interview room in secure accommodation)

4. Outcome measured (e.g. self-report scores, rates of skin conductance or startle blink amplitude, response accuracy and latency)

5. Who carried out the measurement?

6. Was the assessor blind?

7. What other measurement tool/s were used?

8. Was/were the tool(s) validated? If so, how?

ATTRITION

9. Drop-out rates (plus proportion of those who did not agree to participate, if possible) and reasons for drop-out

   Notes

ANALYSIS

1. Stats used

2. Do the stats adjust for confounding? If so, how?

3. How was missing data dealt with?

4. Were results statistically significant (i.e. $p<0.05$)

5. Were effect sizes reported?

FINAL OUTCOME/BOTTOM LINE RESULTS

APPENDIX 6

QUALITY CHECKLIST FOR CROSS-SECTIONAL STUDY

AUTHOR:
TITLE:
YEAR:
ASSESSOR: **DATE:**

SECTION/TOPIC	CRITERIA	DECISION		
		Yes=2	Partial Info /Not Clear=1	No=0
INTRODUCTION				
Objectives	Are objectives outlined/hypotheses pre-specified?			
METHODS				
Sampling Bias	Is there an explanation of how the study size was decided?			
	Were eligibility criteria, recruitment and selection processes clearly stated?			
	Were characteristics of study participants (e.g. demographic, clinical, social) included along with information on potential confounders			
	Was the ASPD group representative of wider ASPD population?			
	Was control group representative of general population?			
	Were groups matched or similar at baseline? (age, IQ, co-morbidity other than ASPD; medication)			
Attrition Bias	Were numbers of individuals at each stage of study reported —e.g. numbers potentially eligible, included in the study, attrition rates and participants analysed?			
	Are reasons for attrition/evidence of non-attrition provided?			

Measurement Bias	Were assessment measures valid?			
	Were assessment measures reliable?			
	Was blinding used where feasible?			
	Are outcome measures appropriate to the measurement of empathy/emotion processing?			
	Were efforts to avoid potential sources of bias described?			
	Were the same outcome measures used across groups?			
Statistical Bias	Are statistical methods used appropriate?			
	Was analysis adjusted to account for confounding variables?			
	Is there an explanation of how missing data was addressed/evidence that there was no missing data?			
	Are confidence intervals 95% or above?			
	Are effect sizes reported			
Outcome/ Interpretation	Are results accurate (i.e., could they be due to chance, bias or confounding variables?)			
	Are the results externally valid?			
	Do results take into account objectives, limitations and results from similar studies?			

SCORE = /46
INCLUDE **EXCLUDE**

SAMPLING BIAS = (0-4 = HIGH; 5-8 = UNCLEAR; 9-12 = LOW)
ATTRITION BIAS = (0-1 = HIGH; 2-3 = UNCLEAR; 4=LOW)
MEASUREMENT BIAS = (0-4 = HIGH; 5-8 = UNCLEAR; 9-12 = LOW)
STATISTICAL BIAS = (0-3 = HIGH; 4-7 = UNCLEAR; 8-10 = LOW)

APPENDIX 7

Table 1: Risk of bias in included cross-sectional studies (*n = 22*)

LOW RISK OF BIAS **UNCLEAR RISK OF BIAS** **HIGH RISK OF BIAS**

AUTHORS	SAMPLING BIAS						ATTRITION BIAS		MEASUREMENT BIAS						STATISTICAL BIAS				
	Explanation of how study size decided?	Eligibility criteria, recruitment and selection processes clearly stated?	characteristics of study participants (e.g. demographic, clinical, social) included along with information on potential confounders	ASPD group representative of wider ASPD population?	Was control group representative of general population?	Were groups matched or similar at baseline? (age, IQ, co-morbidity other than ASPD; medication)	Were numbers of individuals at each stage of reported —e.g. numbers eligible/included, attrition rates and participants analysed?	Are reasons for attrition/evidence of non-attrition provided?	Were assessment measures valid?	Were assessment measures reliable?	Was blinding used where feasible?	Are outcome measures appropriate to measurement of empathy/emotion processing?	Were efforts to avoid potential sources of bias described?	Were the same outcome measures used across groups?	Are statistical methods used appropriate?	Was analysis adjusted to account for confounding variables?	Explanation of how missing data was addressed /evidence for no missing data?	Are confidence intervals 95% or above?	Were effect sizes reported?
Bagcioglu et al, 2014	0	1	1	0	1	0	1	2	2	2	2	2	2	2	2	2	0	2	0
Barbosa et al, 2015	0	2	1	0	1	0	1	0	2	2	0	2	2	2	2	2	0	2	1
Bertone et al, 2017	0	1	1	1	1	0	0	2	2	2	0	2	1	2	2	1	0	2	0
Dinn & Harris, 2000	0	2	1	0	1	1	2	2	2	2	0	2	2	2	2	2	1	2	0
Dolan & Fullam, 2006	0	2	1	1	1	1	1	2	2	2	0	2	2	2	2	2	0	2	0
Domes et al, 2013	0	2	2	1	2	0	1	2	2	2	0	2	2	2	2	2	1	2	2
Drislane et al, 2013	0	2	1	0	0	1	1	2	2	2	0	2	1	2	2	2	2	2	0

AUTHORS	SAMPLING/SELECTION BIAS						ATTRITION BIAS		MEASUREMENT BIAS						STATISTICAL BIAS				
	Explanation of how study size decided?	Eligibility criteria, recruitment and selection processes clearly stated?	characteristics of study participants (e.g. demographic, clinical, social) included along with information on potential confounders	ASPD group representative of wider ASPD population?	Was control group representative of general population?	Were groups matched or similar at baseline? (age, IQ, co-morbidity other than ASPD; medication)	Were numbers of individuals at each stage of reported —e.g. numbers eligible/included, attrition rates and participants analysed?	Are reasons for attrition/evidence of non-attrition provided?	Were assessment measures valid?	Were assessment measures reliable?	Was blinding used where feasible?	Are outcome measures appropriate to measurement of empathy/emotion processing?	Were efforts to avoid potential sources of bias described?	Were the same outcome measures used across groups?	Are statistical methods used appropriate?	Was analysis adjusted to account for confounding variables?	Explanation of how missing data was addressed /evidence for no missing data?	Are confidence intervals 95% or above?	Were effect sizes reported?
Habel et al, 2002	0	2	1	0	1	1	1	1	2	2	0	2	2	2	2	2	0	2	0
Jusyte et al, 2015	0	2	1	0	1	0	1	2	2	2	0	2	2	2	2	2	0	2	2
Levenston et al, 2000	0	2	2	0	0	0	1	2	2	2	0	2	2	2	2	2	2	2	2
Loomans et al, 2015	0	2	1	0	2	0	1	2	2	2	0	2	2	2	2	2	2	2	2
Lorenz & Newman, 2002	0	2	2	1	0	1	1	0	2	2	2	2	2	2	2	2	0	2	0
Miranda et al, 2003	0	2	2	2	2	1	1	2	2	2	0	2	2	2	2	2	2	2	2
Rothemund et al, 2012	0	1	1	1	2	1	1	0	2	2	0	2	1	2	2	1	1	2	2

AUTHORS	SAMPLING BIAS						ATTRITION BIAS		MEASUREMENT BIAS						STATISTICAL BIAS				
	Explanation of how study size decided?	Eligibility criteria, recruitment and selection processes clearly stated?	characteristics of study participants (e.g. demographic, clinical, social) included along with information on potential confounders	ASPD group representative of wider ASPD population?	Was control group representative of general population?	Were groups matched or similar at baseline? (age, IQ, co-morbidity other than ASPD; medication)	Were numbers of individuals at each stage of reported —e.g. numbers eligible/included, attrition rates and participants analysed?	Are reasons for attrition/evidence of non-attrition provided?	Were assessment measures valid?	Were assessment measures reliable?	Was blinding used where feasible?	Are outcome measures appropriate to measurement of empathy/emotion processing?	Were efforts to avoid potential sources of bias described?	Were the same outcome measures used across groups?	Are statistical methods used appropriate?	Was analysis adjusted to account for confounding variables?	Explanation of how missing data was addressed /evidence for no missing data?	Are confidence intervals 95% or above?	Were effect sizes reported?
Sayer et al, 2001	0	1	2	0	0	0	1	2	2	2	0	2	1	2	0	0	0	2	0
Schiffer et al, 2017	0	1	1	1	1	1	1	2	1	1	0	2	2	2	2	2	0	2	0
Schonenberg et al, 2013	0	1	1	0	1	1	0	0	2	2	0	2	1	2	2	2	0	2	2
Schonenberg et al, 2014	0	2	1	0	1	0	1	2	2	2	0	2	2	2	2	2	2	2	0
Sedgwick, 2017	0	2	2	0	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2
Shamay-Tsoory et al, 2010	0	2	1	0	1	0	1	1	2	2	0	2	2	2	2	2	0	2	0
Vaidyanathan et al, 2011	0	1	0	1	0	0	2	2	2	2	0	2	1	2	2	2	2	2	0
Vitale et al, 2018	0	2	2	1	0	1	2	2	2	2	2	2	2	2	2	2	0	2	2

APPENDIX 8

Narrative of Quality Assessment Findings by Bias Categories

None of the studies was rated as low risk across all categories and only nine studies were rated as having no high risk of bias (Dinn & Harris, 2000; Dolan & Fullam, 2006; Domes, Mense, Vohs, & Habermeyer, 2013; Habel, Kuhn, Salloum, Devos, & Schneider, 2002; Loomans, Tulen, & Van Marle, 2015; Miranda, Meyerson, Myers, & Lovallo, 2003; Schiffer et al., 2017; Sedgwick, 2017; Vitale, Kosson, Resch, & Newman, 2018). However, only three were rated as high risk for more than one category of bias (Barbosa, Almeida, Ferreira-Santos, & Marques-Teixeira, 2016; Sayar, Ebrinc, & Ak, 2001; Schonenberg, Louis, Mayer, & Jusyte, 2013). Still, none of the studies provided evidence of a power analysis or explanation of how the study size was determined and nine had ASPD groups of <20 (Bertone, Díaz Granados, Vallejos, & Muniello, 2017; Dinn & Harris, 2000; Habel et al., 2002; Levenston, Patrick, Bradley, & Lang, 2000; Miranda et al., 2003; Rothemund et al., 2012; Schiffer et al., 2017; Sedgwick, 2017; Shamay-Tsoory, Harari, Aharon-Peretz, & Levkovitz, 2010). Findings from studies with small sample sizes are not only limited in terms of external validity but lack statistical power and are therefore more vulnerable to Type II error (Button et al., 2013). Sampling bias was the most prevalent area of risk, with eleven studies rated as high risk (Bagcioglu et al., 2014; Barbosa et al., 2016; Bertone et al., 2017; Drislane, Vaidyanathan, & Patrick, 2013; Jusyte, Mayer, Kunzel, Hautzinger, & Schonenberg, 2015; Levenston et al., 2000; Sayar

et al., 2001; Schonenberg & Jusyte, 2014; Schonenberg et al., 2013; Shamay-Tsoory et al., 2010; Vaidyanathan, Hall, Patrick, & Bernat, 2011), ten as unclear risk (Dinn & Harris, 2000; Dolan & Fullam, 2006; Domes et al., 2013; Habel et al., 2002; Loomans et al., 2015; Lorenz & Newman, 2002; Rothemund et al., 2012; Schiffer et al., 2017; Sedgwick, 2017; Vitale et al., 2018) and only one as low risk (Miranda et al., 2003). Nineteen of the studies rated as high or unclear risk of sampling bias recruited ASPD/DPD participants purely from secure/military hospital and/or prison settings whilst another recruited community ASPD+ participants through newspaper advertisements targeted towards those with prominent psychopathic personality characteristics (Dinn & Harris, 2000) and one recruited a community-based offender ASPD+ population based on Psychopathy Checklist: Screening Version (PCL:SV; Hart, Hare & Cox, 1995) factor 1 scores of ≥ 8, thereby increasing the risk of non-representative samples (Rothemund et al., 2012). Selective sampling then further limited generalisability of results to the wider ASPD population. For instance, Barbosa et al. (2016) recruited only recidivist offenders with ASPD, Levenston et al. (2000) excluded ASPD participants with an imminent release date and three studies excluded ASPD offenders who had committed drug-related crimes, domestic or sexual assault (Jusyte, Mayer, Künzel, Hautzinger, & Schönenberg, 2014; Schonenberg & Jusyte, 2014; Schonenberg et al., 2013).

Four of the studies rated as high risk recruited controls purely from offending populations (Bertone et al., 2017; Drislane et al., 2013; Levenston et al., 2000; Vaidyanathan et al., 2011) whilst six rated as either high or unclear risk recruited non-ASPD controls from the community but did not clarify whether specific populations were targeted (Bagcioglu et al., 2014; Dinn & Harris, 2000; Habel et al., 2002; Schiffer et al., 2017; Shamay-Tsoory et al., 2010; Schonenberg et al., 2013) and one recruited their control group entirely from military personnel (Sayar et al., 2001).

Whilst most studies evidenced a degree of matching between ASPD and control groups (i.e., age, IQ, education), potential differences between groups were not consistently addressed or controlled for within data analysis. For instance, one study provided no information about the age range of their study population or mean ages of ASPD+/- and non-ASPD groups (Vaidyanathan et al., 2011), two studies provided either the age range or mean of their whole study population but did not report group means (Bertone et al., 2017; Drislane et al., 2013). Seven studies provided no IQ or education comparison between groups (Barbosa et al., 2016; Bertone et al., 2017; Drislane et al., 2013; Habel et al., 2002; Loomans et al., 2015; Rothemund et al., 2012; Vaidyanathan et al., 2011) and another study highlighted significant group differences in the educational and socio-economic status of ASPD+/- and control participants but did not control for these differences in their analysis (Sayar et al., 2001) .

Co-morbidity was similarly variable with one study (Schonenberg & Jusyte, 2014) employing ASPD participants with co-morbid major depressive disorder (MDD) and/or dysthymia, both of which are associated with mood-congruent facial processing bias and negative bias in unconscious emotional processing (Stuhrmann, Suslow, & Dannlowski, 2011; Zhang, He, Chen, & Wei, 2016). This study was not excluded because co-morbidity accounted for <11% of their ASPD+/- population and because it is unclear whether facial processing impairment is related to state or trait characteristics of depression. Another highlighted Autism Spectrum Disorder (ASD) in 12% (*n* = 2) of their DPD+/- group which the author acknowledged may have confounded results (Sedgwick, 2017) and two identified co-morbid Narcissistic and Emotionally Unstable personality disorder in those with ASPD+/- (Miranda et al., 2003; Sedgwick, 2017), which are similarly associated with impaired emotion processing and empathy (Levine, Marziali, & Hood, 1997).

Seventeen studies assessed for the presence of co-morbid psychopathy/psychopathic traits. However, only two studies independently compared outcomes of ASPD- and ASPD+ groups against those of controls (Loomans et al., 2015; Vitale et al., 2018), whilst another compared the outcomes of those with DPD (with and without co-morbid psychopathy) against those of controls and then independently compared the results of DPD (without co-morbid psychopathy) and DPD (with co-morbid psychopathy) groups (Dolan & Fullam, 2006). Two studies independently compared the results of ASPD+/- and non-ASPD

groups as well as psychopathic versus non-psychopathic groups (Drislane et al., 2013; Vaidyanathan et al., 2011) whilst two controlled for co-morbid psychopathy/psychopathic traits as a co-variate (Lorenz & Newman, 2002; Miranda et al., 2003) and ten utilised correlations and/or regression to determine the relationship between total psychopathy /psychopathic trait scores and outcomes on emotion processing measures (Dolan & Fullam, 2006; Domes et al., 2013; Drislane et al., 2013; Habel et al., 2002; Jusyte et al., 2015; Schiffer et al., 2017; Schonenberg & Jusyte, 2014; Sedgwick, 2017; Vaidyanathan et al., 2011; Vitale et al., 2018). One study compared the results for offending ASPD+/-, offending non-ASPD and non-offending controls and also compared outcomes for sub-groups of offenders with high, medium or low levels of psychopathic traits against those of non-offending controls (Domes et al., 2013) and one (Schiffer et al., 2017) employed an ASPD population who all were assessed for psychopathy but had a mean PCL:SV score (m = 12.3, sd = 2.0) that was below both the recommended PCL:SV cut-off (≥18) and European equivalent PCL:SV cut-off (≥ 17) for psychopathy classification.[19]

Whilst eleven studies assessed all groups for psychopathy/psychopathic traits (Dinn & Harris, 2000; Drislane et al., 2013; Jusyte et al., 2015; Levenston et al., 2000; Loomans et al., 2015; Lorenz & Newman, 2002; Miranda et al., 2003; Rothemund et al., 2012; Schiffer et al., 2017;

[19] European equivalent cut-off criteria for psychopathy (PCL:SV = ≥ 17) quoted and employed by Dolan & Fullam, 2006 to categorise psychopathic and non-psychopathic ASPD participants.

Vaidyanathan et al., 2011; Vitale et al., 2018), one assessed offenders (with and without ASPD) but not non-offending controls (Domes et al., 2013) and five assessed ASPD/DPD participants only (Dolan & Fullam, 2006; Habel et al., 2002; Schonenberg & Jusyte, 2014; Sedgwick, 2017; Shamay-Tsoory et al., 2010) so were unable to examine the degree to which co-morbid psychopathy/psychopathic traits mediated outcomes for community/control groups or exclude the possibility of co-morbid psychopathy effects in their control groups.

Furthermore, whilst thirteen studies employed PCL:SV (Hart, Hare & Cox, 1995) or Psychopathy Checklist Revised (PCL-R; Hare, 1991) criteria to identify co-morbid psychopathy, one study classified participants as psychopathic but quoted PCL-R scores ranging between 15-31 (Rothemund et al., 2012) and another classified participants as psychopathic if they achieved PCL-R scores >20 (Habel et al., 2002) which despite being above the cut off for non-psychopaths (Hare, 1991) is below the more widely acknowledged US (≥ 30) or European (≥ 25) cut-off scores employed in psychopathy assessment (Coid et al., 2009; Juriloo et al., 2014). One study gave no indication of group mean PCL-R scores (Lorenz & Newman, 2002) and another utilised the PCL-R to assess psychopathy in patients and the Psychopathic Personality Inventory: Revised (PPI-R; Lilienfeld & Widows, 2005) to assess psychopathic traits in controls, which the authors acknowledged could complicate the differentiation of personality characteristics that impact upon startle modulation (Loomans et al., 2015). Although five studies utilised self-

report psychopathy measures (Jusyte et al., 2015; Loomans et al., 2015; Miranda et al., 2003; Schonenberg & Jusyte, 2014; Shamay-Tsoory et al., 2010)**,** only one addressed and highlighted dissimulation in psychopathy scores (Schonenberg & Jusyte, 2014).

Three studies identified current substance misuse/dependence in participants with ASPD+/- (Jusyte et al., 2015; Sayar et al., 2001; Domes et al., 2013) and did not control for differences between ASPD+/- and control groups in their analysis, thereby preventing elimination of substance misuse as a potential confounder. However, six further studies excluded ASPD participants on the basis of historical and/or current co-morbid substance/alcohol misuse or dependence (Bagcioglu et al., 2014; Barbosa et al., 2016; Dinn & Harris, 2000; Miranda et al., 2003; Rothemund et al., 2012; Shamay-Tsoory et al., 2010) thereby increasing the risk of non-representative samples and in some cases presenting a significant threat to the integrity and application of their findings as ASPD populations are recognised as having higher rates of alcohol dependence and substance misuse than those without ASPD (Flory, Lynam, Milich, Leukefeld, & Clayton, 2002; Moeller & Dougherty, 2001). Although three studies identified historical but no current substance abuse/dependence in ASPD/DPD groups, ten studies did not screen ASPD/DPD participants for current substance/alcohol misuse or dependence (Bertone et al., 2017; Dolan & Fullam, 2006; Drislane et al., 2013; Levenston et al., 2000; Loomans et al., 2015; Lorenz & Newman, 2002; Schonenberg & Jusyte, 2014; Schonenberg et al., 2013; Vaidyanathan et al., 2011; Vitale et al.,

2018) which although a less deleterious methodological issue and common practice in research with offending populations who have no community access or who undergo regular alcohol/drug screening during detainment nevertheless prevents substance misuse/alcohol dependence being discounted as a potential confounder Added to this, information regarding historical and current substance/alcohol misuse can help to inform how representative participants are to wider ASPD/DPD and control populations.

Similarly, whilst one study highlighted historical psychopharmacological medication use in ASPD participants (Habel et al., 2002) and two studies recruited ASPD/DPD participants who were current users of psychotropic medication (Loomans et al., 2015; Sedgwick, 2017) which some contend is associated with emotional blunting or numbness (Price, Cole, & Goodwin, 2009), seven excluded ASPD participants on the basis of current psychopharmacological/psychotropic medication use (Bagcioglu et al., 2014; Dinn & Harris, 2000; Dolan & Fullam, 2006; Levenston et al., 2000; Miranda et al., 2003; Shamay-Tsoory et al., 2010; Vitale et al., 2018) and twelve studies did not screen ASPD participants for current psychoactive or psychopharmacological medication use (Barbosa et al., 2016; Bertone et al., 2017; Domes et al., 2013; Drislane et al., 2013; Jusyte et al., 2015; Lorenz & Newman, 2002; Rothemund et al., 2012; Sayar et al., 2001; Schiffer et al., 2017; Schonenberg & Jusyte, 2014; Schonenberg et al., 2013; Vaidyanathan et al., 2011) so could not discount medication effects.

Although attrition bias was less evident, four studies were rated as high overall risk due to lack of clarity regarding participation rates, attrition/ reasons for attrition (Barbosa et al., 2016; Lorenz & Newman, 2002; Rothemund et al., 2012; Schonenberg et al., 2013) and fourteen were rated as unclear risk due to a lack of clarity about numbers of eligible participants and/or because of limited information regarding attrition/reasons for attrition (Bagcioglu et al., 2014; Bertone et al., 2017; Dolan & Fullam, 2006; Domes et al., 2013; Drislane et al., 2013; Habel et al., 2002; Jusyte et al., 2015; Levenston et al., 2000; Loomans et al., Miranda et al., 2003; Sayar et al., 2001; Schiffer et al., 2017; Schonenberg & Jusyte, 2014; Shamay-Tsoory et al., 2010). Of those that did report attrition, only three identified which groups were affected (Levenston et al., 2000; Loomans et al., 2015; Sedgwick, 2017). Notably, one study re-examined data from research undertaken by Lorenz and Newman (2002)[20] and so was not considered to be at risk from attrition (Vitale et al., 2018).

One study was rated as high risk of statistical bias because the authors employed a statistical approach that did not control for observed group differences (i.e., in socio-economic status and education) that were associated with higher rates of alexithymia and did not reference missing

[20] Original study by Lorenz & Newman (2002) differs to that included in SR and did not specify inclusion of ASPD participants – see reference list below.

data (Sayar et al., 2001). However, absence of information regarding missing data and/or between group effect sizes (i.e., partial eta squared/Cohen's *d*) was a common issue which led to ratings of unclear risk for an additional nine studies (Bagcioglu et al., 2014; Barbosa et al., 2016; Bertone et al., 2017; Dinn & Harris, 2000; Dolan & Fullam, 2006; Habel et al., 2002; Lorenz & Newman, 2002; Schiffer et al., 2017; Shamay-Tsoory et al., 2010). Although *p*-values are widely reported, they can be confounded by sample size and lead to misinterpretation of results with serious implications. Consequently, whilst effect sizes can (if unavailable) be calculated based on sample size, group means and standard deviations, they should be reported alongside *p* values because they provide a more accurate indication of how sizeable (and meaningful) differences are and allow a quantitative comparison of differences across studies. They are also useful to wider research as they can be employed to inform meta-analyses and a-priori power analyses that reduce the likelihood of Type II error or finding no effect when one actually exists (Sullivan & Feinn, 2012). Whilst missing data is a common methodological issue in psychological research that does not necessarily constitute a problem because it can be addressed through a range of statistical methods or omission of data sets with a high number of missing values, it can lead to inaccurate interpretation of findings if overlooked or addressed inappropriately and it is therefore recommended that missing data is acknowledged with the conditions under which it occurred and methods employed to address it specified (Dong & Peng, 2013).

None of the studies was rated as high overall risk of measurement bias as all adhered to DSM-IV diagnostic criteria for ASPD, utilised quantitative measures suitable for the investigation of emotion processing and empathy uniformly across groups and reported efforts to resolve potential sources of bias. However, one study was rated as unclear risk of measurement bias, because it did not evidence blinding and used a simplified version of the Reading the Eyes in the Mind Test (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) with only two (as opposed to four) response options, thereby increasing the likelihood that participants would choose the correct answer by chance (Schiffer et al., 2017). In fact, only four of the reviewed studies evidenced blinding (Bagcioglu et al., 2014; Lorenz & Newman, 2002; Sedgwick, 2017; Vitale et al., 2018) and whilst this may be particularly difficult when assessing or collecting data from distinct populations based in different locations (i.e., community vs secure hospital/prison), utilising personnel who are unaware of participants' group status or the hypothesis being tested during participation or data evaluation can help to prevent the introduction of observer bias.

APPENDIX 9

Health Research Authority
NRES Committee East Midlands - Nottingham 1
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 8839697

15 June 2015

Clin. Assoc. Professor Birgit Vollm
University of Nottingham Division of Psychiatry and Applied Psychology
School of Medicine, University of Nottingham
Triumph Rd, Nottingham
NG7 2TU

Dear Clin. Assoc. Professor Vollm,

Study title:	**An investigation of empathic and moral decision making processes comparing patients with a diagnosis of Antisocial Personality Disorder and patients with a diagnosis of Antisocial Personality Disorder and Psychopathy.**
REC reference:	**15/EM/0213**
Protocol number:	**N/A**
IRAS project ID:	**167845**

Thank you for your letter of 8th June 2015, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact the Acting REC Manager, Ms Rachel Nelson, NRESCommittee.EastMidlands-Nottingham1@nhs.net. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from NRES. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Copies of advertisement materials for research participants [Recruitment Poster for Control Participants]	1	14 November 2014
Letter from sponsor [Sponsor Letter]		13 March 2015
Other [Empathy Eliciting Short Stories Task Extract]		
Other [Emotion Mutimorph Task Extract]		27 April 2015
Other [Empathy Image Task Extract]		27 April 2015
Other [Moral Dilemmas Task Extract]		27 April 2015
Other [Moral Emotions Task Extract]		27 April 2015
Other [Letter of Response to REC Committee]		08 June 2015
Participant consent form [Patient Consent Form]	2.0	08 June 2015
Participant consent form [Control Consent Form]	2.0	08 June 2015
Participant information sheet (PIS) [Information Sheet for Patients]	2.0	08 June 2015
Participant information sheet (PIS) [Information Sheet for Control Participants]	2.0	08 June 2015
REC Application Form [REC_Form_24042015]		24 April 2015
Research protocol or project proposal [Empathic and Moral Processing in Personality Disosrdered Patients]	1	15 December 2014
Summary CV for Chief Investigator (CI) [Short Curriculum Vitae - Birgit Vollm]		
Summary CV for student [Curriculum Vitae]		27 April 2015
Validated questionnaire [Ammons Quick Test]		
Validated questionnaire [Interpersonal Reactivity Index]		
Validated questionnaire [Questionnaire of Cognitive and Affective Empathy]		
Validated questionnaire [Toronto Alexithymia Scale (TAS-20)]		

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments

- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:
http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

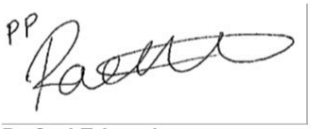
HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

15/EM/0213	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely,



Dr Carl Edwards
Chair

Email: NRESCommittee.EastMidlands-Nottingham1@nhs.net

Enclosures: "After ethical review – guidance for researchers"

Copy to: *Mrs Shirley Mitchell*

APPENDIX 10

INFORMATION SHEET FOR PATIENTS

EMPATHIC AND MORAL PROCESSING IN PERSONALITY DISORDERED PATIENTS

(Student Doctorate Research Project)

You are invited to take part in a research study which aims to compare the empathy and moral decisions of three different groups: **Group 1** - patients with Antisocial Personality Disorder, **Group 2** - patients with Antisocial Personality Disorder and Psychopathy, and **Group 3** – people from within the community with none of these disorders (controls). You are invited to participate in one of the patient groups.

Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and talk to others about the study if you wish, for example your friends, family or staff.

- Part 1 of this information sheet tells you the purpose of this study and what will happen to you if you take part.
- Part 2 of this information sheet gives you more detailed information about the study conduct.

Also, you are free to ask Janet (the research student conducting this study) if there is anything that is not clear or if you would like more information.

PART 1

What is the purpose of the study?

Research suggests that empathic people are more pro-social. We want to look at differences in empathy between personality disordered patients and people from within the community (controls). This may lead to more personalised treatment in the future.

Why have I been chosen?

A total of 75 participants will be invited to take part in the study (25 in each group). You have been chosen because you are a man with a diagnosis of antisocial personality disorder or antisocial personality disorder and psychopathy.

Do I have to take part?

No. It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the level of care you receive.

What will happen to me if I take part?

You will be asked to perform some simple tasks and fill in some short questionnaires on a computer. For example, you will be asked to identify your emotional reactions to some pictures or stories, or to identify emotions from faces. We estimate that taking part will require approximately 60 minutes of your time and can be completed in one session although more sessions can be arranged over a longer time period if required.

What are the side effects or possible disadvantages and risks of taking part?

The tasks/questionnaires themselves will not include topics that might be embarrassing or upsetting. However, if any safeguarding issues arise (which suggest danger to yourself or other persons) they will be reported immediately to the safeguarding officer or other appropriate professional at your facility.

What are the possible benefits of taking part?

All participants will receive a £15.00 inconvenience payment.

There are no immediate benefits for you, but by taking part you may be able to help others with antisocial personality disorder. In the longer term, the study may provide information useful for personalised treatment and prevention of personality disorders.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. More detailed information on this is available in Part 2 of this Information Sheet.

Will my taking part in the study be kept confidential?

All the information about your participation in this study will be kept confidential. The information will be stored using a code number instead of your name, and only the research team will have access to the information. The details are included in Part 2.

Contact details

If you would like further information about the study, please feel free to contact:
Janet.Marsden@nottingham.ac.uk – Researcher
Birgit.Völlm@nottingham.ac.uk – Research Supervisor

If they cannot answer your questions, they will refer you to the most appropriate person within their research organisation or if necessary obtain further information and contact you in due course.

Where will the study take place?

In Rampton Hospital, Arnold Lodge Medium Secure Unit, The Wells Road Centre and The University of Nottingham.

If the information in Part 1 of this leaflet has interested you and you are considering participation in our study, please continue to read the additional information in Part 2 before making any decision.

Thank you for taking the time to read this.

PART 2

What if relevant new information becomes available?

We do not anticipate that new information will become available during the course of the study that will be relevant to your participation.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study at any time and without giving a reason. This would not affect the standard of care you receive. If you do choose to withdraw from the study, we would like to use the data collected up to your withdrawal. However, if you have an objection to this, you can of course ask us not to analyse your data.

What if there is a problem?

Every care will be taken in the course of this study. However, in the unlikely event that you are injured by taking part, compensation may be available.

If you suspect that the injury is the result of the Sponsor's (Nottinghamshire Healthcare Foundation Trust) or the hospital's negligence then you may be able to claim compensation. After discussing your complaint with the researcher, please make the claim in writing to Clinical Associate Professor and Reader in Forensic Psychiatry Birgit Völlm who is the Chief Investigator for the research and is based at the Division of Psychiatry and Applied Psychology, University of Nottingham.

The Chief Investigator will then pass the claim to the Sponsor's Insurers, via the Sponsor's office.

You may have to bear the costs of the legal action initially, and you should consult a lawyer about this.

In addition to this, if you have concerns about any aspect of the way you have been approached or treated by members of staff or about any side effects (adverse events) you may have experienced due to your participation in the research, please contact:

Patient Advice and Liaison Service, Rampton Hospital, Retford, Nottinghamshire, DN22 0PD. Tel: 01777 247396
E-mail: jane.smith@nottshc.nhs.uk

Will my taking part in this study be kept confidential?

The health care team responsible for you will be informed of your participation. However, they will not have access to any of the data collected from you. We will handle, process, store and destroy your data in compliance with the Data Protection Act 1998.

All information which is collected about you during the course of the research will be kept strictly confidential and identified by code rather than your name. The data will be used only for the research questions raised in the present study.

For computerised-tasks, we will collect your data onto computers and then store it electronically (e.g. using password protected external hard-drives).

Data analyses will occur within the Division of Psychiatry and Applied Psychology at the University of Nottingham, using password protected network drives for storage. Identifiable data will not be held on laptops or PC hard drives.

The staff involved in the data analysis are Ms Janet Marsden and Clinical Associate Professor and Reader in Forensic Psychiatry Birgit Völlm.

You have the right to check the accuracy of data held about you and to correct any errors.

All data collected as part of the study will be maintained securely within our department for a period of 10 years.

What will happen to the results of the research study?

The results of the study will be published in scientific journals and at scientific conferences. **You will not be identified in any report or publication. All results are published anonymously, looking at trends across several people. We do not focus on single individuals.**

Who has reviewed the study?

The local Research Ethics Committee and Nottinghamshire Healthcare NHS Foundation Trust Research & Development Department.

APPENDIX 11

Nottinghamshire Healthcare NHS
NHS Foundation Trust

INFORMATION SHEET FOR CONTROL PARTICIPANTS

EMPATHIC AND MORAL PROCESSING IN PERSONALITY DISORDERED PATIENTS

(Student Doctorate Research Project)

You are invited to take part in a research study which aims to compare the empathy and moral decisions of three different groups: **Group 1** - patients with Antisocial Personality Disorder, **Group 2** - patients with Antisocial Personality Disorder and Psychopathy, and **Group 3** – people from within the community with none of these disorders (controls). You are invited to participate in the control group.

Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and talk to others about the study if you wish, for example your friends, family or staff.

- Part 1 of this information sheet tells you the purpose of this study and what will happen to you if you take part.
- Part 2 of this information sheet gives you more detailed information about the study conduct.

Also, you are free to ask Janet (the research student conducting this study) if there is anything that is not clear or if you would like more information.

PART 1

What is the purpose of the study?

Research suggests that empathic people are more pro-social. We want to look at differences in empathy between personality disordered patients and people from within the community (controls). This may lead to more personalised treatment in the future.

Why have I been chosen?

A total of 75 participants will be invited to take part in the study (25 in each group). You have been chosen because you are a man without a diagnosis of antisocial personality disorder or antisocial personality disorder and psychopathy.

Do I have to take part?

No. It is up to you to decide whether or not to take part. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You will be asked to perform some simple tasks and fill in some short questionnaires on a computer. For example, you will be asked to identify your emotional reactions to some pictures or stories, or to identify emotions from faces. We estimate that taking part will require approximately 60 minutes of your time and can be completed in one session although more sessions can be arranged over a longer time period if required.

What are the side effects or possible disadvantages and risks of taking part?

The tasks/questionnaires themselves will not include topics that might be embarrassing or upsetting. However, if any safeguarding issues arise (which suggest danger to yourself or other persons) they will be reported immediately to the safeguarding officer or other appropriate professional at your facility.

What are the possible benefits of taking part?

All participants will receive a £15.00 inconvenience payment.

There are no immediate benefits for you, but by taking part you may be able to help others with antisocial personality disorder. In the longer term, the study may provide information useful for personalised treatment and prevention of personality disorders.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed. More detailed information on this is given in Part 2 of this Information Sheet.

Will my taking part in the study be kept confidential?

All the information about your participation in this study will be kept confidential. The information will be stored using a code number instead of your name, and only the research team will have access to the information. The details are included in Part 2.

Contact details

If you would like further information about the study, please feel free to contact:
Janet.Marsden@nottingham.ac.uk – Researcher
Birgit.Völlm@nottingham.ac.uk – Research Supervisor

If they cannot answer your questions, they will refer you to the best person within their research organisation or if necessary obtain further information and contact you in due course.

Where will the study take place?

In Rampton Hospital, Arnold Lodge Medium Secure Unit, The Wells Road Centre and Nottingham University.

If the information in Part 1 of this leaflet has interested you and you are considering participation in our study, please continue to read the additional information in Part 2 before making any decision.

Thank you for taking the time to read this.

PART 2

What if relevant new information becomes available?

We do not anticipate that new information will become available during the course of the study that will be relevant to your participation.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study at any time and without giving a reason. If you do choose to withdraw from the study, we would like to use the data collected up to your withdrawal. However, if you have an objection to this, you can of course ask us not to analyse your data.

What if there is a problem?

Every care will be taken in the course of this study. However, in the unlikely event that you are injured by taking part, compensation may be available.

If you suspect that the injury is the result of the Sponsor's (Nottinghamshire Healthcare Foundation Trust) negligence then you may be able to claim compensation. After discussing your complaint with the researcher, please make the claim in writing to Clinical Associate Professor and Reader in Forensic Psychiatry Birgit Völlm who is the Chief Investigator for the research and is based at the Division of Psychiatry and Applied Psychology, University of Nottingham.

The Chief Investigator will then pass the claim to the Sponsor's Insurers, via the Sponsor's office.

You may have to bear the costs of the legal action initially, and you should consult a lawyer about this.

Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated by members of staff or about any side effects (adverse events) you may have experienced due to your participation in the research, please contact:

Birgit.Vollm@nottingham.ac.uk

Will my taking part in this study be kept confidential?

We will handle, process, store and destroy your data in compliance with the Data Protection Act 1998.

All information which is collected about you during the course of the research will be kept strictly confidential and identified by code rather than your name. The data will be used only for the research questions raised in the present study.

For computerised-tasks, we will collect your data onto computers and then store it electronically (e.g. using password protected external hard-drives).

Data analyses will occur within the Division of Psychiatry and Applied Psychology at the University of Nottingham, using password protected network drives for storage. Identifiable data will not be held on laptops or PC hard drives.

The staff involved in the data analysis are Ms Janet Marsden and Clinical Associate Professor and Reader in Forensic Psychiatry Birgit Völlm.

You have the right to check the accuracy of data held about you and to correct any errors.

All data collected as part of the study will be maintained securely within our department for a period of 10 years.

What will happen to the results of the research study?

The results of the study will be published in scientific journals and at scientific conferences. **You will not be identified in any report or publication. All results are published anonymously, looking at trends across several people. We do not focus on single individuals.**

Who has reviewed the study?

The local Research Ethics Committee and Nottinghamshire Healthcare NHS Trust Research and Development Department.

APPENDIX 12

Nottinghamshire Healthcare NHS
NHS Foundation Trust

CONSENT FORM FOR PATIENTS

EMPATHIC AND MORAL PROCESSING IN PERSONALITY DISORDERED PATIENTS

(Student Doctorate Research Project)

Part 1: Please initial the appropriate box:

Yes, I would like to participate in this study. ☐

No, I do not want to participate in this study. ☐

If Yes, please initial each of the following to show your agreement:

I have read the Information Sheet version 2.0 (08.06.15) about the study. ☐

I understand that I may withdraw from the study at any time without giving a reason. ☐

I understand my health care team will be informed of my participation. ☐

I have had the opportunity to ask any questions I wish to ask. ☐

I agree to do tests and questionnaires of thinking ability, emotions and morality. ☐

I agree to allow the researcher to gather information about my personality traits and background history from my hospital files ☐

I have kept a record of the name and email address of the researcher in case I have any queries in the future. ☐

Participant's Name (print): _____

Signature: _____

Date: _____

Researcher's Name (print): _____

Signature: _____

Date: _____

Thank you.

APPENDIX 13

Nottinghamshire Healthcare NHS
NHS Foundation Trust

CONSENT FORM FOR CONTROL PARTICIPANTS

EMPATHIC AND MORAL PROCESSING IN PERSONALITY DISORDERED PATIENTS

(Student Doctorate Research Project)

Part 1: Please initial the appropriate box:

Yes, I would like to participate in this study. ☐

No, I do not want to participate in this study. ☐

If Yes, please initial each of the following to show your agreement:

I have read the Information Sheet version 2.0 (08.06.15) about the study. ☐

I understand that I may withdraw from the study at any time without giving a reason. ☐

I have had the opportunity to ask any questions I wish to ask. ☐

I agree to do tests and questionnaires of thinking ability, emotions and morality. ☐

I have kept a record of the names and email address of the researcher
In case I have any queries in the future. ☐

Participant's Name (print): _____

Signature: _____

Date: _____

Researcher's Name (print): _____

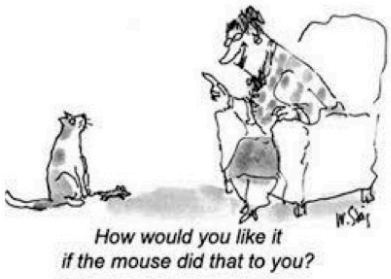
Signature: _____

Date: _____

Thank you.

APPENDIX 14

Nottinghamshire Healthcare NHS
NHS Foundation Trust



Can you tell how other people are feeling?

How do you respond to other people's feelings?

Do you have strong opinions about what is morally right and wrong?

WOULD YOU BE INTERESTED IN TAKING PART IN A RESEARCH PROJECT INVESTIGATING EMPATHIC AND MORAL PROCESSING?

WOULD YOU LIKE TO KNOW HOW ABLE YOU ARE TO UNDERSTAND AND RESPOND TO THE FEELINGS OF OTHERS OR WHAT YOU WOULD DO IF YOU WERE FACED WITH A MORAL DILEMMA?

I am a post-graduate Psychology student working under the supervision of Professor Birgit Völlm and Professor Cris Glazebrook at the University of Nottingham, currently researching empathic and moral processing in offending and non-offending groups.

Due to the use of English-language audio and visual stimuli and reading tasks in this study, I require male participants aged between 20-65 who are fluent in English, have no criminal record, no history of major mental disorder, no history of neuro-degenerative disorder or head injury causing loss of consciousness for one hour or longer and no diagnosis of dyslexia, hearing impairment, current substance misuse/dependence or alcohol intake of more than 20 units per week.

Participation will require approximately 1 hour of your time and involves answering a few background questions followed by completion of (mainly) computer based questionnaires/short tasks. All participants will receive a £15.00 inconvenience payment.

If you are interested in taking part and would like further information, please contact Janet Marsden by email at: lwxjm8@nottingham.ac.uk or on mobile xxxxxxx

APPENDIX 15

QT

Description: A proxy-IQ measure developed by Ammons and Ammons (1962). The test comprises 3 sets of four cartoons and three lists of 50 words. The subject is read words from a list and has to identify the cartoon that best relates to the word. The words in each list get progressively harder, although the first 15 or 20 should be very easy for most adults to link to a cartoon. The number of words correctly linked to cartoons is converted using standard conversion tables into a proxy IQ score.

SOP: To give the respondent an idea of what they have to do in this test, show them one of the sets of cartoons, and read them one easy word and one hard word from the appropriate list (easy/hard words are identified on the word list in brackets) asking them to identify the cartoon that most obviously relates to that word. Then in the formal test, randomly choose any two of the three sets of cartoons (and the appropriate lists of words which will be in the test booklet). Give the subject one of the laminated cartoon sets and read words from the list, making a note of whether or not the subject correctly identifies (by number: 1, 2, 3 or 4) the cartoon that the word relates to. Do not comment if the respondent makes an error, but stop the test when s/he has made 6 consecutive errors. There is no need to start at the top of the list. For healthy adults, start around word 20 or 25 and only backtrack if the subject gets this word wrong. If they get it right assume that they would have answered all the preceding words correctly too. It is important to avoid guessing. If you suspect that the subject is guessing, remind them that they should not guess and/or ask them to define the word you think they have guessed at. If they cannot define it count it as an error.

Instructions to subject: Start out by saying something like: *"This is a test of verbal comprehension, of how you understand words and what they mean. I'm going to show you some pictures, and say some words. When I say a word, tell me the number of the picture which best fits it. Show me ******* (give an easy word). Some words are going to be harder to link to a picture. Show me ********* (give hard word). If you are not sure about a particular word, just say "don't know" and I will go on to another word. Do not guess."*

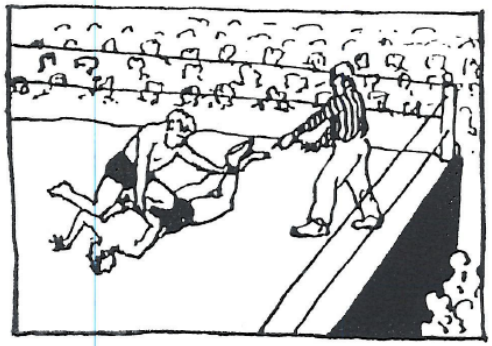
QT SCORE SHEET		
FORM 1	FORM 2	FORM 3
4 belt	2 cans	2 sheet
1 dancing	3 chewing	1 exercise
4 traffic	4 falling	2 machine
4 whistle	3 dinner	4 burners
3 fence	1 cow	1 audience
2 drink	2 groceries	3 dish
3 wreck	4 hat	2 drying
1 music	3 sitting	3 food
2 medicine	1 country	3 fork
4 gun	4 danger	1 crowd
2 pepper	3 plate	3 slice
3 racing	1 river	2 washing
2 salt	3 tasting	4 tears
1 woman	2 shelves	1 fighting
2 sugar	1 sky	4 kitchen
3 track	3 table	3 pastry
4 school	4 carelessness	2 windy
1 partner	3 manners	4 pitiful
1 couples	2 adding	1 contest
3 rail	4 injury	4 sorrow
4 respectful	2 merchandise	1 loser
3 betting	3 waitress	4 heartbreak
1 dating	1 horizon	1 struggle
3 stadium	2 retail	2 rotary
4 pedestrian	1 irrigation	1 opponents
1 graceful	4 unaware	4 grief
2 fluid	1 current	3 utensils
2 solution	1 fertile	2 lever
4 discipline	4 descending	3 portion
3 bleachers	1 spacious	3 edible
2 crystallized	2 proprietor	1 exhibition
1 turntable	4 inattentive	4 soothed
2 saccharin	3 indulging	4 caress
4 immature	1 precipitation	1 combatant
1 cordiality	1 freshet	4 forlorn
3 velocity	4 transom	3 nutrient
4 decisive	3 consumption	4 solace
3 laceration	1 aquatic	1 pacify
3 foliage	4 perilous	1 contorted
4 imperative	1 terrain	4 jets
1 intimacy	4 imminent	4 doleful
2 concoction	2 foresight	3 tines
1 conviviality	1 condensation	4 disconsolate
4 chevrons	3 satiation	3 sustenance
2 condiment	3 visceral	4 maudlin
3 cacophony	1 bovine	3 gustatory
2 miscible	3 replace	4 poignant
2 imbibe	3 prehension	1 bellicose
1 amicable	4 ingress	3 comestible
2 pungent	4 celerity	4 despondency
SCORE	SCORE	SCORE
TOTAL		

QT SCORE SHEET (UK version: js 6/03)		
FORM 1	FORM 2	FORM 3
4 belt (e)	2 cans (e)	2 sheet (e)
1 dancing (e)	3 chewing (e)	1 exercise (e)
4 traffic (e)	4 falling (e)	2 machine (e)
4 whistle (e)	3 dinner (e)	4 burners (e)
3 fence (e)	1 cow (e)	1 audience (e)
2 drink (e)	2 groceries (e)	3 dish (e)
3 wreck (e)	4 hat (e)	2 drying (e)
1 music (e)	3 sitting (e)	3 food (e)
2 medicine (e)	1 country (e)	3 fork (e)
4 gun (e)	4 danger (e)	1 crowd (e)
2 pepper (e)	3 plate (e)	3 slice (e)
3 racing (e)	1 river (e)	2 washing (e)
2 salt (e)	3 tasting (e)	4 tears (e)
1 woman (e)	2 shelves (e)	1 fighting (e)
2 sugar (e)	1 sky (e)	4 kitchen (e)
3 track (e)	3 table (e)	3 pastry (e)
4 school	4 carelessness	2 windy
1 partner	3 manners	4 pitiful
1 couples	2 adding	1 contest
3 rail	4 injury	4 sorrow
4 respectful	2 merchandise	1 loser
3 betting	3 waitress	4 heartbreak
1 dating	1 horizon	1 struggle
3 stadium	2 retail	2 rotary
4 pedestrian	1 irrigation	1 opponents
1 graceful	4 unaware	4 grief
2 fluid	1 current	3 utensils
2 solution	1 fertile	2 lever
4 discipline	4 descending	3 portion
3 grandstand	1 spacious	3 edible
2 crystallised	2 proprietor	1 exhibition
1 turntable	4 inattentive	4 soothed
2 saccharin	3 indulging	4 caress
4 immature	1 precipitation	1 combatant
1 cordiality	1 bank	4 forlorn
3 velocity	4 transom	3 nutrient
4 decisive	3 consumption	4 solace
3 laceration	1 aquatic	1 pacify
3 foliage	4 perilous	1 contorted
4 imperative	1 terrain	4 jets
1 intimacy	4 imminent	4 doleful
2 concoction	2 foresight	3 tines
1 conviviality	1 cumulus	4 disconsolate
4 chevrons	3 satiation (h)	3 sustenance
2 condiment (h)	3 visceral (h)	4 maudlin (h)
3 cacophony (h)	1 bovine	3 gustatory (h)
2 miscible (h)	3 replace (h)	4 poignant (h)
2 imbibe (h)	3 prehension (h)	1 bellicose (h)
1 amicable (h)	4 ingress (h)	3 comestible (h)
2 pungent (h)	4 celerity (h)	4 despondency (h)
SCORE	SCORE	SCORE
TOTAL		

(e) = easy, (h) = hard

QT3

1



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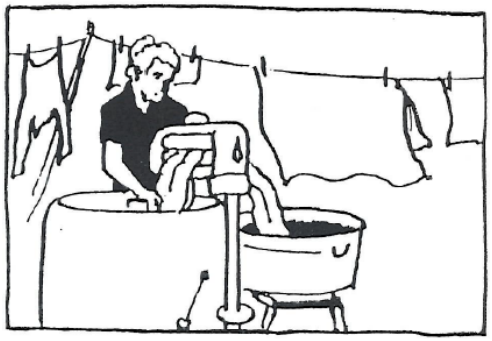

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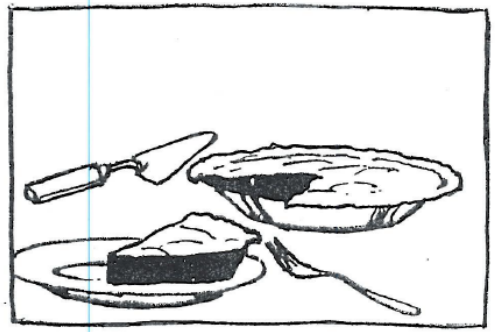

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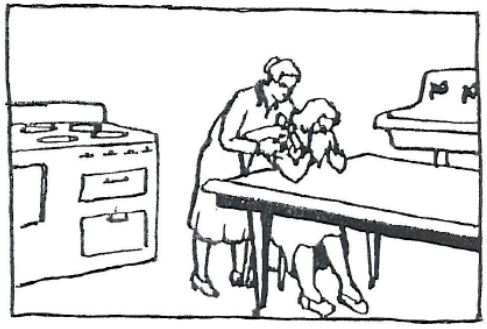


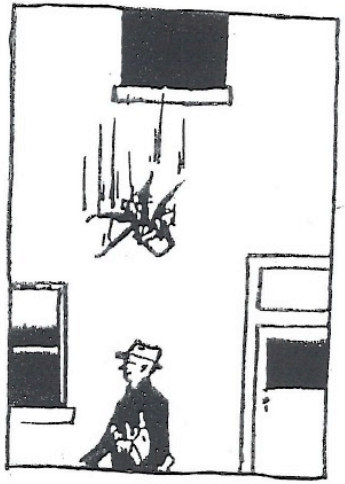
QT2

1

2

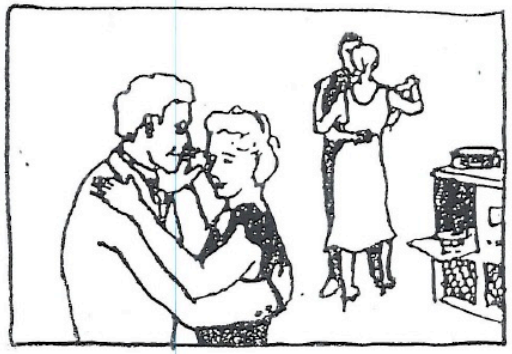
3

4



QT1

1



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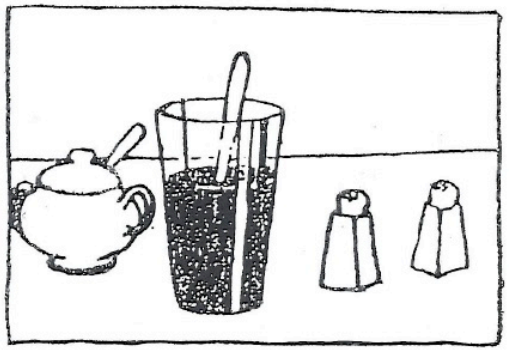

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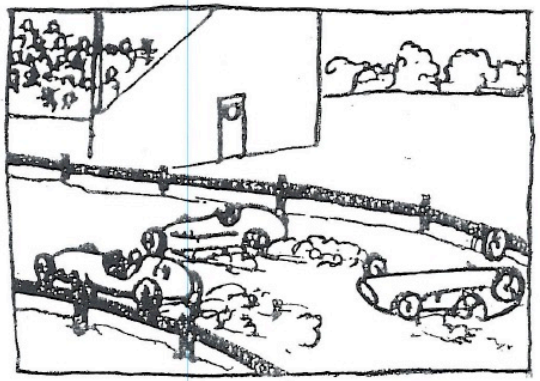

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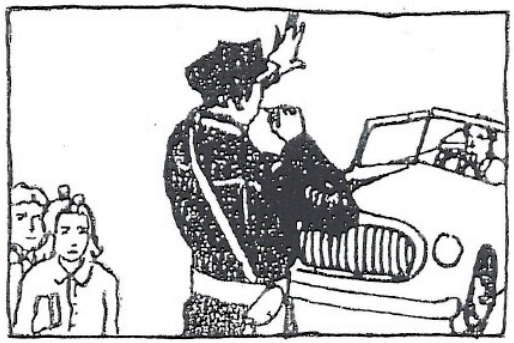


APPENDIX 16

PARTICIPANT INSTRUCTIONS EMPLOYED IN COMPUTER GENERATED TASKS OF FACIAL EMOTION RECOGNITION, COGNITIVE AND AFFECTIVE EMPATHY AND ALEXITHYMIA – CHAPTER THREE

Multi-Morph Task (Facial Emotion Recognition)

In this task you are presented with faces on a computer screen. Each face will start out looking neutral but will slowly change in steps to reveal one of four emotions: angry, happy, fearful or sad. You will also see buttons with the names of all of these emotions on the screen. Please decide as quickly as possible, BUT WITHOUT GUESSING, which emotion the neutral face is morphing into by pressing the button with the name of that emotion. The face will continue to change even after you respond until the full emotion appears. You can change your answer at any time if you want to by pressing a different button. However, if you are happy with your choice just keep watching and do nothing.
Here is an example for you to practise.

Press the space bar when ready.

Interpersonal Reactivity Index (IRI)

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by clicking the appropriate button on the scale at the bottom of the page.
READ EACH ITEM CAREFULLY BEFORE RESPONDING.
Answer as honestly as you can. Thank you.

Begin

Questionnaire of Cognitive and Affective Empathy (QCAE)

Please indicate to what degree the following statements apply to you:

Begin

EMPATHY ELICITING IMAGE TASK

In this task we are interested in knowing your personal reactions to some photos. You will be shown some photos of faces. Below each photo you will see a scale made out of cartoon figures. You should use these cartoon scales to rate how looking at the photo makes you feel.

The scale goes from a frowning to a smiling cartoon and you should mark how good or bad watching the photo makes you feel on these cartoons.

So, if watching the photo makes you feel very bad (for example if it makes you feel unhappy, annoyed, scared, angry, melancholic or despaired) you should click on the figure on the frowning cartoon at the left end of the scale.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue →

If watching the photo makes you feel very good (for example, if you feel happy, pleased, glad, satisfied, cheerful, contented or hopeful), you should click on the smiling cartoon at the right end of the scale.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue →

The figures also allow you to describe intermediate feelings, by clicking on any of the other pictures.

If you feel completely neutral, neither good nor bad, click on the figure in the middle.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue →

If you find that your falling falls BETWEEN two of the cartoons, then click on the space between the figures like this.

(ILLUSTRATION OF SAM MANIKIN)

This allows you to make better ratings of how you feel in reaction to the photo.

Press Space
To continue →

Please look at each image carefully and rate your personal reaction to it. Work fast and don't spend too much time thinking about each picture. We want to know your 'gut feeling' – in other words, how you first feel when you see each photo.

First, here are a couple of examples for you to practice.

Press Space
To continue

Empathy Eliciting Short Story Task

In this task, you will read some short stories, one at a time. Some of the stories are more positive, others are more negative, and we are interested in knowing how reading these stories makes you feel.

Below each story you will see a scale made out of cartoon figures. Please read each story and use the cartoon scale to rate how reading the story makes you feel. The scale goes from a frowning to a smiling cartoon and you should mark how good or bad reading the story makes you feel on these cartoons.

So, if reading the story makes you feel very bad (for example if it makes you feel unhappy, annoyed, scared, angry, melancholic or despaired) you should click on the figure on the frowning cartoon at the left end of the scale.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue

If reading the story makes you feel very good (for example, if you feel happy, pleased, glad, satisfied, cheerful, contented or hopeful), you should click on the smiling cartoon at the right end of the scale.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue

The figures also allow you to describe intermediate feelings, by clicking on any of the other pictures.

If you feel completely neutral, neither good nor bad, click on the figure in the middle.

(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue

If you find that your falling falls BETWEEN two of the cartoons, then click on the space between the figures like this.
This allows you to make better ratings of how you feel in reaction to the story.
(ILLUSTRATION OF SAM MANIKIN)

Press Space
To continue

Please read each story carefully and rate your personal reaction to it.

Press Space
To continue

Toronto Alexithymia Scale (TAS-20)

Indicate how much you agree or disagree with each of the following statements.
Just tick the appropriate box.
Use the middle box (I neither agree nor disagree) only if you are really unable to assess your behaviour.

Begin

PARTICIPANT INSTRUCTIONS EMPLOYED IN COMPUTER GENERATED

MORAL EMOTIONS AND MORAL DILEMMAS TASKS – CHAPTER FOUR

MORAL EMOTIONS TASK

Please read each story carefully and try to imagine how you would feel in the described situation. Note that while some stories have identical beginnings, all endings are different.
After having read the story, please rate to what extent you would feel the described emotion on a scale from 1 to 7, by pressing the appropriate button. Please try to make the choice as quickly as possible.

CONTIN UE

(Vignette presented)

How [target emotion] do you feel?

CONTINU E

MORAL DILEMMAS TASK

In this task you will read short stories. YOU HAVE TO IMAGINE THAT YOU ARE THE STORY CHARACTER. In each story, the character is faced with some choices, and we would like to know what your choice would be.
PLEASE ANSWER "YES", BY PRESSING THE 'Y' KEY, OR "NO", BY PRESSING THE 'N' KEY, TO THE CHOICE OF THE STORY.
You will also need to rate how difficult it was for you to make that choice.

PLEASE USE THE SCALE FROM 1 TO 10 FOR THE DIFFICULTY RATING. 1 MEANS THAT YOU FOUND THE CHOICE VERY EASY TO MAKE, 10 MEANS THAT YOU FOUND IT VERY DIFFICULT TO MAKE.
For example, 3 would mean you found the choice somewhat easy, and 6 that you found the choice a little bit difficult.
Please try to make the choices as quickly as possible. We are mostly interested in your first, 'gut reaction'.

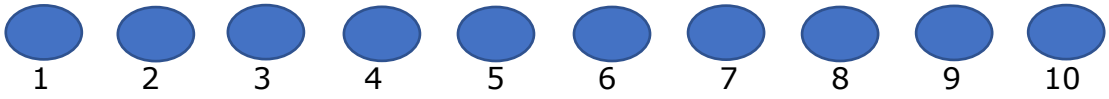
Press space to continue

Place your fingers from each hand on the 'Y' and 'N' keys

(moral dilemma presented in writing with accompanying audio)

Press 'Y' for Yes or 'N' for No

Click the button to indicate how hard it was to make that decision



Very Easy Very Hard

APPENDIX 17

INTERPERSONAL REACTIVITY INDEX (Davis, 1980, 1983b)

ANSWER SCALE:

A	B	C	D	E
DOES NOT DESCRIBE ME WELL				DESCRIBES ME VERY WELL

1. I daydream and fantasize, with some regularity, about things that might happen to me. (FS)
2. I often have tender, concerned feelings for people less fortunate than me. (EC)
3. I sometimes find it difficult to see things from the "other guy's" point of view. (PT) (-)
4. Sometimes I don't feel very sorry for other people when they are having problems. (EC) (-)
5. I really get involved with the feelings of the characters in a novel. (FS)
6. In emergency situations, I feel apprehensive and ill-at-ease. (PD)
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it. (FS) (-)
8. I try to look at everybody's side of a disagreement before I make a decision. (PT)
9. When I see someone being taken advantage of, I feel kind of protective towards them. (EC)
10. I sometimes feel helpless when I am in the middle of a very emotional situation. (PD)
11. I sometimes try to understand my friends better by imagining how things look from their perspective. (PT)
12. Becoming extremely involved in a good book or movie is somewhat rare for me. (FS) (-)
13. When I see someone get hurt, I tend to remain calm. (PD) (-)
14. Other people's misfortunes do not usually disturb me a great deal. (EC) (-)
15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (PT) (-)
16. After seeing a play or movie, I have felt as though I were one of the characters. (FS)
17. Being in a tense emotional situation scares me. (PD)

18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them. (EC) (-)

19. I am usually pretty effective in dealing with emergencies. (PD) (-)

20. I am often quite touched by things that I see happen. (EC)

21. I believe that there are two sides to every question and try to look at them both. (PT)

22. I would describe myself as a pretty soft-hearted person. (EC)

23. When I watch a good movie, I can very easily put myself in the place of a leading character. (FS)

24. I tend to lose control during emergencies. (PD)

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. (PT)

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me. (FS)

27. When I see someone who badly needs help in an emergency, I go to pieces. (PD)

28. Before criticizing somebody, I try to imagine how I would feel if I were in their place. (PT)

NOTE: (-) denotes item to be scored in reverse fashion
PT = perspective-taking scale
FS = fantasy scale
EC = empathic concern scale
PD = personal distress scale

A = 0
B = 1
C = 2
D = 3
E = 4

Except for reversed-scored items, which are scored:

A = 4
B = 3
C = 2
D = 1
E = 0

APPENDIX 18

Table 1: Normality of Distribution Statistics

Continuous Measure	Skewness		Kurtosis		Kolmogorov Smirnov		Shapiro Wilks	
	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (Std. Error.)	Transformed (Std. Error)	Untransformed (*p*-value)	Transformed (*p*-value)	Untransformed (*p*-value)	Transformed (*p*-value)
Morph Total Recognition Accuracy	-1.790 (.319)	.092 (.319) .917 (.319)	3.875 (.628)	-.376 (.628) .972 (.628)	.264 (.000)	.176 (.000) .207 (.000)	.806 (.000)	.916 (.001) .891 (.000)
Morph Sad Response Latency	-.271 (.319)		-.392 (.628)		.101 (.200)		.976 (.335)	
Morph Angry Response Latency	-.145 (.319)		-.811 (.628)		.098 (.200)		.975 (.308)	
Morph Fear Response Latency	-.119 (.319)		-.992 (.628)		.101 (.200)		.960 (.061)	
Morph Happy Response Latency	.229 (.319)		-.500 (.628)		.084 (.200)		.977 (.358)	
IRI Perspective Taking	-.375 (.319)		.011 (.628)		.073 (.200)		.973 (.239)	
IRI Empathic Concern	-.676 (.319)	.056 (.319)	-.109 (.628)	-.721 (.628)	.112 (.078)	.079 (.200)	.946 (.014)	.980 (.462)
QCAE Emotion Contagion	-.205 (.319)		.230 (.628)		.104 (.200)		.970 (.172)	
QCAE Online Simulation	-.512 (.319)	-.170 (.319)	-.291 (.628)	-.543 (.628)	.122 (.036)	.092 (.200)	.963 (.088)	.981 (.523)
QCAE Peripheral Responsivity	-.453 (.319)	-.154 (.319)	-.053 (.628)	.144 (.628)	.139 (.009)	.098 (.200)	.965 (.106)	.976 (.312)
QCAE Proximal Responsivity	-.754 (.319)	.119 (.319)	.545 (.628)	-.151 (.628)	.125 (.028)	.097 (.200)	.947 (.016)	.979 (.428)
QCAE Perspective Taking	-.697 (.319)	-.066 (.319)	.067 (.628)	-.388 (.628)	.114 (.069)	.083 (.200)	.949 (.019)	.981 (.536)
TAS-20 Difficulty Describing Feelings	.082 (.319)		-.599 (.628)		.086 (.200)		.982 (.576)	
TAS-20 Difficulty Identifying Feelings	.466 (.319)		-.606 (.628)		.110 (.087)		.961 (.066)	

Continuous Measure	Skewness		Kurtosis		Kolmogorov Smirnov		Shapiro Wilks	
	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (p – value)	Transformed (p–value)	Untransformed (p-value)	Transformed (p-value)
SAM Stories Sad	2.654 (.319)	1.578 (.319) .801 (.319)	9.618 (.628)	3.353 (.628) .244 (.628)	.230 (.000)	.184 (.000) .171 (.000)	.718 (.000)	.831 (.000) .888 (.000)
SAM Stories Anger	.485 (.319)	-.353 (.319) -1.208 (.319)	1.630 (.628)	1.175 (.628) 2.424 (.628)	.106 (.175)	.116 (.057) .157 (.002)	.959 (.054)	.958 (.047) .900 (.000)
SAM Stories Happy	-.696 (.319)	.365 (.319) .045 (.319)	-.576 (.628)	-1.016 (.628) -1.242 (.648)	.150 (.003)	.110 (.090) .126 (.026)	.898 (.000)	.921 (.001) .923 (.002)
Sam Pictures Happy	-.541 (.319)	.143 (.319)	-.278 (.628)	-.711 (.628)	.106 (.175)	.087 (.200)	.949 (.019)	.964 (.097)
Sam Pictures Sad	1.804 (.319)	.412 (.319)	3.850 (.628)	.230 (.628)	.163 (.001)	.069 (.200)	.834 (.000)	.974 (.269)
Sam Pictures Angry	.948 (.319)	.388 (.319)	.963 (.628)	-.288 (.628)	.122 (.037)	.109 (.098)	.931 (.003)	.971 (.204)
Sam Pictures Neutral	1.723 (.319)	1.614 (.319) 1.507 (.319)	2.830 (.628)	2.413 (.628) 2.038 (.628)	.231 (.000)	.223 (.000) .217 (.000)	.783 (.000)	.798 (.000) .812 (.000)
Sam Pictures Fear	1.252 (.319)	.054 (.319)	1.681 (.628)	.-.543 (.628)	.125 (.030)	.073 (.200)	.901 (.000)	.986 (.737)
Moral Emotions Compassion	-.729 (.319)	-.204 (.319)	-.070 (.628)	-.288 (.628)	.127 (.025)	.073 (.200)	.944 (.012)	.983 (.592)
Moral Emotions Guilt	-.610 (.319)	.141 (.319)	-.185 (.628)	-.717 (.628)	.112 (.076)	.075 (.200)	.948 (.018)	.969 (.157)
Moral Emotions Self-Anger	-.149 (.319)		-.947 (.628)		.104 (.196)		.966 (.121)	
Moral Emotions Other-Anger	.091 (.319)		-.580 (.628)		.083 (.200)		.984 (.655)	
Moral Dilemmas Difficulty MD1	.371 (.319)	.132 (.319) -.127 (.319)	-1.529 (.628)	-1.646 (.628) -1.671 (.628)	.202 (.000)	.194 (.000) .213 (.000)	.828 (.000)	.838 (.000) .827 (.000)
Moral Dilemmas Difficulty MD2	.194 (.319)	-.122 (.319) -.434 (.319)	-1.444 (.628)	-1.501 (.628) -1.416 (.628)	.151 (.003)	.173 (.000) .192 (.000)	.877 (.000)	.872 (.000) .836 (.000)
Moral Dilemmas Difficulty MD3	.359 (.319)	.038 (.319) -.267 (.319)	-1.355 (.628)	-1.517 (.628) -1.563 (.628)	.183 (.000)	.207 (.000) .224 (.000)	.868 (.000)	.866 (.000) .834 (.000)
Moral Dilemmas Difficulty MD4	.180 (.319)	-.121 (.319) -.413 (.319)	-1.483 (.628)	-1.538 (.628) -1.476 (.628)	.165 (.001)	.187 (.000) .204 (.000)	.870 (.000)	.862 (.000) .826 (.000)

Continuous Measure	Skewness		Kurtosis		Kolmogorov Smirnov		Shapiro Wilks	
	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (*p*-value)	Transformed (*p*-value)	Untransformed (*p*-value)	Transformed (*p*-value)
Moral Dilemmas Difficulty MD5	.932 (.319)	.570 (.319) .209 (.319)	-.527 (.628)	-1.803 (.628) -1.501 (.628)	.216 (.000)	.244 (.000) .266 (.000)	.797 (.000)	.831 (.000) .830 (.000)
Moral Dilemmas Difficulty MD6	.298 (.319)	.074 (.319) -.164 (.319)	-1.578 (.628)	-1.684 (.628) -1.678 (.628)	.224 (.000)	.195 (.000) .201 (.000)	.839 (.000)	.842 (.000) .828 (.000)
Moral Dilemmas Difficulty MD7	.040 (.319)	-.192 (.319) -.398 (.319)	-1.619 (.628)	-1.670 (.628) -1.632 (.628)	.207 (.000)	.200 (.000) .220 (.000)	.842 (.000)	.825 (.000) .791 (.000)
Moral Dilemmas Difficulty MD8	.330 (.319)	-.112 (.319) -.521 (.319)	-1.023 (.628)	-1.227 (.628) -1.163 (.628)	.139 (.009)	.167 (.001) .186 (.000)	.911 (.001)	.905 (.000) .857 (.000)
Impersonal Moral Dilemmas Combined Difficulty	.247 (.319)	-.109 (.319) -.491 (.319)	-1.292 (.628)	-1.351 (.628) -1.136 (.628)	.133 (.015)	.105 (.194) .151 (.003)	.914 (.001)	.917 (.001) .887 (.000)
Personal Moral Dilemmas Combined Difficulty*	.253 (.319)	-.712 (.319) -.229 (.319)	-.837 (.628)	-.593 (.628) -.942 (.628)	.079 (.200)	.156 (.002) .108 (.099)	.955 (.037)	.902 (.000) .950 (.021)
Moral Dilemmas Response Latency MD1	1.756 (.319)	1.213 (.319) .052 (.319)	2.499 (.628)	.006 (.628) .274 (.628)	.338 (.000)	.274 (.000) .144 (.005)	.642 (.000)	.752 (.000) .905 (.000)
Moral Dilemmas Response Latency MD2	1.581 (.319)	.295 (.319) 1.288 (.319)	.725 (.628)	-.558 (.628) .113 (.628)	.368 (.000)	.124 (.032) .267 (.000)	.611 (.000)	.940 (.008) .750 (.000)
Moral Dilemmas Response Latency M3	1.287 (.319)	.933 (.319) -.182 (.319)	-.038 (.628)	-.699 (.628) -.328 (.628)	.307 (.000)	.220 (.000) .098 (.200)	.686 (.000)	.807 (.000) .942 (.010)
Moral Dilemmas Response Latency MD4	1.811 (.319)	.022 (.319) 1.182 (.319)	3.006 (.628)	-.044 (.628) .045 (.628)	.336 (.000)	.129 (.022) .261 (.000)	.649 (.000)	.933 (.004) .779 (.000)
Moral Dilemmas Response Latency MD5	1.261 (.319)	.978 (.319) -.013 (.319)	-.137 (.628)	-.718 (.628) -.220 (.628)	.330 (.000)	.248 (.000) .128 (.022)	.674 (.000)	.775 (.000) .919 (.001)
Moral Dilemmas Response Latency MD6	1.601 (.319)	.474 (.319) 1.299 (.319)	.781 (.628)	-.880 (.628) .117 (.628)	.330 (.000)	.124 (.032) .245 (.000)	.600 (.000)	.920 (.001) .732 (.000)
Moral Dilemmas Response Latency MD7	1.501 (.319)	1.163 (.319) .345 (.319)	.497 (.628)	-.152 (.628) -.989 (.628)	.298 (.000)	.223 (.000) .121 (.041)	.637 (.000)	.773 (.000) .929 (.003)
Moral Dilemmas Response Latency MD8	1.160 (.319)	.092 (.319) .909 (.628)	-.496 (.628)	-.947 (.628) -.869 (.628)	.316 (.000)	.142 (.006) .226 (.000)	.665 (.000)	.930 (.003) .778 (.000)

Continuous Measure	Skewness		Kurtosis		Kolmogorov Smirnov		Shapiro Wilks	
	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (Std. Error)	Transformed (Std. Error)	Untransformed (*p*-value)	Transformed (*p*-value)	Untransformed (*p*-value)	Transformed (*p*-value)
Impersonal Moral Dilemmas Response Latency Combined	1.442 (.319)	1.113 (.319) .500 (.319)	.431 (.628)	-.310 (.628) -1.054 (.628)	.318 (.000)	.246 (.000) .140 (.008)	.665 (.000)	.776 (.000) .905 (.000)
Personal Moral Dilemmas Response Latency Combined	1.438 (.319)	.429 (.319) 1.118 (.319)	.340 (.628)	-1.036 (.628) -.295 (.628)	.330 (.000)	.118 (.049) .240 (.000)	.650 (.000)	.910 (.001) .772 (.000)

*Univariate ANOVA employed despite unsuccessful data transformation as SW normality value only marginally significant (p = .037) and because there was no difference output completed with raw and transformed data
NB: skewness and kurtosis values/Standard Error = z-value; z-values ≤ 1.96 indicate normal distribution (at p = ≥ 0.05 level); Kolmogorov Smirnov and Shapiro Wilks p-values ≥ 0.05 indicate normal distribution

APPENDIX 19

Table 1: Spearman Correlation Coefficients – Association Between Age and Outcome Variables – Chapter Three

Outcome Variable	Spearman's Correlation Co-efficient (*r*)	Sig. Value
IRI Perspective Taking	-.229	.090
IRI Empathic Concern	-.088	.521
QCAE Perspective Taking	-.469	<.001
QCAE Online Simulation	-.305	.022
QCAE Proximal Responsivity	-.218	.106
QCAE Peripheral Responsivity	-.190	.161
QCAE Emotion Contagion	-.052	.703
TAS-20 Difficulty Describing Feelings	.400	.002
TAS-20 Difficulty Identifying Feelings	.294	.028
Morph Anger RT (mean)	-.081	.554
Morph Sad RT (mean)	.045	.740
Morph Happy RT (mean)	.237	.079
Morph Fear RT (mean)	.165	.223
Morph Accuracy Total	-.304	.023
Sam Pictures Affect Rating (Anger)	-.278	.038
Sam Pictures Affect Rating (Fear)	-.120	.379
Sam Pictures Affect Rating (Sad)	.025	.856
Sam Pictures Affect Rating (Happy)	.412	.002
Sam Pictures Affect Rating (Neutral)	.018	.896
Sam Stories Affect Rating (Anger)	-.221	.101
Sam Stories Affect Rating (Happy)	.055	.688
Sam Stories Affect Rating (Sad)	.010	.939

Significance value = p = < 0.05

Table 2: Spearman Correlation Coefficients – Association Between Age and Outcome Variables – Chapter Four

Outcome Variable	Spearman's Correlation Co-efficient (r_s)	Sig. Value
Moral Emotions Guilt	-.051	.708
Moral Emotions Compassion	-.074	.587
Moral Emotions Self Anger	.099	.466
Moral Emotions Other Anger	.078	.568
Moral Dilemmas Impersonal – Difficulty Ratings	-.055	.686
Moral Dilemmas Personal – Difficulty Ratings	-.007	.962
MD1 Difficulty Rating	.013	.926
MD2 Difficulty Rating	-.054	.694
MD3 Difficulty Rating	-.108	.430
MD4 Difficulty Rating	-.064	.642
MD5 Difficulty Rating	-.064	.641
MD6 Difficulty Rating	-.082	.548
MD7 Difficulty Rating	.016	.907
MD8 Difficulty Rating	.048	.724
Moral Dilemmas Impersonal – RT	-.137	.315
Moral Dilemmas Personal – RT	-.209	.122
MD1 RT	-.090	.510
MD2 RT	-.099	.466
MD3 RT	-.188	.164
MD4 RT	-.052	.705
MD5 RT	-.223	.099
MD6 RT	-.236	.080
MD7 RT	-.180	.184
MD8 RT	-.146	.283

Significance value – $p = < 0.05$

APPENDIX 20

TABLE 1: Independent T-Tests/Mann Whitney U Test Values – Association Between Education and Continuous Outcome Variables (Chapter Three)

Outcome Variable	T-test value	Sig. Value	Mann Whitney U-Test	Sig Value
IRI – Perspective Taking	-4.035	<.001		
IRI – Empathic Concern			509.00	.023
QCAE – Perspective Taking			590.00	<.001
QCAE – Online Simulation			582.50	<.001
QCAE – Peripheral Responsivity			377.00	.960
QCAE – Proximal Responsivity			512.50	.019
QCAE – Emotion Contagion	-0.627	.533		
TAS-20 – Difficulty Describing Feelings	4.174	<.001		
TAS-20 – Difficulty Identifying Feelings	4.945	<.001		
SAM Stories (Anger)			327.00	.428
SAM Stories (Happy)			341.00	.577
SAM Stories (Sad)			322.00	.374
SAM Pictures (Neutral)			352.50	.709
SAM Pictures (Sad)			265.50	.068
SAM Pictures (Happy)			322.00	.382
SAM Pictures (Fear)			399.00	.675
SAM Pictures (Anger)			407.00	.579
Multi-morph – anger response latency	0.979	.332		
Multi-morph – fear response latency	1.774	.082		
Multi-morph – sad response latency	0.188	.852		
Multi-morph – happy response latency	3.431	.001		
Multi-morph – total emotion recognition accuracy			507.00	.022

p = < 0.05 indicates statistically significant relationship

Table 2: Independent T-tests/Mann Whitney U test Values - Association Between Education and Outcome Variables – Chapter Four

Outcome Variable	T-test Value	Sig. Value	Mann Whitney U-test Value	Sig. Value
Moral Emotions Compassion			505.50	.027
Moral Emotions Guilt			466.50	.120
Moral Emotions Self-Anger	1.608	.114		
Moral Emotions Other-Anger	2.389	.021		
Moral Dilemmas Impersonal Difficulty Ratings			606.50	<.001
Moral Dilemmas Personal Difficulty Ratings			516.50	.017
Moral Dilemma 1 Difficulty Rating			550.00	.003
Moral Dilemma 2 Difficulty Rating			585.00	<.001
Moral Dilemma 3 Difficulty Rating			570.50	.001
Moral Dilemma 4 Difficulty Rating			613.00	<.001
Moral Dilemma 5 Difficulty Rating			436.50	.275
Moral Dilemma 6 Difficulty Rating			522.00	.011
Moral Dilemma 7 Difficulty Rating			549.50	.003
Moral Dilemma 8 Difficulty Rating			508.00	.023
Moral Dilemmas Impersonal RT			544.00	.004
Moral Dilemmas Personal RT			526.00	.011
Moral Dilemma 1 RT			482.00	.070
Moral Dilemma 2 RT			545.00	.004
Moral Dilemma 3 RT			531.00	.008
Moral Dilemma 4 RT			548.00	.004
Moral Dilemma 5 RT			508.50	.024
Moral Dilemma 6 RT			512.00	.021
Moral Dilemma 7 RT			574.00	.001
Moral Dilemma 8 RT			555.00	.002

p = <0.05 indicates statistically significant relationship

APPENDIX 21

Table 1: Independent T-Test/Mann Whitney U Test Values – Association Between Antipsychotic or SSRI Medication and Outcome Variables – Chapter Three

	Antipsychotics			SSRIs		
	T-Test Value	Mann Whitney U-Test Value	Sig. Value	T-Test Value	Mann Whitney U-Test Value	Sig. Value
IRI PT	2.65		**.011**	0.11		.917
IRI EC*		224.50	**.010**		279.50	.756
QCAE PT*		199.50	**.003**		194.50	.164
QCAE OS*		196.00	**.002**		232.00	.522
QCAE PROX*		245.50	**.024**		241.50	.651
QCAE PR*		380.00	.993		272.00	.872
QCAE EM	0.17		.863	0.09		.931
TAS 20 DDF	-3.14		**.003**	-2.17		**.034**
TAS 20 DIF	-2.32		**.024**	-1.09		.281
MORPH TOTAL ACCURACY*		335.50	.451		209.00	.259
MORPH ANGER LATENCY	-1.68		.099	-0.94		.354
MORPH FEAR LATENCY	2.32		**.024**	-1.77		.083
MORPH SAD LATENCY	-0.35		.730	-1.18		.244
MORPH HAPPY LATENCY	2.79		**.007**	2.24		**.029**
SAM PICTURES ANGER*		353.00	.659		259.00	.920
SAM PICTURES FEAR*		336.50	.474		271.00	.889
SAM PICTURES SAD*		423.00	.468		313.50	.322
SAM PICTURES HAPPY*		452.50	.223		297.50	.503
SAM PICTURES NEUTRAL*		383.50	.945		261.50	.959
SAM STORIES HAPPY*		325.50	.365		386.50	**.014**
SAM STORIES SAD*		466.00	.142		245.50	.707
SAM STORIES ANGER*		479.00	.096		265.50	.976

p = <0.05 indicates statistically significant relationship

Table 2: Independent T-tests/Mann Whitney U Test Values – Association Between Anti-psychotic or SSRI Medication and Outcome Variables – Chapter Four

	Antipsychotics			SSRIs		
	T-Test Value	Mann Whitney U-Test Value	Sig. Value	T-Test Value	Mann Whitney U- Test Value	Sig. Value
Moral Dilemmas RT Impers*		307.00	.227		249.00	.765
Moral Dilemmas RT Pers*		282.00	.104		264.00	1.000
Moral Dilemmas Diff Impers*		206.50	**.004**		261.00	.952
Moral Dilemmas Diff Pers*		296.00	.164		291.50	.582
Moral Emotions Compassion*		243.50	**.023**		323.00	.238
Moral Emotions Guilt*		242.00	**.022**		301.50	.453
Moral Emotions Self-Anger	0.82		.416	0.26		.801
Moral Emotions Other-Ang	1.05		.298	0.45		.656

p = <0.05 indicates statistically significant relationship

APPENDIX 22

Table 1: Summary of Findings – Chapter Three

Task	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Emotion Multi-morph Task	The odds of the combined ASPD group achieving 100% accuracy for fear emotions were significantly than those of the control group. However, an age adjusted binary logistic regression indicated no significant group effect There was no significant difference in the anger, sadness or happiness recognition accuracy of combined ASPD patients when compared to controls The combined ASPD were significantly less accurate in their total emotion recognition accuracy when compared to the control group. However, there were no significant effects evident after controlling for group differences in age and educational status.	The odds of ASPD+P patients achieving 100% fear recognition accuracy were marginally (significantly) lower than those of the control group but there was no significant between group effect There was no significant difference in the total emotion recognition accuracy or 100% anger, sadness or happiness recognition accuracy rates of ASPD+P patients when compared to controls	There was no significant difference in the total emotion recognition accuracy or specific emotion recognition accuracy (i.e., for emotions of fear, anger, sadness, happiness) of ASPD-P patients when compared to controls	There was no significant difference in the total emotion recognition accuracy or 100% recognition accuracy rates for specific emotions (anger, sadness, fear or happiness) of ASPD+P patients when compared to ASPD-P patients
	There was no significant difference in the sadness and anger recognition latencies of the combined ASPD and control group The combined ASPD group had significantly longer response latencies for happy emotions when compared to controls. However, this difference was no longer evident following adjustments to account for group differences in educational status The combined ASPD group had significantly longer response latencies for fear emotions when compared to controls. However, this difference was no longer evident following adjustments to account for group differences in antipsychotic use	There was no significant difference in the sadness, anger or fear recognition latencies of ASPD+P patients when compared to controls ASPD+P patients had significantly longer response latencies for happy emotions when compared to controls. However, this difference was no longer evident following adjustments to account for group differences in educational status	There was no significant difference in the sadness and anger recognition latencies of ASPD-P patients when compared to controls ASPD-P patients had significantly longer response latencies for happy emotions when compared to controls. However, this difference was no longer evident following adjustments to account for group differences in educational status ASPD-P patients had marginally (significant) longer response latencies for fear emotions when compared to controls.[21] However, a medication adjusted analysis indicated no significant group effects.	There were no significant different differences in the emotion recognition response latencies of ASPD+P and ASPD-P groups for emotions of anger, sadness, fear or happiness

[21] Finding should be interpreted with caution as this difference was observed purely through parameter estimates/simple contrasts and in the presence of a borderline significant group effect. Furthermore, no significant group difference was evident between patient groups when the analysis was adjusted to account for group differences in anti-psychotic medication status.

Task	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Self-report/ Behavioural Tasks of cognitive and Affective Empathy	The combined ASPD group had significantly lower mean IRI perspective taking (cognitive empathy) scores when compared to controls. However, this difference was not evident after adjustments to account for group differences in educational status	**ASPD+P patients had significantly lower mean IRI perspective taking (cognitive empathy) scores when compared to controls (irrespective of adjustments to account for group differences in educational status)**	There was no significant difference in the mean IRI perspective taking (cognitive empathy) scores of ASPD-P patients and controls	**ASPD+P patients had significantly lower mean IRI perspective taking (cognitive empathy) scores than patients with ASPD (irrespective of adjustments to account for group differences in educational status)**
	The combined ASPD group had significantly lower mean IRI empathic concern (affective empathy) scores when compared to controls. However, this difference was not evident following adjustments to account for group differences in educational status	ASPD+P patients had significantly lower mean IRI empathic concern (affective empathy) scores when compared to controls. However, this difference was not evident following adjustments to account for group differences in educational status	There was no significant difference in the mean IRI empathic concern (affective empathy) scores of patients with ASPD-P when compared to controls	There was no significant difference in the mean IRI empathic concern (affective empathy) scores of ASDP+P patients when compared to ASPD-P patients
	The combined ASPD group had significantly lower QCAE online simulation scores than the control group. However, there were no significant group effects after controlling for group differences in age and educational status	ASPD+P patients had significantly lower mean QCAE online simulation (cognitive empathy) scores than controls. However, this difference was not evident following adjustments to account for group differences in age and educational status	There was no significant difference in the mean QCAE online simulation (cognitive empathy) scores of ASPD-P patients and controls	**ASPD+P patients had significantly lower mean QCAE online simulation (cognitive empathy) scores than ASPD-P patients (irrespective of adjustments to account for group differences in age and educational status)**
	There was no significant difference in the QCAE peripheral responsivity (affective empathy) scores of the combined ASPD and control group	There was no significant difference in the QCAE peripheral responsivity (affective empathy) scores of the ASPD+P and control group	There was no significant difference in the mean QCAE peripheral responsivity (affective empathy) scores of ASPD-P patients and controls	**ASPD+P patients had significantly lower mean QCAE peripheral responsivity (affective empathy) scores than ASPD-P patients**
	The combined ASPD group had significantly lower QCAE proximal responsivity (affective empathy) scores than the control group. However, there were no significant group effects after controlling for group differences in educational status	Patients with ASPD+P had significantly lower mean QCAE proximal responsivity (affective empathy) scores than controls. However, this difference was not evident following adjustments to account for group differences in educational status	There was no significant difference in the mean QCAE proximal responsivity (affective empathy) scores of patients with ASPD-P when compared to controls	**ASPD+P patients had significantly lower mean QCAE proximal responsivity (affective empathy) scores than ASPD-P patients (irrespective of adjustments to account for group differences in educational status and antipsychotic use)**

Task	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Self-report/ Behavioural Tasks of Cognitive and Affective Empathy	The combined ASPD group had significantly lower QCAE perspective taking (cognitive empathy) scores than the control group. However, there were no significant group effects after controlling for group differences in age and educational status	Patients with ASPD+P had significantly lower mean QCAE perspective taking (cognitive empathy) scores than controls. However, this difference was not evident after adjustments to account for group differences in age and educational status	ASPD-P patients had significantly lower mean QCAE perspective taking (cognitive empathy) scores than controls. However, this difference was not evident after adjustments to account for group differences in age and educational status	There was no significant difference in the mean QCAE perspective taking (cognitive empathy) scores of ASPD-P when compared to ASPD-P patients
	There was no significant difference in the QCAE emotion contagion (affective empathy) scores of the combined ASPD and control group	There was no significant difference in the mean QCAE emotion contagion (affective empathy) scores of ASPD+P patients when compared to controls	There was no significant difference in the mean QCAE emotion contagion (affective empathy) scores of ASPD-P patients when compared to controls	There was no significant difference in the mean QCAE emotion contagion (affective empathy) scores of ASPD+P patients when compared to ASPD-P patients
	There were no significant differences in the mean (affective) empathy eliciting short stories task affect ratings of the combined ASPD group when compared to the control group	There were no significant differences in the mean (affective) empathy eliciting short stories task affect ratings of ASPD+P patients when compared to controls	There were no significant differences in the mean (affective) empathy eliciting short stories task affect ratings of ASPD-P patients when compared to controls	There were no significant differences in the mean (affective) empathy eliciting short stories task affect ratings of ASPD+P patients when compared to ASPD-P patients
	There were no significant differences in the mean (affective) empathy eliciting image task affect ratings of the combined ASPD group when compared to the control group	There were no significant differences in the mean (affective) empathy eliciting image task affect ratings of ASPD+P patients when compared to controls	There were no significant differences in the mean (affective) empathy eliciting image task affect ratings of ASPD-P patients when compared to controls	There were no significant differences in the mean (affective) empathy eliciting image task affect ratings of ASPD+P patients when compared to ASPD-P patients
Toronto Alexithymia Scale (TAS-20)	**The combined ASPD group had significantly higher mean alexithymia 'difficulty describing feelings' scores when compared to the control group (irrespective of adjustments to account for group differences in age and education)**	**ASPD+P patients had significantly higher mean alexithymia 'difficulty describing feelings' scores when compared to controls (irrespective of adjustments to account for group differences in age and education)**	ASPD-P patients had significantly higher mean alexithymia 'difficulty describing feelings' scores when compared to controls. However, this difference was only borderline significant following adjustments to account for group differences in age and education	There was no significant difference in the mean alexithymia 'difficulty describing feelings' scores of ASPD+P patients when compared to ASPD-P patients
	The combined ASPD group had significantly higher mean alexithymia 'difficulty identifying feelings' scores when compared to the control group. However, this difference was not evident following adjustments to account for group differences in age and education	ASPD+P patients had significantly higher mean alexithymia 'difficulty identifying feelings' scores when compared to controls. However, this difference was not evident following adjustments to account for group differences in age and education	ASPD-P patients had significantly higher mean alexithymia 'difficulty identifying feelings' scores when compared to controls. However, this difference was not evident following adjustments to account for group differences in age and education	There was no significant difference in the mean alexithymia 'difficulty identifying feelings' scores of ASPD+P patients when compared to ASPD-P patients

APPENDIX 23

VIGNETTES/STORIES FOR MORAL EMOTIONS AND MORAL DILEMMAS TASKS – CHAPTER FOUR

Table 1: Vignettes for Moral Emotions Task

OPENING SENTENCE OF VIGNETTE	GUILT	COMPASSION	SELF-ANGER	OTHER ANGER
You are leaving your flat, and on the stairs you meet your neighbour who is on her way home.	While turning around to say hi, you accidentally knock into her making her drop her bag and breaking the laptop that was inside.			While turning around to say hi, she accidentally knocks into you making you drop your bag and breaking the laptop that was inside it.
You park at the same time as your boss outside your office.	You misjudge your steering and you ram the front of your boss's new car	Your boss misjudges his steering and rams the front of his new car against a pole.		
It is the premiere of the Theatre Society's play at your local theatre.	While walking to your seat in the front row, you accidentally trip up another audience member who stumbles and falls over in front of everyone.		While walking to your seat in the front row, you trip and fall over in front of everybody.	
You have a meeting with a colleague who works in another city.	Listening to your voicemail you hear that your colleague waited for you all day and that you have mistaken the day of the meeting	He has left a message on your phone to say that he mistook the day of the meeting and that he has taken the plane for nothing		

OPENING SENTENCE OF VIGNETTE	GUILT	COMPASSION	SELF-ANGER	OTHER ANGER
One of your cousins has come over to help you replace a damaged doo. While you are both installing the new door		your cousin accidentally lets go of it and it falls on his fingers		your cousin accidentally lets go of it and it falls on your fingers
You are waiting at a newsstand in a London station before taking the Eurostar		You hear the old lady next to you complain that she couldn't hear the boarding call so the train left without her	You are looking for a magazine, and you do not hear the departure call and your train leaves without you.	
You are in a supermarket			You pick up a bottle of olive oil but it slips, falls, and you are splashed with oil	The customer next to you picks up a bottle of olive oil but it slips, falls, and splashes you with oil
During an antique sale, you chat with the owner of the neighbouring stall	By accident, you spill your coffee on his stall and damage the precious book he had inherited from his grandfather			By accident, he spills his coffee on your stall and damages the precious book you had inherited from your grandfather
After having dined with a friend, you both part ways to go home	Your friend calls you to let you know that you have mistaken the time of the last train and that he has to walk home to the other side of town		At the tube station you realize that you have mistaken the time of the last train and that you have to walk back home to the other side of town	

OPENING SENTENCE OF VIGNETTE	GUILT	COMPASSION	SELF-ANGER	OTHER ANGER
You live right by an excellent watchmaker		Your partner has deposited a watch of great value, but he/she loses the ticket and is unable to retrieve it	You have deposited a watch of great value, but you lose the ticket and are unable to retrieve it	
Both you and a colleague are working on a portable computer		By accident, he spills his glass of water on the keyboard and wrecks his computer		By accident, he spills his glass of water on the keyboard and wrecks your computer
While leaving your apartment, you come across your neighbour			You close the door of your apartment behind you and you realize you have left your only set of keys inside	Your neighbour closes the door of your apartment and you realize you have left your only set of keys inside

Neutral Other/Self Scenarios

(These scenarios were not used due to a software/design error which led to inconsistency in the neutral scenarios presented)

STORY 1
You park at the same time as your boss outside your office. He gets out of his car and after greeting you, you start discussing the day's workload. How compassionate do you feel? (Neutral other-compassion)

OR

You park at the same time as your boss outside your office. He gets out of his car and after greeting you, you start discussing the day's workload. How angry do you feel? (Neutral other-anger)

STORY 2
You are waiting at a news-stand in a London station before taking the Eurostar. You are looking for a magazine and the old lady next to you asks the salesperson to show her the international press section. How compassionate do you feel? (Neutral-other compassion)

OR

You are waiting at a newsstand in a London station before taking the Eurostar. You are looking for a magazine and the old lady next to you asks the salesperson to show her the international press section. How angry do you feel? (Neutral other-anger)

STORY 3
It is the premiere of the Theatre Society's play at your local theatre. You have agreed to accompany one of your friends who wanted to see it. How guilty do you feel? (Neutral-self guilt)

OR

It is the premiere of the Theatre Society's play at your local theatre. You have agreed to accompany one of your friends who wanted to see it. How angry with yourself do you feel? (Neutral self-anger)

STORY 4
You have a meeting with a colleague who works in another city. You are both meeting at your office and since you arrive early you take the time to review the details of the meeting. How guilty do you feel? (Neutral self-guilt)

OR

You have a meeting with a colleague who works in another city. You are both meeting at your office and since you arrive early you take the time to review the details of the meeting. How angry with yourself do you feel? (Neutral self-anger)

STORY 5
You are in a supermarket. The person next to you picks up a bottle of olive oil but realises it's not the brand he's after and replaces it. How compassionate do you feel? (Neutral other-compassion)

OR

You are in a supermarket. The person next to you picks up a bottle of olive oil but realises it's not the brand he's after and replaces it. How angry do you feel? (Neutral other-anger)

STORY 6
You are leaving your flat and on the stairs you meet your neighbour who is on her way home. She says hi, chats for a bit and continues on her way. How compassionate do you feel? (Neutral other-compassion)

OR

You are leaving your flat and on the stairs you meet your neighbour who is on her way home. She says hi, chats for a bit and continues on her way. How angry do you feel? (Neutral other-anger)

STORY 7
One of your cousins has come over to help you replace a damaged door. While you are both installing the new door, the phone rings and your cousin answers it. How compassionate do you feel? (Neutral other-compassion)

OR

One of your cousins has come over to help you replace a damaged door. While you are both installing the new door, the phone rings and your cousin answers it. How angry do you feel (Neutral other-anger)

STORY 8
During an antique sale, you chat with the owner of the neighbouring stall. While drinking a coffee you show him a very precious book that you have inherited from your grandfather. How guilty do you feel? (Neutral self-guilt)

OR

During an antique sale, you chat with the owner of the neighbouring stall. While drinking a coffee you show him a very precious book that you have inherited from your grandfather. How angry with yourself do you feel (Neutral self-anger)

STORY 9
After having dined with a friend, you both part ways to go home. You have told your friend the departure time of the last train and once he has arrived on the platform he only needs to wait three minutes before it arrives. How compassionate do you feel? (Neutral other-compassion)

OR

After having dined with a friend, you both part ways to go home. You have told your friend the departure time of the last train and once he has arrived on the platform he only needs to wait three minutes before it arrives. How angry do you feel? (Neutral other-anger)

STORY 10
You live right by an excellent watchmaker. During the lunch break you find a moment to go and finally change the battery of your watch. How guilty do you feel? (Neutral self-guilt)

OR

You live right by an excellent watchmaker. During the lunch break you find a moment to go and finally change the battery of your watch. How angry with yourself do you feel? (Neutral self-anger)

STORY 11
Both you and a colleague are working on a portable computer. He gives you advice on how to present the project you are working on. How guilty do you feel? (Neutral self-guilt)

OR

Both you and a colleague are working on a portable computer. He gives you advice on how to present the project you are working on. How angry with yourself do you feel? (Neutral self-anger)

STORY 12
While leaving your apartment you come across your neighbour. You tell him about the plans to refurbish the building and you explain to him in detail what is going to be done. How guilty do you feel? (Neutral self-guilt)

OR

While leaving your apartment you come across your neighbour. You tell him about the plans to refurbish the building and you explain to him in detail what is going to be done. How angry with yourself do you feel? (Neutral self-anger)

MORAL DILEMMAS

Impersonal Dilemmas

1. You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a single railway workman. If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to avoid the deaths of these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right, causing the death of the single workman. Would you hit the switch in order to avoid the deaths of the five workmen?

2. You are the late-night watchman in a hospital. Due to an accident in the building next door, there are deadly fumes rising up through the hospital's ventilation system. In a certain room of the hospital are three patients. In another room there is a single patient. If you do nothing the fumes will rise up into the room containing the three patients and cause their deaths. The only way to avoid the deaths of these patients is to hit a switch, which will cause the fumes to bypass the room containing the three patients. As a result of hitting the switch the fumes will enter the room containing the single patient, causing his death. Would you hit the switch in order to avoid the deaths of the three patients?

3. You are returning from a Kayaking trip when you see that the dam has broken upstream and is about to flood the river. You now that anyone who is still on the water when the flood comes will die. There are five people downstream on a large raft, and one person fishing in a nearby drainage canal. There is a floodgate nearby that can be opened to divert the flow of the water into the drainage canal. If you do nothing, the water will flood the main river and the five people on the raft will die. If you open the floodgate to divert the water into the drainage canal, the one person who is fishing will die. Would you open the floodgate to divert the water?

4. You are walking home one day when you see a house that is on fire. There are six people in one of the rooms of the house; if you don't act quickly, these six people will die because of the fire. The only way to get all six people out safely is by breaking down the thick door to this room. However, if you break down this door, it will block the exit route of a person standing in an adjacent room, causing this person to die because of the fire. If you do nothing, the six people will die, but the one person will escape. Would you knock down the door?

Personal Dilemmas

5. You are a doctor. You have five patients, each of whom is about to die due to a failing organ of some kind. You have another patient who is healthy. The only way that you can save the lives of the first five patients is to transplant five of this young man's organs (against his will) into the bodies of the other five patients. If you do this, the young man will die, but the other patients will live. Would you perform this transplant in order to save five of your patients?

6. A runaway trolley is heading down the tracks toward five workmen who will be killed if the trolley proceeds on its present course. You are on a footbridge over the tracks, in between the approaching trolley and the five workmen. Next to you on the footbridge is a stranger who happens to be very large. The only way to save the lives of the five workmen is to push this stranger off the bridge and onto the tracks below where his large body will stop the trolley. The stranger will die if you do this, but the five workmen will be saved. Would you push the stranger on to the tracks in order to save the five workmen?

7. A viral epidemic has spread across the globe killing millions of people. You have developed two substances in your home laboratory. You know that one of them is a vaccine, but you have forgotten which one. You also know that the other one is deadly. Once you figure out which substance is the vaccine you can use it to save millions of lives. You have with you two people who are your friends, and the only way to identify the vaccine is to inject each of these people with one of the two substances. One person will live, the other will die, and you will be able to start saving lives with your vaccine. Would you kill one of these people with a deadly injection in order to identify a vaccine that will save millions of lives?

8. You are on vacation and travelling in a remote part of South America when you approach a tribal group that is in the process of preparing for an execution of five tribal members, lined up in a row. The executioner sees you and makes you the following offer based upon the perception that you are an honoured foreigner. If you push a person who is watching the execution to the ground, this person will be shot but the five others will be executed as planned, and the person watching the execution will go free. Would you push the one person to the ground?

APPENDIX 24

Table 1: Summary of Findings – Chapter Four

Task	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Moral Emotions Task	The combined ASPD group self-reported significantly lower guilt ratings when compared to the control group. However, there were no significant effects evident after controlling for group differences in medication use	**ASPD+P patients self-reported significantly lower mean guilt ratings when compared to controls**	There was no significant difference in the mean self-reported guilt ratings of ASPD-P patients when compared to cpntrols	**ASPD+P patients self-reported significantly lower mean guilt ratings than ASPD-P patients**
	The combined ASPD group self-reported significantly lower compassion ratings when compared to the control group. (irrespective of group differences in educational status). However, there were no significant effects evident after controlling for group differences in education and medication use	**ASPD+P patients self-reported significantly lower mean compassion ratings than controls (irrespective of adjustments to account for group differences in educational status)**	There was no significant difference in the mean self-reported compassion ratings of ASPD-P patients when compared to controls	**ASPD+P patients self-reported significantly lower mean compassion ratings than ASPD-P patients (irrespective of adjustments to account for group differences in educational status)**
	There was no significant difference in the mean self-reported self-anger ratings of the combined ASPD group when compared to the control group	There was no significant difference in the mean self-reported self-anger ratings of ASPD+P patients when compared to controls	There was no significant difference in the mean self-reported self-anger ratings of ASPD-P patients when compared to controls	There was no significant difference in the mean self-reported self-anger ratings of ASPD+P patients and ASPD-P patients
	There was no significant difference in the mean self-reported other-anger ratings of the combined ASPD group when compared to the control group	ASPD+P patients self-reported significantly higher mean other-anger ratings than controls. However, no significant group differences were evident following adjustments to account for group differences in educational status	There was no significant difference in the mean self-reported other-anger ratings of patients with ASPD-P patients and controls	There was no significant difference in the mean self-reported other-anger ratings of ASPD+P patients and ASPD-P patients
	There were no significant differences in the odds of the combined ASPD group endorsing utilitarian solutions for impersonal moral dilemmas 1-4 when compared to controls	There were no significant differences in the odds of ASPD+P patients endorsing utilitarian solutions for impersonal moral dilemmas 1-4 when compared to controls	There were no significant differences in the odds of ASPD-P patients endorsing utilitarian solutions for impersonal moral dilemmas 1-4 when compared to controls	There was no significant difference in the odds of ASPD+P patients and endorsing utilitarian solutions for impersonal moral dilemmas 1-4 when compared to ASPD-P patients
	There was no significant difference in the odds of the combined ASPD group endorsing ≥ 50% utilitarian solutions for impersonal moral dilemmas when compared to controls	There was no significant difference in the odds of ASPD+P patients endorsing ≥ 50% utilitarian solutions for impersonal moral dilemmas when compared to controls	There was no significant difference in the odds of ASPD-P patients endorsing ≥ 50% utilitarian solutions for impersonal moral dilemmas when compared to controls	There was no significant difference in the odds of ASPD+P patients endorsing ≥ 50% utilitarian solutions for impersonal moral dilemmas when compared ASPD-P patients
	There were no significant differences in the odds of the combined ASPD group endorsing utilitarian action for personal moral dilemmas 5 or 7 when compared to the control group	There were no significant differences in the odds of ASPD+P patients and controls endorsing utilitarian action for personal moral dilemmas 5, 7 or 8	There were no significant differences in the odds of patients with ASPD-P and controls endorsing utilitarian action for personal moral dilemmas, 5, 6 or 7	There was no significant difference in the odds of ASPD+P patients and ASPD-P patients endorsing utilitarian action for personal moral dilemmas.

Task	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Moral Decision-Making Task	**The odds of the combined ASPD group endorsing utilitarian action for personal dilemmas 6 were significantly higher than those of the control group irrespective of adjustments to account for group differences in age and medication use** The odds of the combined ASPD group endorsing utilitarian action for moral dilemma 8 and endorsing ≥ 50% utilitarian action for moral dilemmas combined were significantly higher when compared to controls. However, no significant group difference was evident for moral dilemma 8 following adjustments to account for group differences in age and there were no group differences in the odds of the combined ASPD group endorsing ≥ 50% utilitarian solutions for personal moral dilemmas after controlling for group differences in age, antipsychotic and SSRI use.	The odds of ASPD+P patients endorsing utilitarian action for personal dilemmas 6 and endorsing ≥ 50% utilitarian decisions for personal moral dilemmas were significantly higher when compared to controls. However, no significant group differences were evident following adjustments to account for group differences in age and educational status	The odds of ASPD-P patients endorsing utilitarian action for personal dilemma 8 and endorsing ≥ 50% utilitarian decisions for personal moral dilemmas were significantly higher than those of controls. However, no significant group differences were evident following adjustments to account for group differences in age and educational status.	
	The combined ASPD group self-reported decisions on whether or not to endorse utilitarian action for impersonal moral dilemmas as significantly easier than the control group. However, no significant group differences in mean decision difficulty ratings for impersonal moral dilemmas were evident following adjustments to account for group differences in educational status There was no significant difference in the mean decision difficulty ratings of the combined ASPD group for personal moral dilemma 5 when compared to the control group The combined ASPD group self-reported significantly lower mean decision difficulty ratings than controls when deciding whether to endorse utilitarian action for personal moral dilemmas 6-8 and for personal moral dilemmas combined. However, no significant group differences were evident following adjustments to account for group differences in educational status	ASPD+P patients self-reported significantly lower mean decision difficulty ratings than controls when deciding whether to endorse utilitarian action for impersonal moral dilemmas 1-4 and for impersonal moral dilemmas combined. However, no significant group differences in mean decision difficulty ratings for impersonal moral dilemmas were evident following adjustments to account for group differences in educational status There was no significant difference in the mean decision difficulty ratings of ASPD+P patients when compared to controls for personal moral dilemma 5 ASPD+P patients self-reported significantly lower mean decision difficulty ratings than controls when deciding whether to endorse utilitarian action for personal moral dilemmas 6-8 and for personal moral dilemmas combined. However, no significant group differences in mean decision difficulty ratings for personal moral dilemmas 6-8 were evident following adjustments to account for group differences in educational status	There was no significant difference in the mean decision difficulty ratings of ASPD-P patients and controls for impersonal moral dilemmas 1 or 3 or impersonal moral dilemmas combined**.** ASPD-P patients self-reported significantly lower mean decision difficulty ratings than controls when deciding whether to endorse utilitarian action for impersonal moral dilemmas 2 and 4. However, no significant group differences in mean decision difficulty ratings for impersonal moral dilemmas were evident following adjustments to account for group differences in educational status There were no significant differences in the mean decision difficulty ratings of ASPD-P patients and controls for personal moral dilemmas 5-8	There was no significant difference in the decision difficulty ratings of ASPD+P patients and ASPD-P patients for impersonal moral dilemmas 1 and 2. **ASPD+P patients self-reported significantly lower mean decision difficulty ratings than ASPD-P patients for impersonal dilemma 4 and this effect remained evident irrespective of controlling for group differences in educational status** ASPD+P patients self-reported marginally (significant) lower mean decision difficulty ratings for impersonal moral dilemma 3 and impersonal moral dilemmas combined. However, there were no evident significant differences following adjustments to account for group differences in educational status There were no significant differences in the mean decision difficulty ratings of ASPD+P patients and ASPD-P patients for personal moral dilemmas 5-8

TASK	Combined ASPD vs controls	ASPD+P vs controls	ASPD-P vs controls	ASPD+P vs ASPD-P
Moral Decision-Making Task (Cont'd)	The combined ASPD group were significantly quicker to make decisions on whether to endorse utilitarian action for impersonal moral dilemma 1. However, this effect was not evident after controlling for group differences in educational status **The combined ASPD group were significantly quicker to make decisions on whether to endorse utilitarian action for impersonal moral dilemmas 2-4 and impersonal moral dilemmas combined and these significant group effects remained evident irrespective of adjustments to account for group differences in educational status**	There was no significant difference in the mean response latencies of ASPD+P patients and controls when deciding whether to endorse utilitarian action for impersonal moral dilemma 1 **ASPD+P patients were significantly quicker to make decisions on whether to endorse utilitarian action for impersonal moral dilemmas 2-4 irrespective of adjustments to account for group differences in educational status** **ASPD+P patients were significantly quicker to make decisions on whether to endorse utilitarian action for impersonal moral dilemmas combined irrespective of adjustments to account for group differences in educational status**	There was no significant difference in the mean response latencies of ASPD-P patients and controls when deciding whether to endorse utilitarian action for impersonal moral dilemma 1 **ASPD-P patients were significantly quicker than controls to decide whether to endorse utilitarian action for impersonal moral dilemmas 2-4 irrespective of adjustments to account for group differences in educational status*** **ASPD-P patients were significantly quicker to make decisions on whether to endorse utilitarian action for impersonal moral dilemmas combined irrespective of adjustments to account for group differences in educational status***	There was no significant difference in the mean response latencies of ASPD+P patients and ASPD-P patients when deciding whether to endorse utilitarian action for impersonal moral dilemmas 1-4
	The combined ASPD group were significantly quicker to make decisions on whether to endorse utilitarian action for personal moral dilemmas 5-8 and personal moral dilemmas combined and irrespective of adjustments to account for group differences in educational status	**The ASPD+P group were significantly quicker to make decisions on whether to endorse utilitarian action for personal moral dilemmas 5-8 and personal moral dilemmas combined irrespective of adjustments to account for group differences in educational status***	**The ASPD-P group were significantly quicker to make decisions on whether to endorse utilitarian action for personal moral dilemmas 5-8 and personal moral dilemmas combined irrespective of adjustments to account for group differences in educational status***	There was no significant difference in the mean response latencies of ASPD+P patients and ASPD-P patients when deciding whether to endorse utilitarian action for personal moral dilemmas 5-8 or personal moral dilemmas combined.