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Differences in emotional contagion, interpersonal relationships and social rewards in males and females: examining the links with primary and secondary psychopathic traits

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Abstract
Individuals with psychopathic traits display low empathy and as a result they have difficulties maintaining meaningful relationships. Emotional contagion, the ability to automatically mimic others' emotional states (facial expressions, movements), is a precursor of empathy that contributes to relationship quality and is impaired in individuals with psychopathic traits. The current study examines sex differences in primary and secondary psychopathic traits in a sample of 389 participants (*M*age = 33.61; 241 females) and the association of these personality traits with romantic and peer relationships, susceptibility to negative (sadness, fear, anger) and positive (happiness, love) emotional contagion and social motivation factors. Hierarchical multiple regressions run separately in male and female participants, revealed different factors contribute to the maintenance of primary and secondary psychopathic traits. Findings infer different difficulties in social functioning (forming and maintaining relationships), regulating emotions, empathizing via emotional contagion, and motivating factors to engage socially, relate to primary and secondary traits, as well as differences in men and women. This research reflects the importance of investigating psychopathic traits heterogeneously in males and females, to better inform prevention efforts focused on hindering the development and maintenance of these personality traits.

Keywords Primary psychopathic traits · Secondary psychopathic traits · Sex · Social rewards · Friendship · Emotional contagion

Introduction

The core traits of psychopathy emphasize a lack of relatedness, emotional distance, and atypical interpersonal functioning (Conradi et al., 2016). Unsurprisingly, individuals with psychopathic traits show insincerity in interpersonal relationships (any affiliation between two or more individuals; Morales-Murillo et al., 2020), resulting in a limited capacity to form deep relationships (Schimmenti et al., 2014). Individuals with psychopathic traits also demonstrate deficits in empathy and emotional contagion, which are essential for understanding and reciprocating others' emotions (Anderson & Kiehl, 2014). Warm and sensitive peer relationships have been found to lead to positive social, emotional, and cognitive growth (Marvin et al., 2020) and provide the foundation for healthy social development (Morales-Murillo et al., 2020). Thus, given the high psychological and emotional benefits of positive social relationships, it is pivotal to understand their association with psychopathic traits. Additionally, psychopathic traits are associated with atypical social reward preferences (Foulkes et al., 2014a), positing an opportunity to investigate the motivating factors that might contribute to the maintenance of these personality traits. As research on the protective function of social relationships is scarce (Backman et al., 2018), the current research investigates differences and/or similarities in emotional contagion (susceptibility to be influenced by others emotions), the quality of friendships and more intimate relationships, and the social motivation factors that encourage or hinder engagement in social interactions with psychopathic traits and more specifically,

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primary and secondary dimensions. Furthermore, the study aims to determine whether interpersonal relationships, empathy, and social factors may be beneficial for attenuating the development and maintenance of psychopathic traits.

Primary and secondary psychopathic traits

Researchers have differentiated psychopathic traits into two distinct but related factors; primary and secondary psychopathic traits (Karpman, 1948; Levenson et al., 1995). The affective-interpersonal dimension also known as the primary dimension, describes the stereotypical individual with elevated psychopathic traits exhibiting shallow affect, callousness, manipulativeness, and superficial charm (Campos et al., 2022). In contrast, the secondary dimension is defined through the behavioral manifestation of psychopathy, exhibited through impulsivity, anxiousness, and guilt-proneness (Johnson, 2019). When comparing primary to secondary psychopathic attributes, research suggests that secondary traits stem from childhood adversities (e.g., parental neglect), while primary traits are more genetically based, deriving from congenital affective deficiencies (di Giacomo et al., 2021; Thompson et al., 2014). Nevertheless, the moderated-expression model posits that one's social environment can influence the expression of traits to make them more pronounced or attenuated (Lilienfeld et al., 2015). Environmental factors also serve a protective role in countering the individual differences in maladaptive traits thought to emerge from heritable risks, such as peer relationships, socioeconomic status and cognitive ability (Viding & McCrory, 2018). In fact, Backman et al. (2018) argue for examining interpersonal relationships as a preventive avenue for psychopathy, as individuals with psychopathic traits can be affected by their social context. Thus, it is important to investigate how social experiences influence the presentation of psychopathic personality traits.

Psychopathic traits are diversely expressed in the general population (Boduszek et al., 2021; Coid et al., 2009). The prevalence rate of psychopathy is estimated to be approximately 4.5% in the general population and 15–25% in incarcerated populations (Coid et al., 2009; Sanz-García et al., 2021). Expressions of psychopathic traits tend to decline with age in both men and women (Hemphälä et al., 2015; Maurer et al., 2022), yet differ depending on sex (Ben-Yaacov et al., 2018; Efferson & Glenn, 2018). Among individuals high in psychopathic traits, research suggests some specific traits categorized under primary and secondary psychopathy are more prevalent in men than women (de Vogel & Lancel, 2016; Efferson & Glenn, 2018; Kreis & Cooke, 2011). Men high on the psychopathy scale are less likely to exhibit anxiety, distinctive of primary traits, compared to women (Falkenbach et al., 2017) but are more likely to act violently, a characteristic of secondary psychopathy (Wynn et al., 2012). These differences could be due to biological sex differences, leading to different expressions of psychopathy (Nicholls & Petrila, 2005). The variation in how psychopathic traits manifest between sexes highlights the need for more research in this area.

Relationships, friendships and psychopathic traits

Most individuals desire meaningful connections with others and find such relationships rewarding (Viding & McCrory, 2019). Individuals scoring high in psychopathic traits are characterized by pathological egocentricity, are unreliable and unresponsive within their relationships (Anderson & Kiehl, 2014; Luckhurst et al., 2017; Munoz et al., 2008) and consequently, end up having short-term relationships (Jonason et al., 2012) and in some cases, experience couples' distress (Savard et al., 2006). Specifically, secondary psychopathic traits have been associated with low relationship satisfaction (Unrau & Morry, 2019) and many marital relationships (Schimmenti et al., 2014). Both primary and secondary psychopathic traits have been associated with peer and romantic relational aggression, a form of indirect aggression where harm is caused through damage to the relationships with peers or the partner (Czar et al., 2011). A study investigating psychopathic traits, friendship, and romantic relationships (Backman et al., 2018) found that high-quality peer and romantic relationships were related to lower psychopathic traits, yet antisocial behavior and negative influence within relationships were associated with higher psychopathic traits, suggesting that the quality of relationships can influence the presentation of psychopathic traits.

Recent research suggests that lower sensitivity to socio-affiliative cues, which refers to reward responsiveness to the positive cues that promote social connection, is uniquely related to primary psychopathic traits (Viding & McCrory, 2019; Waller et al., 2021). However, this lack of affiliation may not impact their social relationships detrimentally, as they appear able to uphold relationships and be part of groups, suggesting this is possible due to the absence of an erratic lifestyle and impulsivity (Persson & Lilienfeld, 2019). Individuals with primary psychopathic traits, who appear superficially charming, may be more adept at using relationships for their own personal gain and manipulating their partners (Leedom, 2017). In contrast, individuals with secondary psychopathic traits demonstrate weak social networks and hostile emotional reactivity, making enduring friendships, being well-liked, and getting along with others challenging (Reale et al., 2020; Vidal et al., 2010), detrimentally impacting their social functioning. Additionally,

individuals with secondary psychopathic traits show diminished interpersonal functioning, such as social withdrawal (Skeem et al., 2007).

One possible explanation for these differences is that individuals with secondary psychopathic traits fail to form secure attachments early on, a pattern that then affects their relationships with friends and partners (Kyranides et al., 2021). A hyperactive emotional system associated with secondary psychopathic traits (Anderson et al., 2017) could explain the high levels of impulsivity and anxiety characterizing this dimension. Childhood adversities, such as parental neglect, are associated with insecure attachment and secondary psychopathic traits (di Giacomo et al., 2021; Sethi et al., 2018). Primary traits differ as they are thought to be inherited (Thompson et al., 2014), and research indicates attenuated emotional responses (Anderson et al., 2017). However, because individuals with primary traits can demonstrate superficial affect (Viding & McCrory, 2019), they demonstrate greater emotional stability relative to secondary traits (Hicks et al., 2004; Yildirim & Derksen, 2015). Therefore, one could argue that individuals with primary psychopathic traits struggle to maintain relationships due to shallow emotional responses, while individuals with secondary traits have difficulties developing and maintaining relationships due to maladaptive coping mechanisms established early on in their adverse environments, which lead to emotion regulation deficits and possibly more volatile relationships (Craparo et al., 2013; Kyranides & Neofytou, 2021; Unrau & Morry, 2019).

Empathy, emotional contagion and psychopathic traits

Empathy is fundamental to having successful social interactions (Jolliffe & Farrington, 2006), consisting of cognitive and affective components (Seara-Cardoso et al., 2012). Cognitive empathy is understanding the mental states of other people, whereas affective empathy refers to the vicarious emotional response to the perceived emotional experiences of others (Owens et al., 2018). A specific process of affective empathy, emotional contagion, is the process whereby individuals automatically and unintentionally replicate the facial expressions, vocalizations, and movements of others, during social interactions (Hatfield et al., 1993; Luckhurst et al., 2017). The contagion process occurs in three stages; unconscious mimicry, the development of subjective emotional experiences through afferent feedback, and convergence, whereby people catch others' emotions (Hatfield et al., 1993). When individuals mimic emotional expressions, they tend to feel the specific emotion they mirrored (Prochazkova & Kret, 2017). Cognitive models propose that this is due to the reflection of one's own experiences when similar emotions were felt, and the conscious re-experiencing of those emotions generates a similar response (Prochazkova & Kret, 2017). Deficits in attention and emotional processing have been documented in individuals with psychopathic traits (Anderson et al., 2017), and some argue that these deficits are related to the neurostructural reduction in the volume of the ventromedial prefrontal cortex or its impaired functioning, including the amygdala, temporal cortex, and caudate nucleus (Blair, 2007; 2013; White et al., 2012). Furthermore, emotional detachment often found in individuals with psychopathic traits has been connected to impairments in the cerebellum, the human mirror neuron system, and the Theory of Mind, which has been linked to empathy deficits and difficulties integrating affective information into cognition (Johanson et al., 2020).

Emotional contagion facilitates cohesiveness, cooperation, connectedness, making it essential for developing interpersonal relationships, and it appears impaired in individuals with psychopathic traits (Hatfield et al., 2014; Luckhurst et al., 2017; van Dongen, 2020). Doherty (1997) suggested distinct emotional subfactors, which can be further separated into positive (happiness and love) and negative (fear, anger and sadness) emotions. Preliminary research indicates that individuals with primary psychopathic traits tend to express positive affect when looking at sad, angry, and fearful images, suggesting that these individuals experience pleasurable affect from the negative feelings of others (Wai & Tiliopoulos, 2012). Others have found that individuals with psychopathic traits are able to "catch" other's emotions when instructed or directed; however, without assistance or instruction, they fail to automatically replicate other's emotions or only undergo the process for certain emotions (Kyranides et al., 2020; 2022; Luckhurst et al., 2017). Dadds et al. (2009) identified psychopathic traits to be negatively associated with both cognitive and affective empathy in males, but only with cognitive empathy in females. So, while women consistently score higher on empathy than men (Kobach & Weaver, 2012), research within psychopathy suggests there may be distinct links to low empathy between males and females. For example, in women, low empathy is associated with narcissism, a characteristic of primary traits, while in men, low empathy is associated with general psychopathy (Jonason et al., 2013). The current research investigates these differences by examining the associations between primary and secondary psychopathic traits and emotional contagion for positive as well as negative emotions.

Social reward and psychopathic traits

Research on the factors motivating the engagement in social situations for individuals with psychopathic traits, suggests

that they experience atypical social rewards (Foulkes et al., 2014a, 2017). However, no study has examined this relationship with primary and secondary psychopathic traits. Social reward refers to the motivational and pleasurable aspect of social interactions (Downie et al., 2008). Foulkes et al. (2014c) established six domains of social reward: (1) Admiration, enjoying being flattered; (2) Sexual Relationships, enjoying sexual intimacy; (3) Passivity, enjoying others being in control; (4) Prosocial Interactions, enjoying kind and reciprocal relationships; (5) Sociability, enjoying engaging in groups; and (6) Negative Social Potency, enjoying being antagonistic, cruel and using others. There is limited research on these specific social rewards. Sexual reward has been found to be positively associated with both primary and secondary traits, while admiration has only been associated with primary traits (e.g., Foulkes et al., 2014a). The previous findings regarding interpersonal relationships illustrate that individuals with psychopathic traits appear not to place equal significance on affiliative relationships as seen in others without these traits (Jonason & Schmitt, 2012). Prosocial interactions and negative social potency are important due to their implications on forming and maintaining interpersonal relationships (Dovidio & Banfield, 2015). Individuals with psychopathic traits (including primary and secondary dimensions) have been negatively associated with prosocial interactions (Foulkes et al., 2014a; 2014c). However, others show that primary traits have been associated with increased public prosocial behaviors and are inversely related to anonymous and altruistic acts, demonstrating that these individuals only find prosocial interactions rewarding when other people can acknowledge their good deeds (White, 2014). Additionally, the literature reports a higher incidence of non-cooperative behavior in individuals with psychopathic traits compared to controls, with this behavior reaping more benefits (Curry et al., 2011; Mokros et al., 2008). These findings suggest that individuals with elevated psychopathic traits, especially primary traits, might engage and display prosocial interactions, but do so because it aligns with their self-serving goals and they can gain something from it (social approval, improve their image, financial success) rather than because they enjoy being nice to others (Foulkes et al., 2014a; 2014b).

It is important to understand the motives behind why some people engage in antisocial interactions, and it seems that for individuals with psychopathic traits, being cruel and callous can be rewarding (Foulkes et al., 2014a; 2014c; 2017). In a recent study, individuals high in psychopathic traits were more likely to provide narcotics to individuals despite not engaging in drug use themselves, signifying ulterior motives (Curtis et al., 2020). Previous research indicates that obtaining a reward, heightening self-perception, duping delight (pleasure from manipulating someone), and social position as reasons for deviant behavior, among individuals with psychopathic traits (Glenn et al., 2017). Furthermore, psychopathic traits and heightened levels of negative social potency have been found to predict Facebook trolling behavior (Craker & March, 2016). A later study distinguishing between the two psychopathy factors found primary, but not secondary psychopathic traits, to predict internet trolling (March, 2019). These findings collectively infer an inverted social reward pattern, whereby individuals with psychopathic traits enjoy being cruel and do not enjoy prosocial interactions (Foulkes et al., 2014a). Based on these findings, it seems that underlying motives are mostly related to primary psychopathic traits, but further research is needed to deepen our understanding of why individuals with primary psychopathic traits find manipulative social interactions rewarding.

Current study

The current research is the first to explore social relationships (friendships and more intimate relationships), emotional contagion, and social motivation factors with primary and secondary psychopathic traits. There have been few studies investigating emotional contagion, specifically with psychopathic traits or that encompass both romantic and peer relationships, despite being intertwined variables (Zedaker & Bouffards, 2017). Additionally, since there has been limited research investigating psychopathic traits and specific categories of social reward, this will be the first to distinguish social reward differences between primary and secondary traits with a focus on sex differences. Thus, although social relationships might have important, distinct consequences contributing to primary and secondary psychopathic traits (i.e. Unrau & Morry, 2019), it remains an understudied topic. Therefore, this study will highlight which of these variables influence interpersonal context positively and negatively in individuals with primary and secondary psychopathic traits, as traits and behavior can influence one another (Hare & Neumann, 2005).

Consistent with prior research (Munoz et al., 2008), individuals with either primary or secondary psychopathic traits are expected to show difficulties in their social interactions, including their friendships and romantic relationships, as individuals with these traits tend to undervalue relationships. As primary psychopathic traits are associated with disregarding others' distress (Baughman et al., 2014; Sethi et al., 2018), it is hypothesized that there will be a negative association with negative emotional contagion (fear, sadness, anger). Since secondary psychopathic traits are associated with emotion regulation deficits (Anderson et al., 2017), a negative association with both positive and negative emotional contagion is expected. Primary and

secondary psychopathic traits are expected to show different associations with respect to the social rewards, however, it is unclear which social reward dimensions will be more prevalent in individuals with elevated levels of primary as opposed to secondary traits. Based on previous research (Craker & March, 2016; Foulkes et al., 2014a; 2017), both primary and secondary traits are expected to relate positively with negative social potency (enjoying using others) and negatively with prosocial interactions. Admiration (enjoying flattery) is hypothesized to be associated predominantly with primary traits because individuals with these traits need the acknowledgement (Foulkes et al., 2014a; Paulhus & Williams, 2002). Lastly, since individuals with secondary psychopathic traits enjoy thrill-seeking and have been found to have shorter romantic relationships, it is expected that they will differ from individuals with primary psychopathic traits in that they enjoy sexual intimacy but are unable to maintain these relationships over time.

Method

Participants

Participants from a community sample were recruited primarily online, through social media (Facebook, LinkedIn), email and QR posters. A total of 417 participants completed the study, however, 28 participants were excluded from the analysis due to incomplete responses. The final sample included 389 participants, 148 were male (38%) and 241 were female (62%). Participant ages ranged between 18 and 76 ($M = 33.61$, $SD = 12.91$). Approximately half of the participants (41.9%; $n = 162$) were single at the time the study was conducted, 12 were divorced (3.1%), 6 were separated (1.5%), 3 were widowed (0.8%), while 106 were in a relationship (27.2%), and 98 were married (25.2%).

Procedure

Participants read through a digital information sheet, filled out a screening questionnaire to determine eligibility for the study (requirements of 18 + age and English proficiency) and gave digital consent prior to commencing the study which was approved by the Ethics Committee at the University of Edinburgh. Participants then completed a demographics form (requesting information on age, sex, and relationship status) and a battery of questionnaires assessing psychopathic traits and variables associated with interpersonal relationships, emotional contagion, friendship, and social reward. The questionnaires were presented in the same order to all participants. Participants were then digitally debriefed and thanked for their time.

Measures

Psychopathic traits

The Levenson Self-Report Psychopathy Scale (LSRP; Levenson et al., 1995) was used to assess psychopathic traits and consists of 26 items evaluating both primary and secondary psychopathic traits. The primary sub-factor examines affective-interpersonal traits of psychopathy (16 items; e.g., "*For me, what's right is whatever I can get away with*"), while the secondary factor evaluates behavioral-lifestyle traits of psychopathy (10 items; e.g., "*I find myself in the same kinds of trouble, time after time*"). Each item is rated on a Likert scale from 1 (*disagree strongly*) to 4 (*agree strongly*). The LSRP has been found to have good reliability for both primary and secondary psychopathic traits (Levenson et al., 1995). It is a well-established scale for assessing psychopathic traits in non-institutionalized samples (Kyranides & Neofytou, 2021).

Emotional contagion

The Emotional Contagion Scale (ECS; Doherty, 1997) was used to assess the susceptibility to catching emotions. The ECS includes 15 items assessing positive emotions; happiness (e.g., "*Being around happy people fills my mind with happy thoughts*") and love (e.g., "*When I look into the eyes of the one I love, my mind is filled with thoughts of romance*"), as well as negative emotions; including fear (e.g., "*I notice myself getting tense when I'm around people who are stressed out*"), anger (e.g., "*It irritates me to be around angry people*") and sadness (e.g., "*I cry at sad movies*"). This questionnaire is rated on a Likert scale from 1 (*never*) to 4 (*always*). The ECS is a widely used self-report questionnaire and has been translated into multiple languages (Hatfield et al., 2014).

Friendship

The Friendship Questionnaire (FQ; Baron-Cohen & Wheelwright, 2003) was used to assess friendship quality. The FQ includes 35 items and participants are asked to decide which items describe them best (e.g., "*I like to be close to people*" or "*I like to keep my distance from people*"). Scores are summed to give a maximum score of 135 whereby higher scores on this scale reflect better, more satisfying friendships. The FQ has good reliability as shown through autism research, whereby the non-autistic samples ($\alpha = 0.84$) had high alpha coefficients (Sedgewick et al., 2019).

Table 1 Means, standard deviations (SD), for men and women and Cronbach's alpha for main study variables

Variable	α	Total ($N = 389$) *Mean* (SD)	Men ($n = 148$) *Mean* (SD)	Women ($n = 241$) *Mean* (SD)	*t*
LSRP Primary	.89	28.52 (8.84)	30.01 (8.43)	27.24 (8.64)	3.17*
LSRP Secondary	.75	20.12 (5.12)	20.84 (5.04)	19.60 (5.05)	2.43*
FQ Friendship	.80	78.12 (20.36)	70.76 (19.22)	83.50 (19.15)	6.49**
ECS Happiness	.82	9.51 (1.99)	9.16 (2.17)	9.78 (1.79)	3.15*
ECS Love	.85	9.37 (2.25)	9.29 (2.20)	9.51 (2.21)	0.88
ECS Fear	.66	8.27 (2.33)	7.43 (2.26)	8.85 (2.19)	6.20**
ECS Anger	.56	7.75 (1.95)	7.35 (1.90)	8.02 (1.93)	3.38*
ECS Sadness	.71	8.09 (2.27)	7.17 (1.91)	8.74 (2.22)	7.46**
SRQ Admiration	.88	5.03 (1.40)	5.05 (1.46)	5.05 (1.36)	0.02
SRQ Negative social potency	.89	1.90 (1.23)	2.19 (1.32)	1.68 (1.11)	4.05**
SRQ Passivity	.82	2.74 (1.36)	2.91 (1.32)	2.66 (1.39)	1.74
SRQ Prosocial interactions	.83	6.15 (0.90)	6.02 (0.93)	6.27 (0.79)	2.88*
SRQ Sexual relationships	.84	4.44 (1.77)	5.06 (1.57)	4.07 (1.75)	5.69**
SRQ Sociability	.68	4.64 (1.40)	4.62 (1.49)	4.67 (1.33)	0.32

Note. LSRP: Levenson's Self-Report Psychopathy Scale; FQ: Friendship Questionnaire; ECS: Emotional Contagion Scale; SRQ: Social Reward Questionnaire

*$p < .05$; **$p < .01$

Social reward

The Social Reward Questionnaire (SRQ; Foulkes et al., 2014c) was used to assess individual differences in social reward. The SRQ has 23 items and assesses admiration (e.g., "*I enjoy it if others look up to me*"), negative social potency (e.g., "*I enjoy making someone angry*"), passivity (e.g., "*I enjoy letting someone else tell me what to do*"), prosocial interactions (e.g., "*I enjoy making someone feel happy*"), sexual relationships (e.g., "*I enjoy having erotic relationships*"), and sociability (e.g., "*I enjoy being a member of a group/club*"). The SRQ is scored on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The SRQ has established good construct validity and test-retest reliability (Foulkes et al., 2014c).

Results

Descriptive statistics for primary and secondary traits, friendship scores, emotional contagion sub-factors, and social reward factors are presented in Table 1, including independent sample t-tests exploring sex differences and the internal consistency of the scales. The scores presented in this study align with the established norms for these measures (Czarna et al., 2015; Kyranides & Neofytou, 2021; Lyons & Aitkens, 2010).

Correlations were run to assess the relationship between age, friendship scores, emotional contagion subscales and social reward factors, and primary and secondary psychopathic traits separately for female and male participants (see Table 2). Both primary and secondary psychopathic traits were negatively associated with age in females. In males, only primary psychopathic traits were significantly negatively associated with age. Both primary and secondary psychopathic traits were negatively associated with friendship scores in both males and females. When looking at emotional contagion, primary psychopathic traits were significantly negatively correlated with all sub-factors, both negative (anger, fear and sadness) and positive (love, happiness) in male participants, suggesting that men with these traits are less likely to be able to pick-up on these emotions and mimic them when seen in others. This finding was not replicated for secondary psychopathic traits in male participants. For females, both primary and secondary psychopathic traits were significantly negatively correlated with all emotional contagion sub-factors, both positive (happiness, love) and negative (fear, anger, and sadness), except for secondary traits and anger, which was not significant. Amongst the social rewards factors, results showed differing relationships between primary and secondary psychopathy in males and females. In males, both primary and secondary traits were significantly negatively associated with interacting prosocially and positively associated with negative social potency (enjoying cruelty). However, admiration, sexual relationships, and sociability were only positively associated with primary but not secondary psychopathic traits, in men. Sociability (enjoying being in groups) was only negatively correlated with secondary psychopathic traits in male participants. In females, both primary and secondary psychopathic tendencies were significantly negatively associated with prosocial interactions and positively associated with admiration and negative social potency. Sexual relationships were significantly positively associated with primary but not secondary traits, in females. Passivity was not correlated with either primary or secondary psychopathic traits in both male and female participants.

A four-stage hierarchical multiple regression analysis was conducted to examine the influence of social variables

Table 2 Correlation on the main study variables for males (lower table) and females (top table)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. LSRP Primary	-	.59**	−.32**	−.49**	−.44**	−.14*	−.36**	−.23**	−.41**	.33**	.77**	−.10	−.52**	.23**	.01
2. LSRP Secondary	.34**	-	−.25**	−.47**	−.39**	−.24**	−.25**	−.10	−.22**	.16*	.61**	−.03	−.44**	.02	−.04
3. Age	−.31**	−.00	-	.00	.30**	−.02	.16*	.18*	.28**	−.42**	−.26**	−.12	.05	−.38**	−.16*
4. FQ Friendship	−.31**	−.18*	.00	-	.42**	.36**	.31**	.18*	.36**	−.06	−.51**	.06	.51**	.13*	.30**
5. ECS Happiness	−.26**	−.23*	.14	.43**	-	.37**	.41**	.29**	.46**	−.22**	−.49**	.04	.44**	−.12	.11
6. ECS Love	−.22**	−.16	.07	.35**	.47**	-	.35**	.21**	.29**	.04	−.24**	.01	.32**	.22**	.15*
7. ECS Fear	−.33**	−.14	.20*	.13	.30**	.27**	-	.59**	.59**	−.10	−.42**	.04	.39**	−.00	.04
8. ECS Anger	−.32**	−.15	.21*	.08	.28**	.22*	.59**	-	.40**	−.14*	−.28**	.10	.19*	−.01	−.02
9. ECS Sadness	−.39**	−.10	.26**	.36**	.39**	.44**	.47**	.39**	-	−.21**	−.39**	.07	.39**	−.11	.04
10 SRQ Admiration	.30**	−.06	−.28**	.17*	.19*	.06	−.13	−.11	−.08	-	.26**	.02	.11	.35**	.42**
11. SRQ Neg. Social Potency	.74**	.40**	−.31**	−.27**	−.28**	−.19*	−.22*	−.20*	−.31**	.30**	-	−.11	−.59**	.18*	.62**
12. SRQ Passivity	−.03	−.12	−.25*	.09	.08	.07	.17*	−.02	.12	.20*	.09	-	.07	.06	.08
13. SRQ Prosocial Interactions	−.44**	−.24*	−.013	.51**	.48**	.48**	.22*	.20*	.38**	.32**	−.41**	.17*	-	.10	.29**
14. SRQ Sexual Relationships	.18*	.06	−.23*	.18*	.06	.23*	−.08	−.14	−.10	.36**	.17*	−.04	.20*	-	.33**
15. SRQ Sociability	.21*	-.16*	−.15	.33**	.38**	.14	−.01	−.10	−.01	.52**	.17*	.22*	.29**	.45**	-

Note: LSRP: Levenson's Self-Report Psychopathy Scale; FQ: Friendship Questionnaire; ECS: Emotional Contagion Scale; SRQ: Social Reward Questionnaire

*$p < .05$; **$p < .01$

on primary and secondary psychopathic traits, separately for men and women. Age was entered in step 1. Experience with social relationships, including relationship status and friendship quality, were entered in step 2. Emotional contagion, a form of affective empathy, which is essential for forming and maintaining interpersonal relationships (Anderson & Kiehl, 2014); as such, emotional contagion subfactors (happiness, love, fear, anger, and sadness) were entered in step 3. Social reward factors (admiration, negative social potency, passivity, prosocial interactions, sexual relationship, and sociability) were entered in step 4. The same entry method was used for both primary and secondary psychopathic traits (see Table 3 for males and Table 4 for females).

The first model, for male participants, which included age, was a significant model in predicting 9% of variance in primary traits; $F(1, 146) = 14.66$, $p < .001$, but not secondary psychopathic traits, explaining 0% of variance; $F(1, 146) = 0.02$, $p = .88$. In females, the first model that included age as a predictor was significant for predicting 10% of variance for primary traits; $F(1, 238) = 26.25$, $p < .001$ and 6% of secondary traits $F(1, 238) = 15.07$, $p < .001$. The addition of relationship status and friendships in model 2, explained a further 10% of the variance for primary psychopathic traits in males; $F(2, 144) = 8.55$, $p < .001$ and 25% in females $F(2, 236) = 45.42$, $p < .001$. Similarly, for secondary psychopathic traits, the addition of relationship status and friendships in model 2, explained a further 8% of the variance $F(2, 144) = 6.19$, $p < .01$ in males and 25% in females $F(2, 236) = 43.57$, $p < .001$. The addition of emotional contagion sub-factors (happiness, love, fear, anger and sadness in model 3 explained 10% for primary traits; $F(5, 139) = 3.78$, $p < .001$ in males and 6% in females $F(5, 231) = 4.66$, $p < .001$. The addition of emotional contagion sub-factors explained 4% for secondary traits in females $F(5, 231) = 2.49$, $p < .05$ but this addition was non-significant in males $F(5, 139) = 1.01$, $p = .42$. The addition of social reward factors (negative social potency, admiration, passivity, sexual relationships, prosocial interactions, and sociability in model 4 explained an additional variance of 38% for primary psychopathic traits; $F(6, 133) = 24.83$, $p < .001$ in males and 26% in females $F(6, 225) = 29.90$, $p < .001$. The addition of social reward factors explained 19% of the variance for secondary psychopathic traits; $F(6, 133) = 5.90$, $p < .001$ in males and 13% in females $F(6, 225) = 9.09$, $p < .001$.

In the final models, low scores on friendship quality and elevated scores on emotional contagion for love were associated with elevated primary psychopathic traits in women but not men. High scores on the social reward sociability factor was also associated with elevated primary traits but only in men. Limited prosocial interactions, high scores on

Table 3 Hierarchical Linear Regression for Psychopathic traits for males

	Primary Psychopathic traits				Secondary Psychopathic Traits			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Variable	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Age	−.30**	−.29**	−.21*	−.07	−.01	.07	.10	.18
Relationship Status [a]		−.03	−.01	−.04		−.22*	−.20*	−.16
Friendship		−.31**	−.23*	−.12		−.21*	−.14	−.03
ECS Happiness			.01	.02			−.12	.05
ECS Love			.01	.05			−.04	−.13
ECS Fear			−.12	−.05			−.04	−.01
ECS Anger			−.13	−.09			−.08	−.11
ECS Sadness			−.17	−.05			.03	.07
SRQ Admiration				.15*				−.12
SRQ Neg. Social Potency				.50**				.52**
SRQ Passivity				−.09				−.04
SRQ Prosocial Interactions				−.22*				.11
SRQ Sexual Relationships				.00				.18
SRQ Sociability				.15*				−.25*
ΔR^2	.09**	.10**	.10*	.38**	.00	.08*	.03	.19**

Note. [a] Relationship status coded: 1 = Single, 2 = In a relationship

*$p < .05$, **$p < .001$

Table 4 Hierarchical Linear Regression for Psychopathic traits for females

	Primary Psychopathic Traits				Secondary Psychopathic Traits			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Variable	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Age	−.32**	−.28**	−.18*	−.06	−.24**	−.17*	−.15*	−.12
Relationship Status [a]		−.09	−.09	−.07		−.18*	−.18**	−.14*
Friendship		−.49**	−.41**	−.16*		−.47**	−.42**	−.24**
ECS Happiness			−.15*	.03			−.15*	−.06
ECS Love			.15*	.10*			−.02	−.03
ECS Fear			−.15*	−.04			−.16*	−.07
ECS Anger			.02	.03			.11	.11
ECS Sadness			.09	−.04			.15*	.16*
SRQ Admiration				.14*				.02
SRQ Neg. Social Potency				.53**				.43**
SRQ Passivity				−.05				.01
SRQ Prosocial Interactions				−.15*				−.07
SRQ Sexual Relationships				.08				−.08
SRQ Sociability				−.02				.04
ΔR^2	.10**	.25**	.06**	.26**	.06**	.25**	.04*	.13**

Note. [a] Relationship status coded: 1 = Single, 2 = In a relationship

*$p < .05$, **$p < .001$

admiration and negative social potency were associated with high primary psychopathic traits for both men and women. In contrast, in the final model for secondary psychopathic traits, being single, low-quality friendship scores, and high scores on emotional contagion for sadness were associated with secondary psychopathic traits in women, but not in men. Low scores on the social reward factor of sociability was associated with elevated secondary traits only in men. High scores in negative social potency was associated with high scores on secondary psychopathic traits in both men and women.

Discussion

The present research aimed to investigate differences and similarities in interpersonal relationships between primary and secondary psychopathic traits by examining the association with relationship status, friendship quality, emotional contagion, and different social rewards in males and females. Low-quality friendships were associated with primary and secondary psychopathic traits in females. Not being in a romantic relationship was associated with secondary psychopathic traits in females only. Surprisingly, being susceptible to sadness was associated with secondary psychopathic traits in females, whereas being susceptible to expressions of love was associated with primary psychopathic traits in females only. Lastly, the current research is the first to examine social reward factors in the context of interpersonal relationships in men and women with primary and secondary psychopathic traits. Not surprisingly, negative social potency (the enjoyment of being cruel to others) was associated with both primary and secondary psychopathic traits in both males and females. High admiration and low prosocial interactions were associated with primary traits in both males and females. Sociability, enjoying being part of a group, was associated with both primary and secondary psychopathic traits in the opposite direction, but only in males. This research reflects the importance of investigating psychopathic traits heterogeneously in men and women to better inform prevention efforts focused on hindering the development and maintenance of these personality traits (Reidy et al., 2013).

Our findings suggest that having low-quality friendships is linked to both primary and secondary psychopathic traits in females. Similarly, other studies have also found that low-quality relationships, mainly consisting of negative interactions, can amplify antisocial behavior and psychopathic traits (e.g., Backman et al., 2018; Miron et al., 2020). Our findings suggest that these low-quality friendships can influence the display of psychopathic traits in females more specifically. Additionally, our results show that not being in a romantic relationship is associated predominantly with secondary psychopathic traits in females, highlighting an important distinction between primary and secondary psychopathic traits. Females tend to engage in more relational aggressive behaviors such as social sabotage, love withdrawal, and verbal forms of aggression compared to men (Carroll et al., 2010), which have been associated with low levels of relationship quality and instability. Prior work also found that individuals with secondary psychopathic traits report lower relationship quality compared to individuals with elevated primary traits who are less reliant and less likely to develop strong attachment bonds with their partners (Schimmenti et al., 2014; Unrau & Morry, 2019). This distinction between primary and secondary psychopathic traits is also apparent in the attachment literature (Kyranides & Neofytou, 2021). Individuals with secondary psychopathic traits present insecure attachments, are emotionally dysregulated, and our results suggest that females high on secondary traits are more affected by their intimate relationships (Gillespie et al., 2013). When it comes to partner choice, it seems that women reporting elevated secondary traits prefer similar partners (also with elevated psychopathic traits) for short-term relationships (Blanchard et al., 2016), suggesting that they might be seeking (consciously or unconsciously) these problematic relationships, because they are familiar. Collectively, our findings suggest that relationships (both social and more intimate) are more influential in females as the variance explained was larger compared to males when adding these variables in the models (model 2).

Regarding emotional contagion, it was hypothesized that there would be differences between primary and secondary traits, with primary psychopathic traits demonstrating a more specific association with negative emotions. This hypothesis was partially supported as when the emotional contagion sub-factors were introduced (in model 3), low susceptibility to fear and happiness were associated with both primary and secondary traits in females only, but when the social reward factors were added (in model 4), these became non-significant. Surprisingly, in the final models, identifying expressions of love was only associated with primary traits in females, suggesting distinct sex differences between these two psychopathic dimensions. Women with high primary traits tend to prefer similar partners and evaluate them as attractive for long-term relationships, a phenomenon called assortative mating (Blanchard et al., 2016). Perhaps, this proclivity towards individuals similar to themselves is unique to women with elevated primary traits and helps them identify other people that can offer them the type of love they need (Blanchard et al., 2016). It may also explain why individuals with primary traits are able to maintain relationships, despite affection being typically disingenuous and self-serving (Viding & McCrory,

2019). In the final models, emotional contagion for sadness was associated with secondary psychopathic traits in females only, revealing distinct differences between the sexes. This finding was surprising as both positive and negative factors of emotional contagion were expected to be related to secondary traits. Nevertheless, the finding that high susceptibility to sad experiences is related to secondary traits in females, suggests that women with elevated secondary traits show difficulties regulating sad emotions specifically. Given the environmental adversities thought to precede the development of secondary psychopathic traits (Thompson et al., 2014), our findings infer that women who are also more likely to take on others' negative emotional state, more specifically their sadness can become overwhelmed, contributing to the maintenance of these traits (Del Gaizo & Falkenbach, 2008; Kimonis et al., 2012). This finding further aligns with research suggesting that individuals with secondary psychopathic traits also display elevated symptoms of depression (Docherty et al., 2016), demonstrating how susceptibility to sadness may maintain secondary psychopathic traits in females through harmful coping mechanisms.

The final aim of this study was to examine the social motivation factors and how these relate to the display and maintenance of primary and secondary psychopathic traits. Enjoying inflicting cruelty on others (negative social potency) was associated with both primary and secondary traits in both males and females, suggesting that this factor sustains these traits and possibly explains the engagement in antisocial behavior (Baughman et al., 2014; Foulkes et al., 2014a; Hare & Neumann, 2008; Sest & March, 2017). It has been reported that individuals high in psychopathic traits con for personal gain and subsequently experience positive emotion when doing so, illustrating a lack of empathy towards others' distress and a lack of guilt after antisocial behaviors (Baughman et al., 2014). Secondary psychopathic traits are impelled by emotional disturbances and neuroticism (behaviorally based; Johnson, 2019), whereas primary psychopathic traits are motivated by callousness and selfishness (personality based; Michels & Roth, 2021). Therefore, despite reports of more violent crimes conducted by individuals with primary psychopathic traits in community samples (Drislane et al., 2014), those with secondary traits are associated with an earlier and more extensive criminal history (Hicks et al., 2004). Nevertheless, the findings demonstrate that enjoying cruelty maintains both primary and secondary psychopathic traits.

The current study also found that 'low prosocial interactions' were associated with primary but not secondary psychopathic traits in both male and female participants, consistent with previous research (Foulkes et al., 2014a; White, 2014). Primary psychopathic traits relate to higher cognitive functioning, deceitfulness, an elevated sense of self-worth, and when coupled with limited empathy, may facilitate active exploitation of others (Jonason & Krause, 2013) and restrict the display of prosocial interactions. Enjoying being admired was also associated with primary psychopathic traits in males and females, which aligns with the profile of individuals with primary traits whereby egocentricity and high narcissism are present (Karpman, 1948; Paulhus & Williams, 2002). Gaining others' admiration facilitates a self-serving social strategy that instils this interaction with high reward value (Foulkes et al., 2014a; 2014b), enables parasitic relationship styles (Jonason & Schmitt, 2012) and enhances the prospect of reaching their goals (Gao et al., 2009), which potentially contributes to maintaining these traits. These results suggest that individuals with elevated primary psychopathic traits display an inverted sense of reward whereby they enjoy maliciousness and admiration over being kind (Foulkes et al., 2014a).

Surprisingly, sociability (enjoying being in or part of a group) was positively associated with primary psychopathic traits and negatively associated with secondary traits in males only, highlighting differences in the motivation to interact with social groups in the sexes. Scoring high on sociability was associated with elevated primary traits, which might be related to the admiration and recognition they receive when interacting in groups (Foulkes et al., 2014a). In contrast, scoring low on sociability was associated with secondary traits in men. Engaging in social activities with groups does not seem to have the same effect on men with elevated secondary traits, and this might be due to their anxious and impulsive predisposition (Johnson, 2019). Interestingly, social reward factors explained the largest variance for primary and secondary traits in males above all other variables, suggesting that social reward factors have more influence and should be an area of focus when designing interventions for men with these traits. In females, social reward factors and social experiences (being in a relationship, friendships) explained the largest variance for both primary and secondary traits, highlighting differences in the manifestation of these traits across sexes and the need for more research in this area (Falkenbach et al., 2017). Together, the current results indicate a distinct difference in the motivation and rewards driving the display of primary and secondary psychopathic traits in men and women.

Implications

The current study highlights the social factors associated with primary and secondary psychopathic traits in men and women, giving insight into how these factors affect interpersonal relationships. Experiencing poor-quality relationships is associated with the exacerbation of psychopathic traits

in a cyclical process (Miron et al., 2020) and our findings suggest that this is the case for women especially. Although some researchers argue that individuals with psychopathic traits are difficult to treat (Reidy et al., 2013), early interventions aiming to improve the quality of relationships in childhood or adolescence may prevent the development of these maladaptive psychopathic traits (Bjørnebekk & Mørkrid, 2021; Kimonis et al., 2019; Kyranides et al., 2018). Effective treatments usually tailor the intervention to fit the distinct characteristics of youths and their families, and our results suggest that a person's biological sex should also be considered. Interventions should provide tools for positive reinforcement, empathy, and be implemented early on, a method that has been successful for young people with callous-unemotional traits (a precursor of psychopathic traits; White et al., 2013). Our results suggest that encouraging good friendships early on (building empathetic listening and other-oriented thinking) for females especially and taking into account motivation aspects for men, might decrease dropout rates through motivation techniques. Additionally, given the environmental adversities associated with secondary psychopathic traits, perhaps early childhood interventions could prevent the development of these traits altogether (Kyranides et al., 2018).

Limitations and future research

Findings should be interpreted considering some limitations. Firstly, given the cross-sectional design of this study, longitudinal research addressing these variables over time would help better understand how primary and secondary psychopathic traits develop in men and women. Secondly, all measures under study were assessed using self-report questionnaires. Some sub-scales on the emotional contagion scale had low reliability. Future studies should verify the current findings using alternative, ecologically valid measures (e.g., spontaneous, automatic mimicry that can be assessed using more objective observational methods; Kyranides et al., 2022) or a combination of measures, including observational methods that assess emotional contagion and self-report questionnaires. Third, it would be important to extend these findings to forensic samples to examine if these can be generalized.

Conclusion

The current study investigates the differences between primary and secondary psychopathic traits in men and women and the association with friendship, relationship status, emotional contagion, and social rewards. Low-quality friendship was associated with both primary and secondary traits in females, but not being in a romantic relationship was associated with secondary psychopathic traits in females, but not males. Similarly, susceptibility to sadness was associated with secondary psychopathic traits in females only, while emotional contagion for love was associated with primary psychopathic traits in females. Perhaps a hyperactive emotional system developed through adverse childhood experiences, such as insecure attachment, is sustained over the years in individuals with secondary psychopathic traits because they are unable to control their emotions. Women with secondary traits consequently take on others' sadness, affecting their social functioning, impacting their peer and romantic relationships, and contributing to the maintenance of these traits. Negative social potency was associated with both primary and secondary traits in men and women, suggesting that individuals who enjoy being cruel to others are more likely to display these traits. Being admired and low prosocial interactions were also found to be associated with primary traits only, indicating an inverted sense of reward. Being sociable and part of a group was associated with primary traits in males only, suggesting that social interactions could be providing them with opportunities to manipulate others. In contrast, sociability was also associated with secondary traits, but in the opposite direction, suggesting that the lack of social interactions in groups was associated with secondary traits in men. The current results highlight the importance of identifying hallmarks for primary and secondary psychopathic traits as well as sex differences and addressing these through early childhood and adolescent interventions to improve interpersonal relationships and prevent the development of these maladaptive psychopathic traits.

References

Anderson, N. E., & Kiehl, K. A. (2014). Psychopathy: Developmental Perspectives and their implications for treatment. *Restorative Neurology and Neuroscience*, *32*(1), 103–117. https://doi.org/10.3233/RNN-139001

Anderson, N. E., Steele, V. R., Maurer, J. M., Rao, V., Koenigs, M. R., Decety, J., Kosson, D. S., Calhoun, V. D., & Kiehl, K. A.

(2017). Differentiating emotional processing and attention in psychopathy with functional neuroimaging. *Cognitive Affective and Behavioral Neuroscience*, *17*(3), 491–515. https://doi.org/10.3758/s13415-016-0493-5

Backman, H., Laajasalo, T., Jokela, M., & Aronen, E. T. (2018). Interpersonal Relationships as Protective and Risk factors for psychopathy: a follow-up study in adolescent offenders. *Journal of Youth and Adolescence*, *47*(5), 1022–1036. https://doi.org/10.1007/s10964-017-0745-x

Baron-Cohen, S., & Wheelwright, S. (2003). The friendship questionnaire: an investigation of adults with Asperger Syndrome or High-Functioning Autism, and normal sex differences. *Journal of Autism and Developmental Disorders*, *33*(5), 509–517. https://doi.org/10.1023/a:1025879411971

Baughman, H. M., Jonason, P. K., Lyons, M., & Vernon, P. A. (2014). Liar liar pants on fire: cheater strategies linked to the Dark Triad. *Personality and Individual Differences*, *71*, 35–38. https://doi.org/10.1016/j.paid.2014.07.019

Ben-Yaacov, T., Glicksohn, J., & Tommasi, M. (2018). Intelligence and psychopathy: a study on non-incarcerated females from the normal population. *Cogent Psychology*, *5*(1), 1–13. https://doi.org/10.1080/23311908.2018.1429519

Bjørnebekk, G., & Mørkrid Thøgersen, D. (2021). Possible interventions for preventing the development of psychopathic traits among children and adolescents? *International Journal of Environmental Research and Public Health*, *19*(1), 409. https://doi.org/10.3390/ijerph19010409

Blair, R. J. R. (2007). The amygdala and ventromedial prefrontal cortex in morality and psychopathy. *Trends in Cognitive Sciences*, *11*(9), 387–392. https://doi.org/10.1016/j.tics.2007.07.003

Blair, R. J. R. (2013). The neurobiology of psychopathic traits in youths. *The National Review of Neuroscience*, *14*(11), 786–799. https://doi.org/10.1038/nrn3577

Blanchard, A., Lyons, M., & Centifanti, L. (2016). An effective way to deal with predators is to taste terrible: primary and secondary psychopathy and mate preference. *Personality and Individual Differences*, *92*, 128–134. https://doi.org/10.1016/j.paid.2015.12.024

Boduszek, D., Debowska, A., Sherretts, N., Willmott, D., Boulton, M., Kielkiewicz, K., Popiolek, K., & Hyland, P. (2021). Are Prisoners more psychopathic than non-forensic populations? Profiling psychopathic traits among prisoners, community adults, University students, and adolescents. *Deviant Behavior*, *42*(2), 232–244. https://doi.org/10.1080/01639625.2019.1665221

Campos, C., Pasion, R., Azeredo, A., Ramião, E., Mazer, P., Macedo, I., & Barbosa, F. (2022). Refining the link between psychopathy, antisocial behavior, and empathy: a meta-analytical approach across different conceptual frameworks. *Clinical Psychology Review*, *94*, 102145. https://doi.org/10.1016/j.cpr.2022.102145

Carroll, J. S., Nelson, D. A., Yorgason, J. B., Harper, J. M., Ashton, R. H., & Jensen, A. C. (2010). Relational aggression in marriage. *Aggressive Behavior*, *36*(5), 315–329. https://doi.org/10.1002/ab.20349

Coid, J., Yang, M., Ullrich, S., Roberts, A., & Hare, R. D. (2009). Prevalence and correlates of psychopathic traits in the household population of Great Britain. *International Journal of Law and Psychiatry*, *32*(2), 65–73. https://doi.org/10.1016/j.ijlp.2009.01.002

Conradi, H. J., Boertien, S. D., Cavus, H., & Verschuere, B. (2016). Examining psychopathy from an attachment perspective: the role of fear of rejection and abandonment. *Journal of Forensic Psychiatry and Psychology*, *27*(1), 92–109. https://doi.org/10.1080/14789949.2015.1077264

Craker, N., & March, E. (2016). The dark side of Facebook: the Dark Tetrad, negative social potency, and trolling behaviours. *Personality and Individual Differences*, *102*, 79–84. https://doi.org/10.1016/j.paid.2016.06.043

Craparo, G., Schimmenti, A., & Caretti, V. (2013). Traumatic experiences in childhood and psychopathy: a study on a sample of violent offenders from Italy. *European Journal of Psychotraumatology*, *4*(21471), 1–6. https://doi.org/10.3402/ejpt.v4i0.21471

Curry, O., Chesters, M. J., & Viding, E. (2011). The psychopath's dilemma: the effects of psychopathic personality traits in one-shot games. *Personality and Individual Differences*, *50*(6), 804–809. https://doi.org/10.1016/j.paid.2010.12.036

Curtis, S. R., Richards, D. K., & Jones, D. N. (2020). The Association between Psychopathy and Influencing others to Use Substances. *Substance Use and Misuse*, *55*(7), 1097–1105. https://doi.org/10.1080/10826084.2020.1729196

Czar, K. A., Dahlen, E. R., Bullock, E. E., & Nicholson, B. C. (2011). Psychopathic personality traits in relational aggression among young adults. *Aggressive Behavior*, *37*(2), 207–214. https://doi.org/10.1002/ab.20381

Czarna, A. Z., Wróbel, M., Dufner, M., & Zeigler-Hill, V. (2015). Narcissism and emotional contagion: do narcissists "Catch" the Emotions of others? *Social Psychological and Personality Science*, *6*(3), 318–324. https://doi.org/10.1177/1948550614559652

Dadds, M. R., Hawes, D. J., Frost, A. D., Vassallo, S., Bunn, P., Hunter, K., & Merz, S. (2009). Learning to 'talk the talk: the relationship of psychopathic traits to deficits in empathy across childhood. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *50*(5), 599–606. https://doi.org/10.1111/j.1469-7610.2008.02058.x

de Vogel, V., & Lancel, M. (2016). Gender differences in the assessment and manifestation of psychopathy: results from a multicenter study in forensic psychiatric patients. *International Journal of Forensic Mental Health*, *15*(1), 97–110. https://doi.org/10.1080/14999013.2016.1138173

del Gaizo, A. L., & Falkenbach, D. M. (2008). Primary and secondary psychopathic-traits and their relationship to perception and experience of emotion. *Personality and Individual Differences*, *45*(3), 206–212. https://doi.org/10.1016/j.paid.2008.03.019

di Giacomo, E., Santorelli, M., Pessina, R., Rucco, D., Placenti, V., Aliberti, F., Colmegna, F., & Clerici, M. (2021). Child abuse and psychopathy: interplay, gender differences and biological correlates. *World Journal of Psychiatry*, *11*(12), 1167–1176. https://doi.org/10.5498/wjp.v11.i12.1167

Docherty, M., Boxer, P., Huesmann, L. R., O'Brien, M., & Bushman, B. J. (2016). Exploring primary and secondary variants of psychopathy in adolescents in Detention and in the community. *Journal of Clinical Child and Adolescent Psychology*, *45*(5), 564–578. https://doi.org/10.1080/15374416.2014.979934

Doherty, W. R. (1997). The emotional contagion scale: a measure of individual differences. *Journal of Nonverbal Behavior*, *21*, 131–154. https://doi.org/10.1023/A:1024956003661

Dovidio, J. F., & Banfield, J. C. (2015). Prosocial Behavior and Empathy. In *International Encyclopedia of the Social & Behavioral Sciences* (pp. 216–220). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.24024-5

Downie, M., Mageau, G. A., & Koestner, R. (2008). What makes for a Pleasant Social Interaction? Motivational Dynamics of Interpersonal Relations. *The Journal of Social Psychology*, *148*(5), 523–534. https://doi.org/10.3200/SOCP.148.5.523-534

Drislane, L. E., Patrick, C. J., Sourander, A., Sillanmäki, L., Aggen, S. H., Elonheimo, H., Parkkola, K., Multimäki, P., & Kendler, K. S. (2014). Distinct variants of extreme psychopathic individuals in society at large: evidence from a population-based sample. *Personality Disorders: Theory Research and Treatment*, *5*(2), 154–163. https://doi.org/10.1037/per0000060

Efferson, L. M., & Glenn, A. L. (2018). Examining gender differences in the correlates of psychopathy: a systematic review of emotional, cognitive, and morality-related constructs. *Aggression*

and Violent Behaviour, *41*, 48–61. https://doi.org/10.1016/j.avb.2018.05.009

Falkenbach, D. M., Reinhard, E. E., & Larson, F. R. R. (2017). Theory based gender differences in psychopathy subtypes. *Personality and Individual Differences*, *105*, 1–6. https://doi.org/10.1016/j.paid.2016.09.023

Foulkes, L., McCroy, E. J., Neumann, C. S., & Viding, E. (2014a). Inverted social reward: Associations between psychopathic traits and self-report and experimental measures of social reward. *PloS One*, *9*(8), 1–10. https://doi.org/10.1371/journal.pone.0106000

Foulkes, L., Neumann, C. S., Roberts, R., McCrory, E., & Viding, E. (2017). Social reward questionnaire—adolescent version and its association with callous–unemotional traits. *Royal Society Open Science*, *4*, 1–14. https://doi.org/10.1098/rsos.160991

Foulkes, L., Seara-Cardoso, A., Neumann, C. S., Rogers, J. S., & Viding, E. (2014b). Looking after number one: Associations between psychopathic traits and measures of social motivation and functioning in a community sample of males. *Journal of Psychopathology and Behavioral Assessment*, *36*(1), 22–29. https://doi.org/10.1007/s10862-013-9381-2

Foulkes, L., Viding, E., McCrory, E., & Neumann, C. S. (2014c). Social reward questionnaire (SRQ): development and validation. *Frontiers in Psychology*, *5*(201), 1–8. https://doi.org/10.3389/fpsyg.2014.00201

Gao, Y., Glenn, A. L., Schug, R. A., Yang, Y., & Raine, A. (2009). The neurobiology of psychopathy: a neurodevelopmental perspective. *Canadian Journal of Psychiatry*, *54*(12), 813–823. https://doi.org/10.1177/070674370905401204

Gillespie, S. M., Mitchell, I. J., Johnson, I., Dawson, E., & Beech, A. R. (2013). Exaggerated Intergroup Bias in economical decision making Games: Differential Effects of primary and secondary psychopathic traits. *Plos One*, *8*(8), e69565. https://doi.org/10.1371/journal.pone.0069565

Glenn, A. L., Efferson, L. M., Iyer, R., & Graham, J. (2017). Values, goals, and motivations associated with psychopathy. *Journal of Social and Clinical Psychology*, *36*(2), 108–125. https://doi.org/10.1521/jscp.2017.36.2.108

Hare, R. D., & Neumann, C. S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology*, *4*, 217–246. https://doi.org/10.1146/annurev.clinpsy.3.022806.091452

Hare, R. D., & Neumann, C. S. (2005). Structural models of psychopathy. *Current Psychiatry Reports*, *7*(1), 57–64. https://doi.org/10.1007/s11920-005-0026-3

Hatfield, E., Bensman, L., Thornton, P. D., & Rapson, R. L. (2014). New Perspectives on emotional contagion: a review of Classic and recent research on facial mimicry and contagion. *Interpersonal: An International Journal on Personal Relationships*, *8*(2), 159–179. https://doi.org/10.5964/ijpr.v8i2.162

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current Directions in Psychological Science*, *2*(3), 96–100. https://doi.org/10.1111/1467-8721.ep10770953

Hemphälä, M., Kosson, D., Westerman, J., & Hodgins, S. (2015). Stability and predictors of psychopathic traits from mid-adolescence through early adulthood. *Scandinavian Journal of Psychology*, *56*(6), 649–658. https://doi.org/10.1111/sjop.12257

Hicks, B. M., Markon, K. E., Patrick, C. J., Krueger, R. F., & Newman, J. P. (2004). Identifying psychopathy subtypes on the basis of personality structure. *Psychological Assessment*, *16*(3), 276–288. https://doi.org/10.1037/1040-3590.16.3.276

Johanson, M., Vaurio, O., Tiihonen, J., & Lähteenvuo, M. (2020). A systematic literature review of neuroimaging of psychopathic traits. *Frontiers in Psychiatry: Forensic Psychiatry*, *10*, 1–20. https://doi.org/10.3389/fpsyt.2019.01027

Johnson, S. (2019). Understanding the violent personality: antisocial personality disorder, psychopathy, and sociopathy explored. *Forensic Research and Criminology International Journal*, *7*(2), 76–88. https://doi.org/10.15406/frcij.2019.07.00267

Jolliffe, D., & Farrington, D. P. (2006). Examining the relationship between low empathy and bullying. *Aggressive Behavior*, *32*(6), 540–550. https://doi.org/10.1002/ab.20154

Jonason, P. K., & Krause, L. (2013). The emotional deficits associated with the Dark Triad traits: cognitive empathy, affective empathy, and alexithymia. *Personality and Individual Differences*, *55*(5), 532–537. https://doi.org/10.1016/j.paid.2013.04.027

Jonason, P. K., Luevano, V. X., & Adams, H. M. (2012). How the Dark Triad traits predict relationship choices. *Personality and Individual Differences*, *53*(3), 180–184. https://doi.org/10.1016/j.paid.2012.03.007

Jonason, P. K., Lyons, M., Bethell, E. J., & Ross, R. (2013). Different routes to limited empathy in the sexes. *Personality and Individual Differences*, *54*(5), 572–576. https://doi.org/10.1016/j.paid.2012.11.009

Jonason, P. K., & Schmitt, D. P. (2012). What have you done for me lately? Friendship-selection in the Shadow of the Dark Triad Traits. *Evolutionary Psychology*, *10*(3), https://doi.org/10.1177/147470491201000303

Karpman, B. (1948). The myth of the psychopathic personality. *American Journal of Psychiatry*, *104*, 523–534. https://doi.org/10.1176/ajp.104.9.523

Kimonis, E. R., Fleming, G., Briggs, N., Brouwer-French, L., Frick, P. J., Hawes, D. J., & Dadds, M. (2019). Parent-child interaction therapy adapted for preschoolers with callous-unemotional traits: an open trial pilot study. *Journal of Clinical Child and Adolescent Psychology*, *48*, S347–S361. https://doi.org/10.1080/15374416.2018.1479966

Kimonis, E. R., Frick, P. J., Cauffman, E., Goldweber, A., & Skeem, J. (2012). Primary and secondary variants of juvenile psychopathy differ in emotional processing. *Development and Psychopathology*, *24*(3), 1091–1103. https://doi.org/10.1017/S0954579412000557

Kobach, M. J., & Weaver, A. J. (2012). Gender and Empathy differences in negative reactions to fictionalized and real violent images. *Communication Reports*, *25*(2), 51–61. https://doi.org/10.1080/08934215.2012.721087

Kreis, M. K., & Cooke, D. J. (2011). Capturing the psychopathic female: a prototypicality analysis of the Comprehensive Assessment of psychopathic personality (CAPP) across gender. *Behavioral Sciences & the Law*, *29*(5), 634–648. https://doi.org/10.1002/bsl.1003

Kyranides, M. N., Fanti, K. A., Katsimicha, E., & Georgiou, G. (2018). Preventing conduct disorder and callous unemotional traits: preliminary results of a school based pilot training program. *Journal of Abnormal Child Psychology*, *46*(2), 291–303. https://doi.org/10.1007/s10802-017-0273-x

Kyranides, M. N., Fanti, K. A., Petridou, M., & Kimonis, E. R. (2020). In the eyes of the beholder: investigating the effect of visual probing on accuracy and gaze fixations when attending to facial expressions among primary and secondary callous-unemotional variants. *European Child and Adolescent Psychiatry*, *29*(10), 1441–1451. https://doi.org/10.1007/s00787-019-01452-z

Kyranides, M. N., Kokkinou, A., Imran, S., & Cetin, M. (2021). Adult attachment and psychopathic traits: investigating the role of gender, maternal and paternal factors. *Current Psychology*, 1–10. https://doi.org/10.1007/s12144-021-01827-z

Kyranides, M. N., & Neofytou, L. (2021). Primary and secondary psychopathic traits: the role of attachment and cognitive emotion regulation strategies. *Personality and Individual Differences*, *182*, 1–8. https://doi.org/10.1016/j.paid.2021.111106

Kyranides, M. N., Petridou, M., Gokani, H. A., Hill, S., & Fanti, K. A. (2022). Reading and reacting to faces, the effect of facial mimicry in improving facial emotion recognition in individuals with

antisocial behavior and psychopathic traits. *Current Psychology*, 1–14. https://doi.org/10.1007/s12144-022-02749-0

Leedom, L. J. (2017). The Impact of Psychopathy on the Family. In F. Dubano (Ed.) *Psychopathy - New Updates on an Old Phenomenon*. InTechOpen. https://doi.org/10.5772/intechopen.70227

Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a Noninstitutionalized Population. *Journal of Personality and Social Psychology*, *68*(1), 151–158. https://doi.org/10.1037//0022-3514.68.1.151

Lilienfeld, S. O., Watts, A. L., & Smith, S. F. (2015). Successful psychopathy: a scientific Status Report. *Current Directions in Psychological Science*, *24*(4), 298–303. https://doi.org/10.1177/0963721415580297

Luckhurst, C., Hatfield, E., & Gelvin-Smith, C. (2017). Capacity for Empathy and Emotional Contagion in those with psychopathic personalities. *An International Journal on Personal Relationships*, *11*(1), 70–91. https://doi.org/10.5964/ijpr.v11i1.247

Lyons, M., & Aitken, S. (2010). Machiavellian friends? The role of Machiavellianism in friendship formation and maintenance. *Journal of Social Evolutionary and Cultural Psychology*, *4*(3), 194–202. https://doi.org/10.1037/h0099290

March, E. (2019). Psychopathy, sadism, empathy, and the motivation to cause harm: new evidence confirms malevolent nature of the internet troll. *Personality and Individual Differences*, *141*, 133–137. https://doi.org/10.1016/j.paid.2019.01.001

Marvin, C. A., Moen, A. L., Knoche, L. L., & Sheridan, S. M. (2020). Getting ready strategies for promoting Parent–Professional Relationships and parent–child interactions. *Young Exceptional Children*, *23*(1), 36–51. https://doi.org/10.1177/1096250619829744

Maurer, J. M., Edwards, B. G., Harenski, C. L., Decety, J., & Kiehl, K. A. (2022). Do psychopathic traits vary with age among women? A cross-sectional investigation. *The Journal of Forensic Psychiatry & Psychology*, *33*(1), 112–129. https://doi.org/10.1080/14789949.2022.2036220

Michels, M., & Roth, M. (2021). Searching for successful psychopathy: a typological approach. *Current Psychology*. https://doi.org/10.1007/s12144-021-01864-8

Miron, C. D., Satlof-Bedrick, E., & Waller, R. (2020). Longitudinal association between callous-unemotional traits and friendship quality among adjudicated adolescents. *Journal of Adolescence*, *81*, 19–26. https://doi.org/10.1016/j.adolescence.2020.03.010

Mokros, A., Menner, B., Eisenbarth, H., Alpers, G. W., Lange, K. W., & Osterheider, M. (2008). Diminished cooperativeness of psychopaths in a prisoner's dilemma game yields higher rewards. *Journal of Abnormal Psychology*, *117*(2), 406–413. https://doi.org/10.1037/0021-843X.117.2.406

Morales-Murillo, C., Garcia-Grau, P., & Fernández-Valero, R. (2020). Interpersonal Relationships in Early Childhood. In M. P. Levine (Ed.), In *Interpersonal Relationships*. IntechOpen. https://doi.org/10.5772/intechopen.94859

Munoz, L. C., Kerr, M., & Besic, N. (2008). The peer relationships of youths with psychopathic personality traits: A matter of perspective. *Criminal Justice and Behavior*, *35*(2), 212–227. https://doi.org/10.1177/0093854807310159

Nicholls, T. L., & Petrila, J. (2005). Gender and psychopathy: an overview of important issues and introduction to the special issue. *Behavioral Sciences and the Law*, *23*(6), 729–741. https://doi.org/10.1002/bsl.677

Owens, E. S., McPharlin, F. W. H., Brooks, N., & Fritzon, K. (2018). The Effects of Empathy, Emotional Intelligence and Psychopathy on interpersonal interactions. *Psychiatry Psychology and Law*, *25*(1), 1–18. https://doi.org/10.1080/13218719.2017.1347936

Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality*, *36*(6), 556–563. https://doi.org/10.1016/S0092-6566(02)00505-6

Persson, B. N., & Lilienfeld, S. O. (2019). Social status as one key indicator of successful psychopathy: an initial empirical investigation. *Personality and Individual Differences*, *141*, 209–217. https://doi.org/10.1016/j.paid.2019.01.020

Prochazkova, E., & Kret, M. E. (2017). Connecting minds and sharing emotions through mimicry: a neurocognitive model of emotional contagion. *Neuroscience and Biobehavioral Reviews*, *80*, 99–114. https://doi.org/10.1016/j.neubiorev.2017.05.013

Reale, K. S., Bouchard, M., Lim, Y. L., Cook, A. N., & Hart, S. D. (2020). Are psychopathic Traits Associated with Core Social Networks? An exploratory study in University students. *Social Psychology Quarterly*, *83*(4), 423–442. https://doi.org/10.1177/0190272520902105

Reidy, D. E., Kearns, M. C., & DeGue, S. (2013). Reducing psychopathic violence: a review of the treatment literature. *Aggression and Violent Behavior*, *18*(5), 527–538. https://doi.org/10.1016/j.avb.2013.07.008

Sanz-García, A., Gesteira, C., Sanz, J., & García-Vera, M. P. (2021). Prevalence of psychopathy in the General Adult Population: a systematic review and Meta-analysis. *Frontiers in Psychology*, *12*, 3278. https://doi.org/10.3389/fpsyg.2021.661044

Savard, C., Sabourin, S., & Lussier, Y. (2006). Male sub-threshold psychopathic traits and couple distress. *Personality and Individual Differences*, *40*(5), 931–942. https://doi.org/10.1016/j.paid.2005.10.001

Schimmenti, A., Passanisi, A., Pace, U., Manzella, S., di Carlo, G., & Caretti, V. (2014). The relationship between attachment and psychopathy: a study with a sample of violent offenders. *Current Psychology*, *33*(3), 256–270. https://doi.org/10.1007/s12144-014-9211-z

Seara-Cardoso, A., Neumann, C., Roiser, J., McCrory, E., & Viding, E. (2012). Investigating associations between empathy, morality and psychopathic personality traits in the general population. *Personality and Individual Differences*, *52*(1), 67–71. https://doi.org/10.1016/j.paid.2011.08.029

Sedgewick, F., Leppanen, J., & Tchanturia, K. (2019). The friendship questionnaire, autism, and gender differences: a study revisited. *Molecular Autism*, *10*(40), 1–12. https://doi.org/10.1186/s13229-019-0295-z

Sest, N., & March, E. (2017). Constructing the cyber-troll: psychopathy, sadism, and empathy. *Personality and Individual Differences*, *119*, 69–72. https://doi.org/10.1016/j.paid.2017.06.038

Sethi, A., McCrory, E., Puetz, V., Hoffmann, F., Knodt, A. R., Radtke, S. R., Brigidi, B. D., Hariri, A. R., & Viding, E. (2018). Primary and secondary variants of psychopathy in a Volunteer Sample are Associated with different neurocognitive mechanisms. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, *3*(12), 1013–1021. https://doi.org/10.1016/j.bpsc.2018.04.002

Skeem, J., Johansson, P., Andershed, H., Kerr, M., & Louden, J. E. (2007). Two subtypes of psychopathic violent offenders that parallel primary and secondary variants. *Journal of Abnormal Psychology*, *116*(2), 395–409. https://doi.org/10.1037/0021-843X.116.2.395

Thompson, D. F., Ramos, C. L., & Willett, J. K. (2014). Psychopathy: clinical features,developmental basis and therapeutic challenges. *Journal of Clinical Pharmacy and Therapeutics*, *39*(5), 485–495. https://doi.org/10.1111/jcpt.12182

Unrau, A. M., & Morry, M. M. (2019). The subclinical psychopath in love: mediating effects of attachment styles. *Journal of Social and Personal Relationships*, *36*(2), 421–449. https://doi.org/10.1177/0265407517734068

van Dongen, J. D. (2020). The empathic brain of psychopaths: from Social Science to Neuroscience in Empathy. *Frontiers in Psychology*, *11*, 1664–1078. https://doi.org/10.3389/fpsyg.2020.00695

Vidal, S., Skeem, J., & Camp, J. (2010). Emotional intelligence: painting different paths for low-anxious and high-anxious psychopathic

variants. *Law and Human Behavior*, *34*(2), 150–163. https://doi.org/10.1007/s10979-009-9175-y

Viding, E., & McCrory, E. J. (2018). Understanding the development of psychopathy: progress and challenges. *Psychological Medicine*, *48*(4), 566–577. https://doi.org/10.1017/S0033291717002847

Viding, E., & McCrory, E. J. (2019). Towards understanding atypical social affiliation in psychopathy. *The Lancet Psychiatry*, *6*(5), 437–444. https://doi.org/10.1016/S2215-0366(19)30049-5

Wai, M., & Tiliopoulos, N. (2012). The affective and cognitive empathic nature of the dark triad of personality. *Personality and Individual Differences*, *52*(7), 794–799. https://doi.org/10.1016/j.paid.2012.01.008

Waller, R., Corbett, N., Raine, A., Wagner, N. J., Broussard, A., Edmonds, D., Reardon, S., Jones, C., Itkin-Ofer, M., Schell, T., & Neumann, C. S. (2021). Reduced sensitivity to Affiliation and psychopathic traits. *Personality Disorders: Theory Research and Treatment*, *12*(5), 437–447. https://doi.org/10.1037/per0000423

White, B. A. (2014). Who cares when nobody is watching? Psychopathic traits and empathy in prosocial behaviors. *Personality and Individual Differences*, *56*(1), 116–121. https://doi.org/10.1016/j.paid.2013.08.033

White, S. F., Frick, P. J., Lawing, K., & Bauer, D. (2013). Callous-unemotional traits and response to functional family therapy in adolescent offenders. *Behavioral Sciences and the Law*, *31*(2), 271–285. https://doi.org/10.1002/bsl.2041

White, S. F., Marsh, A. A., Fowler, K. A., Schechter, J. C., Adalio, C., Pope, K., & Blair, R. J. R. (2012). Reduced amygdala response in youths with disruptive behavior disorders and psychopathic traits: decreased emotional response versus increased top-down attention to nonemotional features. *American Journal of Psychiatry*, *169*(7), 750–758. https://doi.org/10.1176/appi.ajp.2012.11081270

Wynn, R., Hoiseth, & Pettersen, G. (2012). Psychopathy in women: theoretical and clinical perspectives. *International Journal of Women's Health*, *4*(1), 257. https://doi.org/10.2147/IJWH.S25518

Yildirim, B. O., & Derksen, J. J. L. (2015). Clarifying the heterogeneity in psychopathic samples: towards a new continuum of primary and secondary psychopathy. *Aggression and Violent Behavior*, *24*, 9–41. https://doi.org/10.1016/j.avb.2015.05.001

Zedaker, S. B., & Bouffard, L. A. (2017). Relationship status, romantic relationship quality, monitoring, and antisocial influence: is there an effect on subsequent Offending? *Journal of Developmental and Life-Course Criminology*, *3*(1), 62–75. https://doi.org/10.1007/s40865-017-0056-7