Influencing Motivation to Empathize in Individuals with Heightened Psychopathic Traits: Neural and Behavioural Assessment of Empathizing with Others

by

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THESIS EXAMINATION INFORMATION

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An oral defense of this thesis took place on August 6th, 2021 in front of the following examining committee:

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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

Abstract

Central to psychopathy is a purported lack of empathy for others. However, recent literature suggests that the decreased empathic responses of psychopathic individuals may be a result of aberrant motivations, rather than incapacities. To further consider the validity of these motivational hypotheses, a series of three studies was completed using a modified Empathic Accuracy (EA) task to assess whether empathic responses across conditions designed to influence empathy differed as a function of psychopathic traits. Studies 1a and 1b employed fMRI to assess whether community members with varying levels of psychopathic traits would show changes in EA as a function of the target's social distance. There were no overall significant differences in neural or behavioural metrics of EA. However, EA functioned as a result of psychopathic traits such that those higher in psychopathic traits demonstrated decreased, rather than increased, EA for those closest to them. Study 2 assessed whether students with varying levels psychopathic traits would show changes in EA as a function of the utility of the emotional information. Contrary to study hypotheses, EA functioned as a result of psychopathic traits such that those higher in psychopathic traits demonstrated decreased, rather than increased, EA scores in the implicit motivation (i.e., high utility - emotional Lie Detection) condition. Study 3 expanded on Study 2, assessing the effect that influencing explicit (i.e., increase condition) versus implicit motivations had on the EA scores of individuals with varying levels of a psychopathic traits. Psychopathic traits influenced EA scores in the implicit, but not explicit, motivation condition, in line with results from Study 2. Overall, support for hypotheses was mixed. Empathic responses in those with heightened psychopathic traits did appear influenced by the various motivational manipulations, but not always in the expected direction. Supportive of motivational frameworks, these results suggest that empathic responses fluctuated across targets and contexts; however, more research is required to identify the specific drivers of empathy in those with heightened psychopathic traits. These findings may help further the identification of motivations deemed relevant to those high in psychopathic traits for use in the potential development of empathy-based treatments.

Keywords: psychopathy; empathy; empathic accuracy; motivation

AUTHOR'S DECLARATION

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____ Lindsay L. Groat

STATEMENT OF CONTRIBUTIONS

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. I have used standard referencing practices to acknowledge ideas, research techniques, or other materials that belong to others. I performed the majority of the experimental work, data cleaning, organization, and analysis and writing of the studies within. All three studies were conducted in the Clinical Affective Neuroscience Laboratory for Discovery and Innovation (CANdiLab) operated by Dr. Matthew Shane. Undergraduate Research Assistants working in the lab assisted with data collection for Study 2 and Study 3.

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LIST OF ABBREVIATIONS AND SYMBOLS

ACC	Anterior Cingulate Cortex
AI	Anterior Insula
CH	Coldheartedness
EA	Empathic Accuracy
EC	Empathic Concern
FD	Fearless Dominance
fMRI	Functional Magnetic Resonance Imaging
IRI	Interpersonal Reactivity Index
mPFC	Medial Prefrontal Cortex
PCL-R	Psychopathy Checklist-Revised
PPI-R	Psychopathic Personality Inventory-Revised
PD	Personal Distress
PT	Perspective Taking
SCI	Self-Centered Impulsivity
TPJ	Temporoparietal Junction

Chapter 1. Introduction

1.1 Empathy: A Multi-Component Process for Understanding and Sharing Others' Emotions

Since the nineteenth century, empathy has been defined as a multi-faceted trait promoting the understanding and sharing of another's affective states (Batson et al., 1987; Davis, 1983; Zaki, 2014). While a vast array of empathy-based research has occurred since that time (see Wispé, 1987 for an overview of the history of empathy research), there remains considerable variation in the processes necessary for empathizing. For instance, there remains disagreement surrounding whether empathy is reliant on the distinction between one's own emotions and the target's emotions (de Vignemont & Singer, 2006; Decety & Lamm, 2006); is an automatic or controlled process (Preston & de Waal, 2002; Singer et al., 2004); is a state or a trait (Keysers & Gazzola, 2014; Zaki, 2014), and whether it requires congruency with the target's emotions to be considered empathy (Lishner et al., 2011; Vachon & Lynam, 2016). At the least, there is some consensus surrounding the belief that empathy exists as a complex, multi-faceted trait consisting of both cognitive and affective components (e.g., Batson et al., 1987; Cuff et al., 2016; Davis, 1983; Zaki et al., 2008) that work together to garner one's empathic responses towards others.

Most contemporary theories of empathy suggest that it includes related, yet independent, cognitive and affective components. Cognitive empathy is ability to understand the thoughts and feelings of a target (e.g., Cuff et al., 2016), whereas affective empathy is the ability to experience and respond to other's thoughts and feelings (e.g., Batson, 2009; Bloom, 2017; Cuff et al., 2016). Affective empathy has been conceptualized as including three-subfacets. An automatic experience of emotional contagion, which involves one's tendency to experience the emotions of a target (e.g., Batson et al., 1987; Decety & Moriguchi, 2007; Zaki, 2014), and two less automatic components referred to as empathic concern and personal distress. Whereas empathic concern is an *other-oriented* response that involves concerning one's self with the feelings of another (see Davis, 1983), personal distress is a *self-oriented* response that involves the manifestation of anxiety or depression (Davis, 1983). Eisenberg and Fabes (1992) suggests that whether an individual responds with empathic concern or personal distress relies on the level of emotional arousal they feel in response to the target's emotions. When the level of arousal from viewing negative emotions is deemed as "optimal", individuals will shift their focus of concern to the target. In comparison, however, if the individual becomes over aroused from viewing negative emotions, they may then in turn focus on alleviating their own, rather than another's, distress. Together, the cognitive and affective components of empathy are believed to work in conjunction to promote self- or other-oriented empathic responses.

Cognitive and affective empathy can be measured through a variety of self-report (e.g., Empathy Scale, Hogan, 1969; the Interpersonal Reactivity Index, Davis, 1983; the Empathy Quotient, Baron-Cohen & Wheelwright, 2004) and behavioural (e.g., Reading the Mind in the Eyes Task to assess perspective-taking, Baron-Cohen et al., 2001; pictures and videos showing different emotions, see Lishner et al., 2011) modalities. There are strengths and weaknesses to each. Self-report measures allow for the assessment of trait empathy (i.e., dispositional levels of empathy); however, they are reliant on the level of accuracy in an individual's introspection. Behavioural tasks can be of service here, as they can allow the researcher to measure state (i.e., situational levels of empathy), and the participant's ability to share in, and/or to accurately infer, the target's emotions. Further, these tasks can rely on both static (i.e., sequential display of emotional images) and dynamic (i.e., videos depicting individuals experiencing emotions such as pain) assessments of emotion. Use of dynamic videos allows for greater ecological validity as it displays videos of targets experiencing and/or describing emotional events. One particularly useful task of this nature is the Empathic Accuracy task (Zaki et al., 2008, 2009), which requires participants to watch videos of target's describing emotional events that have occurred in their lives. Participants are asked to assess the affective states of these targets continuously throughout the video playback. Moreover, it allows for direct correlation with the targets' own ratings. A perceivers' level of empathic accuracy is defined by the effect size of the correlation between target and perceivers ratings (e.g., Zaki et al. 2008, 2009). Mean levels of empathic accuracy tend to range from moderate (i.e., r = .46-.47, Zaki et al., 2008, 2009) to high (i.e., r = .75, Mackes et al., 2018), and varies on the expressivity of targets (increased accuracy for highly expressive targets, Mackes et al., 2018; Zaki et al., 2008).

1.2. Empathy: A Motivational Process

Recent models of empathy have been shifting somewhat, from strict trait-based models (i.e., that some individuals are inherently more empathic than others) to increasingly state-based/motivational perspectives (i.e., that empathic responding may vary based on individual and situational differences in motivation strength, Keysers & Gazzola, 2014; Zaki, 2014). One of the earliest models to incorporate state-based features (see Keysers & Gazzola, 2014), suggested that individuals vary in both their ability and propensity to empathize. According to this model, individuals have a set range within which they can empathize (i.e., an innate ability level); however, the likelihood that they will in fact invoke that ability in any given moment will vary as a function of several individual or situational characteristics (Keysers & Gazzola, 2014). In a similar vein, Zaki (Weisz & Zaki, 2018; Zaki, 2014) has highlighted the motivational nature of empathy, whereby the likelihood that an individual will empathize will vary as a function of the balance between forces that push towards (i.e., approach motives) or away from (i.e., avoidance motives) empathizing. Further, Cameron and colleagues (2015) have suggested that empathy functions as a choice, which is influenced by a number of individual and situational factors including the amount of effort necessary to engage in empathic responses.

Very little work has focused on the specific factors that influence one's motivation to empathize. However, insights can be gleaned from the much larger literature focusing on how empathy varies by situational context. For instance, people are more likely to avoid empathizing when it is costly (Cameron et al., 2019). Moreover, research has demonstrated that individuals have increased empathy for others when they value the target (Batson et al., 2007); when the target is highly similar to them (Eklund et al., 2009); when the target is an ingroup member (Cikara et al., 2011; Cikara & Van Bavel, 2014; Hein et al., 2010; Xu et al., 2009); or when they want to share the target's positive emotions (Morelli et al., 2015). Together, these findings converge in providing some evidence for the influence of target and context on individual's empathic responses.

The ideas surrounding the development of empathy as a motivational construct stem from the emotion regulation literature, which suggests that motivational fluctuations underlie one's willingness to engage with or regulate their emotions (Gross et al., 2006; Keysers & Gazzola, 2014; Tamir, 2016; Tamir & Gutentag, 2017; Zaki, 2014). Regulation is believed to rely on both hedonic (i.e., how positive or negative that given emotion is), and utilitarian (i.e., how useful that given emotion is deemed to be, Tamir, 2009, 2016; Tamir & Gutentag, 2017) motives. Hedonic motives are thought to drive emotion regulation such that individuals want to maximize pleasure and minimize pain (Tamir, 2016). However, if a given painful (or negative) emotion helps one reach a specific goal, it is thought that emotion regulation becomes driven by more utilitarian, rather than hedonic, motives (Tamir & Gutentag, 2017). In support of this, a series of studies by Tamir and colleagues (2013) manipulated the "emotion-outcome expectancies" (the perceived utility of specific emotions in completing upcoming tasks) of a variety of situations and assessed the likelihood that participants would engage in specific negative emotions. Participants were more likely to engage in situations that would induce certain emotions (e.g., listening to angry music to increase anger) if they believed those emotions would serve useful for a future task (e.g., in a confrontational task; Tamir et al., 2013). Thus, the motivation underlying the willingness to engage in a specific emotion may influence the likelihood of its experience. The studies conducted within this dissertation are heavily influenced by these ideas of utilitarian motives. Specifically, they aim to use the EA task to evaluate whether individuals with heightened psychopathic traits are similarly influenced by these utilitarian motives to empathize. As will be discussed in the following section, dominant theories of psychopathy have long argued that psychopathic individuals are characterized by an *inability* to empathize. Evidence that their expression of empathy is also influenced by hedonic and/or utilitarian motives may provide considerably greater insight into psychopathy.

1.3. Psychopathy: Understanding the Personality Disorder

Several characteristics underlie psychopathy, including, but not limited to, callousness, a diminished capacity for remorse, a lack of empathy, impulsivity and poor behavioural control (Hare, 2003). These characteristics are assessed through the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), which factor analyses have most commonly organized into two distinct yet related Factors (e.g., Hare, 2003; Hare et al., 1990). Factor one covers the interpersonal/affective aspects of psychopathy, such as glibness/superficial charm, emotional shallowness, and a callous/lack of empathy. Factor two covers the antisocial/lifestyle characteristics of psychopathy, including a need for stimulation/proneness to boredom, a parasitic lifestyle, and poor behavioural controls (see Appendix A, for all PCL-R items). Other research has at times broken these Factors down further, into four facets, comprised of interpersonal, affective, lifestyle, and antisocial facets (Vitacco et al., 2005; see Cooke et al., 2004 for a discussion of a three-facet model). Together, these characteristics comprise the personality disorder, which is related to immoral and antisocial behaviours.

The clinical concept of psychopathy is often linked to criminal behaviour and violence (Hare, 2003; Hart, 1998). The prevalence rates of psychopathy are estimated to be about 16-20% of incarcerated men (Kiehl & Hoffman, 2014), compared to an estimated 1% in the general population (Hare, 2003). Given the average cost of incarceration per year in the US ($2.3 trillion US in 2009; Kiehl & Hoffman, 2014), the number of psychopaths incarcerated (e.g., 16-20%), and the fact psychopathic individuals also show recidivism rates up to five times higher than non-psychopathic individuals (Hemphill et al., 1998), psychopathy's economic burden on society is immense. Indeed, recent estimates argue that psychopathy may cost society as much as $460 billion/year – comparable to schizophrenia and depression combined (Kiehl & Hoffman, 2014).

Some research suggests that empathy, in particular, may play a key role in the characteristic behaviours of psychopathic individuals. Empathy is thought to promote prosocial behaviour, and to inhibit aggressive, violent behaviour (Miller & Eisenberg, 1988). Indeed, psychopaths tend to commit emotionless, goal-driven crimes (i.e., instrumental crimes, Woodworth & Porter, 2002), which are thought to be linked to Factor 1 traits (Skeem et al., 2003; Woodworth & Porter, 2002); the factor of the PCL-R related to interpersonal/affective aspects of psychopathy including a lack of empathy. Moreover, individuals with heightened Factor 1 traits tend to engage in general (Leistico et al., 2008; Salekin et al., 1998), and violent (Hemphill et al., 1998; Leistico et al., 2008; Olver et al., 2013) recidivism. Items included specifically in the affective facet of the PCL-R (such as callous/lack of empathy) have predicted institutional violence (Mossière et al., 2020), as well as violent recidivism (e.g., Sohn et al., 2020; but see Kennealy et al., 2010, which discusses the predictive utility of both Factor 2 and the antisocial facet for recidivism rates). In an 11-year follow up of prisoners in Korea, Sohn and colleagues (2020) found that violent recidivism was positively correlated with the interpersonal, affective, and antisocial facets of the PCL-R; the strongest predictor of violent recidivism was the callous/lack of empathy item of the affective facet. Further, some research has suggested that emotional dysregulation mediates the relationship between psychopathy and physically aggressive, angry, and hostile behaviour (Garofalo, Neumann, Kosson, et al., 2020). Thus, both empathic deficits and difficulties with emotion regulation, appear to be associated with heightened offending behaviours of psychopathic individuals.

1.4. Psychopathy: Decreased Affective Experience

1.4.1. Affective Deficits

Historical conceptualizations posit that the affective characteristics central to psychopathy come from a core inability to recognize and experience normal levels of various emotions, including sadness (Dawel et al., 2012; Decety et al., 2014; Eisenbarth et al., 2008; Hastings et al., 2008; Marsh & Blair, 2008), fear (Blair et al., 2004; Dawel et al., 2012; Decety et al., 2013; Marsh & Blair, 2008), anxiety (Fowles, 1980; Lykken, 1957; Patrick et al., 1993), distress (e.g. Blair, 1999) and other negatively-valent emotions (e.g. Dawel et al., 2012; Decety et al., 2014; Hastings et al., 2008; see Marsden et al., 2019, for a recent review). The earliest modern conceptualization of psychopathy, written within Cleckley's (1941) *The Mask of Sanity*, argued that the true psychopath, while able to mimic others' emotions effectively, was genuinely incapable of experiencing emotional reactions. According to Cleckley's account, this core deficit, or "semantic dementia," results from psychopathic individuals' inability to process and experience deep, complex emotional cues (Cleckley, 1941). Cleckley (1941) hypothesized that the psychopath's lack of emotional experience hinders their ability to associate emotions with the consequences of their behaviour, preventing punishment-based learning and socialization.

Other theories hold that the affective deficit may be most pronounced for specific emotions. For instance, Lykken (1957), in his Low Fear Hypothesis, posited that psychopaths suffer from deficits experiencing fear that precludes their ability to learn from fear-based situations. Lykken (1957) found that when psychopaths were navigating a mental maze, wherein the goal was to avoid incorrect paths (i.e., those that led to aversive shocks), they were less likely to make decisions to avoid aversive shocks, and experienced decreased levels of physiological arousal towards cues indicating upcoming shocks. Thus, Lykken concluded that psychopaths are less likely to become effectively socialized due to their inability to manifest fear as a result of the negative repercussions of their actions (including antisocial or violent behaviour; Lykken, 1996). There is much support for this hypothesis, including research that indicates that individuals higher in psychopathic traits have difficulties recognizing fearful emotional expressions (particularly when the emotional image is ambiguous; Blair et al., 2004; Jusyte & Schönenberg, 2017; Marsh & Blair, 2008), are less likely to exhibit fearfulness when shown fear-inducing stimuli (Patrick et al., 1994), and demonstrate decreased fear-potentiated startle reactions to negatively-valent/aversive stimuli (e.g., Levenston et al., 2000; Patrick et al., 1993).

1.4.2. Empathic Deficits

Other theories have focused specifically on psychopathic individuals being characterized by a distinct lack of empathy (Cleckley, 1941; Hare, 2003; Verschuere et al., 2018); the affective responses that occurs from the understanding of another's emotional state (i.e., Davis, 1983; Eisenberg & Fabes, 1990). Thus, it is thought that psychopathic individuals not only suffer from an inability to experience emotions, but also from an inability to recognize and/or respond to the emotions of others. In an attempt to identify the core characteristics of psychopathy, Verscheure and colleagues (2018) completed a series of network analyses within three offender samples. The goal of network analyses is to identify connectivity relationships among a set of variables or characteristics. The results revealed that of all PCL-R traits, that of callous/lack of empathy emerged as a central characteristic of psychopathy.

Indeed, a vast body of literature spanning self-report (e.g., Domes et al., 2013; Pajevic et al., 2018), behavioural (e.g., Brook & Kosson, 2013; Domes et al., 2013; Mayer et al., 2018; Seara-Cardoso et al., 2015), physiological (e.g. Pfabigan et al., 2015; van Heck et al., 2017; Verona et al., 2013) and neuroimaging (e.g. Decety et al., 2013; Marsh et al., 2013; Seara-Cardoso et al., 2015, 2016) modalities confirm that this is the case. In one study, Brook and Kosson (2013) used a modified version of an empathic accuracy task (based off of Ickes (1997), rather than the Zaki and colleagues (2008) protocol described below), to examine whether inmates with and without psychopathy demonstrated differing levels of empathic accuracy. Participants watched videos of targets describing past emotional autobiographical events and were told to identify and rank-order the emotions they thought the target was feeling at each video stop-point. Empathic accuracy was measured as amount of correspondence (0-2 points) between the perceiver's ratings and target's own ratings. The researchers found that psychopathic individuals (PCL-R > 29) had lower empathic accuracy scores than both mid-scoring (PCL-R = 21-29) and non-psychopathic (PCL-R < 21) offenders. Further, a study conducted by Seara-Cardoso and colleagues (2016) assessed how psychopathic traits influenced participant's subjective and neural responses to stimuli depicting others' pain. Participants were instructed to rate how they felt while viewing images of targets expressing emotions. Results revealed that psychopathic traits negatively modulated subjective and neural empathic responses. Together, these studies suggest that individuals with heightened levels of psychopathic traits demonstrate decreased behavioural and/or neural evidence of cognitive and affective empathy.

However, there are notable inconsistencies that exist within this literature. For instance, several studies have reported no relationship between psychopathy and empathic traits (e.g., Lishner et al., 2012; Robinson & Rogers, 2015) or empathic responding (e.g., Lishner et al., 2012; Pham et al., 2000). Further, another line of work has illustrated that when psychopathic individuals' baseline motivations are influenced through explicit instructions (e.g., Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013), or their attention is directed towards emotional stimuli (Drayton et al., 2018), their attenuated emotional responses become normalized. These studies assessed the neural responses within empathy-related regions of psychopathic individuals as they attempted to maximize or minimize their emotional responses to others. Results indicated that although psychopathic individuals showed diminished neural responses when merely observing emotional images, these regions' activation significantly increased when instructed to try to maximize their emotional responses (Arbuckle & Shane, 2017; Meffert et al., 2013; Shane & Groat, 2018). Together, these results highlight the possibility that psychopathic individuals may not be inherently incapable of empathizing with others and can demonstrate normative levels of empathy when they are sufficiently motivated to do so.

1.4.3. Cognitive Deficits

Several theories of psychopathy suggest that underlying cognitive deficits contribute to both the affective and behavioural characteristics central to those with heightened psychopathic traits. It can be challenging to disentangle cognitive and emotional processes in a clear-cut way; the discussion below will review the literature and explain how they argue that specific cognitive deficits may preclude the psychopath's reduced affectivity.

Response Modulation Hypothesis. The Response Modulation Hypothesis (RMH; Gorenstein & Newman, 1980; Newman et al., 1990; Patterson & Newman, 1993) posits that psychopathic individuals have abnormalities in emotional and behavioural responding due in part to an underlying deficit in selective attention (Patterson & Newman, 1993). Response modulation is a brief, automatic shift of attention that enables the monitoring and usage of information outside of one's current response set. According to the RMH, psychopathic individuals suffer from an inability to make that automatic switch in attention. Once an attentional focus is set, they are unable to modify it in order to include any peripheral information that may contradict their current goals (Patterson & Newman, 1993). Some work suggests that this focus on a dominant response set occurs early in the attentional process (Baskin-Sommers et al., 2011), reducing the scope of attentional focus and preventing any peripheral information from being attended to. Thus, once a goal-set is determined, information is missed and not successfully integrated into their response patterns to effectively modify behaviour (Patterson & Newman, 1993). As a result, the psychopathic individual may show poor passive avoidance learning and response perseverance (e.g., Blair et al., 2006; Newman et al., 1990; Newman & Kosson, 1986; Newman & Schmitt, 1998), reduced fear (e.g., Newman et al., 2010), and a failure to recognize and respond to emotional stimuli (Lorenz & Newman, 2002; Newman et al., 1997), as this type of emotional information is also often peripheral to one’s current goal set (e.g., Hiatt et al., 2004; Vitale et al., 2007).

Despite these difficulties in automatic selective attention, the RMH suggests that psychopathic individuals will display normative processing of information (emotional, or otherwise) following the intentional allocation of attention towards those stimuli (i.e., it is a part of their goal-directed set; Lorenz & Newman, 2002). Research has revealed that psychopathic individuals show normative processing of emotion-related distractor information when early cues guide their attention towards relevant stimuli (Baskin-Sommers et al., 2011, 2012; Zeier et al., 2009). A series of studies completed by Baskin-Sommers and colleagues (2011, 2012) reported that psychopathic individuals' purported fearlessness can be overcome by guiding attention to threat-relevant stimuli. In these studies, participants were instructed to either attend to a cue indicative of an incoming shock (i.e., threat cues) or an irrelevant cue (i.e., cue that makes threat information secondary). They found that by instructing psychopathic individuals to attend to threat-related information (i.e., making it a part of their current goal set), psychopathic individuals experienced similar fear-potentiated startle as non-psychopathic controls (Baskin-Sommers et al., 2011, 2012). However, when their focus was not drawn towards threat-irrelevant stimuli (i.e., it was peripheral to their current goal set), they did not display normative fear-potentiated startle responses (e.g., Baskin-Sommers et al., 2011, 2012). Together, these findings highlight an attentional deficit that may be underlying some common affective deficits displayed by those with psychopathic traits.

1.4.4. Motivation-Based Theories of Psychopathy

Other theories of psychopathy have similarly focused on the nuances of the psychopath’s emotional responding. Early work by Hare, Frazelle and Cox (1978) found that when awaiting punishment psychopathic individuals showed increased heart rate, and reduced levels of skin conductance. Hare (1978), in his gating hypothesis, posited that psychopathic individuals' increased heart rate occurred as a result of attempts to regulate the incoming negative information, whereas the decreased skin conductance responses highlighted the efficacy of the regulatory process. That is, the psychopathic individual saw the stimuli as being aversive, and initiated regulatory mechanisms to decrease their processing of that stimuli. In line with this notion, Shane and Peterson (2004) suggested that psychopathic individuals may be able to successfully use regulation strategies to minimize the adverse effects that processing negatively valent information would have. The researchers posited, that similarly to normative populations, psychopathic individuals are inherently proficient at regulating their own emotions and will do so in order to avoid negative affective states. As such, the minimized experience of, or responses to, negatively valent emotions, may mimic what can be perceived as a core inability to experience those negative emotions (Shane & Peterson, 2004). Together, these researchers align in the notion that since psychopathic individuals' find negatively valent information aversive, they may modulate their experience of those emotions to lessen their impact.

Another line of work suggests that the emotion dysregulation common to psychopathy may occur as a result of abnormalities in their motivations to experience and regulate their emotions (Garofalo & Neumann, 2018). Indeed, psychopathic individuals are characterized by high levels of emotional dysregulation (Garofalo et al., 2018; Garofalo, Neumann, Kosson, et al., 2020), and this emotion dysregulation has been found to mediate the relationship between psychopathy and levels of reactive and proactive aggression (Garofalo et al., 2018). However, it is thought that this emotion dysregulation is due to psychopathic individuals valuing specific emotions over others (e.g., Garofalo et al., 2019; Kosson et al., 2020; Spantidaki Kyriazi et al., 2020). Moreover, psychopathic individuals engage in other-directed emotions such as spite and contempt (Garofalo et al., 2019), and are more likely to express anger than supress it (Kosson et al., 2020). Additionally, Spantidaki Kyriazi and colleagues (2021) found that psychopathic individuals endorsed wanting to experience anger in their daily lives. In addition, it was found that psychopathic individuals positively endorsed the perceived utility of experiencing the emotions of anger, fear and sadness. Moreover, the perceived utility of fear and anger mediated the relationship between psychopathic traits and the emotion goals of fear, and anger, respectively. Together, these studies suggest that both emotion-specific value and utility may be guiding the types of emotions psychopathic experience.

The Affect Regulation Theory (Kosson et al., 2018; Vitale et al., 2018) suggests that in response to early-stress, psychopathic individuals develop an automatic regulation style in which they block out, and attend to, specific emotional information. The authors suggest that the blunted emotional responses of psychopathic individuals occur as a result of learned emotion regulation strategies which down-regulate experiences of certain emotions (i.e., negative affect) and increase the experiences of other emotions (i.e., anger). Psychopathic individuals become reliant on this regulatory process and over time it can lead to a maladaptive automatic regulation of negative emotions. In line with the Motivational Framework, the authors characterize psychopathic individuals being resistant, rather than incapable, of responding to emotional information such that if given enough time, the automatic down regulation of negative emotions can be overcome. In support of their theory, Vitale and colleagues (2018) had psychopathic offenders perform a Lexical Decision Task to assess the time associated with the accurate identification of positively and negatively valent word and non-word pairs. Results indicated that there was a significant positive relationship between response time and accuracy for negatively valent words, such that accurate identification took longer for psychopathic individuals. This relationship was only present for the psychopathic offender group and provides support for the idea that psychopathic individuals can respond to emotional stimuli, particularly negatively valent stimuli, if given sufficient time to do so.

1.5. Motivational Framework of Psychopathy

Perhaps most comprehensively, Groat and Shane (2020) have put forward a broad motivational framework for conceptualizing the psychopathy. Groat and Shane's (2020) Motivational Framework for psychopathy explicitly posited that psychopathic individuals may be characterized by a reduced motivation to process emotional stimuli fully. As a result of this insufficient motivation, psychopaths may not allocate the resources necessary to process emotional information effectively. This aberrant information processing may occur due to indifference, wherein psychopathic individuals have no motivation to allocate processing resources towards emotional stimuli; or as active avoidance, wherein psychopathic individuals have a negative motivation, leading to the avoidance of allocating processing resources towards emotional stimuli. Thus, due to the value that psychopathic individuals place on certain emotional stimuli, they may engage in a deliberate, yet systematic, information-processing approach that will modulate their processing of that emotional stimuli. The aberrant processing is thought to resemble a true insensitivity to these emotional stimuli and, as such, leads to similar effects on the psychopaths' cognitive and affective processes. While this may seem rudimentary, interpretations of the situational nature of empathy are prevalent in other forensic areas (e.g., sexual offending). For example, it has been theorized that sexual offenders' lack of empathy for their victims occurs as a result of cognitive distortions preventing a complete understanding of their victims' emotions and perspectives (e.g., Fernandez & Marshall, 2003; Marshall et al., 2001). This helps provide further support for the notion that emotional and empathic responses may occur situationally, and that the likelihood of psychopathic individuals' empathizing is based on the motivational relevance of the emotional stimuli.

This framework, while showing considerable convergence with Garofalo and Neumann (2018) and Kosson and colleagues (2018; Vitale et al., 2018), goes deeper into the specific motivations that may present in the psychopath. While Garofalo and Neumann (2018) suggest that individuals with heightened levels of psychopathic traits may value certain emotions over others (e.g., spite and contempt; Garofalo et al., 2019), the current Motivational Framework builds on this notion by suggesting that it is the value of these emotions that leads to the psychopathic individuals' modulation of processing resources necessary for processing of certain emotional stimuli. This further highlights the role those emotional preferences may have in modulating psychopathic individuals' motivation to process emotional stimuli. In addition, the current framework differs from Kosson and colleagues (2018; Vitale et al., 2018) Affect Regulation Theory (ART) in two main ways. First, whereas the ART suggests that psychopathic individuals suffer from a habitual blunting of emotion (a notion similar to active avoidance), the Motivational Framework explores how differential motivation, in general, may influence psychopathic individuals' emotional processing. Second, whereas the ART focuses on habitual coping styles that develop in response to childhood trauma, the current framework suggests that the psychopathic individuals' differential motivation may develop as either an innate, or learned, information-processing approach (see Groat and Shane (2020) for a more in-depth comparison of the current framework to other motiovational theories of psychopathy).

The Motivational Framework builds from the normative literature highlighting that emotion regulation may be driven by individual's goals (e.g., Tamir, 2009). Indeed, considerable research suggests that there are a variety of motivations that underlie an individual's willingness to regulate their emotions in different situations (e.g., Gross et al., 2006; Tamir, 2016; Tamir & Gutentag, 2017). The direction in which people choose to regulate their emotions depend on the motivations driving that regulation (Tamir, 2016), as well as the perceived utility of the outcome emotion (Chow & Berenbaum, 2012; Tamir & Gutentag, 2017). For example, people may regulate their emotions in order to increase positive, and decrease negative, emotions (i.e. hedonic motivations; Tamir, 2016). Alternately, individuals may be motivated to experience a specific emotion if they believe that it will optimize behaviour to reach a certain goal (i.e., utilitarian motivations; Tamir & Gutentag, 2017). In a series of studies, Tamir and colleagues (2009; 2008, 2013; 2012) manipulated emotion-outcome expectancies (the perceived utility of specific emotions in coming tasks) in order to assess the likelihood that participants would engage in tasks that directed at inducing those emotions (e.g., listening to angry music to increase anger). Results revealed that participants were more likely to engage in situations to induce certain emotions (e.g., listening to angry music to increase anger) if they believed those emotions would serve useful for a future task (e.g., in a confrontational task; Tamir et al., 2013). Following the engagement of emotion-inducing situations, participants rated feeling higher levels of the goal-emotion (Tamir et al., 2015), and were more successful on their goal-related task (e.g., Tamir et al., 2015). Thus, when an individual believes that an emotion will be useful in reaching a goal, the willingness of that individual to experience that emotion may increase.

The present dissertation builds off of Tamir's work, to investigate the possibility that the decreased empathic responding characteristic of psychopathic individuals reflects a reduced inclination to process emotional information necessary for empathizing (Groat & Shane, 2020). Following her utilitarian hypothesis, such reduced inclination could occur as a result of an indifference toward empathy-related information, or an active avoidance of that information. In either case, this reduced inclination may decrease processing in a way that can mimic a true incapacity to empathize. To this end, in each study of my dissertation, individuals with differing levels of psychopathic traits performed the empathic accuracy task described above under a variety of motivational instructional sets. The goal was to evaluate whether individuals with heightened psychopathic traits would indeed show increased engagement in empathic processing when motivational sets increased the perceived utilitarian benefits of doing so.

1.6. Current Dissertation

The primary aim of the dissertation was to empirically assess the extent to which neural and/or behavioural metrics of empathy would vary based on the motivational set the individual was in. Study 1 sought to examine whether they could be motivated by group membership. Study 2 sought to examine whether they could be motivated by the utilitarian nature of the situation. Study 3 sought to further examine these utilitarian influences, while bolstering certain study design issues from Study 2. Together, all three sought to evaluate the extent to which empathic expression would vary as a context of motivational features. Support for these hypotheses would provide additional support for motivational hypotheses of psychopathy, and have potentially important implications for understanding, managing and rehabilitating individuals with heightened psychopathic traits.

Chapter 2. General Methods

All studies within this dissertation utilized a modified version of Zaki and colleagues (2008) Empathic Accuracy Paradigm (see Figure 1), as well as a core set of self-report assessment devices. Described below are these methodological components that were common to all of the studies within the dissertation. Study-specific variations to these methods are handled within each study's method section.

2.1. Materials

2.1.1. Personality Measures

Psychopathic Personality Inventory-Revised (Lilienfeld & Widows, 2005).

The Psychopathic Personality Inventory is a 154-item scale that measures psychopathic traits in both clinical and non-clinical populations. The items are rated on a 4-point Likert scale ranging from 1 "*False"* to 4 "*True*" with higher scores indicating increased psychopathic traits. The PPI-R gives one total score and three-factor scores: Fearless Dominance (Factor 1), Self-centered Impulsivity (Factor 2), and Coldheartedness (Factor 3). Fearless Dominance assesses one's overall wellbeing, assertiveness, narcissism, and thrill-seeking. Self-centred impulsivity assesses traits of impulsivity, aggressiveness, substance use, negative affect, and antisocial behaviour. Finally, Coldheartedness assesses a distinct lack of emotion or regard for others' emotions. The use of the PPI-R in non-forensic samples has shown high reliability and validity (e.g., Ray et al., 2011; Ruchensky et al., 2016, 2018; Uzieblo et al., 2010) and mean PPI-R scores of 1.85 (extrapolated from Sörman et al., 2016; Uzieblo et al., 2010; van Dongen et al., 2017).

Interpersonal Reactivity Index (IRI; Davis, 1983)

The Interpersonal Reactivity Index (IRI; Davis, 1983) is a 28-item scale designed to assess dispositional empathy. The questionnaire items are answered on a 5-point Likert-type scale ranging from 0 "Does not describe me very well" to 4 "Describes me very well." The questionnaire has four subscales: perspective-taking, empathic concern, personal distress, and fantasy. Of most relevance for the studies within this dissertation are the perspective-taking and empathic concern subscales, which assess one's tendency to adopt others' points of view (cognitive empathy), and to experience compassion or sympathy for others (affective empathy), respectively. Higher scores on each subscale are indicative of higher perspective-taking and empathic concern, respectively.

2.1.2. Autobiographical Videos

Creation of autobiographical videos

Prior to study initiation, 13 community members (six male, seven female) were recruited to be videotaped while describing the four most positive and four most negative events from their lives. These individuals (from herein referred to as 'targets') were first given a few minutes to identify their most positive/negative events and to write some notes to help them put themselves in the mood of their selected events. They were then seated in front of a Sony Bloggie™ camera that pictured them from the torso up and were asked to describe the details of each event in a natural, truthful way. All positive events were described first, followed by all negative events (counterbalanced across participants). In total, 104 videos were created.

Following the oration of all videos, each target was then sat in front of a computer in the lab and asked to re-watch their own videos. While watching each video, they were asked to use a mouse to continuously indicate, on a scale from 0 "Extremely Bad" to 100 "Extremely Good" how they felt while they were describing their emotional event (not during the original event itself). After completing this task for all eight videos, the participants were debriefed. Ten of the 13 participants gave permission to have their videos used as stimuli in future research projects.

Selection and validation of autobiographical videos

Ninety-two participants were recruited from the University of Ontario Institute of Technology (UOIT) Psychology Participant Pool to participate in the study's video selection/validation phase. These participants were shown a randomly selected subset of 8 (out of the 80 total) autobiographical videos and were asked to rate each video on 7-point Likert scales for video valence (positive/negative), and target intensity, expressivity, likeability, similarity, clarity and believability. All responses were recorded.

Eight videos were selected based on several specific criteria. First, to ensure we included believable stories, all included videos were rated above the mean for target believability (M = 5.39). Additionally, to ensure we had a range of target expressivity, we included two highly expressive targets (expressivity score greater than M = 4.57) and two minimally expressive targets (expressivity score less than M = 4.57). Lastly, we ensured that our videos were counterbalanced to match valence (four positive and four negative), target gender (two males and two males) and target expressivity (four with higher expressivity and four with lower expressivity).

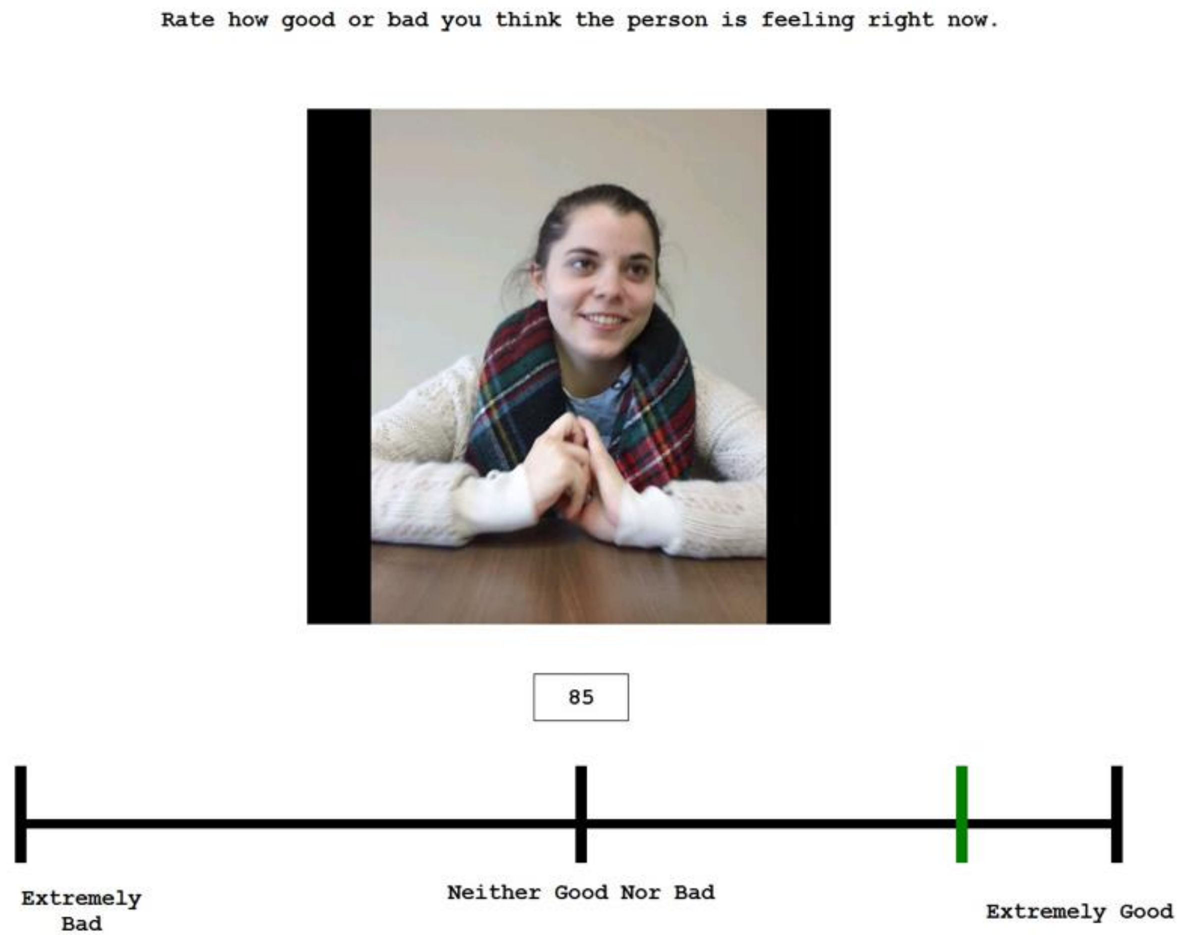
Following preliminary analyses of these videos, it was determined that two of the chosen videos were too difficult/ambiguous, and elicited scores that did not correlate well with the other six videos. As a result, these videos were replaced with two additional videos that were created after the validation phase.

2.2. Modified Empathic Accuracy Task

The current task was designed in E-Prime 2.0 (*E-Prime*, 2016) as an fMRI-based version of Zaki and colleagues (2008, 2009) Empathic Accuracy Paradigm (see Figure 1). Participants were shown videos of targets describing emotional autobiographical narratives of events that have happened in their lives. While watching these videos, participants were asked to rate how good or bad they thought the target was feeling as the target *spoke about* their emotional events (i.e., not during the event itself). The videos were presented on a white background with a 100-point sliding scale below each video, from 0 ("Extremely Bad") to 100 ("Extremely Good"), with the cursor starting at a rating of 50 (neutral). Throughout the entire duration of each video, participants were told to continuously move their cursor for any changes in target emotion. Emotion ratings were collected every 250ms, and as participants moved their mouse, the number corresponding to the scale location was presented below the video.

Figure 1

Modified Empathic Accuracy Task



Chapter 3. Study 1a.

Psychopathic Individuals' Motivation to Empathize with Ingroup and Outgroup Targets

3.1. Introduction

Psychopathy is characterized by a combination of interpersonal/affective (i.e. shallow affect, lack of empathy) and behavioural/antisocial lifestyle (i.e. impulsivity, irresponsibility) characteristics (Cleckley, 1941; Hare, 2003) that predispose individuals to heightened antisocial behaviour (e.g. Hemphill et al., 1998). Early theories suggest that a lack of empathic responding (e.g. Cleckley, 1941) is particularly central to psychopathy. Indeed, there is a vast body of empirical work spanning behavioural (e.g. Brook & Kosson, 2013; Mayer et al., 2018; Seara-Cardoso et al., 2016), self-report (e.g. Pajevic et al., 2018), physiological (e.g. Pfabigan et al., 2015; van Heck et al., 2017; Verona et al., 2013) and neuroimaging (e.g. Decety et al., 2013; Marsh et al., 2013; Seara-Cardoso et al., 2016) modalities that indicate that psychopathic individuals experience decreased levels of empathic responding in a wide variety of contexts. However, despite the breadth of these findings, several notable inconsistencies have been reported. For example, some research has found no differences between low and high psychopathy groups on self-reported (e.g. Domes et al., 2013; Robinson & Rogers, 2015), behavioural (e.g. Domes et al., 2013; Lishner et al., 2012), or physiological measures (e.g., Pham et al., 2000). Additionally, recent research has indicated that psychopathic individuals can increase their empathic responses to other's emotions – at levels similar to non-psychopathic individuals – when explicitly asked to do so (e.g. Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013; Shane & Groat, 2018). Together these results suggest that while a lack of empathy is theorized as being central to psychopathy (e.g. Cleckley, 1941; Hare, 2003), it may be that the true relationship between psychopathy and empathy is, in fact, more complicated (see Groat & Shane, 2020).

Recent conceptualizations suggest that empathy may function as a choice (e.g., Cameron et al., 2019), leading one to approach or avoid empathy (e.g., Zaki, 2014). If empathy does function as a choice, it may be affected by various motivational factors (e.g., Zaki, 2014). One such motivational factor that has been shown to influence empathic responding is group membership (e.g. Cikara et al., 2011, 2011; Cikara & Van Bavel, 2014; Gutsell & Inzlicht, 2012; Keysers & Gazzola, 2014; Zaki, 2014). Indeed, group membership has been shown to influence empathy, such that people are more likely to empathize with ingroup compared to outgroup targets (Cikara, 2015; Cikara, Botvinick, et al., 2011; Cikara & Van Bavel, 2014). This effect has been shown when groups are separated based on race (Azevedo et al., 2013; Contreras-Huerta et al., 2013; Xu et al., 2009), teams (e.g. Cikara et al., 2011; Hein et al., 2010), and even based on arbitrary group assignments (Cikara et al., 2014). Moreover, neuroimaging work has demonstrated neural evidence indicative of emotion sharing, a component of empathy, when watching ingroup, but not outgroup, targets experiencing negative-affect/pain (Cikara, Bruneau, et al., 2011; Cikara & Van Bavel, 2014; Gutsell & Inzlicht, 2012; Hein et al., 2010; Xu et al., 2009, see Weisz & Zaki, 2018 for an overview of the social neuroscience underlying motivated empathy). This ingroup empathy bias may be due to increased familiarity (e.g., Preston et al., 2007), closeness (e.g. Beeney et al., 2011), or concern for (e.g. Zaki, 2014) ingroup versus outgroup targets, which together, may increase the likelihood of choosing to empathize with those ingroup targets.

To date, only a few studies have considered the possibility of an ingroup bias for individuals with heightened psychopathic traits. Some of this work has targeted biases in empathy specifically, however, most work has taken a more general approach to considering potential biases related to more/less favourable reactions to ingroup/outgroup targets. Arbuckle and Cunningham (2012) had participants make gambling decisions based on the probability of decision success, and value of money allotted, to themselves or to ingroup or stranger targets. A selfish decision involved basing a gambling decision on the expected value that gamble held for the participant, without consideration of the other target's gamble. However, a selfless gamble involved the consideration of the expected value of both their own, as well as the other target's, gambling outcome. They found that the likelihood of those low in psychopathic traits making selfless gambling decisions did not rely on the nature of the target. Alternately, in general, those with heightened psychopathic traits were more likely to base gambling decisions on what benefitted them. Yet, they were more likely to make selfless gambling decisions when targets were described as ingroup members. Similarly, Gillespie and colleagues (2013) used a Dictator game within which participants were asked to split ten British pounds between themselves and either an ingroup or outgroup target. They found that while individuals with high and low secondary psychopathic traits offered similar amounts of money to targets overall, those with heightened psychopathic traits offered significantly lower amounts of money to the outgroup than the ingroup targets. Further, only one study has explicitly assessed the relationship between empathy for ingroup and outgroup targets in individuals with heightened levels of psychopathic traits. Molenberghs and colleagues (2014) used fMRI to evaluate participants' neural responses to painful and nonpainful situations that they felt they were responsible for causing. Results indicated that psychopathic individuals' neural activation in regions underlying empathy and perspective-taking varied as a function of target group membership, such that psychopathic traits correlated negatively with neural response to pain inflicted to outgroup targets but not to ingroup targets. In each of these instances, the empathic responses of those with heightened psychopathic traits were influenced by group membership, suggesting that they may similarly hold an ingroup bias.

The previous literature highlights the potential influence that group membership may have on the empathic responses of those with heightened levels of psychopathic traits. One may argue that this effect occurred as a result of the influence group membership has on the motivations underlying psychopathic individuals' inclination to empathize with others (Groat & Shane, 2020). Indeed, central to Groat and Shane's (2020) Motivational Framework is the notion that psychopathic individuals' characteristic lack of empathy functions as a result of differences in their underlying motivations, rather than ability, to empathize. As such, psychopathic individuals decreased empathic responses occur as a result of being insufficiently motivated to process emotional stimuli; thus, resulting in reduced allocation of resources necessary to process that information. Together this may suggest that the psychopathic individuals' differential empathic responding for ingroup targets occurred as group membership served as a sufficient motivating factor influencing their empathic responses.

The present study was designed as an empirical assessment of the motivational framework of psychopathy. Research within normative populations suggests that individuals tend to empathize more with their ingroup members as it is thought to increase behaviours aimed at alleviating others' suffering and in turn promotes social cohesion and survival (Brewer, 1999; de Waal, 2008). While there is limited research in this area, previous research has suggested that individuals with psychopathic traits also hold an ingroup-bias in general (e.g., Arbuckle & Cunningham, 2012; Gillespie et al., 2013) and within regard to empathy (e.g., Molenberghs et al., 2014). As such, group membership was used as a means of evaluating whether motivation influenced the empathic responses of psychopathic individuals. Specifically, it was explored whether individuals with heightened psychopathic traits would show an ingroup empathy bias of magnitude similar to those with lowered psychopathic traits, as this would support the notion that psychopathic individuals may be similarly sensitive to motivational influences.

The current study aimed to add to the literature by using an fMRI-based version of a modified empathic accuracy task (Zaki et al., 2008, 2009) wherein participants watched positive and negative videos of ingroup and outgroup targets and rated how the targets were feeling while they described emotional autobiographical events to explore whether individuals with heightened levels of psychopathic traits have an ingroup empathy bias. Previous studies using an fMRI version of the Empathic Accuracy task have identified activation of regions underlying both the affective (i.e., anterior cingulate cortex (ACC) and anterior insula (AI); e.g., Hein & Singer, 2008; Singer et al., 2009; Singer & Lamm, 2009), and cognitive (i.e., medial prefrontal cortex (mPFC) and temporoparietal junction (TPJ); e.g., Frith & Frith, 2006; Schnell et al., 2011; Schurz et al., 2014) components of empathy (Mackes et al., 2018; Zaki et al., 2009). Further, by using videos and dynamic target/perceiver ratings, this task affords for an ecologically valid assessment of the interpersonal nature of empathic accuracy (EA). Use of empathic accuracy task allowed for the simultaneous assessment of EA and its neural underpinnings, and whether these responses varied based on group membership or psychopathic traits.

It was hypothesized that psychopathic individuals would show reduced evidence of EA overall. However, of particular interest to this study was whether individuals with heightened psychopathic traits would nonetheless show an ingroup/outgroup bias similar to that reported within non-psychopathic populations. Behaviourally, this would manifest as a null association between PPI-R and EA scores within the Ingroup, but not Outgroup, condition; neurally, this would manifest a null association between PPI-R and activation of regions underlying both cognitive (i.e., mPFC and bilateral TPJ) and/or affective (i.e., ACC and bilateral AI) empathy within the Ingroup, but not the Outgroup, condition. Further, it was hypothesized that activation in regions underlying cognitive and/or affective empathy would be parametrically modulated with participants' EA scores. It was hypothesized that this parametric modulation would be influenced by psychopathic traits overall. If individuals with heightened levels of psychopathic traits similarly demonstrate an Ingroup empathy bias then psychopathic traits would not influence the association between activation in regions underlying cognitive and/or affective empathy and parametrically modulated EA scores within the Ingroup condition specifically. Thus, revealing similar neural activation/subjective synchrony for those high and low in psychopathic traits. Together, this pattern of results would support the notion that individuals with heightened psychopathic traits may be sensitive to the specific motivational influence manipulated in the present study.

3.2. Methods

3.2.1. Participants

Forty participants were recruited from the Greater Toronto Area through poster advertisements at York University, and advertisements through a popular local online classified website (Kijiji.com). To be considered for the study, participants needed to pass an initial screening to ensure that they: a) were between the ages of 18-55, b) had at least an eighth grade reading and comprehension level, c) did not self-report any psychological or neurological issues and d) had no contra-indicators for MRI (e.g., pregnancy, exposure to metal, or metallic implants). Six participants were removed from final analyses for the following reasons: three showed high movement during their scans (over 20% of scans had movement greater than the 0.5mm/TR threshold), and one failed the Team Identification manipulation check (see below). Further, two participants were removed from analyses involving EA scores as they had over 50% of videos within a condition removed for lack of variance (EA rating SD less than 2.5). Thus, the final data set consisted of 36 participants for neuroimaging analyses not involving EA scores, and 34 for parametrically modulated neuroimaging and behavioural analyses. Mean sample age of all included participants was 26.32 (*SD* = 5.18; males = 16); the majority reported being Caucasian (88%), or having a mixed ethnicity (9%; the ethnicity from one participant was not indicated).

3.2.2. Team Identification Task (modified from Van Bavel & Cunningham (2009))

Ingroup/Outgroup Manipulation

A modified version of Van Bavel and Cunningham's (2009) Team Identification Task was administered to establish participants' ingroups and outgroups. The current study used a minimal group paradigm (i.e., arbitrary assignment of individuals into groups), within which targets from the *Autobiographical video creation* phase were randomly assigned to either Team Lion or Team Tiger. All participants were told that they had been randomly assigned to Team Lion. As such, all targets on Team Lion were a part of the participants' ingroup and all targets on Team Tiger were a part of the participants' outgroup.

In the familiarization phase of the Team Identification Task, participants were shown images of each team member (the targets) and were instructed to learn which team each member belonged to. Participants were first shown the images of the two targets on their team. Once participants familiarized themselves with the targets on their team, they clicked to show the images of the two targets on the other team. In the learning phase of the Team Identification Task, participants were presented with one image at a time and were asked to categorize targets as being a part of either their team, or the opposing team. They were shown 80 images (each of the four targets presented 20 times) and were told to press "1" to indicate the target was on "their team – Team Lion" or "2" to indicate the target was on the "opposing team – Team Tiger." The images advanced only when the participant responded.

3.2.3. Modified Empathic Accuracy Task

The fMRI-based Empathic Accuracy Task was completed as described above. During the task, all participants viewed two ingroup and two outgroup videos. Both the assignment of Targets as ingroup or outgroup, and the order of Target presentation was randomized.

3.2.4. Procedure

After arriving in the laboratory, participants underwent a full informed consent process and were seated in front of a laptop computer. Via the minimal group procedure reported above, participants were assigned to be a part of Team Lion, and were told that the targets were either also on Team Lion (their ingroup), or were on Team Tiger (their outgroup). To become familiar with their ingroup and outgroup members, participants completed the Team Identification task and were then put into the fMRI scanner for completion of the fMRI-based Empathic Accuracy task. Following the fMRI-based Empathic Accuracy Task, individuals completed a battery of self-report questionnaires. Upon completion of all study components, they were debriefed and allowed to leave the laboratory.

3.2.5. Image Acquisition

All fMRI data was collected using a Siemens 3T Magnetom Tim Trio MRI Scanner equipped with a 32-channel head coil. Videos were programmed in E-Prime 2.0 software (Schneider & Zuccoloto, 2007) and presented to participants with a PROPixx™ projector made by VPixx Technologies, and an MR Confon audio system. Thirty-two axial slices acquired in an interleaved pattern (3.5mm thickness) covering the whole brain were collected using parallel imaging with an acceleration factor of two (TR: 2000 ms, TE: 30ms, FOV: 240mm x 80mm x 80mm, flip angle: 78°). All voxels were set to a [3mm, 3mm, 3.5mm] size in the normalized space.

3.3. Data Analytic Process

3.3.1. Behavioural data analyses

All behavioural analyses were completed using IBM SPSS Version 26 (*IBM SPSS Statistics*, 2019). To match the fMRI TR duration, every eight consecutive ratings (acquired every 250s) were averaged to create a 2s mean emotional rating. The correlation between participants' averaged emotion ratings for each video and the Target's own original ratings were used as the Empathic Accuracy metric. Mean empathic accuracy scores were calculated for each condition and were used as the dependent variable. Additionally, absolute difference scores were created for each lower-level condition ($Ingroup_{POS}$, $Ingroup_{NEG}$, $Outgroup_{POS,}$ $Outgroup_{NEG}$) by taking the absolute difference between participant and target ratings at each 2s time point. The use of these absolute difference scores allowed for the parametrically-modulated assessment of the relationship between accuracy (i.e., how close target and participant ratings were at each time point) and neural activation throughout the task.

3.3.2. Imaging Analyses

Preprocessing analyses

All scans were first preprocessed using Statistical Parametric Mapping 12 (SPM12). Scans were registered to mean and fit to a reference template (ICBM – European Brains). Six movement parameters (x, y, z; yaw, pitch, roll) were extracted. Within the SPM pipeline, images were subsequently realigned and normalized to the ICBM – European Brains template. These scans were smoothed using a [9mm, 9mm, 9mm] Gaussian kernel. Smoothed scans were then inputted into the artifact repair tool (ARTRepair; Mazaika et al., 2009) to identify participant's excessive movement. Scans were flagged for excessive movement and repaired following the interpolation method (i.e., averaging the locations from before and after scans) using a motion threshold of 0.5 mm/TR. All repaired images were then appropriately weighted and resliced using ART Redo and utilized in the first-level analyses. All participants that had over 20% of their scans above the 0.5 mm/TR threshold were excluded from further analyses.

First-level analyses

Individual participant data was analyzed using the general linear model in SPM12. Target/Valence video conditions of $Ingroup_{POS}$, $Ingroup_{NEG}$, $Outgroup_{POS,}$ $Outgroup_{NEG}$ videos were modelled as separate events with a standard hemodynamic response function. Six movement parameters (x, y, z; yaw, pitch, roll) were covaried in the model to control for participant-level movement. *t*-contrasts were completed to assess changes in hemodynamic responses during Target/Valence video conditions. Absolute difference scores were created for every 2s time-point, to assess the absolute difference between participant's and target's EA. Separate parametric modulation analyses were conducted using these absolute difference scores at the first level to assess the time-series correlations between participant's neural responses and their empathic accuracy scores throughout each video (neural activation/subjective synchrony).

Second-level analyses

Task data was analyzed using a repeated measures model in the Multivariate and Repeated Measures Toolbox for Neuroimaging (MRM; McFarquhar et al., 2016). First-level contrast images for Target/Valence video conditions of $Ingroup_{POS}$, $Ingroup_{NEG}$, $Outgroup_{POS}$, and $Outgroup_{NEG}$ were entered into a 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated-measures ANCOVA with mean centered PPI-R scores as a covariate of interest. Post-hoc *t*-contrasts followed evaluation of higher-order main effects and interactions. Whole-brain data was voxel-wise thresholded at $p < .001$, with a cluster-size correction ($k = 94$). Determination of voxel threshold was completed via RESTPlus AlphaSim (Song et al., 2011); FWHM of 18.9 mm, 18.8mm, 18.6mm; rmm of 5mm, 1000 iterations) to equate to a family-wise error (FWE) rate of $p < .05$. A separate second level, 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated-measures ANCOVA, with mean-centered PPI-R scores entered as a covariate of interest, was performed to evaluate the parametrically modulated events ($p < .001$, with a cluster size correction ($k = 94$)).

Region of Interest (ROI) analyses

Of particular interest was the activation of neural regions underlying both empathy and perspective-taking, and how activation within these regions would vary as a function of *Target* and *PPI-R* scores. To this end, 10mm regions of interest (ROI) spheres from regions underlying empathy (bilateral anterior insula (AI): $x = 37$, $y = 18$, $z = 0$; $x = -37$, $y = 17$, $z = 2$; anterior cingulate cortex (ACC): $x = 4$, $y = 17$, $z = 32$) and perspective-taking (medial frontal cortex (MFC): $x = 0$, $y = 36$, $z = 46$) were obtained from Zaki and colleagues (2009)'s neural assessment of empathic accuracy. The bilateral temporoparietal junction (TPJ) ROIs ($x = 54$, $y = -54$, $z = 21$; $x = -52$, $y = -59$, $z = 21$) in Zaki and colleagues (2009) were located more dorsally and laterally than most other studies assessing this region. Thus, bilateral TPJ ROIs were created by averaging the most frequently activated TPJ co-ordinates in studies assessing perspective-taking (obtained via neurosynth: x =54, y = -56, z = 20; x = -50, y = -56, z =18). All ROI analyses were entered as a mask in the aforementioned MRM analyses and were thresholded at $p < .05$, FWE.

3.4. Results

Demographics

All questionnaire and behavioural data are displayed in Table 1. Total PPI-R scores ranged from 1.78 – 2.78 (M = 2.24, SD = .29), and were normally distributed. Both the empathic concern and perspective-taking scores of the IRI showed slight negative skews, with more people receiving high scores on both measures (see Table 1 for demographic information). PPI-R scores showed non-significant, yet moderate, negative correlations with both empathic concern (r = -.24, p = .17, 95% CI [-.53, .11]), and perspective-taking (r = -.21, p = .24, 95% CI [-.52, .14]) scores. The IRI subscale scores of empathic concern and perspective-taking were significantly positively correlated (r = .64, p < .001, 95% CI [.39, .80]).

Evidence of Overall Task Efficacy

Group Identification Task

One participant was highly inaccurate on the group identification task (scoring 41.25%) and was excluded from further analyses. The mean identification accuracy of all remaining participants was 97.50% (SD = 6.52). Thus, participants demonstrated that they were aware of which targets were on their team, and which were on the other team.

Table 1

Behavioural and Demographic Data

	M	*SD*	*Minimum*	*Maximum*
Empathic Accuracy (EA)	0.7720	0.09	.57	.89
EA for Ingroup Targets	0.7719	0.11	.48	.92
EA for Outgroup Targets	0.7721	0.12	.39	.92
PPI-R Total Scores	2.24	0.29	1.78	2.78
Empathic Concern Scores	3.05	0.80	1.29	4.00
Perspective-Taking Scores	2.79	0.80	.43	4.00

Note: EA scores are displayed to four decimal places to show minor differences between EA overall and for each Target group.

Empathic Accuracy Task

Behavioural Results

On average, individuals demonstrated high levels of empathic accuracy (*M* = .77, *SD* = 0.90, 95% CI [0.58, 0.88]; see Table 1 for full descriptions of behavioural data). Mean EA scores were non-significantly correlated to PPI-R (*r* = -.13, *p* = .47, 95% CI [-.44, .22]), empathic concern (*r* = .18, *p* = .30, 95% CI [-.17, .49]) and perspective-taking (*r* = .09, *p* = .60, 95% CI [-.44, .22]) scores.

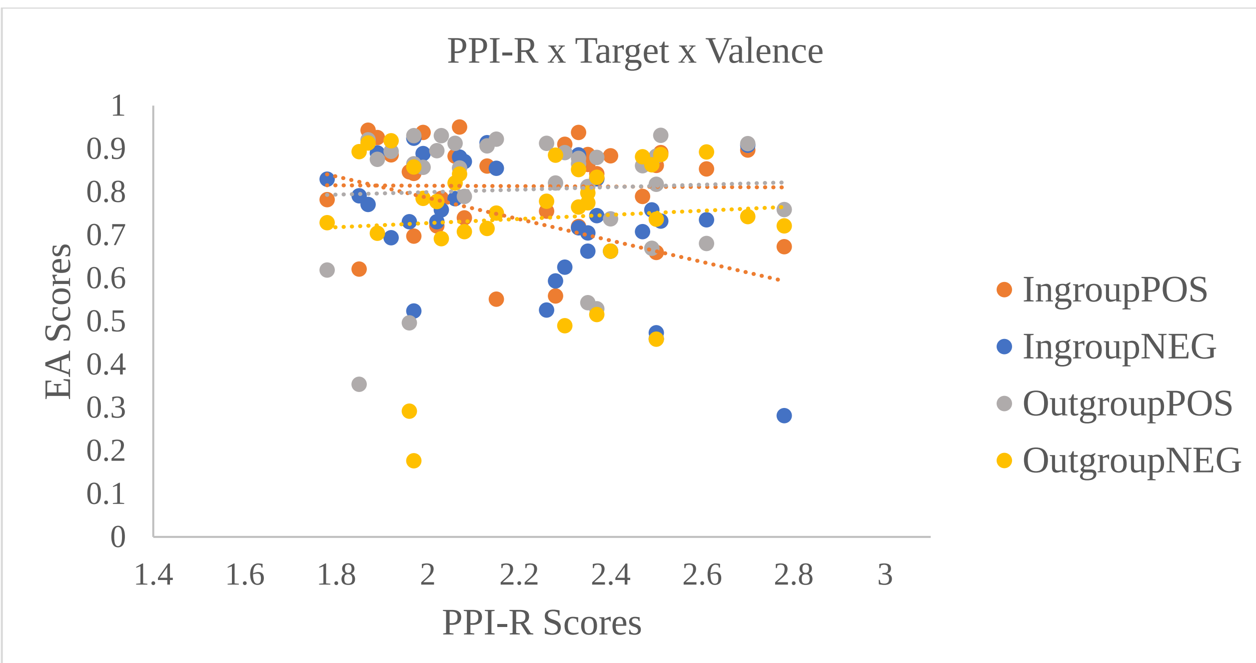
A 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated measures ANCOVA, with mean-centered PPI-R scores as a covariate of interest, was run to assess the effect of psychopathic traits on EA scores across conditions. While assumptions of independence and sphericity were met, the data showed a significant skew of residuals. Given that ANOVA tends to be robust to deviations of normality, no transformations were undertaken. A main effect of *Valence*, *F* (1, 32) = 10.27, *p* = .003,

η_p^2 = .24, was identified, indicating that EA scores were higher for Positive (*M* = .81, *SD* = 0.02, 95% CI [.78, .84])) than for Negative (*M* = .74, *SD* = 0.02, 95% CI [.69, .78]) videos. Neither the main effect of *Target Group,* nor the *Target Group x Valence* interaction reached statistical significance. However, while non-significant, the 2-way *PPI-R* x *Target Group (F*(1, 32) = 3.22, *p* = .08, η_p^2 = .09), and 3-way *PPI-R x Target Group x Valence* (*F*(1, 32) = 3.25, *p* = .08, η_p^2 = .09) interactions both demonstrated moderate effect sizes. The two-way interaction was driven by a negative correlation between *PPI-R* and EA scores within the Ingroup (*r* = -.32, *p* = .06, 95% CI [-.59, .02]) but not Outgroup (*r* = .08, *p* = .64, 95% CI [-.27, .41]) condition. To dissect the three way interaction, correlational analyses between *PPI-R* and EA scores separately within each *Target Group x Valence* category (i.e., Ingroup_{POS}, Ingroup_{NEG}, Outgroup_{POS}, Outgroup_{NEG}) were evaluated and subsequently compared. Results revealed a significant negative PPI-R/EA correlation within the Ingroup_{NEG} condition, *r* = -.44, *p* = .01, 95% CI [-.68, -.12]; the PPI-R/EA correlation did not reach significance within any other conditions (all *p*'s > .05, see Figure 2). A series of two-tailed Steiger's *r*-to-*z*-tests (calculation from Lee & Preacher, 2013) were run using a Bonferroni correction of $p \leq .017$ to control for three comparisons. This confirmed that the magnitude of the PPI-R/EA correlation was higher in the Ingroup_{NEG} condition than in the Outgroup_{NEG} condition, *z* = -2.51, *p* = .01, and non-significantly higher than in the Ingroup_{POS}, *z* = -2.26, *p* = .02, and Outgroup_{POS}, *z* = -2.08, *p* = .04, conditions (using Bonferroni correction of $p \leq .017$).

A main goal of the study was to determine whether there would be differences in the extent to which individuals with heightened psychopathic traits would manifest behavioural and/or neural evidence of empathy for others. The non-significant main effect of PPI-R provided no evidence for such differences. However, this non-significant effect could indicate low/no empathic accuracy across all levels of PPI-R scores or medium/high empathic accuracy across all levels of PPI-R scores. To determine which of these explanations best fit the data, the sample was split into tertiary PPI-R groups (Low = PPI-R ≤ 2.06, Mid = 2.06 < PPI-R ≤ 2.36 and High = PPI-R > 2.36) and evaluated for both within- and between-group differences in behavioural empathic accuracy responses using correlational analyses. All three groups had empathic accuracy scores greater than *r* = .75, and Low-, Mid- and High- PPI-R groups' empathic accuracy scores did not significantly differ (all *p*'s > .05).

Figure 2

PPI-R x Target Group x Valence Interaction on EA Scores



Note: Solid line indicates a significant effect.

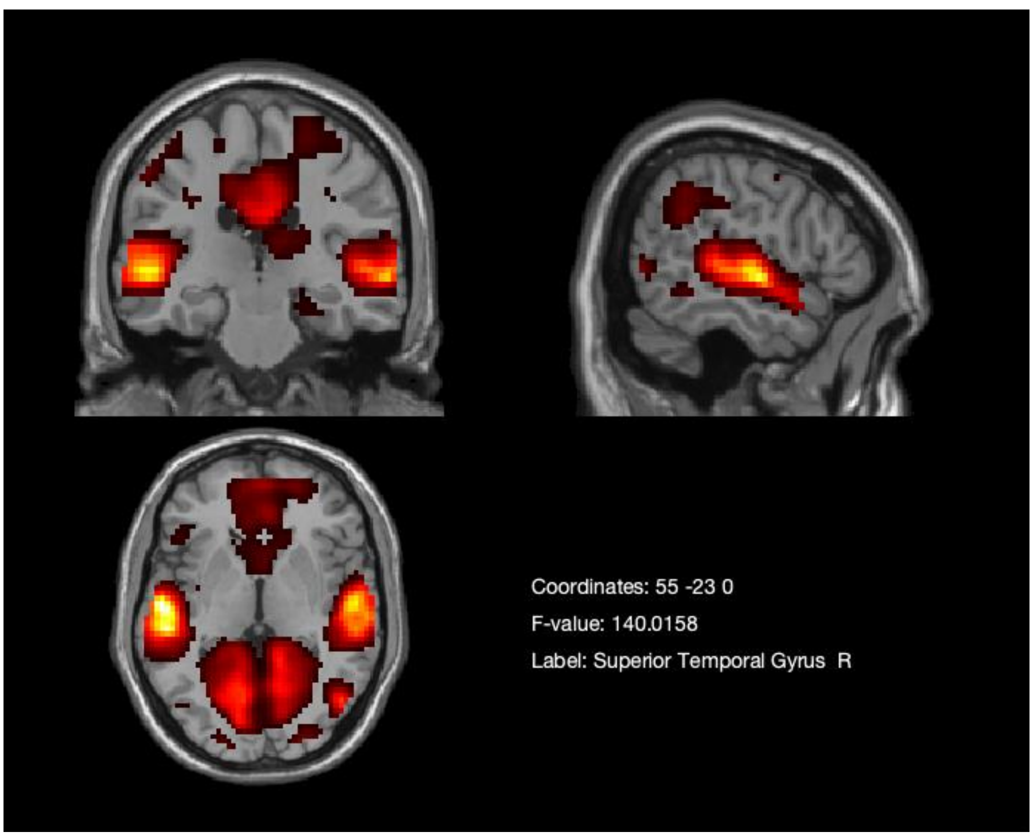
Neuroimaging Results

Main Effect of Task

The main effect of *Task* (i.e., compared to implicit baseline) revealed significant activity throughout diverse brain regions. Activated regions include a large cluster (k = 10,703, *peak F* [precuneus] = 271.65) that spanned across the cuneus, PCC, ACC, parahippocampal gyrus, middle/medial frontal, lingual gyri, supramarginal gyrus, thalamus, caudate, right inferior parietal and left fusiform gyrus. Two additional clusters within right/left superior temporal cortices (k = 978, *peak F* [left superior temporal cortex] = 286.18; k = 850, *peak F* [right superior temporal cortex] = 227.13) extending into bilateral middle temporal gyri/TPJ also reached significance (see Figure 3).

Figure 3

Main Effect of Task



Note: Image is thresholded at uncorrected voxel level of $p < .001$ for display purposes.

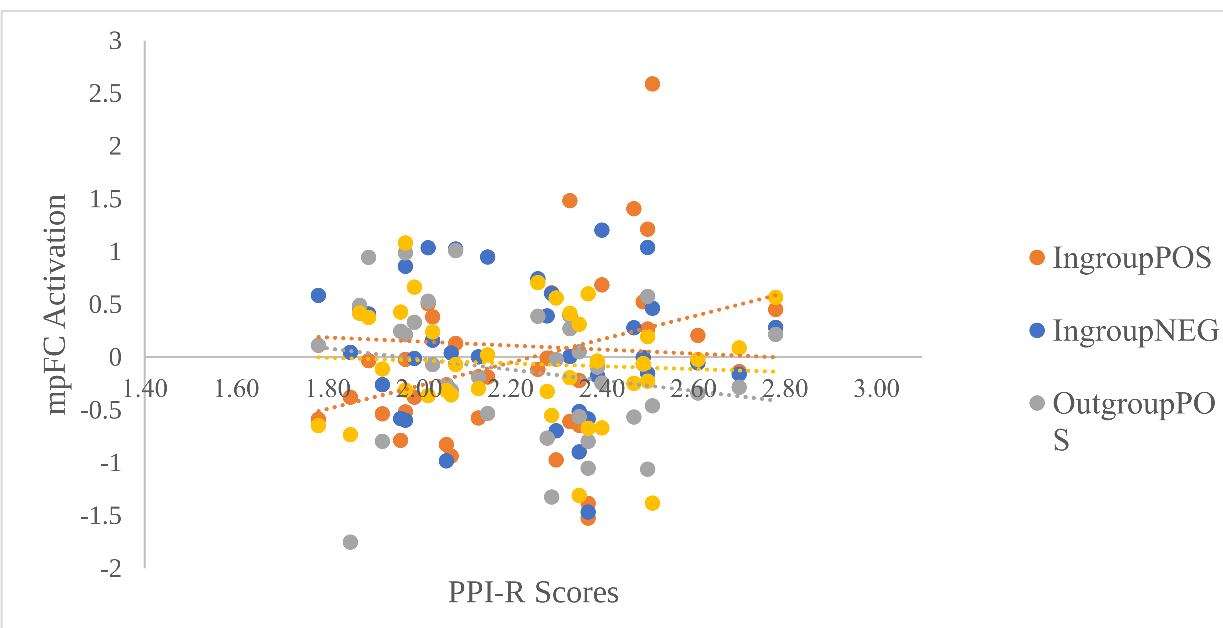
Effects of Target and Valence on Neural Indicators of Empathy

In symmetry with the behavioural analyses, a 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated measures ANCOVA, with PPI-R as a covariate of interest, was conducted on the neuroimaging data. This analysis revealed a main effect of *Valence* within right AI and mPFC ROIs, with activity consistently lower for Positive compared to Negative videos. Main effects of *Target* and *PPI-R* were non-significant. However, these effects were influenced by a significant 3-way *PPI-R x Target x Valence* interaction within the mPFC ROI.

To evaluate this interaction, activity within the mPFC ROI was extracted for each of the four *Target/Valence* conditions and correlated with total *PPI-R* scores in SPSS (see Figure 4). While non-significant, correlation analyses revealed that the PPI-R/mPFC correlation within the Ingroup$_{POS}$ condition was moderate in magnitude (r = .29, p = .09),

Figure 4

mPFC Activation/PPI-R Score Correlations for each Target x Valence Condition



Note: Solid line for significant effect; light dashed line for non-significant effect.

and Stieger's *r*-to-*z* tests (calculation from Lee & Preacher, 2013) with Bonferroni correction at $p \leq .017$, indicated that the magnitude of this correlation was significantly different from those in the Ingroup_{NEG} condition ($z = 2.51$, $p = .01$) but not the Outgroup_{POS} ($z = 2.30$, $p = .02$) or Outgroup_{NEG} ($z = 1.49$, $p = .14$) conditions.

In line with the behavioural analyses, analyses were conducted to assess whether there were differences in the activation of neural regions underlying empathy between the High- and Low- PPI-R scorers. As such, tertiary split PPI-R groups were used to assess within- and between-group differences in neural responses both at the whole-brain and ROI-level. Results indicated that all three groups had increased activation within bilateral superior/middle temporal cortices that included the TPJ (see Figure 5). All three groups also experienced deactivation within bilateral precuneus, lingual gyrus, middle frontal cortex into ACC/PCC, and parahippocampal gyrus. To determine whether the Low-, Mid- and High- PPI-R groups had differential activation within these regions both whole-brain and ROI between-group *t*-tests were conducted. These tests revealed no whole-brain or ROI activation differences across the Low-, Mid- and High-PPI-R groups.

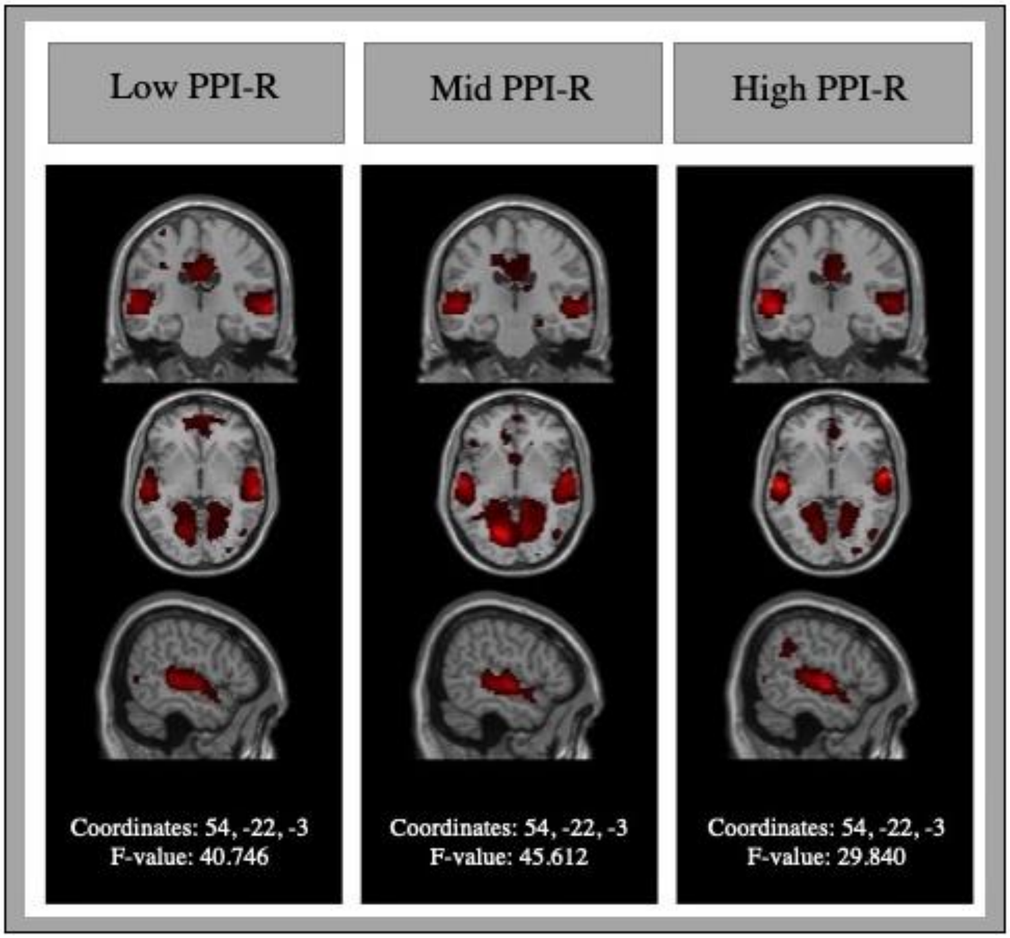
Assessing the Parametric Modulation of EA Scores on Neural Activation

Main Effect of Task – Parametrically Modulated Data

Parametric modulation analyses afford for the analysis of neural activation/subjective synchrony by adding EA absolute differences scores as a covariate to the neuroimaging model. The main effect of *Task* revealed increased neural activation/subjective synchrony in two clusters originating in each lingual gyri ($k = 700$, *peak F* [left lingual gyrus] = 32.91; *peak F* [right lingual gyrus] = 25.22), that extended into bilateral cuneus/precuneus. There were two additional clusters within left lentiform nucleus/putamen and medial frontal/cingulate cortices. Further, ROI analyses revealed activation in the bilateral anterior insula, ACC and mPFC ROIs (see Figure 6). No regions demonstrated decreased neural activation/subjective synchrony.

Figure 5

Low-, Mid- and High- PPI-R scorers Overall Neural Activation



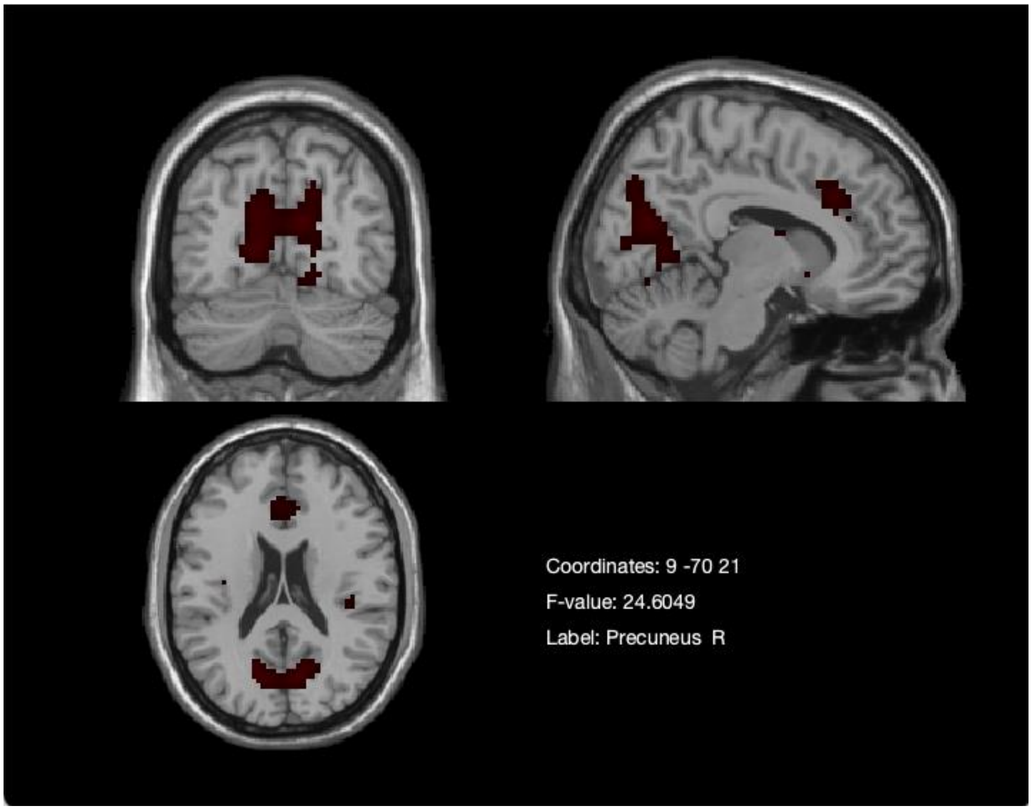
Note: Image is thresholded at uncorrected voxel level of $p < .001$ for display purposes.

Effects of Target and Valence on Parametrically Modulated Data

Another 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence:* Positive vs. Negative) repeated measures ANCOVA, with PPI-R scores as a covariate of interest, was run on the parametrically modulated data. A significant main effect of *Valence* was present within the left TPJ ROI which indicated that neural/subjective synchrony was greater for Positively- compared to Negatively- valent videos. No other whole-brain or ROI effects reached significance.

Figure 6

Main Effect of Task – Parametric Modulation



Note: Image is thresholded at uncorrected voxel level of $p < .001$.

Tertiary PPI-R groups were used to evaluate whether the magnitude of the relationship neural activation/subjective synchrony differed across groups. Within-group analyses identified a positive correlation – indicative of higher synchrony - in a cluster originating within bilateral cuneus/precuneus (k = 582, *peak F* [left cuneus] = 25.09) extending into the lingual gyrus. Additional clusters were present within bilateral cingulate cortices and the right inferior parietal cortex, as well as bilateral anterior insula, mPFC, ACC, and right TPJ ROIs. No regions displayed neural activation/subjective synchrony within the Low or High- PPI-R groups. Further, between-group tests revealed no significant differences in activation between the Low-, Mid- and High- PPI-R groups.

3.5. Discussion

The current study sought to test components of the motivational theory of psychopathy by determining whether group membership would influence the empathic responses of individuals with varying levels of psychopathic traits. Overall, results were not consistently in line with study hypotheses. The behavioural data revealed that individuals with heightened psychopathic traits showed decreased, rather than increased, EA within the Ingroup versus Outgroup condition. While the direction of this effect is contradictory to study hypotheses, it does nonetheless suggest that psychopathic individuals' level of empathic accuracy was influenced by the group membership of the target. Additionally, the non-parametrically modulated neural data was partially supportive of study hypotheses. There was some evidence of mPFC differences in relationship to psychopathic traits for ingroup targets, but all other ROI regions failed to show the hypothesized patterns. Specifically, the interaction revealed that mPFC activation within the $\text{Ingroup}_{\text{POS}}$, but not $\text{Ingroup}_{\text{NEG}}$, condition was influenced by psychopathic traits; results revealed that mPFC activation was positively correlated with PPI-R scores within this condition. Thus, there was no consistent evidence of an ingroup bias, but there may be more contextualized effects in some target and valence conditions. Further, in line with study hypotheses, the behavioural and neural data converged in indicating that the magnitude of the empathic responding of those both high and low in psychopathic traits was similar. That is, Low-, Mid- and High- PPI-R groups demonstrated similar levels of behavioural and neural evidence of empathy overall, and the recruitment of similar neural regions supported their level of accuracy. This may provide preliminary support for the notion that the empathic responding of individuals with heightened psychopathic traits may be aberrant, rather than absent, in nature.

The results indicated that EA for Ingroup and Outgroup targets was influenced by psychopathic traits. Specifically, the negative relationship between psychopathic traits and EA scores only occurred for Ingroup, but not Outgroup, targets. One possibility is that those with heightened psychopathic traits lack concern for their Ingroup targets, and as such, find little value in empathizing with them. Some research has suggested that individuals with heightened psychopathic traits tend to devalue social and relational motives (Foulkes et al., 2014; Jonason et al., 2015; Jonason & Ferrell, 2016; Jonason & Zeigler-Hill, 2018; Waller et al., 2020). Indeed, negative relationships have been found between psychopathic traits and the loyalty they hold for ingroup members (Jonason et al., 2015), their desire for having close relationships (i.e., lower intimacy motives; Jonason & Ferrell, 2016), their drive to spend time with others (i.e., lower affiliation motives, Foulkes et al., 2014; Jonason & Ferrell, 2016; Jonason & Zeigler-Hill, 2018; Waller et al., 2020) and their desire to engage in social interactions to feel socially connected (i.e., lower relatedness motives; Jonason & Ferrell, 2016). If they hold little value for their ingroup, they may experience emotional indifference towards their ingroup targets. This is in line with Groat and Shane (2020), who explicitly predict that the psychopathic individual's lack of emotional processing may result from motivational indifference. The present study did not explicitly evaluate motivational strength towards each target, but future research may do well to do so.

Another possibility is that personal distress influenced EA differently across Target Conditions. In normative populations, personal distress (i.e., self-oriented anxiety in an interpersonal situation, Davis, 1983) is increased for close targets in pain (e.g., Grynberg & Konrath, 2020), and has been related to exaggerated affective responses to ingroup members (e.g., heightened displeasure to unpleasant situations, and pleasure to pleasant situations, Batson et al., 1995), and decreased emotion recognition for individuals with similar life experiences (Israelashvili et al., 2020). Thus, it may be that differences in personal distress led to differences in EA for ingroup members in those with heightened psychopathic traits. To test this, exploratory analyses were conducted to elucidate the relationship between psychopathic traits and EA found in the current study. In line with the extant literature (e.g., Pfabigan et al., 2015), results revealed that psychopathic traits were negatively correlated with personal distress overall. However, the interaction between psychopathic traits and personal distress was negatively related to EA scores within the Ingroup, but not Outgroup, condition (see Appendix B for exploratory post-hoc analyses). In delineating the interaction, it was determined that psychopathic traits interacted with personal distress to negatively predict EA scores within the $\text{Ingroup}_{\text{NEG}}$, but not $\text{Ingroup}_{\text{POS}}$, condition; this effect was only found for those in the High PPI-R group. This may indicate that psychopathic individuals' trait level of self-oriented distress influenced their empathic responding for those closest to them when they were experiencing negative emotions, precluding their empathic accuracy.

This interpretation aligns well with the motivational framework, highlighting the potential effect of personal distress for ingroup targets to influence the motivations underlying psychopathic individuals' empathic responding. Groat and Shane (2020) propose that individuals with heightened psychopathic traits may be motivated to actively avoid negatively valent/aversive stimuli. This active avoidance is characterized by a negative motivation to (i.e., failure to) allocate resources necessary for empathizing, leading to decreased levels of empathy that may mirror an incapacity. As such, it is possible that the increased personal distress experienced by those high in psychopathic traits heightened avoidance motives, leading to decreased EA within the Ingroup condition. This effect was especially prominent within the $\text{Ingroup}_{\text{NEG}}$ condition, which may be a result of the particularly aversive nature of negatively-valent stimuli. Together, these results could suggest that the increased personal distress for ingroup targets, combined with the aversive nature of the negatively-valenced videos, may have heightened avoidance motives leading to decreased, rather than increased, EA within the $\text{Ingroup}_{\text{NEG}}$ condition compared to the $\text{Ingroup}_{\text{POS}}$, $\text{Outgroup}_{\text{POS}}$ and $\text{Outgroup}_{\text{NEG}}$ conditions.

Particularly interesting was activity in the mPFC ROI, which was positively related to psychopathic traits specifically in the $\text{Ingroup}_{\text{POS}}$ condition. Given that the mPFC is associated with cognitive empathy (e.g., Schnell et al., 2011), one interpretation could be that individuals with heightened psychopathic traits demonstrated increased cognitive empathy for ingroup targets (specifically for positively valent videos). However, given that there was no overall effect of *Target*, and that the overall relationship between psychopathic traits and EA within the $\text{Ingroup}_{\text{POS}}$ condition was near zero, this may not hold. Another possibility is that the heightened mPFC activity could be a result of increased neural effort necessary for those with heightened psychopathic traits to respond to the $\text{Ingroup}_{\text{POS}}$ condition. Indeed, the mPFC has also been related to processes such as neural effort (e.g., Vassena et al., 2017), and self-focused emotion regulation (i.e., manipulating one's emotions in response to stimuli;

Olsson & Ochsner, 2008). Thus, it is possible that as psychopathic traits increase, the activation associated with the neural effort necessary for emotion regulation processes increases, leading to heightened mPFC activation.

A potentially problematic result was that there was no main effect of *Target*, indicating that empathic accuracy did not differ between Ingroup and Outgroup targets. This is contrary to considerable work which has assessed empathy using the minimal group paradigm (e.g., Cikara et al., 2014; Mathur et al., 2010; Montalan et al., 2012); as well as with more concretely defined groups (e.g. race, (Azevedo et al., 2013; Contreras-Huerta et al., 2013; Xu et al., 2009); or sports teams, (Cikara, Botvinick, et al., 2011; Hein et al., 2010)). Nonetheless, it is possible that the minimal group paradigm in the present study was not potent enough to create a strong affiliation (e.g., Montalan et al., 2012) or feelings of closeness (Beeney et al., 2011) with ingroup targets. Future studies involving normative and psychopathic populations should include affiliation and closeness measures to better understand the role these may play in influencing empathic responding towards targets.

While building on previous research, this study is not without its limitations. First, it is important to note our modest sample size. Further work should be completed in a larger sample in order to evaluate whether the current results can be replicated. Second, while we report an effect of group membership for those with heightened psychopathic traits, we did not find this effect in our overall sample. It is possible that, as a result of using random assignment for the minimal group paradigm, the participants did not experience a high level of identification with their group members. Given that affiliation has been shown to increase the outcomes of ingroup empathy bias (Ruckmann et al., 2015), this lack of affiliation with ingroup targets may have prevented differences in EA scores across targets. While a manipulation check was completed to assess the participant's memory for group members in the current study, there was no evaluation of participants' group identity and affiliation levels. Future work should assess not only the overall level of affiliation, but the level of affiliation specifically held by psychopathic individuals. This may help to understand further whether psychopathic individuals will empathize with those they have higher affiliation with (i.e., ingroup members). Additionally, future work should assess various other situations within which psychopathic individuals may be motivated to empathize with others, such as when that information may be beneficial for them. Indeed, recent work has suggested that psychopathic individuals are motivated to benefit from others without reciprocating (Burris et al., 2013) and are motivated by power (Jonason & Ferrell, 2016) and authority (Glenn et al., 2017). As such, psychopathic individuals may be motivated to empathize in situations where they can use that information for self-gain. Lastly, the current study was completed by community members within the Greater Toronto Area. Rates of psychopathy may be higher in other populations (e.g., criminals, those within specific professions); thus, evaluating these groups may reveal differing Ingroup-bias effects.

Despite these limitations, the present findings reveal that individuals with heightened psychopathic traits can demonstrate behavioural and neural evidence of empathy for certain targets. Overall, PPI-R scores were not correlated with total EA levels. Moreover, the magnitude of the empathic responses of those with Low-, Mid- and High- levels of psychopathic traits did not significantly differ from one another. Together, this suggests that psychopathic traits did not appear to influence the magnitude of participants' overall empathic responding. However, psychopathic traits led to differential empathic responses for ingroup and outgroup targets. While the direction of this effect was contrary to hypotheses (i.e., less EA for ingroup targets), the results provided further insight into the intricate nature of the group dynamics of those with psychopathic traits. Further research will be necessary to continue to evaluate contexts where psychopathic individuals may empathize with others and have important implications for current deficit-based models of psychopathy.

Chapter 4. Study 1b.

Psychopathic Individuals Motivation to Empathize with Family Targets

4.1. Introduction

The results of Study 1a suggested that psychopathic individuals may differentially empathize with targets that are a part of their ingroup, compared to their outgroup. Specifically, results indicated that individuals with heightened psychopathic traits showed decreased, rather than increased, EA for Ingroup versus Outgroup targets. While this result was not what was originally hypothesized, it may point to important features of the psychopathic individuals' empathic processing tendencies. Study 1b sought to seek further support for this finding, by evaluating empathic accuracy not only for ingroup and outgroup targets, but also for close friend/family member targets.

There is minimal work assessing how close psychopathic individuals are to their families. However, most work on social closeness assumes that family members and close friends represent an individual's closest in-group members. Thus, any effect of social closeness should be maximized for family members and/or closest friends. To this end, Study 1b was designed to evaluate the extent to which individuals with heightened psychopathic traits would demonstrate behavioural and/or neural differences in EA for their close friends/family member targets. To do so, a subset of Study 1a participants (N = 22) were asked to invite a close friend or family member into the lab to create autobiographical videos in line with those described in Study 1a. These participants then watched and rated these autobiographical videos, in addition to the ingroup and outgroup videos in Study 1a. Thus, these 22 participants completed the EA task with a close friend/family member in addition to ingroup and outgroup members as targets. Study 1b focused only on this subset of participants, to compare the level of EA for family members to the ingroup/outgroup data reported in Study 1a. It was hypothesized that psychopathic individuals would show reduced evidence of EA overall. However, despite this overall reduction in EA, it was hypothesized that they would nonetheless show an close friend/family bias similar to the ingroup bias reported within non-psychopathic populations. Behaviourally, this would manifest as a positive association between PPI-R and EA scores within the close friend/family condition compared to the ingroup and outgroup conditions (note that within this smaller subset of participants ingroup/outgroup analyses must be repeated). Neurally, this would manifest a positive association between PPI-R and activation of regions underlying both cognitive (i.e., mPFC and bilateral TPJ) and/or affective (i.e., ACC and bilateral AI) empathy within the Close friend/family group, but not the Ingroup or Outgroup, conditions. Further, it was hypothesized that activation in regions underlying cognitive and/or affective empathy would be parametrically modulated with participants' EA scores. It was hypothesized that this parametric modulation would be influenced by psychopathic traits overall. However, within the Ingroup condition, it was hypothesized that psychopathic traits would not influence the association between activation in regions underlying cognitive and/or affective empathy and parametrically modulated EA scores. This pattern of data would serve as evidence that the empathic responses of those with heightened psychopathic traits can be influenced by group membership, which would, in, turn imply sensitivity to motivational constructs.

4.2. Methods

4.2.1. Participants

Of the original 40 participants recruited into Study 1a, 26 participated in the close friend/family member condition. Prior to participating, these participants were instructed to choose a close friend/family member who would come in and record additional videos. Close friends/family members arrived at either the laboratory at Ontario Tech, or the scanning location at York University, to record their videos. Upon arrival, close friends/family members consented before creating their videos and completed a series of questionnaires. Seven participants were removed from EA-related (behavioural and parametrically modulated) analyses: two for Family Target videos having low variance in their ratings (below 2.5SD), three for the participant having low variance in their ratings (below 2.5SD) and two for their total Family EA scores being deemed as outliers (2.5SD from mean total Family EA). Additionally, four participants who had a family member participate, but were removed from Study 1a, analyses were subsequently removed. As a result, the final Study 1b data set consisted of 15 participants. Mean sample age was 27.33 (*SD* = 6.35) and the majority of participants were Caucasian (93%; one participant indicated having a mixed ethnicity, 0.7%).

4.2.2. Materials

Family Member/Close Friends Videos

Close friend/family member videos were developed following the same methodology described in the *Creation of autobiographical videos* section in General Methods**.** For the creation of these videos, close friends/family members were asked, to the best of their ability, to include only events that the participant had no personal recollection of. To ensure that participants' responses were not influenced by their memory and feelings associated with the described event, only those videos describing events the participant was not a part of were included. Similar to the other video conditions, two positive and two negative videos were chosen for each close friend/family member.

4.2.3. Modified Empathic Accuracy Task

Participants completed the fMRI-based Empathic Accuracy Task as described above. In addition to watching two Ingroup and two Outgroup target videos, these subset participants watched four videos of their Close friend/Family member. The order of Ingroup and Outgroup Target presentation was randomized, and their Close friend/Family member videos were presented last.

4.2.4. Procedure

See Study 1a for a full description of the procedure.

4.3. Data Analytic Process

4.3.1. Behavioural data analyses

To evaluate the effect of close friends/family members, Family was added as an additional level of Target within the ANCOVA model analyzed in Study 1a. Thus, the 2 (*Target Group*: Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated measures ANCOVA from Study 1a was modified into a 3 (*Target Group*: Family vs. Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated measures ANCOVA, with mean-centered PPI-R scores entered as a covariate of interest. Given the similarity of the model, reported results will aim to focus primarily on differences associated with the *Family* condition. However, because only a subset of the participants received the *Family* condition, Study 1a, effects may be expected to shift to some degree.

4.3.2. Imaging Analyses

Preprocessing analyses

Preprocessing analyses were the same as described in Study 1a.

First-level analyses

In line with Study 1a, individual participant data were analyzed using the general linear model in SPM12, with the addition of $\text{Family}_{\text{POS}}$, and $\text{Family}_{\text{NEG}}$.

Second-level analyses

In line with Study 1a, task data was analyzed using a repeated measures model in the Multivariate and Repeated Measures Toolbox for Neuroimaging (MRM; McFarquhar et al., 2016), with the addition of $\text{Family}_{\text{POS}}$, and $\text{Family}_{\text{NEG}}$. To this end, a 3 (*Target Group*: Family vs. Ingroup vs. Outgroup) x 2 (*Valence*: Positive vs. Negative) repeated-measures ANCOVA with mean centered PPI-R scores as a covariate of interest, was run.

Region of Interest (ROI) analyses

All Regions of Interest from Study 1a were used and similarly entered as a mask in the aforementioned MRM analyses (thresholded at $p < .05$, FWE).

4.4. Results

Demographics

All questionnaire and behavioural data are displayed in Table 2. Total PPI-R scores ranged from 1.78 – 2.78 (*M* = 2.19, *SD* = .27), and were normally distributed. While the IRI perspective-taking subscale had a normal distribution, the empathic concern scores of the IRI showed a slight negative skew, with more people receiving high scores. PPI-R scores showed non-significant, yet small-to-moderate, negative correlations with both empathic concern (r = -.17, p = .54, 95% CI [-.63, .37]), and perspective-taking (r = -.19, p = .49, 95% CI [-.64, .36]) scores. The IRI subscale scores of empathic concern and perspective-taking were significantly positively correlated (r = .61, p = .02, 95% CI [.14, .86]).

Empathic Accuracy Task

Behavioural Results – Family Subset

On average, individuals demonstrated high levels of empathic accuracy (M = .72, SD = 0.10, 95% CI [.33, .90]; see Table 2 for full descriptions of behavioural data). Mean EA scores were non-significantly correlated to PPI-R (r = -.27, p = .33, 95% CI [-.69, .28]), empathic concern (r = -.09, p = .76, 95% CI [-.58, .44]) and perspective-taking (r = .06, p = .82, 95% CI [-.47, .56]) scores.

Table 2

Behavioural and Demographic Data

	M	*SD*	*Minimum*	*Maximum*
Empathic Accuracy (EA)	0.7196	0.10	.59	.87
EA for Family Targets	0.5874	0.22	.20	.86
EA for Ingroup Targets	0.7961	0.09	.61	.91
EA for Outgroup Targets	0.7755	0.12	.52	.92
PPI-R Total Scores	2.19	0.27	1.78	2.78
Empathic Concern Scores	3.27	0.86	1.29	4.00
Perspective-Taking Scores	2.78	0.95	.43	4.00

Note: EA scores are displayed to four decimal places to show minor differences between EA overall and for each Target group.

Preliminary data analyses showed a significant skew of residuals; however, ANOVA tends to be robust to deviations of normality, so no transformations were undertaken. Additionally, the data did not meet the assumption of sphericity, so all analyses were completed using Greenhouse-Geisser tests.

Several effects remained consistent in this smaller sample of participants: the main effect of *Valence* remained significant, F (1, 13) = 4.85, p = .05, η_p^2 = .27, such that EA scores were higher for Positive (M = .78, SD = 0.03, 95% CI [.71, .85]) compared to Negative (M = .66, SD = 0.04, 95% CI [.57, .75]) videos. Additionally, while not present in the larger sample, there was a main effect of *Target*, F (2, 17.58) = 11.98, p = .001, η_p^2 = .48, with paired samples *t*-tests revealing significantly lower EA scores in the Family (M = .59, SD = 0.05, 95% CI [/47, .70]) condition compared to both the Ingroup (M = .80, SD = 0.02; p = .001, 95% CI [-.75, .85]) and Outgroup (M = .78, SD = 0.03, p = .01, 95% CI [.71, .84]) conditions (the Ingroup and Outgroup conditions did not differ significantly, p > .05). However, compared to the larger subset, neither the main effect of *PPI-R*, the *PPI-R x Target*, nor the *PPI-R x Target x Valence* interactions approached significance. In Study 1a, the *PPI-R x Target* interaction revealed that PPI-R/EA scores were negatively correlated within the Ingroup condition, and uncorrelated in the Outgroup condition. When explored in this smaller subset of 15 participants, this interaction revealed a non-significant moderate negative correlation between PPI-R/EA scores within the Family condition, r = -.43, p = .11, 95% CI [-.77, .11], and correlations approaching zero within the Ingroup, r = -.04, p = .90, 95% CI [-.54, .48], and Outgroup, r = .12, p = .68, 95% CI [-.42, .60], conditions.

To specifically explore the potential effect of *Family* in the *PPI-R x Target Group x Valence Interaction*, the relationship between *PPI-R* and *Valence* was analyzed separately within each of the six Target/Valence conditions within this smaller subset. Whereas in Study 1a analyses there was a negative relationship between PPI-R/EA scores within the $\text{Ingroup}_{\text{NEG}}$ condition, the current results indicated a substantial, though non-significant, negative relationship between PPI-R scores and EA in the $\text{Family}_{\text{NEG}}$ condition, $r = -.40$, $p = .14$, 95% CI [-.76, .14] (see Figure 7); no other conditions revealed significant effects.

Consistent across Studies 1a and 1b, was the non-significant main effect of PPI-R on EA scores. Results from both studies converge in demonstrating that the average EA scores of those in both the Low- and High- PPI-R groups were greater than $r = .67$. Moreover, mean EA scores for the Low ($M = .75$, $SD = 0.09$) and High ($M = .68$, $SD = 0.10$) PPI-R groups did not significantly differ from one another, $t(13) = 1.38$, $p = .19$, 95% CI [-.04, .14], $d = .09$.

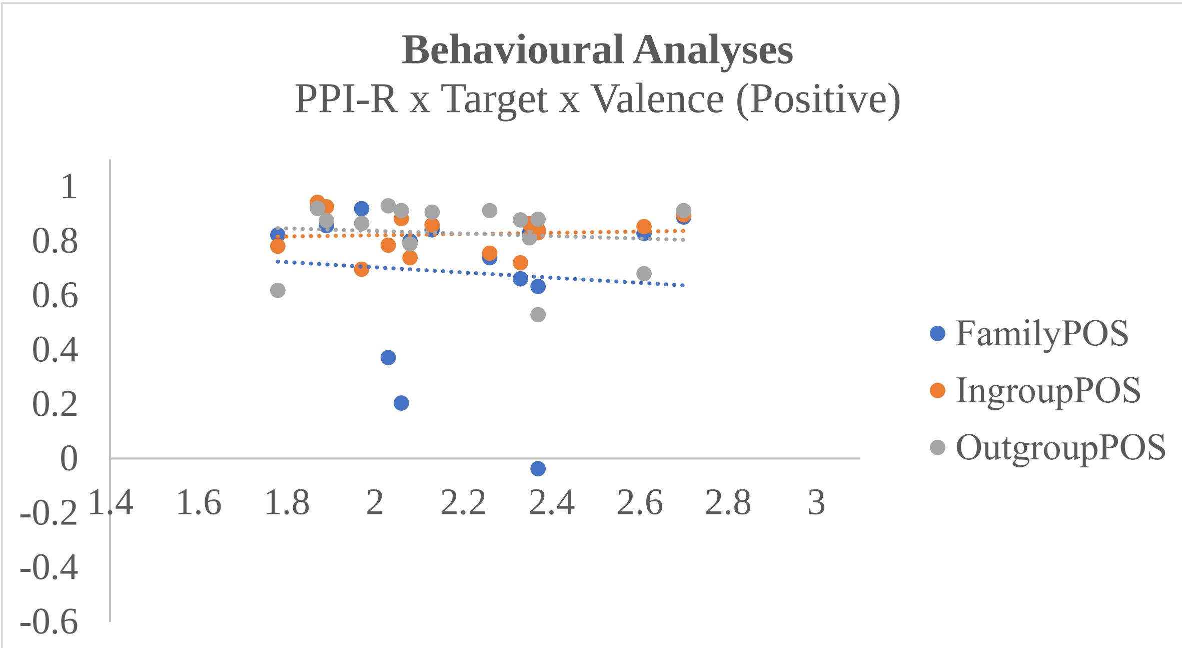
The Role of Personal Distress

Analyses of the full sample in Study1a revealed a negative relationship between Personal Distress (PD) and EA within the $\text{Ingroup}_{\text{NEG}}$ condition for those high in psychopathic traits; this effect was similarly examined in the current subset. Overall, the results revealed a moderate, though non-significant, negative correlation between PPI-R scores and PD, $r = -.47$, $p = .08$, 95% CI [-.79, .06]. To further assess the potential role that PD had on EA, the correlations between PD and EA scores within each Target/Valence condition were evaluated separately for those in the Low and High PPI-R groups. The pattern of results suggested that PD influenced EA for $\text{Family}_{\text{POS}}$ and

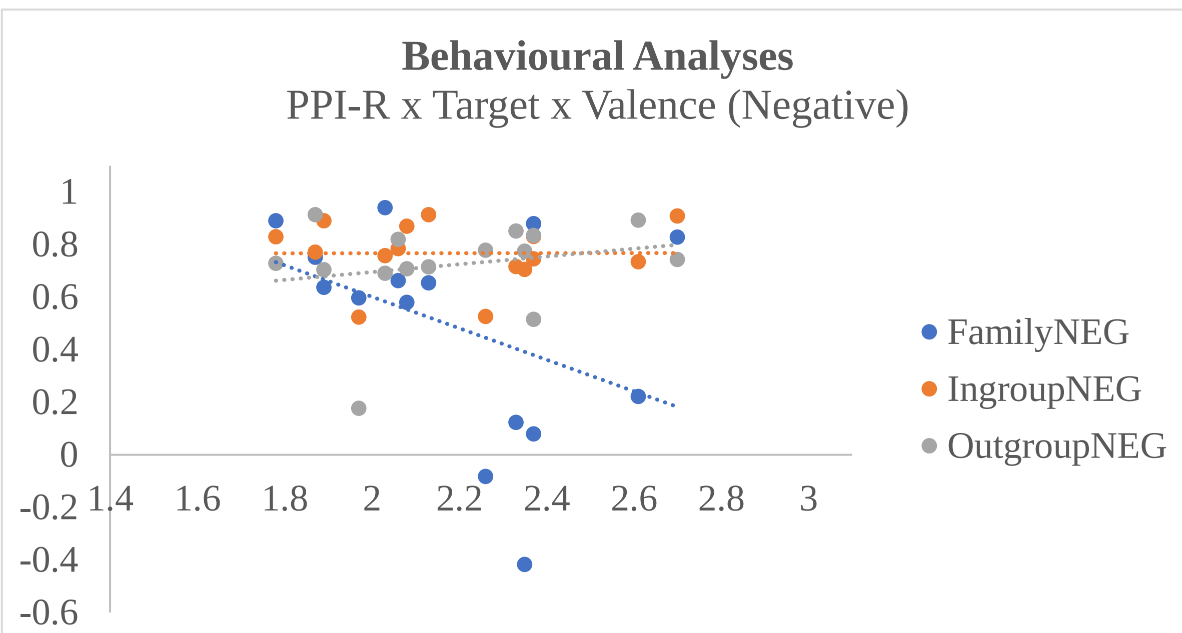
Figure 7

PPI-R x Target Group x Valence Interaction on EA scores

a) *PPI-R x Target Group EA for Positive Valence*



b) *PPI-R x Target Group EA for Negative Valence*



Note: Solid line for significant effect; light dashed line for non-significant effect.

$Family_{NEG}$ conditions differently for those in the High and Low PPI-R groups. For those in the High PPI-R group, there was a negative correlation between PD/EA within the $Family_{NEG}$ condition. In contrast, for those in the Low PPI-R group there was a negative correlation between PD/EA within the $Family_{POS}$ condition. Given the small sample sizes in both High (*n* = 6) and Low (*n* = 9) groups, the results must be considered only preliminary, and patterns and effect sizes of correlations were explored instead of levels of significance (see Table 3).

Table 3

Mean PD and PD/EA Correlations Within Each Target/Valence Condition for High vs. Low PPI-R Scorers

	PPI-R Group					
	High PPI-R		Low PPI-R		High PPI-R vs. Low PPI-R	
n	6		9			
M(SD) PD score	1.07 (0.85)		1.49 (0.69)			
PD/EA Correlation	*r*	*95% C.I.*	*r*	*95% C.I.*	*z*	*p*
$Family_{POS}$	.29	[-.68, .89]	$-.52^{+}$	[-.88, .22]	1.24	.22
$Family_{NEG}$	$-.70^{+}$	[-.96, .26]	.38	[-.38, .83]	-1.79	.07
$Ingroup_{POS}$	-.39	[-.91, .62]	.20	[-.54, .76]	-.87	.38
$Ingroup_{NEG}$	-.52	[-.94, .50]	.33	[-.43, .82]	-1.3	.19
$Outgroup_{POS}$	.65	[-.34, .96]	-.25	[-.78, .50]	1.46	.14
$Outgroup_{NEG}$	.31	[-.67, .90]	-.06	[-.70, .63]	.54	.59

Note: $^{+}p \leq .15$. Correlation magnitudes compared using Fisher's *r*-to-*z* calculations (Preacher, 2002).

Neuroimaging Results

Main Effect of Task

As may be expected, the main effect of *Task* compared to baseline was similar to that reported in the full sample in Study 1a and exhibited widespread activity across several regions including bilateral superior temporal cortex (*k* = 936, *peak F* [left superior temporal cortex] = 215.04; *k* = 787, *peak F* [right superior temporal cortex] = 133.07) extending into bilateral middle temporal cortices, temporoparietal junction and anterior insula. Deactivations were found in right precuneus (*k* = 10,898, *peak F* [precuneus] = 219.03) extending into left precuneus, right middle temporal gyrus, right superior frontal gyrus, bilateral cuneus, lingual gyrus, PCC/MCC/ACC, middle frontal gyrus, and superior/inferior parietal cortex.

Effect of Target and Valence on Neural indicators of Empathy

A similar 3 (*Target Group:* Family vs. Ingroup vs. Outgroup) x 2 (*Valence:* Positive vs. Negative) repeated measures ANCOVA design, with PPI-R as a covariate of interest, was run to investigate neural indices of empathic accuracy within the Study 1b subset of participants. Some effects remained consistent from Study 1a analyses: a main effect of *Valence* was identified within the Negative compared to Positive video condition (however, within the left AI ROI, rather than right AI and mPFC, as found in Study 1a). However, other effects changed somewhat: a main effect of *Target* was identified, revealing decreased activity in the left medial frontal cortex (*k* = 94, *peak F* [left medial frontal] = 68.83) extending into the bilateral precuneus, right cuneus, left middle temporal cortex, and right PCC, with additional clusters found in bilateral middle temporal cortices. To evaluate this effect, condition-specific data was exported from

MRM and subsequent lower-level *t*-tests were conducted at each peak coordinate of deactivation (using Bonferroni corrections, $p \leq .017$). These lower-level *t*-tests revealed consistently greater deactivation of the left medial temporal cortex, angular gyrus, precuneus, and medial frontal cortex for all groups, such that the level of deactivation was greatest within *Ingroup* compared to *Outgroup* compared to *Family* conditions. In some cases (medial temporal cortex and precuneus), this was due to differences in levels of deactivation. In others (angular gyrus and medial frontal cortex) this was a result due to activation within the *Family* Target condition, compared to deactivation within both the *Outgroup* and *Ingroup* Target conditions. Within the mPFC, this was due to significant deactivation within the *Ingroup* condition, and activation within the *Outgroup* condition.

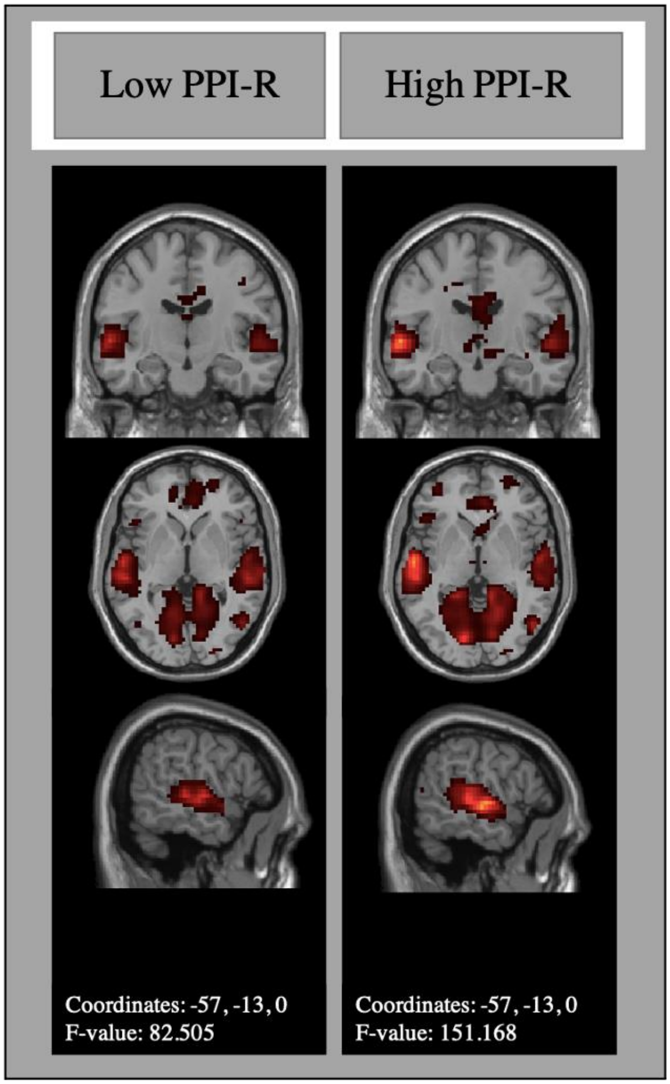
A significant *Target x Valence* interaction was identified within mPFC and ACC ROIs. Follow-up analyses indicated that there was greater deactivation in these regions following Negative compared to Positive video for *Family* Targets. This pattern was reversed for *Ingroup* Targets, and there were no significant activation differences for Positive or Negative videos for *Outgroup* Targets.

In addition, a *Target Group x PPI-R* interaction was revealed within the left TPJ ROI. To explore this effect, activity from the peak coordinate within this left TPJ ROI was extracted for each of the three *Target* conditions and correlated with PPI-R scores in SPSS. The magnitude of this PPI-R/Left TPJ correlation did not reach significance within any of the conditions. However, examination of the specific correlation coefficients indicated that the relationship between PPI-R/Left TPJ activation was moderately positive within the Family condition, $r = .25$, $p = .27$, 95% CI [-.19, .61] but was mildly or moderately negative in the Ingroup, r = -.05, p = .83, 95% CI [-.46, .38], and Outgroup, r = -.31, p = .17, 95% CI [-65, .13] conditions. The PPI-R/TPJ correlation magnitude within the Family Condition was significantly greater than the magnitude of the PPI-R/TPJ correlation within the Outgroup (z = 3.29, p = .001), but not the Ingroup (z = 1.35, p = .18), condition. The *PPI-R x Target* x *Valence* interaction within the mPFC ROI (identified in Study 1a) did not reach significance (which may be due to the smaller sample size); the *PPI-R x Valence* interaction was non-significant.

In line with analyses of the full sample in Study 1a, it was evaluated whether the null main effect of PPI-R occurred as a result of similar low-levels, or high levels, of neural activation, participants were median-split (instead of Tertiary split, due to sample size) into High- and Low- PPI-R scores and both within- and between-group differences in neural responses were evaluated (see Figure 8). Similar to Study 1a results, within-group results indicated that both groups demonstrated increased activation within left middle/superior temporal and inferior frontal cortices. Further, both groups showed decreased activation within a cluster spanning bilateral cuneus, ACC/PCC, hippocampus, lingual gyrus, right middle/superior temporal and superior parietal cortices. High PPI-R scorers showed activation within an additional region of the right middle/superior temporal cortices. Also, in line with Study 1a, between-group analyses indicated that the Low and High- PPI-R groups showed no regions of differential responses.

Figure 8

Low-, and High- PPI-R Scorers Overall Neural Activation



Note: Image is thresholded at uncorrected voxel level of $p < .001$ for display purposes.

Assessing the Parametric Modulation of EA Scores on Neural Activation

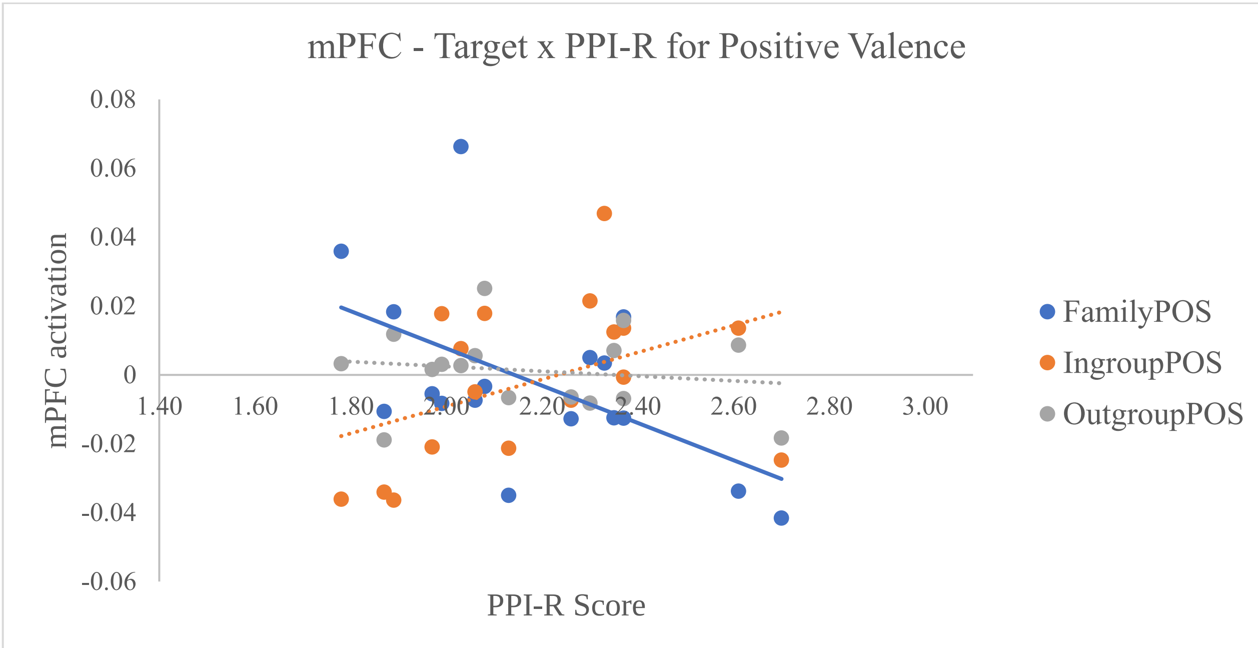
Once again, a 3 (*Target Group:* Family vs. Ingroup vs. Outgroup) by 2 (*Valence:* Positive vs. Negative) repeated measures ANCOVA design, with PPI-R scores as a covariate of interest was conducted. The parametrically modulated analyses revealed no main effect of Valence (unlike in Study 1a). A main effect of *Target* was found within bilateral anterior insula, ACC and mPFC ROIs. Follow-up analyses indicated increased activity (indicative of neural/subjective synchrony) within ACC, left AI, and mPFC for both *Ingroup* > *Family* and *Outgroup* > *Family* contrasts (the right AI also showed this effect within *Outgroup* > *Family*). In addition, a *Target Group x Valence x PPI-R* interaction was identifying within the mPFC ROI (see Figure 9). To better understand this interaction, activity within the mPFC ROI was extracted for each of the six *Target/Valence* conditions and correlated with PPI-R scores in SPSS. The magnitudes of the PPI-R/mPFC correlation reached significance within the $\text{Family}_{\text{POS}}$ condition (r = -.57, p = .03, 95% CI [-.84, -.08]) and revealed moderate, though non-significant, correlations within the $\text{Ingroup}_{\text{POS}}$ (r = .48, p = .07, 95% CI [-.04, .80]), and $\text{Ingroup}_{\text{NEG}}$ (r = -.45, p = .10, 95% CI [-.78, .08]) conditions (no other conditions reached significance). The magnitude of the correlation between PPI-R/mPFC within the $\text{Ingroup}_{\text{POS}}$ condition was significantly different from the $\text{Ingroup}_{\text{NEG}}$ (z = 3.29, p = .001) and $\text{Family}_{\text{POS}}$ (z = 3.09, p = .002), conditions, and non-significantly different from $\text{Outgroup}_{\text{POS}}$ scores (z = 2.01, p = .04; via Stieger's *r*-to-*z* tests (Preacher, 2002) with Bonferroni correction, $p \leq .01$).

To evaluate whether Low- and High- PPI-R scorers had similar neural activation to one another, median split data was used to evaluate both within- and between-group differences in parametrically modulated responses and revealed no parametrically modulated activation for Low and High PPI-R groups.

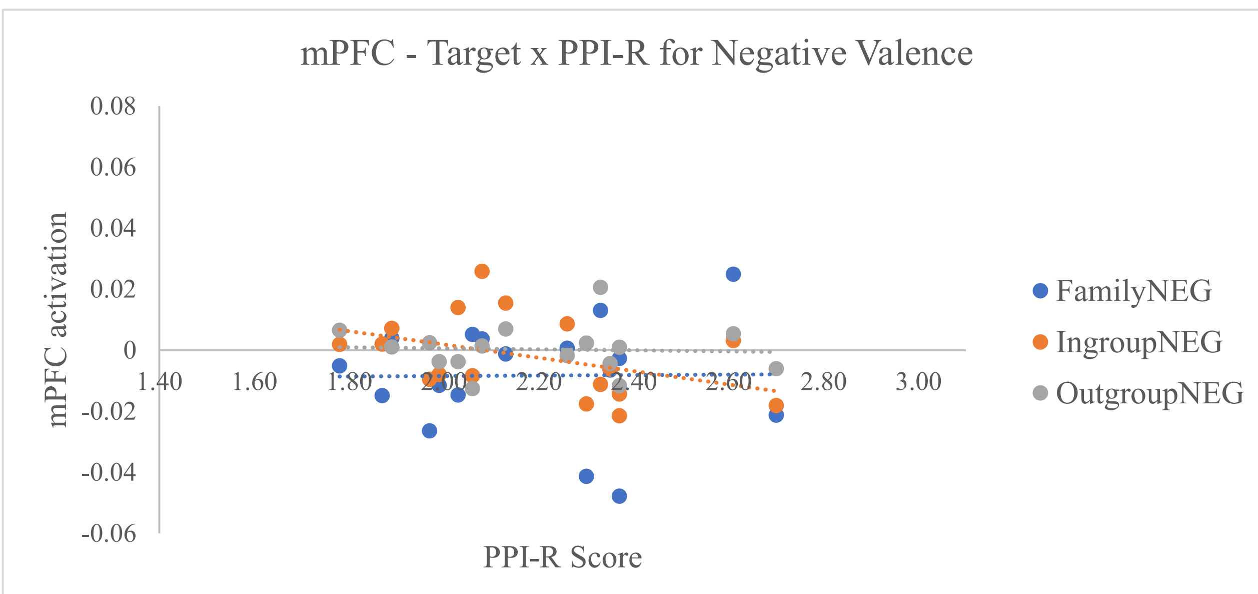
Figure 9

Target x Valence x PPI-R interaction within the mPFC ROI

a) Target x PPI-R interaction within the mPFC ROI for Positive Valence



b) Target x PPI-R interaction within the mPFC ROI for Negative Valence



Note: Solid line for significant effect; light dashed line for non-significant effect.

4.5. Discussion

This study expanded on Study 1a results by further assessing whether psychopathic traits influenced the relationship between social closeness and empathic accuracy. To this end, a subset of the participants from Study 1a also rated the emotions of a close friend/family member while they described emotional autobiographical events from their life. It was hypothesized that those with heightened psychopathic traits would demonstrate a pattern of empathic responding that was highest for their close friends/family member targets (EA for Ingroup and Outgroup targets would remain in line with Study 1a results).

Similar to the analyses conducted in Study 1a, the current subset results were not consistently in line with study hypotheses. The neural results were partially supportive: neural analyses identified correlations between PPI-R scores/neural activation in the left TPJ that was positive for *Family*, near-zero for *Ingroup* and negative for *Outgroup* targets; most other ROI regions failed to show the hypothesized patterns. Further, the parametric modulation analyses were also partially supportive. In line with study hypotheses there was no relationship between PPI-R and neural/subjective synchrony within the Family condition. However, an interaction revealed a negative relationship between neural/subjective synchrony and PPI-R scores within the $\text{Family}_{\text{POS}}$ condition; thus, highlighting differential associations between PPI-R scores and neural/subjective synchrony within the Family condition, based on video valence. Behavioural results, however, were unsupportive of hypotheses and revealed a negative correlation between PPI-R scores and EA, but only for $\text{Family}_{\text{NEG}}$ videos. Together these results suggest that closeness can influence the empathic responses of those with heightened psychopathic traits, but the outcome of that influence may not be as originally hypothesized.

Particularly interesting was the activity within the left TPJ, which was positively related to psychopathic traits, specifically within the Family condition, compared to the Ingroup or Outgroup conditions. Given that the left TPJ is a region thought to underlie cognitive empathy processes (e.g., Saxe & Kanwisher, 2003; Schnell et al., 2011), one possibility is that individuals with heightened psychopathic traits demonstrated increased cognitive empathy for Family targets. While research has yet to compare empathy for family members relative to ingroup and outgroup members, this finding aligns with research from normative populations, wherein individuals demonstrate increased TPJ activation when empathizing with close others (i.e., ingroup relative to outgroup targets; Bruneau et al., 2012; Cheon et al., 2011; Fourie et al., 2017; Vaughn et al., 2018; romantic partners, López-Solà et al., 2020). As such, in line with hypotheses, individuals with heightened levels of psychopathic traits may have demonstrated increased empathy towards their close friend/family targets, relative to the ingroup and outgroup targets. However, given that there is a negative relationship between PPI-R and behavioural EA scores within the Family condition, and no other whole-brain or ROI effects emerged, it may not hold that the increased activation in this region is indicative of empathic responding. The TPJ plays an essential role in various other social cognitive processes such as familiarity with stimuli (e.g., Gobbini & Haxby, 2007). For instance, several studies using non-perspective-taking tasks have demonstrated that increased familiarity of social stimuli was associated with increased activation in various mentalizing regions, including the TPJ. Thus, another possibility may be that the positive correlation between TPJ activation and PPI-R scores for Family is indicative of the heightened familiarity of those targets, rather than evidence of increased empathic responding.

However, in comparison to the Target effect present within the neural data, the behavioural data revealed a negative relationship between PPI-R and EA scores within the Family condition, compared to Ingroup and Outgroup conditions. It is also possible that study hypotheses were not supported because individuals with heightened psychopathic traits do not have inherently close, high-quality relationships with their friends/family members. Some research has indicated that there is no difference in the number of self-nominated family-member (Christian et al., 2019b) or close peer (Christian et al., 2019a; Muñoz et al., 2008) attachments for those both high and low in psychopathic traits. However, the attachment-related values (Foulkes et al., 2014; Jonason et al., 2015; Jonason & Ferrell, 2016; Jonason & Zeigler-Hill, 2018; Waller et al., 2020), behaviour (Christian et al., 2019a; Sherman & Lynam, 2017), and length of relationships (e.g., Foulkes et al., 2014; Jonason et al., 2012; Muñoz et al., 2008) tend to vary based on level of psychopathic traits. In assessing attachment-related values, psychopathic traits are negatively associated with group affiliation (Foulkes et al., 2014; Jonason & Ferrell, 2016; Jonason & Zeigler-Hill, 2018; Waller et al., 2020), kin care (Jonason & Zeigler-Hill, 2018) and relatedness (Jonason & Ferrell, 2016). Further, individuals with heightened levels of psychopathic traits are less likely to rely on familial relationships in particular (Christian et al., 2019b) and act less altruistically than those lower in psychopathic traits towards those close to them (Waller et al., 2020). Together, the combination of placing a lower value on close interpersonal relationships and behaving in ways to discount those relationships leads individuals high in psychopathic to have short-term friendships (e.g., Muñoz et al., 2008) and romantic (e.g., Jonason et al., 2012) relationships. As such, it may follow that the negative correlation between PPI-R and EA within the Close friend/Family Member condition may have resulted from participants not feeling close to the targets, and as such, may not have been encouraged to empathize accurately.

In Study 1a, it was determined that EA scores for those high in psychopathic traits functioned as a result of personal distress. As such, it may hold that personal distress similarly influenced the pattern of results in the current subsample. Exploratory analyses revealed that there were no mean differences in personal distress between those high and low in psychopathic traits. Interestingly, however, a negative relationship between personal distress and EA scores within the $\text{Family}_{\text{NEG}}$ was seen only for those with heightened psychopathic traits. It is possible that their motivation, while often associated with the presence of reward (e.g. Newman et al., 1990), may also be influenced by the level of distress. However, the effect of personal distress only influenced the empathic accuracy of those with heightened psychopathic traits for Family and Ingroup, but not Outgroup Targets. Research suggests that personal distress only plays a role for those deemed closest to the individual (e.g., Batson et al., 1995). Further, individuals tend to be empathically inaccurate (i.e., a failure to accurately infer emotions of targets; Ickes et al., 2005) when the situation is harmful or threatening. It may be then that personal distress only influences the responses of those with heightened psychopathic traits when the situation is viewed as aversive (e.g., in the expression of negative emotions for close targets). Given the small sample sizes in both Study 1a and 1b, it will be important to further examine the potential role that personal distress may play in the empathic responding of individuals with heightened psychopathic traits.

Across both behavioural and non-parametric neural analyses, those with heightened psychopathic traits demonstrated empathic responding of a magnitude similar to those with low levels of psychopathic traits. These findings align with previous work completed (Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013), and the results from the larger sample collected in Study 1a. Together the analyses from both Study 1a and Study 1b converge on the notion that psychopathic individuals' empathic responses may be aberrant rather than absent, and that those with heightened psychopathic traits may be able to exhibit empathic responses when sufficiently motivated.

One of the limitations from Study 1a was that there was no main effect of Target. However, in the smaller Study 1b subset, a Target effect was found within behavioural and neural analyses. Overall, participants demonstrated consistently greater deactivation of the left medial temporal cortex, angular gyrus, precuneus, and medial frontal cortex for *Ingroup* compared to *Outgroup* compared to *Family* Targets. Specifically, there was increased activation (rather than less deactivation) within the angular gyrus and medial frontal cortex for Family compared to both Ingroup and Outgroup Targets. Activation of the angular gyrus has previously been found in studies assessing empathy for others in negative (e.g. Kanske et al., 2015) and anxious (e.g., Morelli et al., 2014) situations. Activation of the medial frontal cortex, specifically the mPFC, has been consistently implicated in cognitive empathy processes (e.g. Gallagher & Frith, 2003). One possibility is that the increased activity of these regions indicates increased empathic responses for Family targets compared to both Ingroup and Outgroup targets. Another possibility is that, similarly to those with heightened psychopathic traits, there was increased activation of these regions as a result of target recollection (e.g., Spreng & Mar, 2012). Indeed, voxel-based meta-analyses suggest that these regions are consistently activated for both autobiographical memory-based and cognitive empathy-based tasks (Spreng et al., 2009). As such, it is possible that participants are merely indicating mere recollection of, rather than empathy for, Family/Close Friend targets.

The current subsample analyses are not without limitations. First, since these current analyses were run on a subset of Study 1a participants, the current analyses had a very modest sample size, consisting of only 15 community-member participants with limited ethnic diversity (due to simultaneous study data collection). Additional work should be conducted to assess the reliability of the findings in a larger and more ethnically diverse sample, as well as a sample that may have increased levels of psychopathic traits (i.e., probation/parole or prison-based populations). Second, while the close friend/family condition was designed to create an ecologically valid target that individuals would feel extremely close to, it led to having target videos that varied in expressivity, emotional depth and context, and topic of the autobiographical video. Compared to Ingroup and Outgroup target videos, these individual close friend/family member target videos were chosen from a smaller set (eight in total for each participant). While the videos were selected based on story valence and whether the participant was mentioned in the video, the videos were unable to be validated in line with the Ingroup/Outgroup target videos. To account for this, these analyses could be replicated in a larger study wherein the collection of close friend/family videos occurs far enough in advance, allowing for video validation.

Overall, in combination with Study 1a, the findings may suggest that individuals with heightened psychopathic traits may suffer from aberrant rather than absent empathic responses. In both Studies 1a and 1b, there were no differences in behavioural EA or level of activation in regions underlying empathy and perspective-taking, for those scoring High and Low on the PPI-R. While, hypotheses were not supported across both studies, results provided insight into how closeness may influence the empathic responding of those with heightened psychopathic traits and explore the possible role that personal distress may play. Further research should continue to assess the influence that implicit motivations play in the empathic responding of those with increased psychopathic traits. This may be done through continuing to assess the role of group membership, or by assessing carefully constructed contexts that may motivate psychopathic individuals to empathize with others.

Chapter 5. Study 2.

Targeting Utilitarian Motives to Influence Empathic Accuracy

5.1. Introduction

The current study took a slightly different approach towards the same goal of testing the extent to which implicit motives may influence empathic processing in those with heightened psychopathic traits. The premise for the study was based on an idea put forth by Tamir and colleagues (e.g., Tamir et al., 2007, 2013), which suggested that utilitarian motives guide emotion regulation. The utilitarian approach to emotion regulation suggests that individuals are motivated to feel (or avoid feeling) certain emotions based on the potential benefits those emotions may have towards reaching one's goals. Thus, if the emotion is considered valuable or useful, the motivation to experience that emotion will increase.

While little work to date has assessed the hedonic or utilitarian motives underlying the emotions of psychopathic individuals, Garofalo and Neumann (2018) suggest that psychopathic individuals may in fact value experiencing certain emotions over others. Indeed, research has shown that individuals with heightened levels of psychopathic traits feel increased levels of spite and contempt towards others (Garofalo et al., 2019), and endorse not only wanting to feel emotions such as anger, but also find utility in their experience (i.e., anger, fear, and sadness; Spantidaki Kyriazi et al., 2020). Together this suggests that psychopathic individuals place heightened value on some emotions over others, and that value may differ based on perceived utility. To date, research has yet to explore whether there are instances wherein psychopathic individuals find utility in empathizing with others, and whether the utility of specific emotional information increases empathy. To this end, the goal of this study was to assess whether individuals with heightened psychopathic traits would empathize in a situation where it may be beneficial for them to do so. Given that psychopathic individuals are inherently selfish (e.g., Cleckley, 1941) and endorse engaging in self-serving actions (Burris et al., 2013), it may be that these self-serving attitudes would motivate them to empathize with others when that information may be relevant to later goals.

The current study used a modified version of the Empathic Accuracy task that included three carefully constructed conditions. Within the control condition, participants were instructed to complete the Empathic Accuracy task as per Study 1 instructions. The second was a “Reaction Time” condition, within which participants were told that after watching the videos, they would be competing against the targets in the videos in a competitive reaction time task. Participants were told that they would have to press the spacebar 100 times in a shorter time than the targets in order to win the reaction time task. The third condition was a “Lie Detection” condition, within which participants were told that after watching the videos, they would be competing against the same targets (as in the EA task) in a lie detection task. Participants were told that they would watch an additional set of emotional autobiographical videos from the same targets, and to win they would need to accurately determine whether their opponents were lying or telling the truth.

These two carefully constructed conditions were included to determine whether psychopathic individuals’ EA scores would increase in a situation that may benefit them. The Lie Detection condition was designed as a condition within which participants may believe that there would be future benefits if they paid increased attention to the emotions of the targets. The reaction time task served as a careful control for the potential influence that the mere existence of a competitive situation may have on EA. As such, it was hypothesized that any EA reductions that those with heightened psychopathic traits show in the control condition would disappear or minimize in the Lie Detection condition. There were no specific hypotheses surrounding performance in the Reaction Time condition.

5.2. Methods

5.2.1. Participants

One hundred and fifty-three (55 males) Ontario Tech University students were recruited from the university participant pool in exchange for course credit. Mean sample age was 20.69 years and ethnic background was diverse (31.8% Caucasian; 16.2% Black or African Canadian; 35.1% Asian; 16.9% Other). Participants completed a self-report prescreen to ensure they met the following screening criteria: normal or corrected-to-normal vision/hearing and the ability to speak and read English. Of the 153 participants, seven were removed from the final analyses for the following reasons: three (one control; one Reaction Time; one Lie Detection) did not follow task instructions, two (both in Reaction Time condition) did not pass the manipulation check (see below), and three (one Control; one Reaction Time; one Lie Detection) had more than 50% of their videos removed (SD of EA scores ≤ 2.5). Following removal of these participants, the final dataset consisted of 145 undergraduate participants (49 Control; 48 Reaction Time; 48 Lie Detection).

5.2.2. Materials

Personality Measures

Study 2 used the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) and Interpersonal Reactivity Index (IRI; Davis, 1983) questionnaires (see General Methods).

5.2.3. Empathic Accuracy Task

Participants were provided with one of three sets of instructions, depending on which condition they were assigned to. In the control condition, they were told to perform the EA task normally, as per the instructions described in the General Methods. In the other two conditions, participants were given additional instructions. Specifically, they were told that the targets in the video had been previous participants in this study, and that after watching the videos, they were going to compete with them in one of two tasks. These instructions were used to alter the motivational set that the participants held while watching the videos. In the "Lie Detection" condition, participants were told that they would be competing against the targets in a lie detection task, wherein they would need to accurately determine whether their opponents were lying or telling the truth. The rationale for including this condition was that participants might believe there would be future benefits if they paid increased attention to the emotions of the targets. As such, it was hypothesized that any EA reductions that those with heightened psychopathic traits show in the control condition would disappear or minimize in the Lie Detection condition as that information may prove beneficial. In the "Reaction Time" condition, participants were told that they would be competing against the targets in a reaction time task, where they would need to press the spacebar 100 times faster than their opponents. The inclusion of the Reaction Time task was to control for the potential influence competition had on EA. In actuality, there were no interactions between participants and targets.

At the end of the Modified Empathic Accuracy Task, participants were asked to rate Task Difficulty on a scale ranging from 1 – "Extremely Easy" to 5 "Extremely Difficult", and Task Effort on a scale with options 1 – "No effort at all", 2 – "A little bit of effort" and 3 – "A lot of effort".

5.2.4. Procedure

After arriving in the laboratory, participants underwent a full informed consent process and were seated in front of a laptop computer. Participants were randomly assigned to one of the three conditions (Control, Reaction Time, Lie Detection). Prior to starting, and following completion of, the Empathic Accuracy Task participants in both the Reaction Time and Lie Detection Conditions were asked "How confident are you that you could beat your opponent?". This question served as a way to gauge if the Empathic Accuracy Task influenced levels of confidence for the following task. Following the Empathic Accuracy Task, as a ***Manipulation Check***, participants were verbally asked: "Can you please remind me what task you will be completing now?". If participants could not accurately answer this question (i.e., reaction time task; lie detection task), they were excluded from analyses (because of uncertainty over the impact this manipulation would have had on their EA task performance). As stated above, only two participants were excluded for this reason. Participants subsequently completed a battery of self-report questionnaires and upon completion of all study components, they were debriefed and allowed to leave the laboratory.

5.2.5. Power Analysis

G*Power was used to identify the sample size required to demonstrate a medium-sized effect within the proposed one-way ANOVA (i.e., differences in empathic accuracy across conditions for the high scoring psychopathy group). To this end, the G*Power analysis was set up as follows: one-way ANOVA, with three conditions, medium effect size (F = .25), power = .80. The power analysis indicated that 159 participants would be required (or 53 participants per condition).

5.2.6. Data Cleaning

The data for each individual video was explored using a MATLAB fill outliers' function, to control for mouse movements that were classified as extreme outliers. Using a 21-element window (equivalent to 5.25 seconds, or 2.5s on each side of the given data point), the function identified data points that were more than three standard deviations away from the local median and replaced them with the most recent non-outlier value from within that 21-element window. If the outlier data points were at the beginning of the video data, they were replaced with the next non-outlier value within the 21-element window. Following this, every eight consecutive ratings (acquired every 250s) were averaged to create a 2s mean emotional rating. Finally, the correlation between participants' averaged emotion ratings and the target's own original ratings were calculated, and represented the Empathic Accuracy metric.

The videos were organized into two variables based on video Valence and video Difficulty (described in the ***Creation of autobiographical*** *videos* section in Study 1a***)***. As such, the data was organized into four levels: Pos_Easy, Pos_Hard, Neg_Easy, Neg_Hard. Participant's videos were removed from analyses as outliers if: the SD of individual EA scores were ≤ 2.5SD, or if the EA score within Pos_Easy, Pos_Hard, Neg_Easy, or Neg_Hard was 2SD away from the mean. All outliers were mean replaced, with the mean value for the corresponding Valence/Difficulty level. This led to the following percentage of videos with mean-replaced values: 10.3% within Pos_Easy, 11% within Pos_Hard, 6.9% within Neg_Easy and 13.8% within Neg_Hard.

5.3. Results

Demographics

All questionnaire and behavioural data are displayed in Table 4. Total PPI-R scores ranged from 1.51 – 2.75 (M = 2.08, SD = .29), and were normally distributed. While the IRI perspective-taking subscale scores had a normal distribution, the empathic concern scores of the IRI showed a slight negative skew. Three one-way ANOVAs revealed that participants in each of the three conditions did not differ in terms of PPI-R, empathic concern, or perspective-taking scores (p's > .05). As expected, PPI-R scores showed significant negative correlations with both empathic concern (r = -.59, p < .001, 95% CI [-.69, -.47]), and perspective-taking (r = -.27, p = .001, 95% CI [-.41, -.11]) scores. The IRI subscale scores of empathic concern and perspective-taking were significantly positively correlated (r = .34, p < .001, 95% CI [.19, .48]).

Confidence Check

Prior to and immediately following the EA task, participants were asked: "How confident are you that you can beat these opponents in the reaction time/lie detection task?" This was to evaluate whether completing the Empathic Accuracy task led to fluctuations in participant's confidence ratings. It was thought that this fluctuation reflected the participants' consideration of the emotional information in their ability to

Table 4.

Behavioural and Demographic Data

	Control				Reaction Time				Lie Detection			
n	49				48				48			
	M	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*
Empathic Accuracy (EA)	0.67	0.12	.33	.89	0.66	0.13	.37	.94	0.68	0.13	.24	.88
PPI-R												
Total	2.06	0.27	1.62	2.60	2.13	0.24	1.58	2.60	2.05	0.34	1.51	2.75
Self-Centered Impulsivity	1.97	0.34	1.26	2.58	2.06	0.31	1.22	2.62	1.94	0.27	1.39	2.48
Fearless Dominance	2.48	0.42	1.65	3.48	2.44	0.39	1.65	3.21	2.32	0.44	1.33	3.51
Coldheartedness	1.72	0.41	1.00	2.88	1.90	0.35	1.25	2.94	1.88	0.57	1.00	3.44
IRI												
Empathic Concern	3.06	0.70	1.57	4.00	2.90	0.64	1.57	4.00	2.90	0.74	1.29	4.00
Perspective-Taking	2.86	0.59	1.57	4.00	2.75	0.60	1.14	4.00	2.91	0.57	2.00	4.00
Manipulation Check												
Pre-EA Task	-	-	-	-	67.2%	19.74	5%	100%	59.2%	21.81	10%	100%
Post EA-Task	-	-	-	-	68.9%	19.35	5%	99%	64.2%	18.27	20%	96%

succeed in the next task. To this end, a paired-samples *t*-test was conducted, which revealed that participants rated their confidence at Time 1 (prior to the empathic accuracy task) as being lower (M = 63.6, SD = 20.97) than at Time 2 (following the empathic accuracy task; M = 66.86, SD = 18.83). There were no significant differences in confidence ratings across Reaction Time and Lie Detection conditions pre- and post-Empathic Accuracy Task (p's > .05). Further, the magnitude of change in confidence pre-Empathic Accuracy task, and post-Empathic Accuracy task did not differ between the two conditions, $p > .05$.

Preliminary Analyses

Linear regression was used to evaluate whether Task Effort and Task Difficulty scores predicted Total EA scores. Results found no indication that this was the case (F (2, 141) = 1.01, p = .36). These regression models were repeated within each condition separately, with results again finding no effect of Task Effort and Task Difficulty on EA scores (all p's > .10). As such, all further analyses were run without controlling for these Difficulty and Effort variables.

A 2 (*Valence*: Positive vs. Negative) x 2 (*Difficulty*: Easy vs. Hard) x 3 (*Condition*: Control vs. Reaction Time vs. Lie Detection) mixed measures ANCOVA with *Valence* and *Difficulty* as within-subjects measures, Condition as a between-subjects measure and mean-centered PPI-R scores as a covariate of interest, was run to evaluate the effect of psychopathic traits on EA scores across conditions**.** Since neither *Valence* or *Difficulty* was related to either condition or PPI-R scores, the analyses will be completed collapsing across these variable levels for the remaining analyses.

Empathic Accuracy Task

EA of Overall Task

Overall, participants were fairly accurate at identifying others' emotions (r = .67, SD = .13, 95% CI [.57, .75]). Mean EA scores were significantly correlated to PPI-R (r = -.21, p = .33, 95% CI [-.36, -.05]), and empathic concern (r = .21, p = .01, 95% CI [.05, .36]), but not perspective-taking (r = .10, p = .23, 95% CI [-.06, .23]) scores.

A one-way (*Condition*: Control vs. Increase vs. Lie Detection) between subjects ANCOVA with mean-centered PPI-R scores as a covariate of interest was run to evaluate the effect of psychopathic traits on EA scores across conditions**.** The results demonstrated a significant main effect of the PPI-R covariate, $F(1, 139) = 4.72$, p = .03, $\eta_p^2 = .03$, that revealed a negative relationship between PPI-R scores and Total EA, r = -.21, p = .01, 95% CI [-.36, -.05]. Neither the main effect of Condition, nor the Condition x PPI-R interaction reached significance (p's > .50).

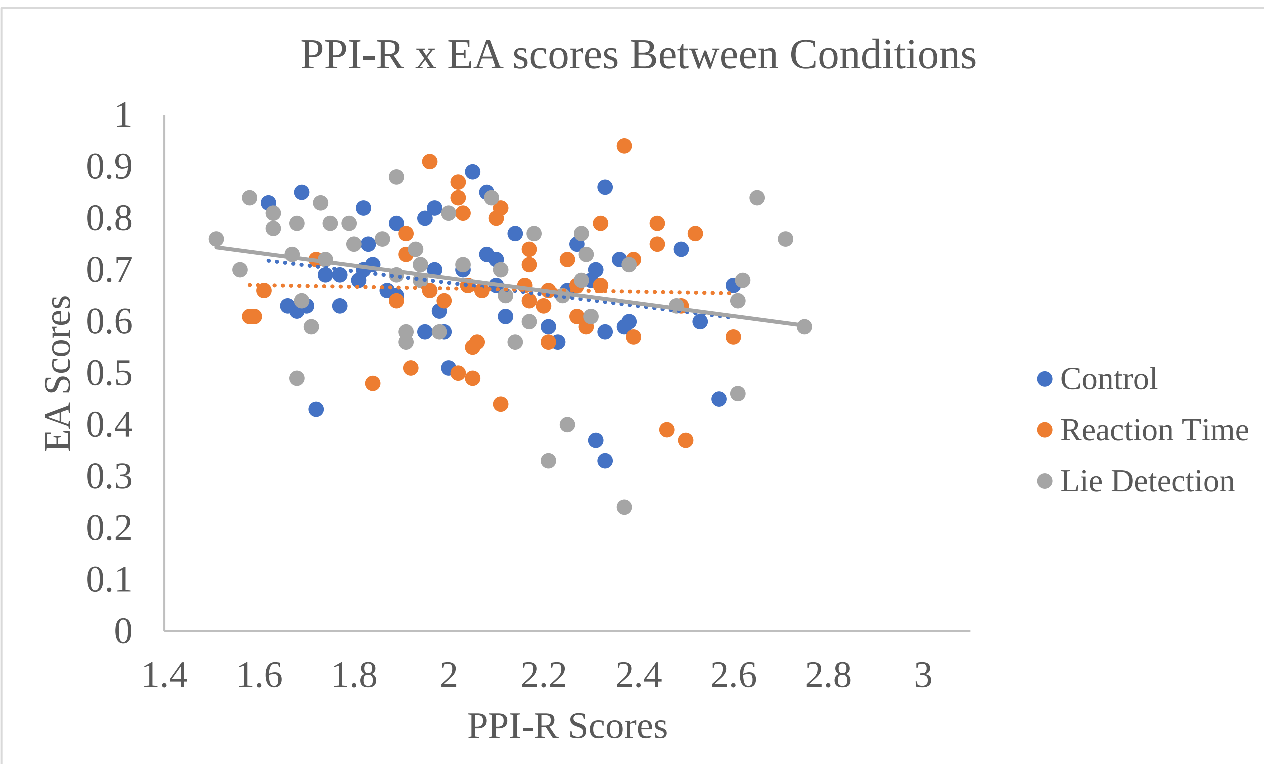
Condition-Specific Results – Influence of Total Psychopathic Traits on EA

Of particular interest was how those with increased psychopathic traits would perform in the implicit motivation (Lie Detection) condition. To this end, despite having no main effect of condition, targeted analyses were undertaken to determine the effect of PPI-R scores on EA within each condition. The results demonstrated a moderate, but non-significant, negative correlation between PPI-R and EA scores within the Control condition, r = -.24, p = .09, 95% CI [-.49, .04], and a significant negative correlation between PPI-R and EA scores within the Lie Detection condition, r = -.31, p = .03, 95% CI [-.55, -.03]; no relationship between PPI-R and EA scores was found in the Reaction

Time condition ($p > .80$; see Figure 10). The magnitudes of the EA/PPI-R correlations within each condition did not significantly differ from one another (all p's $> .15$). In addition, the sample was median split into Low (PPI-R ≤ 2.06) and High (PPI-R > 2.06) groups, and three independent samples *t*-tests (one per condition; with Bonferroni correction ($p \leq .017$)) were run to evaluate for differences in EA between those with High vs. Low PPI-R scorers. Within the Lie Detection condition, those in the Low PPI-R group ($M = .72$, $SD = 0.10$) had significantly higher EA scores than those in the High PPI-R group ($M = .63$, $SD = 0.15$), $t(46) = 2.46$, $p = .02$, 95% CI [.02, .16], $d = .13$. This effect did not reach significance in the Control or Reaction time conditions (See Figure 11).

Figure 10

Between Conditions Comparison of the Relationship Between PPI-R and EA Scores



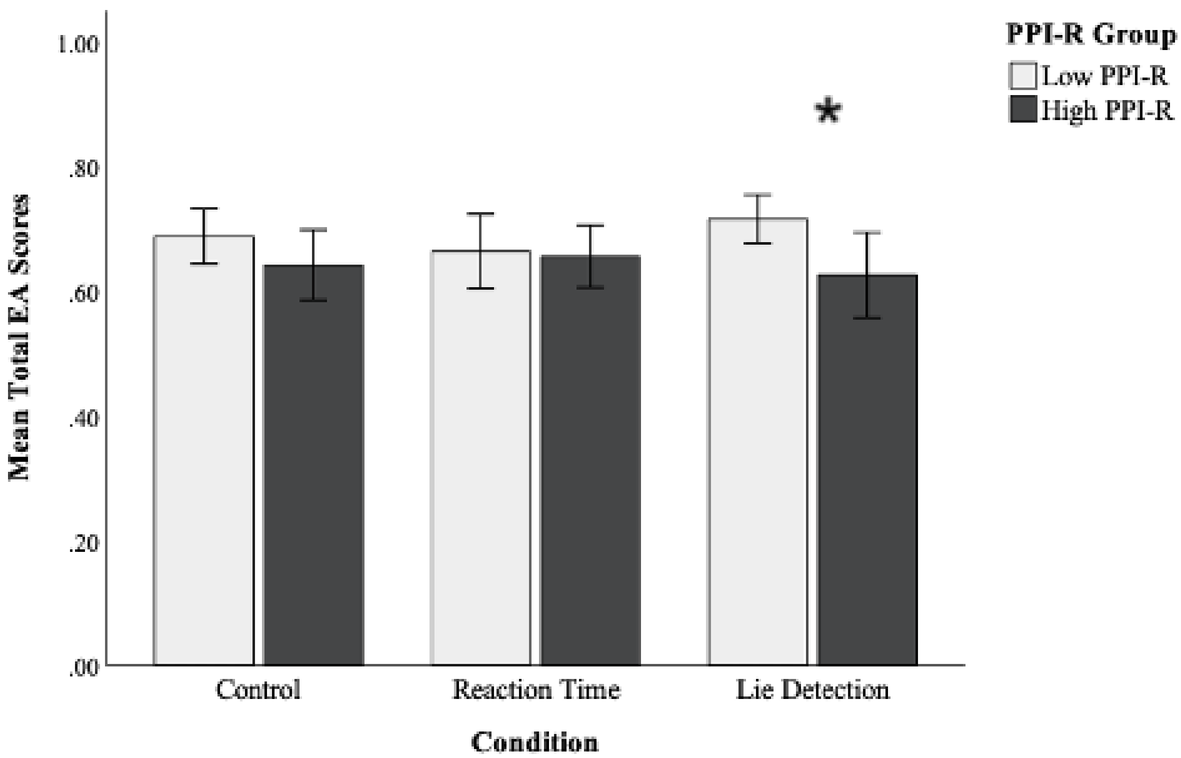
Note: Solid line for significant effect; light dashed line for non-significant effect.

Role of Personal Distress

In the previous studies, results revealed an unexpected effect of PD, such that a PD x PPI-R interaction influenced Total EA scores, particularly if participant-target social closeness was high. Given that the targets in the current study were all strangers, no effect of Personal Distress was expected. In line with hypotheses, the PD x PPI-R interaction was unrelated to EA scores overall, or within any of the conditions (all p's > .10).

Figure 11

Between Samples t-tests Comparing EA Scores for Low vs. High PPI-R Scorers in each Condition



Note: * indicates a significant effect; errors bars: 95% CI.

Influence of Psychopathic Traits Subscales on EA

While not hypothesized, the relationship between PPI-R subscales and EA was explored. To this end, three separate one-way (*Condition*: Control vs. Increase vs. Lie

Detection) ANCOVA's with condition as a between-subjects measure and each mean-centered PPI-R subscale scores as a covariate of interest, were run. Results revealed main effects of both Self-Centered Impulsivity and Coldheartedness. The effect of Self-Centered Impulsivity was non-significant, ($F(1,141) = 3.41$, $p = .07$, $\eta_p^2 = .02$), yet a small negative correlation with Total EA scores, $r = -.16$, $p = .06$, 95% CI [-.31, .003] was demonstrated. The effect of Coldheartedness ($F(1,141) = 5.00$, $p = .03$, $\eta_p^2 = .03$) was significant, such that it was negatively correlated with total EA scores, $r = -.18$, $p = .03$, 95% CI [-.31, -.02].

Despite having no main effect of Condition, several exploratory, yet targeted, correlational analyses between PPI-R subscales and EA were subsequently undertaken within each condition. Effects were only found within the Lie Detection condition, which revealed a significant negative correlation between EA and Self-Centered Impulsivity, $r = -.29$, $p = .05$, 95% CI [-.53, -.01], and a small-to-moderate, yet non-significant, correlation between EA and Coldheartedness, $r = -.25$, $p = .09$, 95% CI [-.50, .04]. No correlations within the Control or Reaction time conditions, or with Fearless Dominance approached significance. In addition, the sample was median split separately into Low and High PPI-R groups on each subscale, and targeted independent samples *t*-tests (one per condition for each subscale; with Bonferroni correction ($p \leq .017$)) were run to evaluate for differences in EA between High vs. Low PPI-R scorers. In line with correlational analyses, the independent samples *t*-tests revealed a pattern within the Lie Detection condition, such that those with Lower SCI and CH scores had higher EA scores compared to those with Higher SCI and CH scores. However, this effect only reached significance for CH, $t(46) = 1.99$, $p = .053$, 95% CI [-.001, .15], $d = .13$.

5.4. Discussion

The goal of the current study was to explore whether individuals with heightened levels of psychopathic traits would be motivated to empathize in a situation where doing so was anticipated to benefit them. To evaluate this, participants completed a modified version of the Empathic Accuracy Task within one of three deliberately conceived conditions: a control condition; a competition control condition (i.e., Reaction Time), and an implicit motivation condition (i.e., Lie Detection). Overall, results did not support the notion that the EA of psychopathic individuals would increase based on the utilitarian nature of the situation; psychopathic traits showed a negative, rather than a positive, association with EA scores within the Lie Detection condition. Yet, as expected, psychopathic traits negatively influenced EA scores within the Control condition. In addition, there was no association between psychopathic traits and EA scores within the Reaction Time condition; the condition that served as a control for the competition aspect of the study. Given that psychopathic traits did not influence empathic accuracy within the Reaction Time condition further suggests that the Lie Detection condition did not function as expected. Together, the pattern of results suggest that the utilitarian nature of the Lie Detection condition did not sufficiently motivate psychopathic to increase their empathic accuracy scores.

While I can only speculate, there are at least two potential reasons that can explain this pattern of results. One possibility is that psychopathic individuals are indeed incapable of increasing their expression of empathy. This is in line with classic deficit models of psychopathy; however, this interpretation discounts a wide array of recent research which suggests that the emotional responses of individuals with heightened psychopathic traits can be modulated under certain conditions (Arbuckle & Shane, 2017; Berluti et al., 2020; Drayton et al., 2018; Meffert et al., 2013; Shane & Groat, 2018). In these studies, the attenuated emotional responses of those high in psychopathic traits were reduced following instruction to maximize their emotional (Shane & Groat, 2018), perspective-taking (Drayton et al., 2018) or empathic (Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013) responses. This suggests that they can in fact do it in certain situations. As such, it would be premature to use the present data to suggest that psychopathic individuals are incapable of being motivated to empathize.

Another possibility is that the Lie Detection condition may not have been sufficiently effective at targeting the underlying utilitarian motives for those with heightened psychopathic traits. Whereas between group comparisons revealed no differences between those High and Low in psychopathic traits within Control and Reaction Time conditions, those Low in psychopathic traits performed significantly better in the Lie Detection condition. As such, it is possible that the Lie Detection condition was not deemed as utilitarian in nature for those high in psychopathic traits. While there is work conducted within normative populations that suggests individuals will experience specific emotions if they believe they are beneficial to achieving goals (i.e., utility; Tamir, 2009; Tamir et al., 2007, 2008, 2013; Tamir & Ford, 2012), and recent work demonstrates that psychopathic individuals find utility in experiencing certain emotions (i.e., anger, fear, and sadness; Spantidaki Kyriazi et al., 2020), the current study is the first to attempt to influence these utilitarian motives in psychopathic individuals. Further, the emotional information in the EA task may not have been seen as being beneficial to the later Lie Detection task. Indeed, research has shown that when detecting lies, individuals higher in psychopathic traits are increasingly likely to use cues related to the structure of the event report such as hesitations and repetitions (Peace & Sinclair, 2012). As such, it is possible that since those high in psychopathic traits focus more on event-related cues, they do not find the utility in empathizing, as the emotion-related information may not be of relevance to them.

Similar patterns were seen with regard to the PPI-R subscales. EA was positively correlated with SCI and CH in the Control and RT conditions, but negatively associated with these subscales in the Lie Detection condition. The self-centered impulsivity subscale was developed to assess characteristics relevant to Factor 2 of the PCL-R (e.g., Miller & Lynam, 2012). Individuals high on self-centered impulsivity are thought to be characterized by disinhibition, impulsive behaviour and impaired executive functioning (e.g., Lilienfeld & Widows, 2005; Miller & Lynam, 2012). Further, across several studies, self-centered impulsivity has been shown to be negatively associated with measures of empathy (Miller & Lynam, 2012; Sörman et al., 2016; Uzieblo et al., 2010). Given that individuals high in SCI experience impaired executive functioning, and empathy has been suggested to rely on executive functioning processes (Preston & de Waal, 2002), it may follow that the increased cognitive demand on their executive functioning (i.e., increased task demands, focus and relating the emotional content across tasks) could have hindered their performance within this condition. Further, the coldheartedness subscale is a measure of callousness, and lack of empathy (Lilienfeld & Widows, 2005), which demonstrates a consistent link with decreased empathic responding (Miller & Lynam, 2012; Sörman et al., 2016; Uzieblo et al., 2010). However, since previous work has indicated that individuals high in coldheartedness can demonstrate increases in empathic responses following instruction (Berluti et al., 2020), it may be that they were simply not motivated by the Lie Detection condition.

The current study is not without limitations. First, the power analysis was conducted to demonstrate a medium effect size of the targeted one-way ANOVA within High PPI-R scorers. However, it is important to note that this sample size becomes modest when conducting higher-order analyses across both PPI-R and condition. Thus, the study should be replicated within a larger sample to determine whether effects remain consistent. Second, the task itself needs to be set up very precisely, as it involves the delivery of several carefully constructed scripts. The study was conducted by me, along with a collection of Research Assistants. Research characteristics and demeanour have been found to influence participants' recall of consent procedures and laboratory behaviours (Edlund et al., 2014). Given the particular nature of the study, the differences in researcher characteristics (such as clarity and confidence in script delivery) may have influenced task believability, participant performance and overall task outcomes. To account for this, the study could be replicated by a single researcher, or be conducted using pre-recorded video instructions to ensure consistency in script delivery.

Another limitation of the current study is that it does not include a well-validated condition that would allow for a comparison of the decreased EA scores of individuals with psychopathic traits within the Lie Detection condition. To this end, Study 3 was run with the inclusion of a well-validated instruction-based Increase condition to help discern if there are potential condition- or task-based issues leading to decreased EA within the Lie Detection condition. Previous studies using an Increase condition have demonstrated that following instructions to increase empathy, individuals with heightened psychopathic traits can increase their empathic responses of a magnitude similar to non-psychopathic individuals (e.g., Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013). The pattern of results across the Increase and Lie Detection condition will allow for a greater understanding as to why there was a negative association between psychopathic traits and EA within the Lie Detection condition in Study 2. Given that use of the Increase condition has resulted in heightened empathic responding for psychopathic individuals, if EA scores in both the Increase and Lie Detection condition are negatively associated with psychopathic traits in Study 3, it may suggest that there are issues with the overall task. However, if EA scores are negatively associated with psychopathic traits in the Lie Detection, but not Increase condition, it may reveal that there are issues with the Lie Detection task sufficiently targeting the underlying motivation to empathize of individuals with heightened psychopathic traits. Thus, the addition of the Increase condition will allow for exploration of potential task- or condition-based issues that may have contributed to the findings in Study 2.

Chapter 6. Study 3.

Influencing Empathic Accuracy Through Providing Explicit Instructions to Empathize and Targeting Utilitarian Motives

6.1. Introduction

Study 2 aimed to assess whether individuals with heightened psychopathic traits would be motivated to empathize in a situation that may benefit them. Contrary to study hypotheses, the EA scores within the implicit motivation condition were negatively associated with psychopathic traits. There are several reasons why these results may have manifested. One possibility is that those with heightened psychopathic traits lack the ability to empathize. However, as discussed previously, this interpretation goes against recent literature indicating that those high in psychopathic traits demonstrate similar levels of empathy to those low in psychopathic traits following an instruction to increase their empathy towards targets. Alternately, the Lie Detection condition may have simply been ineffective at encouraging increased empathy in participants.

To this end, Study 3 sought to further examine these utilitarian influences, while bolstering certain study design issues from Study 2. Specifically, Study 3 added a well-validated Increase condition to extrinsically motivate individuals with psychopathic traits to empathize. In the Increase condition, participants were asked to maximize their level of concern for the target and empathize with what the target was feeling. Previous studies using the Increase condition have demonstrated that psychopathic individuals can increase their empathic responses, at levels similar to non-psychopathic individuals following the Increase instruction (e.g., Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013). As such, if EA scores in both the Increase and Lie Detection condition are negatively associated with psychopathic traits in the current study, it may suggest that there are issues with the overall task. However, if EA scores are negatively associated with psychopathic traits in the Lie Detection, but not the Increase condition, it may suggest that there are issues with the Lie Detection task sufficiently targeting the underlying motivation to empathize for individuals with heightened psychopathic traits. Thus, the addition of the Increase condition will allow for exploration of potential task- or condition-based issues that may have contributed to the findings in Study 2.

The current study similarly attempts to assess whether individuals with heightened psychopathic traits will be motivated by the utilitarian nature of a certain situation. Of interest is whether there are differences in the magnitude of EA across motivation-type (i.e., intrinsic vs. extrinsic) and whether the magnitude of EA is influenced by psychopathic traits differently across conditions. The overarching hypothesis was that psychopathic individuals would demonstrate an empathic response following sufficient implicit motivation. As such, condition-based hypotheses were derived as a means to assess this higher-order goal. It was hypothesized that within the control condition there would be a negative association between psychopathic traits and levels of empathic accuracy. Alternately, it was hypothesized that psychopathic individuals would be motivated to empathize through extrinsic (i.e., within the Increase condition) and intrinsic (i.e., within the Lie Detection condition) motivational cues. As such, psychopathic traits would not influence empathic accuracy scores in either of these conditions. Additionally, while there were no concrete hypotheses about the magnitude of EA across conditions for those within High and Low PPI-R groups, or whether PPI-R subscales would be associated with EA scores, these relationships were explored.

6.2. Methods

6.2.1. Participants

One hundred and fifty-nine (72 males) Ontario Tech University students were recruited from the university participant pool in exchange for course credit. Participants average age was 20.41 (*SD* = 3.04) years and were ethnically diverse (35.7% Caucasian; 7.1% Black or African Canadian; 37.2% Asian; 1.6% Aboriginal; 18.3% Other). Using a self-answered prescreen provided through the undergraduate participant portal, participants indicated if they met the following pre-screen criteria: having normal or corrected-to-normal vision/hearing and having the ability to speak and read English. Of the 153 participants, 33 were removed from the final analyses for the following reasons: one (Increase condition) did not follow task instructions, 16 had technical difficulties and we did not retrieve all of the data (7 Control; 5 Increase; 4 Lie Detection) and 16 (1 Control; 11 Increase; 4 Lie Detection) had more than 50% of their videos removed. Following removal of these participants, the final dataset consisted of 126 (60 males) undergraduate participants (49 Control; 33 Increase; 44 Lie Detection).

6.2.2. Materials

Personality Measures

Study 2 used the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) and Interpersonal Reactivity Index (IRI, Davis, 1983) questionnaires (see General Methods).

6.2.3. Modified Empathic Accuracy Task

Participants were given one of three sets of instructions depending on which condition (Control, Increase or Lie Detection) they were assigned to. The Control and Lie

Detection conditions are identical to those used in Study 2 (see Study 2 Methods) however an Increase condition was added in the current study. In this condition, participants were asked to try to maximize their level of concern for the targets, and really try to empathize with what they are feeling. These instructions were used to alter the motivational set that the participants hold when watching the videos (control, explicit motivation (asked to increase), implicit motivation (emotional lie detection task)).

6.2.4. Procedure

Participants completed this study remotely due to the COVID-19 pandemic. Upon sign-up participants were sent a link to an online version of the consent form. Once signed, participants were randomly assigned to one of the three conditions (Control, Increase, Lie Detection) and sent a study link to complete the Empathic Accuracy Task remotely using E-Prime Go. Following the Empathic Accuracy Task, participants subsequently completed a battery of self-report questionnaires and upon completion of all study components, and they were debriefed.

6.2.5. Power Analysis

Similar to Study 2, G*Power was used to identify the sample size that would be required to demonstrate a medium-sized effect within the proposed one-way ANOVA (i.e., differences in empathic accuracy across conditions for our high scoring psychopathy group). To this end, the G*Power analysis was set up as follows: one-way ANOVA, with three conditions, medium effect size (F = .25), power = .80. The power analysis indicated that 159 participants would be required (or 53 participants per condition).

6.2.6. Data Cleaning

All data cleaning was completed following the steps outlined in Study 2. In the current study, this led to the following percentage of videos that have mean-replaced values in each variable: 19.8% for Pos_Easy, 17.5% for Pos_Hard, 4.0% for Neg_Easy and 15.9% for Neg_Hard.

6.3. Results

Demographics

All questionnaire and behavioural data are displayed in Table 5. Total PPI-R scores ranged from 1.51 – 3.00 ($M = 2.05$, $SD = .28$), and were slightly positively skewed due to two participants having PPI-R total scores more than 3*SD* above the mean. Given that the goal of the current study was to evaluate whether individuals with heightened levels of psychopathic traits would be motivated to empathize in a situation intended to make empathizing beneficial for them, these participant's scores were included. The IRI subscales of empathic concern and perspective-taking were both negatively skewed. Three one-way ANOVAs revealed that participants in each of the three conditions did not differ in terms of PPI-R, empathic concern, or perspective-taking scores (p's > .05). As expected, PPI-R total scores showed a significant negative correlation with empathic concern scores ($r = -.49$, $p < .001$, 95% CI [-.61, -.34]), and a non-significant, yet small-to-moderate, negative correlation with perspective-taking scores ($r = -.12$, $p = .17$, 95% CI [-.29, .06]). The IRI subscale scores of empathic concern and perspective-taking were significantly positively correlated ($r = .30$, $p = .001$, 95% CI [.13, .45]).

Table 5

Behavioural and Demographic Data

	Control				Increase				Lie Detection			
n	49				33				44			
	M	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*
Empathic Accuracy (EA)	0.64	0.10	.29	.83	0.64	0.12	.45	.84	0.64	0.15	.22	.86
PPI-R												
Total	2.05	0.31	1.52	3.00	2.02	0.28	1.56	2.58	2.07	0.26	1.51	2.63
Self-Centered Impulsivity	2.03	0.28	1.52	2.96	1.95	0.33	1.27	2.75	2.01	0.32	1.37	2.59
Fearless Dominance	2.29	0.45	1.43	3.43	2.35	0.48	1.24	3.14	2.33	0.43	1.34	3.28
Coldheartedness	1.82	0.48	1.06	3.13	1.75	0.37	1.06	2.44	1.86	0.32	1.25	2.75
IRI												
Empathic Concern	2.94	0.70	.57	4.00	3.06	0.57	1.86	4.00	2.83	0.55	1.71	3.86
Perspective-Taking	2.90	0.61	1.71	4.00	2.76	0.61	1.29	3.71	2.69	0.65	.86	3.86

Preliminary Analyses

Linear regression was used to evaluate whether Task Effort and Task Difficulty scores predicted Total EA scores. Results found no indication that this was the case (F (2, 123) = .35, p = .71). These regression models were repeated within each condition separately, with results again finding no effect of Task Effort and Task Difficulty on EA scores (all p's > .20). As such, all further analyses were run without controlling for these Difficulty and Effort variables.

A 2 (*Valence*: Positive vs. Negative) x 2 (*Difficulty*: Easy vs. Hard) x 3 (Condition: Control vs. Increase vs. Lie Detection) mixed measures ANCOVA with Valence and Difficulty as within-subjects measures, condition as a between-subjects measure and mean-centered PPI-R scores as a covariate, was run to evaluate the effect of psychopathic traits on EA across conditions**.** Analyses revealed a *Valence x PPI-R* interaction, $F(1,122) = 3.18$, $p = .08$, $\eta_p^2 = .03$; however, there was no effect of Difficulty on condition or PPI-R scores. As such, all additional analyses were completed collapsing across the Difficulty variable.

Empathic Accuracy Task

EA of Overall Task

On average, individuals were fairly accurate at identifying other's emotions (M EA = .64, SD = 0.12, 95% CI [.52, .73]). Mean EA scores were non-significantly correlated to PPI-R (r = -.11, p = .23, 95% CI [-.28, .07]), empathic concern (r = .01, p = .89, 95% CI [-.17, .18]), and perspective-taking (r = .14, p = .12, 95% CI [-.04, .31]) scores.

A 2 (*Valence*: Positive vs. Negative) x 3 (*Condition*: Control vs. Increase vs. Lie Detection) mixed measures ANCOVA with Valence as a within-subjects measure, condition as a between-subjects measure and mean-centered PPI-R scores as a covariate of interest, was run to evaluate the effect of psychopathic traits on EA scores across conditions**.** There was a main effect of *Valence*, $F(1, 120) = 38.57$, $p < .001$, $\eta_p^2 = .24$. Follow up analyses revealed that EA scores were higher for Positive ($M = .70$, $SD = 0.16$), compared to Negative ($M = .60$, $SD = 0.17$) videos. Results further demonstrated a significant *PPI-R* x *Valence* interaction, $F(1, 120) = 3.97$, $p = .05$, $\eta_p^2 = .03$. To dissect the interaction, separate correlations between PPI-R scores and EA for Positive and Negative videos were run and the correlation magnitudes were subsequently compared. There was a significant negative relationship between PPI-R/EA in the Negative, $r = -.18$, $p = .05$, 95% CI [-.34, -.01], and a non-significant positive relationship between PPI-R/EA in the Positive, $r = .02$, $p = .81$, 95% CI [-.16, .19], condition. The difference in the magnitudes of the PPI-R/EA correlations was non-significant (using Steiger's *r*-to-*z*-test, calculated from (Lee & Preacher, 2013), $z = 1.69$, $p = .09$).

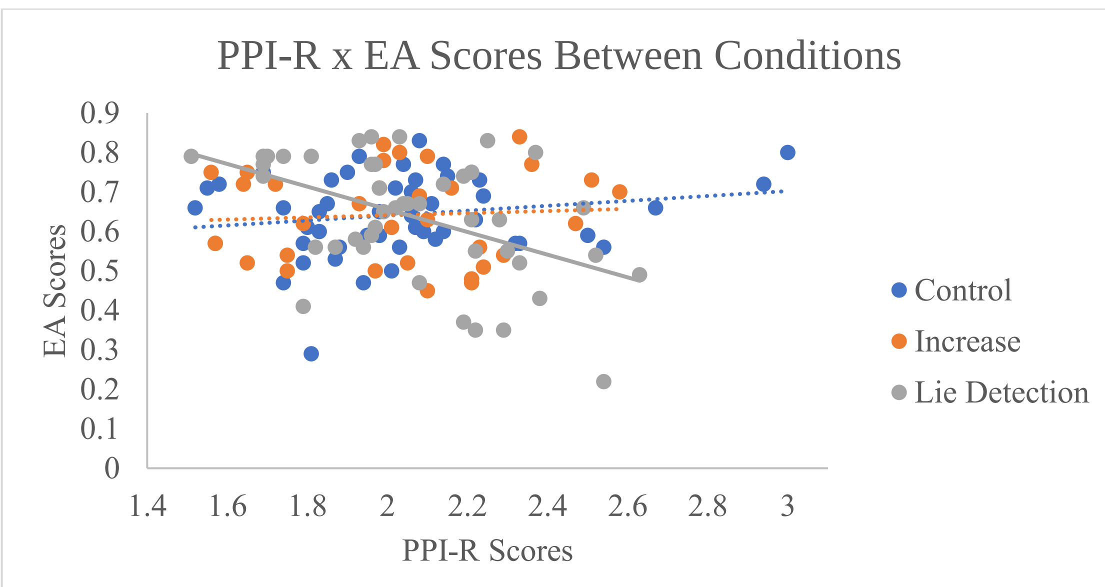
In addition, results revealed that the *PPI-R x Condition* interaction was significant, $F(2, 120) = 9.23$, $p < .001$, $\eta_p^2 = .12$. To dissect the interaction, separate PPI-R/EA correlations were run within each condition and the correlation magnitudes were subsequently compared. The results demonstrated a significant negative correlation between PPI-R and EA scores within the Lie Detection condition, $r = -.48$, $p = .001$, 95% CI [-.68, -.21]; no significant relationships between PPI-R and EA scores were found in the Control, $r = .19$, $p = .20$, 95% CI [-.10, -.45], or Increase, $r = .07$, $p = .72$, 95% CI [-.28, .40], conditions (see Figure 12). Fisher's *r*-to-*z* tests (calculated using (Preacher, 2002)) with Bonferroni correction at $p \leq .025$ indicated that the magnitude of the PPI-R/EA correlation within the Lie Detection condition was significantly greater than those in the Control ($z = -3.31$, $p < .001$) and Increase ($z = -2.45$, $p = .01$), conditions. No other main or interaction effects reached significance.

Condition-Specific Results – Influence of Total Psychopathic Traits on EA

Of particular interest to the study was how those with heightened psychopathic traits would perform in the implicit (Lie Detection) and explicit (Increase) motivation conditions. To this end, the sample was median split into Low (PPI-R ≤ 2.03) and High (PPI-R > 2.03) PPI-R groups and targeted analyses were run. Targeted analyses included, two one-way ANOVA (one within each PPI-R group) and three targeted independent samples *t*-tests (one per condition; with Bonferroni correction, $p \leq .017$) were conducted

Figure 12

Between Conditions Comparison of the Relationship Between PPI-R and EA Scores



Note: Solid line for significant effect; light dashed line for non-significant effect.

to evaluate for differences in EA between those with High vs. Low PPI-R scores (see Figure 13). Though non-significant, the one-way ANOVA's within both the Low (F(2, 58) = 2.62, p = .08, η^2 = .08. 95% CI [.00, .22]) and High (F(2, 62) = 2.67, p = .08, η^2 = .08. 95% CI [.00, .21]) PPI-R groups revealed medium effect sizes. Follow-up analyses revealed that the Low PPI-R group had non-significantly increased EA scores within the Lie Detection (M = .69, SD = 0.12) compared to the Control (M = .61, SD = 0.11) condition (p = .07, 95% CI [-.16, .004]). This effect was reversed for those in the High PPI-R group, such that they had increased EA scores within the Control (M = .67, SD = 0.08) compared to the Lie Detection (M = .58, SD = 0.17) condition (p = .06, 95% CI [-.003, .18]).

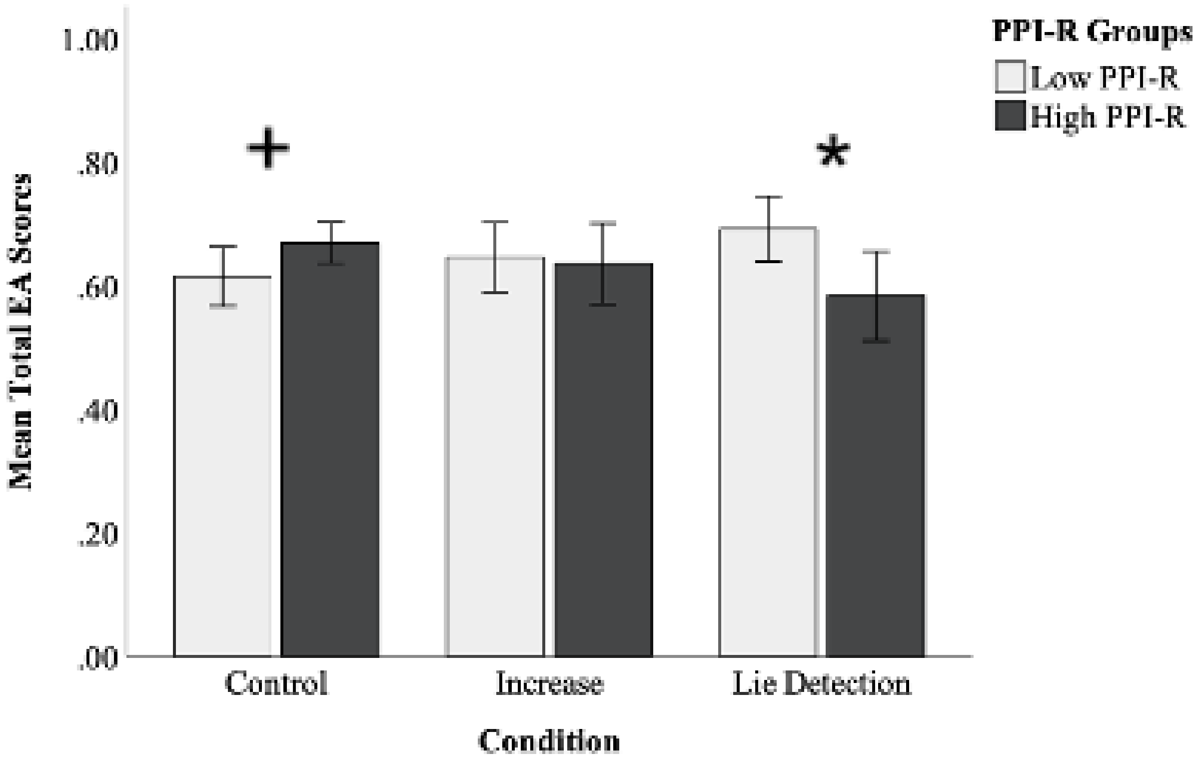
Targeted independent samples t-tests revealed that within the Lie Detection condition, those in the Low PPI-R group (M = .69, SD = 0.12) had significantly higher EA scores than those in the High PPI-R group (M = .58, SD = 0.17), t (42) = 2.46, p = .02, 95% CI of mean difference [0.20, .20], d = .15. While non-significant, within the Control condition, those in the Low PPI-R group (M = .61, SD = 0.11) had higher EA scores than those in the High PPI-R group (M = .67, SD = 0.09), t (47) = -1.94, p = .058, 95% CI of mean difference [-.11, .001], d = .10 . The effect of PPI-R on EA scores did not reach significance in the Increase condition.

Role of Personal Distress

In the previous studies, results revealed a relationship between PD x PPI-R interaction and Total EA scores for targets closest to participants. Given that the targets in the current study were all strangers, no effect of Personal Distress was expected. Inconsistent with hypotheses, the PD x PPI-R interaction was significantly negatively

Figure 13

Between Samples t-tests Comparing EA Scores for Low vs. High PPI-R Scorers in each Condition



Note: * = $p < .05$; + = $p < .10$; error bars: 95% CI.

correlated with EA scores Overall, $r = -.19$, $p = .04$, 95% CI [-.35, -.02], and non-significantly correlated with EA scores within each condition (all *p*'s > .10). To dissect the relationship between PPI-R x PD on EA scores overall, the PD/EA correlation was completed for those in the High and Low PPI-R groups, and their magnitudes were compared using a Fisher's *r*-to-*z* test. The PD/EA correlation did not reach significance in either the High, $r = -.17$, $p = .19$, 95% CI [-.40, .08], or the Low, $r = -.005$, $p = .97$, 95% CI [-.26, .25], PPI-R groups, and the magnitude of the correlations was non-significantly different from one another ($p > .10$).

Influence of Psychopathic Traits Subscales on EA

While not hypothesized, the effects of PPI-R subscales on EA scores were explored. To this end, three separate 2 (*Valence*: Positive vs. Negative) x 3 (Condition: Control vs. Increase vs. Lie Detection) mixed measures ANCOVA's were run, with Valence as a within-subjects measure, condition as a between-subjects measure and mean-centered PPI-R subscales scores as covariates of interest. Results revealed effects of both Self-Centered Impulsivity (SCI) and Coldheartedness (CH), but not Fearless Dominance (FD). The effect of Self-Centered Impulsivity (SCI) was significant, $F(1,120) = 3.63$, $p = 0.03$, $\eta_p^2 = .04$, and revealed a negative correlation between SCI and Total EA scores, $r = .-.21$, $p = .02$, 95% CI [-.37, -.04]. Additionally, the *SCI x Condition* interaction was significant, $F(2, 120) = 13.97$, $p < .001$, $\eta_p^2 = .19$. To dissect the interaction, separate SCI/EA correlations were run within each condition and the correlation magnitudes were subsequently compared. The SCI/EA correlation reached significance within the Lie Detection condition, $r = -.63$, $p <.001$, 95% CI [-.78, -.41], but not within the other two conditions (*p*'s > .05). Fisher's *r*-to-*z*-tests (Lee & Preacher, 2013), using a Bonferroni correction of $p < .025$ for two comparisons, confirmed that the magnitude of the SCI/EA correlation was greater in the Lie Detection condition than in the Control, $z = -3.49$, $p < .001$, and Increase, $z = -4.20$, $p < .001$, conditions.

The Coldheartedness analyses revealed a significant *Valence x CH* interaction, F (1,120) = 5.68, p = 0.02, $\eta_p^2 = .04$, a *Condition x CH* interaction, F (1,120) = 4.63, p = 0.01, $\eta_p^2 = .07$, and a non-significant *Condition x Valence x CH* interaction, F (1,120) = 2.86, $p = 0.06$, $\eta_p^2 = .05$, with a medium effect size. To assess the three-way interaction, correlations between CH/EA for Positive and Negative videos were conducted separately within each Condition. The PPI-R/EA correlations for Positive videos were significant within the Control ($r = .31$, $p = .03$, 95% CI [.03, .54]) and Increase ($r = .34$, $p = .05$, 95% CI [-.003, .61]) conditions, and non-significant within the Lie Detection ($r = -.27$, $p = .08$, 95% CI [-.52, .03]) condition. The PPI-R/EA correlation for Negative videos was significant within the Increase condition ($r = -.35$, $p = .05$, 95% CI [-.62, -.008]), and non-significant within the Lie Detection ($r = -.26$, $p = .09$, 95% CI [-.55, .09]) and the Control ($r = .06$, $p = .69$, 95% CI [-.24, .35]) conditions.

Additional exploratory analyses were conducted to assess whether those with heightened PPI-R subscale characteristics demonstrated increased EA within the implicit (Lie Detection) and explicit (Increase) motivation conditions. To this end, the sample was median split separately into Low and High PPI-R groups on each subscale, and targeted independent samples *t*-tests (one per condition for each subscale; with Bonferroni correction ($p \leq .017$)) were run with each median-split subscale group to evaluate for differences in EA scores between those with High vs. Low PPI-R scorers. In line with the mixed-measures ANOVA, results revealed effects of both Self-Centered Impulsivity (SCI) and Coldheartedness (CH), but not Fearless Dominance (FD). Within the Lie Detection condition, those in both the Low SCI group ($M = .71$, $SD = 0.11$) and Low CH group ($M = .70$, $SD = .12$) had significantly higher EA scores than those in the High SCI group ($M = .57$, $SD = 0.16$) and High CH group ($M = .59$, $SD = 0.16$), respectively (t's > 2.50, p's < .01). No significant differences were found for those High vs. Low on the FD subscale, nor within the Control or Increase conditions.

6.4. Discussion

Undergraduate students with varying levels of psychopathic traits completed a modified Empathic Accuracy task within a control condition, or conditions that influenced implicit or explicit motivations. Similar to Study 2, it was predicted that individuals with heightened psychopathic traits would demonstrate decreased levels of empathic accuracy in the control condition that would normalize (i.e., increase) in the Increase and Lie Detection conditions. Overall, results did not consistently support hypotheses, as individuals with heightened psychopathic traits demonstrated increased EA in the Increase, but not Lie Detection Condition. However, these results are difficult to interpret as psychopathic traits did not significantly influence EA scores within the Control condition; yet targeted analyses revealed higher EA for High versus Low PPI-R scorers. Together, the results suggest that influencing the explicit and implicit motivations of those high in psychopathic traits led to inconsistent alterations of the empathic responses of those with heightened levels of psychopathic traits.

These results help to further understand the nature of EA in those with heightened psychopathic traits, and the efficacy of the EA task. Study two results left open two main possibilities: that the emotion deficit theory was correct, or that the Lie Detection condition was ineffective. The pattern of the results from study three suggest that were specific issues within the Lie Detection condition. Indeed, psychopathic traits were not consistently negatively related to EA scores, an outcome necessary for support of the emotion deficit theory. While in line with Study 2, psychopathic traits were negatively associated with EA scores within the Lie Detection condition, and between subjects' analyses revealed that EA scores were significantly lower for those high in psychopathic traits, this effect was not seen in the Increase condition. Targeted analyses within the Increase condition, revealed those in the High and Low PPI-R groups demonstrated similar levels of EA when explicitly asked to try to empathize with what targets are feeling. These results are in line with work demonstrating that following task instructions, individuals with heightened levels of psychopathic traits can increase their empathic responses to other's emotions at levels similar to non-psychopathic individuals (Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013). Further, the influence of psychopathic traits on EA scores were of a greater magnitude in the Lie Detection, compared to the Increase condition. This pattern of results converges on the notion that psychopathic individuals can empathize if sufficiently motivated, but that the Lie Detection condition specifically may not sufficiently motivate those high in psychopathic traits.

As such, following from Study 2, it is possible that the Lie Detection condition lacked perceived utility for individuals with heightened levels of psychopathic traits, such that they did not find the information in the EA task as being beneficial to the later Lie Detection task. As a result, future work should continue to assess situations wherein psychopathic individuals may find utility in sharing the emotions of others. Given that individuals with heightened psychopathic traits find utility in negative emotions such as fear, anger and sadness (Spantidaki Kyriazi et al., 2021), and value the emotions of contempt and spite (Garofalo et al., 2019), these individuals may be motivated to share the emotions of others in situations where these emotions provide utility. As such, future work should assess whether psychopathic individuals may find utility in sharing emotions with others for self-serving goals such as manipulation (O'Connell, 2018), and emotional and physical aggression (Garofalo et al., 2019).

As in Study 2, the relationship between EA and the PPI-R subscales was also evaluated. Consistent with the results from Study 2, the negative relationship between PPI-R scores and EA scores appeared to be driven by the Self-centered Impulsivity and Coldheartedness subscales. Additionally, between subjects' tests demonstrated that those high in SCI and CH traits had lower EA scores than those low in SCI and CH traits. These findings align with literature suggesting that increased levels of these PPI-R subscale traits are associated with decreased empathic responding (e.g., Miller & Lynam, 2012; Sörman et al., 2016; Uzieblo et al., 2010). However, following explicit instructions the negative association between psychopathic traits and EA scores approached zero (see also (Berluti et al., 2020)). Targeted analyses within the Increase condition revealed that those high on total PPI-R, SCI and CH demonstrated similar levels of empathic responding to those low in these traits, further providing support for the notion that psychopathic individuals suffer from aberrant empathic responses across contexts (Groat & Shane, 2020).

It is important to note potential limitations of the current study. First, due to the COVID-19 pandemic, the study had to be switched to an online modality. As previously mentioned, the modified Empathic Accuracy task has to be set up and run in a very particular way. Since the task was completed by participants in their homes, there is no way to evaluate or control for external variables. Although all participants were told to complete the study in a quiet, distraction-free environment, there is no way to ensure that this occurred. Given the time-sensitive nature of the task itself (i.e., emotion ratings collected every 250ms), distractions are likely to influence participant EA scores. When in the laboratory, researchers can monitor task progress and make a note of any outside distractions that may influence task outcomes. Additionally, in a laboratory setting, the researchers are more readily able to determine whether the participant understands the task instructions and procedure. It is possible that participants had questions regarding the study procedure but felt unable or willing to ask in the online setting. Thus, the study should be replicated in a carefully controlled laboratory environment. Future work should continue to assess situations where empathy-related information may be seen as useful for achieving later task goals by those higher in psychopathic traits. Examining situations when psychopathic individuals may find it beneficial to empathize would allow for a better understanding of the aberrant emotional responses' characteristic of psychopathic individuals.

Chapter 7. General Discussion

A series of studies were conducted to evaluate specific motivational features that may influence the empathic responding of individuals with heightened levels of psychopathic traits. Guided by the motivational framework of psychopathy (Groat & Shane, 2020), this work attempted to increase the empathic responses of those with heightened psychopathic traits by implicitly influencing their motivation to empathize. Overall, results were inconsistent across the series of studies revealing that psychopathic traits modulated EA in some, but not all, study conditions. Inconsistent with study hypotheses, psychopathic traits were negatively related to EA scores within the close friend/family member (Study 1b), ingroup (Study 1a), and Lie Detection (Study 2 & 3) conditions that were designed to increase psychopathic individual's motivation to empathize. However, in line with hypotheses, EA scores did not function as a result of psychopathic traits in the Increase condition (Study 3) designed to explicitly influence psychopathic individual's motivation to empathize. Thus, although not consistently in line with study hypotheses, these results may suggest that the empathic responses of individuals with heightened levels of psychopathic traits are not absent, and instead, can fluctuate across targets and situational contexts.

The idea that empathic responses fluctuate across contexts is increasingly discussed in the normative literature. Research suggests that empathy is a contextual phenomenon (e.g., Keysers & Gazzola, 2014; Zaki, 2014) that may rely on situational characteristics such as experience with and perception of the situation (e.g., Batson et al., 1987), relationship with the person who needs empathy (e.g., Batson et al., 2007; Batson et al., 1987; Keysers & Gazzola, 2014; Zaki, 2014), and perceived cost of empathizing

(Cameron et al., 2019). Thus, it may hold that the empathic responses of psychopathic individuals are similarly influenced by these contextual phenomena, leading to the decreased empathic accuracy in some, but not all, study conditions.

There may be several reasons for the negative associations between EA scores and psychopathic traits in some study conditions across the series of studies. One possibility is that individuals with heightened psychopathic traits were unable to overcame purported automatic filtering out of specific emotional information in some more challenging conditions (Kosson et al., 2018; Vitale et al., 2018). The Affect Regulation Theory posits that as a result of an automatic regulation style psychopathic individuals downregulate negative emotional information; yet, if given sufficient time, the automatic regulation can be overcome (Kosson et al., 2018; Vitale et al., 2018). As such, when psychopathic individuals experience increased personal distress (within the close friend/family and ingroup conditions) or increasing emotionally-based task demands (within the Lie Detection Condition), they may be unable to allocate the resources necessary to overcome the automatic emotion regulation. Thus, as a result, the empathic accuracy within those conditions decreases as a function of psychopathic traits.

Another possibility is that the specific task instructions guided attention away from, rather than towards, the emotional task, precluding the psychopathic individual’s ability to accurately empathize in those cases (Newman et al., 2010). The Response Modulation Hypothesis (RMH; Patterson & Newman, 1993) posits that psychopathic individuals’ abnormalities in emotional processing occur as a result of being unable to process information peripheral to their current goal set. The goal of using conditions, such as the Lie Detection condition, was to target the utilitarian motivates of individuals with heightened levels of psychopathic traits to increase their empathy towards others. However, it is possible that the notion of a later task became the dominant focus of individuals with heightened psychopathic traits, and as such reduced the scope of their attention for the empathic accuracy task leading to a decrease in their EA scores. This effect may not have been seen in the Increase condition, as the instructions explicitly guided attention towards increasing participant's level of empathy for the targets.

Alternately, while the goal of the studies was to heighten empathic responses by increasing the motivational relevance of emotion-related information, it is possible that the targeted conditions led to decreased motivational relevance and associated processing (i.e., avoidance or indifference; Groat & Shane, 2020). For example, in Study 1, close friend/family member and ingroup targets were used as closeness is associated with increased empathic responding (e.g., Beeney et al., 2011). However, negative relationships have been found between psychopathic traits and the loyalty and desire they have for maintaining close relationships (e.g., Foulkes et al., 2014; Jonason & Ferrell, 2016; Jonason & Zeigler-Hill, 2018; Waller et al., 2020). Further, in Studies 2 and 3, while the Lie Detection condition was carefully constructed to implicitly motivate psychopathic individuals to empathize, it is possible that those with heightened psychopathic traits had lower EA scores as they did not find the emotional information in the EA task as being beneficial to the later Lie Detection task. Although the exact cause of the fluctuations remains unknown, the findings that EA functioned as a result of psychopathic traits in some, but not all conditions, support the notion that those with heightened psychopathic traits are not incapable of empathizing. Instead, these individuals may suffer from abnormalities in their motivation to empathize, decreasing the likelihood that they will empathize across all situations.

In addition, the findings point to an interesting relationship between the level of personal distress experienced by those with heightened psychopathic traits and their ability to accurately empathize. In line with the normative literature (e.g., Batson et al., 1995; Ickes et al., 2005), findings suggest that personal distress interfered with empathizing with those closest to them. While psychopathic individuals experience lower levels of personal distress (Pfabigan et al., 2015), there is little work assessing the specific role that personal distress levels may play in their overall emotional responding. However, research suggests that psychopathic individuals suffer from emotion dysregulation (Garofalo et al., 2018), which may involve difficulties engaging in non-impulsive and goal-directed behaviours when distressed. As such, the experience of personal distress may hinder their performance in emotion-related tasks (Garofalo et al., 2018). Further, research suggests that psychopathic individuals are characterized by insecure attachments (e.g., Craparo et al., 2013; Schimmenti et al., 2014) due to early life trauma (e.g. Craparo et al., 2013; Perez, 2012; Schimmenti et al., 2014), that may preclude their ability to empathize with others (e.g., Porter, 1996). Indeed, work in normative literature suggests that individuals with insecure attachment styles are inversely related to levels of empathic reactions and are positively correlated with levels of personal distress (Joireman et al., 2002; Mikulincer et al., 2001).Thus, the inconsistent EA scores of psychopathic individuals in the current dissertation may have occurred in part from varying levels of personal distress/anxiety involved in processing the emotions of specific targets, particularly those who may have been associated with trauma (i.e., close friend/family target).

In the case that psychopathic individuals are not incapable of empathizing with others, but instead suffer from issues underlying the regulation of those emotional responses, they may be responsive to targeted treatment. To date, the findings on efficacy in treating psychopathy are mixed (e.g., Baskin-Sommers et al., 2015; Rice et al., 1992; Skeem et al., 2002; Wong et al., 2012). Recently, treatments that focus on remediating cognitive (Baskin-Sommers et al., 2015; Konicar et al., 2015), or the affective (CBT; Chakhssi et al., 2010), deficits central to psychopathy, have shown some promise. However, given that there is an association between psychopathy, emotion dysregulation and aggression in both community and offender samples (Garofalo et al., 2018), treatments may benefit from focusing on the emotion regulation of this group. These treatment modalities may increase the utilitarian value or incentives related to empathetic behaviour (see Caldwell et al., 2012, for success using extrinsic rewards in influencing change in youth with psychopathic traits). Moreover, treatment may focus on providing tools to help promote positive emotion regulation strategies in offenders to help limit aggressive behaviour (Garofalo et al., 2018; Garofalo, Neumann, & Velotti, 2020). Thus, advancing knowledge of the emotional regulation of psychopathic individuals, including when they may be motivated to empathize, could prove beneficial in developing future treatment modalities (see Groat & Shane (2020) for avenues related to motivation-based treatments).

It is important to note some of the limitations that arose across the series of studies. First, post-hoc analyses revealed that some participant demographics varied across studies. The total PPI-R scores of participants in Study 1 (a and b) were significantly higher than the total PPI-R scores in both Study 2 and 3. Given these demographic differences, comparison of the relationship between psychopathic traits and empathic accuracy across studies must be done with caution. Further, it is possible that differences in sample sizes, recruitment, and study implementation could have contributed to the inconsistences across studies. Post-hoc analyses demonstrated that EA scores decreased from Study 1a and 1b (involving community members via in-person study implementation), to Study 2 (involving undergraduate students via in-person study implementation) and were the lowest in Study 3 (involving undergraduate students via remote study implementation). One possibility is that variation in sample size influenced the inconsistencies in results across studies. The sample size of Study 1 (a & b) was smaller than both Study 2 and Study 3 as it involved large-scale fMRI-based methodology. Thus, the small sample size of Study 1 may have led to an over exaggeration of true EA levels, as the impact of random error is greater (e.g., Thiese et al., 2016). Another possibility is that differences in study modalities led to the inconsistences in EA across the dissertation. Due to the COVID-19 pandemic the final study had to be moved to an online modality. Given the complex and specific nature of the task, it is possible that participants did not understand the instructions, or complete the study as directed, both of which could influence EA scores. As such, studies should continue using the modified EA task in future research to provide further evidence on EA score replicability.

Additionally, it is possible that the empathic accuracy task itself was not the best tool to assess whether the empathic responses of those with heightened psychopathic traits can be influenced. Previous work highlighting the ability of psychopathic individuals to empathize following instruction have used tasks more in line with affective empathy responses (particularly for pain; Arbuckle & Shane, 2017; Berluti et al., 2020; Meffert et al., 2013). However, measures of empathic accuracy have been shown to be unrelated to affective empathy in undergraduate students (Winczewski et al., 2016; Zaki et al., 2008), community members (Mackes et al., 2018), psychopathic offenders (Brook & Kosson, 2013), and other clinical populations (e.g., schizophrenic patients, Lee et al., 2011; van Donkersgoed et al., 2019). Further, this lack of relationship holds regardless of whether the participants are asked to provide a rating of the target's primary and secondary emotions (Brook & Kosson, 2013; Winczewski et al., 2016), valence (Lee et al., 2011; van Donkersgoed et al., 2019), emotional valence (Zaki et al., 2008) or emotional intensity (Mackes et al., 2018). In the current work, the modified empathic accuracy task instructions asked participants to rate "how good or bad the target is feeling". The instructions may have led participants to make inferences about, rather than experience, the target's emotions, actions which are more closely in line with cognitive empathy (e.g., Zaki, 2014). Previous work suggests that affective and cognitive empathy can be beneficial if they match the task requirements (Gilin et al., 2013). As such, it is possible that the results were inconsistent as the target of the motivationally relevant conditions (i.e., affective empathy and empathic concern), were not being assessed with the empathic accuracy task.

Another possible limitation lies in the videos that were used. In the ***video creation phase,*** targets were told to describe positive and negative autobiographical events that they were comfortable describing. Guiding video creation based on overarching emotional-valence categories did not allow for control over which specific emotions would be presented to participants. Given that this series of work is one of the first to both: a) use this version of the EA task in psychopathic individuals and b) target the implicit motivations underlying psychopathic individuals; increasing internal validity through standardizing emotions discussed would have helped interpret the study by comparing specific emotion-deficit models to the motivational framework. Further, although the use of dynamic videos allowed for increased ecological validity through mirroring real-life empathy-inducing situations, there is a possibility that this was at a cost to video reliability. Post-study analyses revealed relatively low reliability across the videos in each Difficulty and Valence condition (see Appendix C). Moreover, individual video assessment indicated a large degree of variation in participants' EA scores for each video. It is possible that this decreased reliability occurred as the videos themselves had both positive and negative components, making the task more challenging. Thus, future work using this task with psychopathy individuals may consider controlling the emotional content of the videos to target empathic responses for these emotions in what is still an ecologically valid manner.

Future Directions

This series of studies was the first to assess whether targeting the implicit motivations underlying empathy would influence the empathic responses of individuals with heightened psychopathic traits. Future research could address some of the limitations of the current studies, such as including assessments of affective empathy (i.e., empathic concern) and using increasingly reliable videos. The current work included an assessment of whether individuals with subclinical levels of psychopathic traits would be motivated to empathize in several targeted situations. While this work is important and allows for an understanding of empathic accuracy within those with heightened levels psychopathic traits, the current work should be expanded to include populations with clinical levels of psychopathy, such as those on probation/parole or currently incarcerated. Individuals who meet the criteria for psychopathy (i.e., those scoring ≥ 30 on the PCL-R) likely differ from undergraduate and community members in many ways, including their expression of empathy and processing of complex socioemotional information. Thus, conducting this research in highly antisocial populations would allow for the evaluation of both the replicability and generalizability of the results obtained in the current dissertation. Research should also examine the potential outcomes that may arise as a result of increased empathic responding. For example, O'Connell (2018) finds that psychopathic individuals concern themselves with the emotions of others for antisocial rather than prosocial means. Thus, in understanding why psychopathic individuals may want to empathize with others, the understanding of when they may do so becomes clearer.

Additional studies could examine how state, rather than trait, levels of personal distress influence empathic responding of those with heightened psychopathic traits. The current series of studies provided preliminary evidence of a link between trait personal distress and the empathic responding of those with heightened psychopathic traits. To better elucidate the relationship between the personal distress and empathic responding of those with heightened psychopathic traits, the evaluation of state-based personal distress, as assessed through psychophysiological data, may prove useful. Variation in the autonomic responses to emotional stimuli, as assessed via skin-conductance responses (SCR), has been associated with individuals' empathic responding and has reliably been used in previous research (Hein et al., 2011; Pfabigan et al., 2015). Some research posits that personal distress leads to greater physiological arousal, as indicated by greater SCR, rather than other-directed feelings (e.g., empathy and sympathy, Eisenberg & Fabes, 1990). Thus, research may consider using SCR to measure state-based personal distress in psychopathic individuals and determine whether there is a link to both trait-level PD and context-specific empathic responding. This information would allow for a greater understanding of why psychopathic individuals' empathic responses appear to vary across targets and contexts and to determine if this contextual-based responding is due to current levels of personal distress.

Finally, a main avenue for future research includes understanding what motivates psychopathic individuals and how to target these motivations in empathy-related tasks. The current studies focused on implicitly encouraging empathic responses from those with heightened psychopathic traits by using group membership and targeting utilitarian motives underlying empathizing. However, recent work suggests that psychopathic individuals may have different emotion goals than normative populations (e.g.,Spantidaki Kyriazi et al., 2020) and endorse having self-enhancing motives such as wanting power (e.g., Burris et al., 2013; Glenn et al., 2017; Jonason et al., 2015; Jonason & Ferrell, 2016) and money (e.g., Foulkes et al., 2014). Assessing whether targeting these motives can influence the empathic responding of psychopathic individuals may provide further insight into the intricacies of their empathic responses and the callous and manipulative nature that is characteristic of these individuals.

Conclusion

The dissertation empirically assessed the Motivational Framework of Psychopathy (Groat & Shane, 2020), by examining the extent to which neural and/or behavioural metrics of empathy would vary based on the motivational set the individual was in. This work furthered our understanding of the contextual nature of the psychopathic individual's empathic responses, challenging the notion that psychopathic individuals suffer from a core incapacity to empathize. The results of the series of studies could be used to inform future treatments strategies targeted at influencing the empathic responding of psychopathic individuals.

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Appendix A

Factor and Facet Structure of Hare (2003) Psychopathy Checklist-Revised Items

Table A

Factor Structure of the Hare Psychopathy Checklist-Revised (PCL-R)

Trait	Factor 1	Factor 2	Other
Facet 1: Interpersonal			
Glibness/superficial charm	X		
Grandiose sense of self-worth	X		
Pathological lying	X		
Conning/manipulative	X		
Facet 2: Affective			
Lack of remorse/guilt	X		
Emotionally shallow	X		
Callous/lack of empathy	X		
Failure to accept responsibility	X		
Facet 3: Lifestyle			
Need of stimulation/proneness to boredom		X	
Parasitic Lifestyle		X	
Lack of realistic, long-term goals		X	
Impulsivity		X	
Irresponsibility		X	
Facet 4: Antisocial			
Poor behavioural control		X	
Early behavioural problems		X	
Juvenile delinquency		X	
Revocation of conditional release		X	
Criminal versatility		X	
Non-Loading Items			
Promiscuous sexual behaviour			X
Many short-term marital relationships			X

Appendix B

Supplementary Study 1a Data Analyses

Neural Analyses with IRI Scales of EC, PT and PD as Covariates

Empathic Concern

An *Empathic Concern x Target x Valence* interaction was identified within the mPFC ROI. To evaluate this interaction, activity within this mPFC ROI was extracted for each of the four *Target/Valence* conditions and correlated with total Empathic Concern (EC) scores in SPSS.

The magnitudes of these EC/mPFC correlations did not approach significance, and the magnitudes were not statistically different.

Perspective-taking

No effects of Perspective-taking on neural activity were found.

Personal Distress

There was a significant main effect of Personal Distress (PD) on neural activation within the mPFC ROI. mPFC activation was extracted and correlated with PD in SPSS, which revealed a significantly negative correlation between mPFC activation and PD, r = -.46, p = .006.

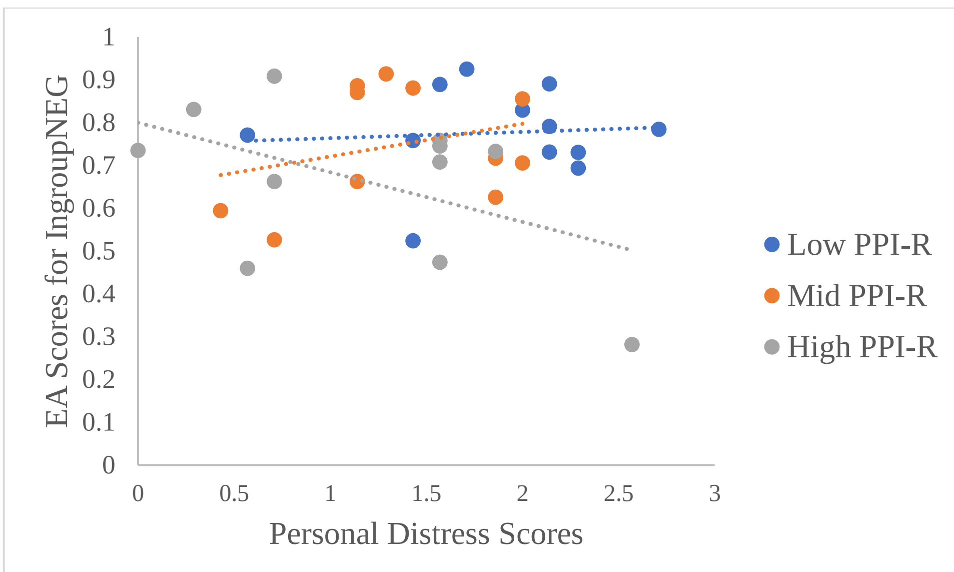
Behavioural Results Exploring the Ingroup$_{NEG}$ Effect

To gain a better understanding of our ingroup-bias results, the influence of PD on the negative relationship between PPI-R scores and EA scores across conditions was assessed. To do so, correlations between the PPI-R x PD interaction variable and EA scores within each condition were run which revealed a non-significant, yet moderate, negative correlation between PD x PPI-R for EA within the Ingroup condition, r = -.32, p

= .07, 95% CI [-.59, .02], and a significant negative correlation, *r* = -.36, *p* = .04, 95% CI [-.62, -.02] within the Ingroup$_{NEG}$ condition. To dissect the interaction, the relationship between PD and Ingroup$_{NEG}$ EA was examined at tertiary-split levels of PPI-R scores (see Figure A). The pattern indicates that there is a slight positive Ingroup$_{NEG}$ EA/PD correlation for the Mid PPI-R group (*r* = .29, 95% CI [-.38, .76]), little-to-no EA/PD correlation for the Low PPI-R group (*r* = .08, 95% CI [-.52, .63]) and a medium magnitude negative EA/PD correlation for the High PPI-R group, (*r* = -.49, 95% CI [-.84, .16]; all *p*'s > .05).

Figure B

Relationship between Ingroup$_{NEG}$ EA/Personal Distress Scores for Tertiary Split PPI-R



Appendix C

Assessment of the Reliability of the EA Task

To determine the reliability of the videos used throughout the dissertation, post-hoc correlation analyses were run between each videos EA and mean EA for all other videos (with that video removed, see Table C.1). Results indicated significant positive correlations for all Video EA/Mean EA with video removed pairs, except for Video 1, Video 3 and Video 4. Given that Video 3 and Video 4 were from the same target, the correlational analyses were re-run without EA scores for those videos, to determine whether this would increase video reliability (see Table C.2). All correlation values remained significant after the removal of Video 3 and Video 4. Additionally, correlation values increased in magnitude in all cases except for the Video 1/Video 1 Removed and Video 2/Video 2 Removed correlations, where the correlations remained significant, but had a slight decrease in magnitude. This suggests that the removal of Video 3 and 4 increased the overall reliability of EA scores.

To assess the validity of the task, mean total EA scores were correlated with IRI-subscales. Correlations between IRI subscales and Total EA did not reach significance when all videos were included, as well as when Video 3 and Video 4 were removed (all *p*'s > .10). These results are consistent with previous studies using EA paradigms in normative (e.g., Zaki, Bolger & Oschner, 2008) and clinical (e.g., van Donkersgoed et al., 2019) populations**.**

Table C.1

Correlation Between Each Video's EA and Mean EA of All Other Videos

Video EA	EA Variable with Specific Videos Removed							
	Video 1 Removed	Video 2 Removed	Video 3 Removed	Video 4 Removed	Video 5 Removed	Video 6 Removed	Video 7 Removed	Video 8 Removed
Video 1	.14	.47**	.49**	.49**	.46**	.46**	.44**	.50**
Video 2	.58**	.23**	.64**	.57**	.57**	.57**	.56**	.57**
Video 3	.71**	.72**	.14	.75**	.68**	.68**	.68**	.68**
Video 4	.48**	.47**	.63**	.11	.47**	.47**	.47**	.48**
Video 5	.55**	.55**	.58**	.53**	.28**	.53**	.59**	.60**
Video 6	.49**	.48**	.49**	.49**	.47**	.23*	.46**	.58**
Video 7	.67**	.68**	.70**	.68**	.71**	.67**	.35**	.75**
Video 8	.70**	.69**	.67**	.67**	.69**	.72**	.75**	.17*

Note: ***p* < .001; **p* < .05.

Table C.2

Correlation Between Each Video's EA and Mean EA of All Other Videos: Exclusion of Video 3 and Video 4

Video EA	EA Variable with Specific Videos Removed					
	Video 1 Removed	Video 2 Removed	Video 5 Removed	Video 6 Removed	Video 7 Removed	Video 8 Removed
Video 1	.07	.80**	.62**	.60**	.60**	.66**
Video 2	.89**	.16*	.73**	.72**	.72**	.74**
Video 5	.60**	.60**	.30**	.61**	.63**	.65**
Video 6	.55**	.54**	.56**	.27*	.52**	.64**
Video 7	.70**	.70**	.73**	.69**	.37**	.78**
Video 8	.72**	.71**	.70**	.74**	.77**	.18*

Note: ** $p < .001$; * $p < .05$.