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Psychopathy and gaze cueing

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Abstract

Background and Objectives: Psychopathic traits – and especially callous affective features – have been linked to altered processing of others' emotional expressions, and to reduced attention to the eyes. Despite the importance of gaze cueing (i.e., the tendency to orient attention toward where someone else is looking) for social functioning, few studies have investigated relationships between psychopathic traits and gaze cueing, and whether facial emotional expression influence these relationships, obtaining mixed results. To address this gap, the present study aimed to evaluate associations between psychopathic traits and gaze cueing for emotional and neutral expressions.

Methods: 65 non-clinical male participants (M_{age} = 27.3 years) completed two self-report measures of psychopathy and performed laboratory tasks to assess gaze-cueing for emotional vs. neutral faces and an arrow-cueing task as a comparison.

Results: Linear mixed models showed no significant associations of emotional (versus neutral) expressions, or psychopathy trait dimensions, with either gaze cueing or arrow cueing.

Limitations: Reliance on a convenience sample of non-clinical men, assessed with self-reports measures of psychopathy, and using static emotional stimuli limit the generalizability of our findings.

Conclusions: Findings suggest that psychopathic traits are not associated with individual differences in following others' gaze to direct attention, and that there was no advantage for affective relative to neutral expressions.

Keywords: *psychopathic personality; egocentricity; callousness; antisocial; eye gaze; emotion*

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Psychopathy and gaze cueing

Psychopathy is a form of personality pathology of great relevance for public health and the criminal justice system due the deleterious impact it poses on society, with psychopathic traits showing strong associations with various indices of dangerousness (DeLisi, 2009; Gillespie et al., 2023; Reidy et al., 2015). There is general agreement that psychopathy is a dimensional construct that varies along a continuum in the general population (Edens et al., 2006; Guay et al., 2007), that it includes pathological traits in the interpersonal (e.g., antagonism, dominance), affective (e.g., callousness, guiltlessness), and behavioral (e.g., impulsivity, aggressiveness) domains (e.g., Cooke et al., 2004; Sellbom, 2011), and that research across any point of the continuum of severity provides insights for understanding the social, cognitive, and affective correlates of the construct (Seara-Cardoso & Viding, 2015). For the purpose of the present study, we employed the operationalization of psychopathy captured by the Levenson Self-Report Psychopathy (LSRP) scale (Levenson et al., 1995) and the Youth Psychopathic traits Inventory (YPI; Andershed et al., 2002). The LSRP operationalizes psychopathic traits along three dimensions, labeled: *egocentricity*, which involves interpersonal antagonism and manipulation; *callousness,* which entails a lack of empathy and remorse; and *antisocial*, referring to problems with anger and impulse control, but without any direct reference to overt antisociality (Brinkley et al., 2008; Sellbom, 2011). Similarly, the YPI operationalization includes conceptually similar domains, respectively capturing: grandiose-manipulative *interpersonal* traits, callous-unemotional *affective* traits, and impulsive-irresponsible *behavioral* traits (Andershed et al., 2002).

There is now a considerable body of evidence that psychopathy is associated with profound disturbances in socio-affective functioning, including emotion regulation (Garofalo, Neumann, Kosson, et al., 2020; Garofalo & Neumann, 2018), recognizing emotional facial expressions (Dawel et al., 2012), understanding others thoughts, intentions and beliefs (Song et al., 2023), automatically taking the perspective of another (Drayton et al., 2018), and differences in neurophysiology in response to others'

affective states (Gillespie et al., 2019; Jones et al., 2009; Lozier et al., 2014). It has been suggested that these problems in socio-affective functioning may, in part, help to explain why individuals with high levels of psychopathic traits show chronic and severe tendencies to harm others (Blair, 2013; Garofalo, Neumann, & Velotti, 2020; Lozier et al., 2014).

The human ability to process information from others' (emotional) expressions represents a key aspect of socio-emotional development and moral socialization. Specifically, attention to the eye region of human faces is a natural predisposition already evident in infants, and is crucial for the development of healthy communication and relational attunement, attachment, self-regulation, and empathy (Dadds et al., 2011). In this respect, research with both children and adults has shown that psychopathic traits (or child callous-unemotional traits) are associated with diminished attention to the eye region of faces (Bedford et al., 2015; Dadds et al., 2006, 2008, 2011, 2012; Demetriou & Fanti, 2021; Gehrer et al., 2021; Gillespie et al., 2015, 2017), with this effect being particularly pronounced when viewing afraid faces (Dadds et al., 2008; Gillespie et al., 2017). Further, some studies have shown that difficulties in recognizing others emotional expressions (e.g., fear) can be ameliorated by using a simple instruction to attend to the eye region (Dadds et al., 2006; Hubble et al., 2015). This suggests a potential dissociation between implicit and explicit (or automatic versus effortful) emotion processing deficits.

It is important to note that looking at others' emotional expressions can serve multiple purposes that are relevant for socio-emotional development and prosocial behavior. On the one hand, looking at the emotional expressions of others provides information about the impact of one's behavior on others, hence operating as a reinforcer (e.g., when we make others happy) or deterrent (e.g., when we make others sad) for future behavior (Blair, 2013). On the other hand, looking at others' emotional expressions can serve to communicate about potential threats in the environment, thereby allowing one to prepare for socially sensed threats (Keysers & Gazzola, 2021). Following others' eye gaze may provide important information about the environment and possible sources of risk or reward (e.g., following

one's eye gaze may reveal the precise location of a threatening stimulus). Gaze cueing, referring to the relatively automatic tendency to orient one's attention to where someone else is looking, is present in infants as young as 3 months (D'Entremont et al., 1997), and impairments in gaze cueing have been implicated in disrupted socio-affective functioning in children, and adults, with autism spectrum disorders (Freeth & Bugembe, 2019).

In experimental research, participants show difficulty suppressing the tendency to automatically follow the gaze of another, even when such cues are task irrelevant (e.g., when ignoring the direction of the eye gaze would be beneficial for task performance; see Frischen et al., 2007). Further, eye gaze cueing research has generally provided some evidence that particular emotional expressions can enhance the eye gaze cueing effect, although this effect is modulated by a variety of factors (e.g., emotional valence, cognitive control, gaze target, etc.; Bayliss et al., 2010; Dalmaso et al., 2020b; Pecchinenda et al., 2008; Pecchinenda & Petrucci, 2016). Taken together, both the direction of others' gaze, and the emotional content of the face, are consequential for human development and provide invaluable information to guide human behavior, when processed adequately.

There are theoretical and empirical reasons to expect that psychopathy – and in particular its callous, unempathetic affective features – is related to gaze cueing tendencies, and that these relations may vary as a function of emotional expressions. However, the ensuing predictions vary dependent on the theoretical perspective. As such, the present study aimed at gauging the evidence for and against the different theoretical perspectives outlined in the following paragraphs, including expectations based on each theoretical perspective.

First, a theoretical perspective posits a profound affective deficit at the core of psychopathy, with the prediction that psychopathic individuals would show either generalized (Cleckley, 1941) or specific (i.e., to fear and sadness; Blair, 2003) deficits in (facial) emotion processing (for a review, see Brook et al., 2013), although findings on facial expression recognition in psychopathic individuals are

mixed (Hoppenbrouwers et al., 2016; Olderbak et al., 2018). Accordingly, psychopathy may be linked to reduced gaze cueing when the target face is showing an emotion, if psychopathic traits are associated with an impairment in processing the affective salience of a facial cue.

Second, an alternative theoretical perspective posits that psychopathy is underpinned by a primarily cognitive deficit characterized by abnormalities in selective attention (Hamilton & Newman, 2018). This perspective would explain why – when participants' attention is manipulated towards the eye region (or other sources of emotional information) – any association between psychopathy and impairments in emotion recognition are either attenuated or disappear completely (Baskin-Sommers et al., 2011; Newman et al., 2010). According to this cognitive-attentional perspective, psychopathic individuals would be unable to process goal-irrelevant information (here, eye gaze, with or without emotional expressions) when their attention is committed to another task (here, identifying a target's location). This perspective would predict reduced gaze cueing when irrelevant for the task at hand (e.g., reduced gaze cueing when not specifically instructed to attend to the direction of the gaze), and it would predict that gaze cueing would be unaffected by the task-irrelevant emotional content of the facial expression. Of note, this perspective would also hypothesize that any cueing effect should not be specific to social stimuli like eye gaze, but also extend to non-social stimuli (e.g., arrow cueing).

Finally, developmental theory and research on callous-unemotional traits posits that reduced attention to the eye region characterizes the affective traits of psychopathy (Dadds et al., 2012). In turn, this would lead to the prediction that – because psychopathic traits are associated with reduced attention to the eyes – that they would plausibly be related to reduced gaze cueing as well. Overall, each of these theoretical perspectives would predict reduced eye gaze cueing that was advantageous to performance under conditions where the gaze cue is incongruous with the target location. Yet, the different perspectives make varying predictions based on affective processing, attentional focus, or specific impairments in attention to the eyes, respectively.

In line with contrasting theoretical predictions, the existing literature on psychopathy and gaze cueing in adults has also reported mixed findings. Dawel et al. (2015) reported that callous-unemotional traits were associated with reduced attentional cueing that extended across emotional and neutral faces as well as non-social (i.e., arrow) cueing. In contrast, Baskin-Sommers and Newman (2014) reported that psychopathic traits were associated with increased gaze cueing, and this was not affected by emotional expressions. A key distinction between these studies is that in Dawel et al.'s (2015) paradigm, participants were instructed to ignore the gaze cue and focus on identifying the target on the screen, being truthfully told that eye gaze did not predict target location. In contrast, Baskin-Sommers and Newman (2014) asked participants to only indicate the direction of the gaze, rather than to use this information to identify a target's location, hence explicitly manipulating participants' attention to the eye gaze. As such, Baskin-Sommers and Newman's (2014) study bears only indirect relevance for the present investigation.

Due to the importance of emotion processing and gaze cueing for socio-emotional development, it is imperative that the pattern of findings emerging from previous research is subject to further empirical scrutiny, in order to support or refine existing theories and inform prevention and intervention strategies. To this end, the present study sought to investigate associations between psychopathic traits and gaze cueing for neutral and emotional expressions, to examine (a) associations between psychopathic traits and gaze cueing; (b) whether these associations would be modulated by emotional vs. neutral facial expressions; and (c) whether these associations would differ from associations with arrow cueing. Arrow cueing provides a meaningful comparison because arrows are known to elicit strong and reliable attentional orienting, even when they do not predict target location (Galfano et al., 2012; Tipples, 2002), and because the cueing elicited by arrows is comparable to those observed for eye-gaze stimuli (Dalmaso et al., 2020a).

Although the mixed pattern of findings from previous studies, and competing theoretical perspectives, render the present study largely exploratory, we formulated tentative hypotheses. Specifically, consistent with most theoretical perspectives and available empirical evidence, we predicted that psychopathy would be associated with reduced gaze cueing from emotional expressions, but that this effect would be most pronounced in relation to the affective psychopathic traits. Most theories and studies implicitly or explicitly focused on the affective (callousness, lack of empathy) traits of psychopathy; hence, we expected these traits to drive the associations between psychopathy and gaze cueing. At the same time, we examined all psychopathy components to disentangle differential relationships given that they tend to show partly distinctive nomological networks (e.g., Garofalo et al., 2019; Hare & Neumann, 2008; Sellbom, 2011).

Method

Participants and Procedure

The current study was conducted in a male sample as elevations on psychopathic traits are more common in men compared to women (Hare & Neumann, 2008), and the correlates of psychopathy may differ to some extent when comparing men and women (Gillespie et al., 2021). Participants (N = 65) were recruited from the community (n = 24, 36.9%) and at the University of Amsterdam (n = 41, 63.1%). Participants were aged between 18 and 69 years (M = 27.3, SD = 11.1) and were primarily of Dutch nationality (92.3%), with other represented nationalities including German (4.6%), Spanish (1.5%), and Portuguese (1.5%). The highest level of education varied widely across participants, and included university (13.8%), university of applied sciences/college ('HBO'; 18.5%), community college ('MBO'; 10.8%), high school at pre-university level ('VWO'; 44.6%), high school at higher level ('HAVO'; 10.8%), and primary school (1.5%).

The current study was approved by the local Ethics Review Board (third author's institution). All participants provided informed consent, after which the measures described above were completed in

the same fixed order at a university laboratory. No monetary compensation was provided, but psychology students received course credit in exchange for their participation. Because sample size was not determined a-priori, we performed a sensitivity analysis in G*Power for the correlation of psychopathy with eye gaze. This showed that our sample size would be sufficiently well powered to detect an effect size of r = .24 with 80% power (p <. 05), which is in line with the small and medium effect sizes reported in previous studies (i.e., Baskin-Sommers & Newman, 2014, and Dawel et al., 2015, respectively).

Measures

Psychopathy

Psychopathy was assessed using the LSRP (Levenson et al., 1995) and the YPI (Andershed et al., 2002). The LSRP is a 26-item self-report measure developed to assess psychopathic traits in nonincarcerated populations. Each item is rated on a Likert scale (1*"disagree strongly"* to 4 *"agree strongly")*. The LSRP shows moderate concordance with other measures of psychopathy, including the Psychopathy Checklist-Revised (Hare, 2003) (Brinkley et al., 2001). Although originally devised to include two subscales (i.e., primary and secondary psychopathy), research on the factor structure of the LSRP has shown that it is best modeled with a three-factor structure, including 1) egocentric (10 items), 2) callous (4 items), and 3) antisocial (5 items) traits (Salekin et al., 2014). This 3-factor model is based on 19 of the original 26 items and has received evidence of adequate model fit and construct validity in the Dutch translation of the LSRP (Garofalo et al., 2019; Uzieblo et al., 2006), which was used in the present study. In the current study, internal consistency was α = .83 (egocentric), α = .48 (callous), and α = .63 (antisocial). Albeit low, the internal consistency coefficients of the callous and antisocial subscales are in line with previous studies and likely due to the reduced number of items and presence of reverse-keyed items in those scales (Christian & Sellbom, 2016).

The YPI is a 50-item self-report measure designed to assess psychopathic traits in youth. Items are rated on a Likert scale (1 "*does not apply at all*" to 4 "*applies very well*"). The measure consists of ten subscales that are combined into three factors: 1) grandiose-manipulative (dishonest charm, grandiosity, manipulation, lying; tot. 20 items), 2) callous-unemotional (callousness, remorselessness, unemotionality; tot. 15 items), and 3) impulsive-irresponsible (impulsiveness, irresponsibility, thrill-seeking; tot. 15 items). These three subscales had good to excellent internal consistency in this study (grandiose-manipulative: α=.90; callous-unemotional: α=.77; impulsive-irresponsible: α=.85). The YPI has been shown to correlate moderately with other indices of psychopathy in both youth (Andershed et al., 2002; Shepherd & Strand, 2016) and adults, including in the Dutch version used in the present study (Uzieblo et al., 2010).

Gaze cueing paradigm

Gaze cueing tendencies were assessed using a variation of the spatial cueing paradigm (Posner, 1980). Socio-affective stimuli were derived from the empirically validated Pictures of Facial Affect (Ekman & Friesen, 1976), which includes black and white photographs of 10 actors (equally split across biological sex), showing seven different expressions (neutral, happy, fear, anger, sadness, disgust, surprise). Manipulated intensity facial expression stimuli were created using a morphing procedure, whereby facial expression stimuli for each emotion were morphed with the equivalent neutral expression, with the emotional content gradually morphing from neutral (0%) into a full-blown emotional expression (100%), through twenty stages of five percent. We selected 70% intensity emotional expressions for use as gaze cue stimuli, as this intensity was deemed sufficient to enable perceptual differentiation between emotions, yet not to be too extreme to threaten the ecological validity of the task. Similar procedures have previously been used to create emotional expression stimuli of manipulated intensity, which have greater ecological validity, are more challenging to recognize, and are associated with a difference in eye scan paths during emotion categorization (Wells et al., 2016).

To manipulate gaze direction, the irises and pupils of the eyes were placed in, respectively, the left and right corner of the eyes using Adobe Photoshop (Adobe Systems Inc., San Jose, CA). Each trial began with the presentation of a fixation cross (600 ms), after which a face with direct gaze was presented for 900 ms. A gaze cue was then produced by replacing this stimulus with the same face with averted gaze. After the face with averted gaze had been presented for 300 ms, a target was presented (*) on either the left or right side of the face. Both the target and the stimulus face remained on the computer screen until a response was registered. Participants were asked to indicate on which side of the face the target was presented using the 'z' (left) and 'm' (right) buttons on a QWERTY-keyboard. They were truthfully told that the gaze direction of the face did not predict the target location. Participants were asked to respond as quickly and as accurately as possible. The gaze task consisted of 280 randomly ordered trials, in which all combinations of the ten actors, seven expressions, two gaze directions and two target locations were presented. The actual test phase was preceded by eight practice trials that depicted different faces than those in the test phase. Trials were separated by a 1500 ms interval, and every 70 test trials were followed by a 15 s break. Errors (1.5%), responses faster than 200 ms (2.7%) or slower than 2500 ms (0.3%), and responses ±3.24 *SD*s from the mean (1.2%) were removed from the data.

Arrow cueing paradigm

We also used a Posner-like cueing task to assess the tendency to avert visual attention towards the direction of arrows. This task was included to investigate whether the potential effect of psychopathy on reflexively following directional signals is specific to socio-affective cues (gaze), or whether this effect also extends to non-social signals. In the arrow cueing task, each trial began with a fixation cross (600 ms), followed by the presentation of a horizontal bar (600 ms). The bar was then replaced by an equally sized arrow pointing to either the left or right. After the arrow had been presented for 300 ms, a target (*) was presented on either the left or right side of the arrow. The arrow

and target remained on the screen until a response was registered. Trials were separated by a 1500 ms interval. Again, participants were instructed to indicate the location of the target as quickly and accurately as possible. The task consisted of forty trials in which all combinations of arrow direction and target location were equally represented. The task was preceded by eight practice trials. As for the gaze task, errors (1.0%), responses faster than 200 ms (4.1%) or slower than 2500 ms (0.0%), and responses ±3.24 *SD*s from the individual mean (1.0%) were not considered.

Results

All assumptions were met for both correlation analyses and linear mixed models. Table 1 shows descriptive statistics and Pearson's correlation coefficients for relationships between LSRP and YPI psychopathic traits. Scores on the LSRP egocentricity subscale were positively related to scores on the LSRP callous and antisocial subscales, but the relationship between LSRP callous and antisocial was non-significant. Scores on the YPI grandiose- manipulative, callous-unemotional, and impulsive-irresponsible subscales were all positively correlated. Across the two scales, correlations were in line with expectations that the pair of subscales capturing similar underlying constructs in the different measures would be more strongly correlated than the other pairs of subscales (i.e., LSRP egocentric and YPI grandiose-manipulation, and LSRP antisocial and YPI impulsive-irresponsibility), except for the two callousness scales (i.e., LSRP Callous and YPI callous-unemotional), which were not significantly associated with one another. Table 2 shows descriptive statistics of response times in the gaze cueing task as a function of emotion and cue type.

Table 1

Descriptive statistics and Pearson's correlation coefficients for LSRP and YPI subscales (N = 65).

Variable	1.	2.	3.	4.	5.	6.
1. LSRP Egocentric	-					
2. LSRP Callous	.33**	-				
3. LSRP Antisocial	.28*	.11	-			
4. YPI Grandiose/ manipulative	.54***	.30*	.31*	-		
5. YPI Callous Unemotional	.34**	.18	.24	.53***	-	
6. YPI Impulsive/ irresponsible	.27*	.01	.68***	.52***	.29*	-
Range in current sample	10 – 29	4 – 12	5 – 19	22 – 63	15 – 45	21 – 52
Possible range	10 – 40	4 – 16	5 – 20	20 – 80	15 – 60	15 – 60
Mean	17.60	7.66	9.94	37.29	27.23	33.29
SD	4.85	2.00	2.76	9.78	5.57	7.81

Note. LSRP = Levenson Self-Report Psychopathy scale. YPI = Youth Psychopathic traits Inventory.

Table 2

Descriptive statistics for response times (ms) on the gaze cueing task as a function of emotion and cue type (N = 65).

Cue type	Anger *M (SD)*	Disgust *M (SD)*	Fear *M (SD)*	Happy *M (SD)*	Sad *M (SD)*	Surprise *M (SD)*	Neutral *M (SD)*
Congruent	309.95 (59.04)	308.27 (60.68)	310.59 (56.95)	312.25 (64.93)	309.52 (59.96)	311.21 (60.22)	307.66 (58.33)
Incongruent	325.18 (68.20)	326.81 (70.71)	324.66 (71.26)	325.40 (69.09)	326.02 (72.01)	322.57 (67.51)	328.80 (69.14)

Manipulation check

Socio-affective cues

A paired samples *t*-test with Bias Corrected and Accelerated 95% Confidence Intervals (95% BCa CI) showed that responses were significantly quicker following a congruent (M = 309.90, SD = 58.65) relative to an incongruent (M = 325.61, SD = 68.62) gaze-cue (t = 6.80, p < .001, 95% BCa CI = -20.05, -11.29), suggesting that the gaze-cue manipulation was successful.

Arrows

A paired samples *t*-test with 95% BCa CI showed that RTs did not significantly differ following a congruent (*M* = 311.91, *SD* = 62.03) relative to an incongruent (*M* = 310.67, *SD* = 73.29) arrow-cue (*t* = 0.40, *p* = .692, 95% BCa CI = -4.44, 7.54).

Socio-affective cues

A linear mixed model with a random intercept for participant, and the factors cue type (congruent versus incongruent), and valence (affective face versus neutral), including age, and LSRP callous, egocentric, and antisocial subscale scores as covariates, and all two- and three-way interactions, was used to examine the effects of LSRP psychopathic traits on eye-gaze cueing. The ICC indicated that a multilevel model was appropriate, with the fixed effects explaining 16.7% of the variance in RTs (Marginal R^2), and the total model explaining 49.8% of the variance (Conditional R^2). The model showed that older age and greater egocentricity were associated with slower responses, but there were no other significant main-effects or interactions (see Table 3). These results suggest that LSRP psychopathic traits were not significantly associated with the congruent cue-type advantage from eye-gaze.

Table 3

Results of linear mixed model showing effects of LSRP psychopathic traits on response times for congruent and incongruent cue types from eye-gaze

Predictors	*Estimates*	*CI*	*p*
(Intercept)	165.58	64.37 – 266.80	**0.001**
Congruent [incongruent]	-13.35	-44.97 – 18.27	0.408
Face type [other]	-22.01	-46.19 – 2.18	0.074
Congruent [incongruent] * Face type [other]	9.00	-25.12 – 43.12	0.605
Age	3.68	2.29 – 5.06	**<0.001**

LSRP Egocentric	3.84	0.36 – 7.31	**0.031**
LSRP Callous-unemotional	-1.79	-10.00 – 6.42	0.669
LSRP Antisocial	0.00	-5.79 – 5.79	0.999
Congruent [incongruent] * LSRP Egocentric	0.59	-0.73 – 1.91	0.379
Congruent [incongruent] * LSRP Callous-unemotional	1.59	-1.53 – 4.70	0.317
Congruent [incongruent] * LSRP Antisocial	-1.13	-3.34 – 1.08	0.317
Face type [other] * LSRP Egocentric	0.83	-0.18 – 1.84	0.108
Face type [other] * LSRP Callous-unemotional	0.02	-2.37 – 2.41	0.989
Face type [other] * LSRP Antisocial	0.75	-0.95 – 2.44	0.388
Congruent [incongruent] * Face type [other] * LSRP Egocentric	-1.03	-2.46 – 0.39	0.156
Congruent [incongruent] * Face type [other] * LSRP Callous-unemotional	-0.34	-3.70 – 3.03	0.844
Congruent [incongruent] * Face type [other] * LSRP Antisocial	1.48	-0.91 – 3.87	0.224

Random Effects

σ^2	5447.75
$\tau_{00\ Participant}$	3598.57
ICC	0.40
$N_{\ Participant}$	65
Observations	17262
Marginal R^2 / Conditional R^2	0.167 / 0.498

Arrow cues

A linear mixed model with a random intercept for participant, and the factor cue type (congruent versus incongruent), including age, and LSRP callous, egocentric, and antisocial subscale scores as covariates, and all two-way interactions, was used to examine the effects of LSRP psychopathic traits on arrow cueing. The ICC indicated that a multilevel model was appropriate, with the fixed effects explaining 31.6% of the variance in RTs (Marginal R^2), and the total model explaining 64.7% of the variance (Conditional R^2). The model showed that older age and higher egocentricity were associated with slower responses, but there were no other significant main-effects or interactions (see Table 4). These results suggest that LSRP psychopathic traits were not significantly associated with the congruent cue-type advantage from arrows.

Table 4

Results of linear mixed model showing effects of LSRP psychopathic traits on response times for congruent and incongruent cue types from arrows

Predictors	*Estimates*	*CI*	*p*
(Intercept)	119.23	35.00 – 203.47	**.006**
Congruent [incongruent]	16.21	-5.24 – 4.33	.151
Age	4.31	3.14 – 5.48	**< .001**
LSRP Egocentric	4.48	1.61 – 7.35	**.002**
LSRP Callous-unemotional	0.16	-6.62 – 6.94	.963
LSRP Antisocial	-0.46	-5.24 – 4.33	.852
Congruent [incongruent] * LSRP Egocentric	0.37	-0.57 – 1.30	.441
Congruent [incongruent] * LSRP Callous-unemotional	0.16	-4.09 – 0.29	.088
Congruent [incongruent] * LSRP Antisocial	-1.02	-2.58 – 0.55	.203
Random Effects			
σ^2	2665.02		

$\tau_{00\ Participant}$	2505.46
ICC	0.48
$N_{\ Participant}$	65
Observations	2446
Marginal R^2 / Conditional R^2	0.316 / 0.647

Effects of YPI psychopathic traits

Socio-affective cues

A linear mixed model with a random intercept for participant, and the factors cue type (congruent versus incongruent), and valence (affective face versus neutral), including age, and YPI callous-unemotional, grandiose-manipulative, and impulsive-irresponsible subscale scores as covariates, and all two- and three-way interactions, was used to examine the effects of YPI psychopathic traits on eye-gaze cueing. The ICC indicated that a multilevel model was appropriate, with the fixed effects explaining 14.8% of the variance in RTs (Marginal R^2), and the total model explaining 49.9% of the variance (Conditional R^2). Age was associated with slower responses, but there were no other significant main-effects or interactions. Our results suggest that different YPI psychopathy trait dimensions are not associated with the congruent cue-type advantage from eye-gaze.

Table 5

Results of linear mixed model showing effects of YPI psychopathic traits on response times for congruent and incongruent cue types from eye-gaze

Predictors	*Estimates*	*CI*	*p*
(Intercept)	178.79	75.29 – 282.30	**0.001**
Congruent [incongruent]	-13.29	-47.24 – 20.66	0.443
Face type [other]	-13.61	-39.62 – 12.40	0.305
Congruent [incongruent] * Face type [other]	3.12	-36.40 – 42.64	0.877
Age	3.24	1.82 – 4.66	**<0.001**

YPI Grandiose-manipulative	-1.24	-3.41 – 0.94	0.265
YPI Callous-unemotional	2.92	-0.43 – 6.27	0.087
YPI Impulsive-irresponsible	0.58	-1.79 – 2.94	0.633
Congruent [incongruent] * YPI Grandiose-manipulative	0.64	-0.16 – 1.44	0.118
Congruent [incongruent] * YPI I Callous-unemotional	0.41	-0.83 – 1.66	0.516
Congruent [incongruent] * YPI Impulsive-irresponsible	-0.71	-1.59 – 0.17	0.114
Face type [other] * YPI Grandiose-manipulative	0.16	-0.45 – 0.77	0.607
Face type [other] * YPI Callous-unemotional	0.11	-0.84 – 1.06	0.816
Face type [other] * YPI Impulsive-irresponsible	0.14	-0.53 – 0.82	0.680
Congruent [incongruent] * Face type [other] * YPI Grandiose-manipulative	-0.70	-1.56 – 0.16	0.112
Congruent [incongruent] * Face type [other] * YPI Callous-unemotional	-0.31	-1.65 – 1.04	0.656
Congruent [incongruent] * Face type [other] * YPI Impulsive-irresponsible	0.71	-0.24 – 1.66	0.143

Random Effects

σ^2	5449.96
$\tau_{00\ Participant}$	3820.47
ICC	0.41
$N_{\ Participant}$	65
Observations	17262
Marginal R^2 / Conditional R^2	0.148 / 0.499

Arrow cues

A linear mixed model with a random intercept for participant, and the factor cue type (congruent versus incongruent), including age, and YPI callous-unemotional, grandiose-manipulative, and impulsive-irresponsible subscale scores as covariates, and all two-way interactions, was used to examine the effects of YPI psychopathic traits on arrow cueing. The ICC indicated that a multilevel model was appropriate, with the fixed effects explaining 29.9% of the variance in RTs (Marginal R^2), and the total model explaining 64.9% of the variance (Conditional R^2). Older age and higher callous-unemotionality were associated with slower responses, but there were no other significant main-effects or interactions. Our results suggest that YPI psychopathy trait dimensions are not associated with the congruent cue-type advantage from arrows. All results remained substantially unchanged after removing age as a covariate.

Table 6

Results of linear mixed model showing effects of YPI psychopathic traits on response times for congruent and incongruent cue types from arrows

Predictors	*Estimates*	*CI*	*p*
(Intercept)	139.63	53.76 – 225.51	**0.001**
Congruent [incongruent]	19.14	-4.53 – 42.80	0.113
Age	3.85	2.66 – 5.05	**<0.001**
YPI Grandiose-manipulative	-0.41	-2.21 – 1.39	0.655
YPI Callous-unemotional	3.49	0.73 – 6.26	**0.013**
YPI Impulsive-irresponsible	-0.36	-2.32 – 1.59	0.714
Congruent [incongruent] * YPI Grandiose-manipulative	-0.48	-1.04 – 0.09	0.097

Congruent [incongruent] * YPI Callous-unemotional	0.24	-0.63 – 1.10	0.589
Congruent [incongruent] * YPI Impulsive-irresponsible	-0.30	-0.92 – 0.32	0.348

Random Effects	
σ^2	2662.18
$\tau_{00\ Participant}$	2659.81
ICC	0.50
$N_{\ Participant}$	65
Observations	2446
Marginal R^2 / Conditional R^2	0.299 / 0.649

Discussion

To contribute novel insight into the socio-affective functioning of psychopathic individuals, the present study aimed to examine the association of psychopathic traits with gaze cueing, whether these effects varied with the emotional content of a cue, and whether the effects also extended to non-social cue types (i.e., arrows). Our results showed that, overall, participants were able to use gaze cues from social stimuli to identify a target's location. Crucially, psychopathic traits were not associated with the gaze cueing effect. Notably, these results were consistent across psychopathy measures, and did not differ based on the emotional vs. neutral content of the facial expression showing a gaze cue. Similarly, no significant interactive effects of psychopathic traits were observed for the arrow cueing task, operationalizing non-social cue types.

The finding that psychopathic traits were not associated with advantages in identifying a targets location following a congruent cue type suggests that although these traits are typically associated with problems in identifying the emotional content of a facial expression (Dawel et al., 2015), and a reduced tendency to fixate the eye region of emotional faces (Dadds et al., 2006, 2008; Gillespie et al., 2015,

2017), these traits did not impair nor enhance participants' ability to automatically infer a targets location based on gaze cueing information. Although others (e.g., Baskin-Sommers & Newman, 2014) have previously shown that psychopathic traits, but not externalizing features, are associated with enhanced detection of eye gaze (but not strictly a gaze cueing advantage), the nature of the task explicitly manipulated participants' attention toward the eyes (i.e., participants were asked to report the direction of the eyes gaze). Our findings suggest that gaze cueing effects occur without specifically manipulating attention toward the eyes, but that individual differences in psychopathic traits do not impact the tendency to automatically use this information to one's advantage (i.e., to identify the location of a stimulus). Interestingly, we found that the absence of gaze cueing in relation to psychopathy also extended to non-social stimuli, such as the arrow cues.

Our results also showed that the gaze cueing effects were independent of the emotional vs. neutral content of the facial stimulus. Thus, although psychopathic traits have consistently been linked with difficulties in identifying the emotional content of a facial expression (Dawel et al., 2015), and in directing attention toward the eye region (Gillespie et al., 2015), our findings suggest that these traits do not confer a disadvantage (or an advantage) in automatically using information from the eye region to infer a target's location, irrespective of the emotional content of the face showing a gaze cue. This pattern of results may have some benefits for people who score highly on psychopathy. For example, people who show these traits may have intact ability to use social information such as gaze cues to identify the location of a threat in the environment, without showing concern for the other person's affective state. The fact that the emotional content of the expression did not influence gaze cueing tendencies may be indicative of a pattern to respond equally to different socio-affective cues, irrespective of whether they signal a potential threat (i.e., in response to displays of fear).

The present study formulated tentative hypotheses but mainly took an exploratory approach to gauge the evidence in support of competing theoretical perspectives presented in the introduction. The

present findings are not fully in line with predictions from any of the three main theoretical perspectives presented in the introduction (Blair, 2013; Dadds et al., 2012; Hamilton & Newman, 2018), nor with our predictions. Evidence in support of these perspectives, and in contrast with the results reported here, has been reported in previous studies, where elevated psychopathic traits were associated with reduced gaze cueing effects from emotional expressions (Dawel et al., 2015). On balance, the two prior studies that had looked at relations between psychopathy and gaze cueing, albeit with different methodologies that bear more or less direct relevance to the present study, reported significant effects in opposed directions (Baskin-Sommers & Newman, 2014; Dawel et al., 2015). These findings should be subject to further scrutiny to investigate whether previously reported associations may have been spurious findings, or whether the present study was not able to detect those effects.

Interpretation of our results may be aided by considering theoretical and empirical reports of the relationship of psychopathy with other aspects of social cognitive functioning, most notably theory of mind. Theoretical and empirical findings have reported that people with elevated psychopathic tendencies, while typically impaired at identifying others' affective states (so called affective theory of mind), are largely able to infer other peoples' thoughts, intentions, and beliefs (so called cognitive theory of mind) (Gillespie et al., 2018; Lockwood et al., 2013; Sebastian et al., 2012; Shamay-Tsoory et al., 2010). Although this notion has been challenged in a recent meta-analysis, which showed that psychopathic traits are associated with slight impairments during both cognitive and affective theory of mind task types (Song et al., 2023), it has been shown that better socio-cognitive competencies are nonetheless associated with increased use of instrumental aggression among boys with conduct problems and callous-unemotional traits (Gillespie et al., 2018). The findings that we report here suggest that although people with elevated psychopathic traits are unable to identify others emotional states based on information conveyed specifically using the eyes (Dadds et al., 2006, 2008), they can nonetheless use cognitive information from the eyes to identify a target's location to the same extent as

people with lower levels of psychopathy. Thus, psychopathic individuals may have an intact ability to use cognitive information in a social context, despite showing deficits in processing affective information (Brook et al., 2013). Our findings may therefore have implications for understanding the use of instrumental and reactive types of aggression which are associated with the use of socio-cognitive information (Gillespie et al., 2018). When interpreting our findings it should also be considered that Olderbak et al.'s (2018) study showed that associations between psychopathy and emotion recognition are fully accounted for by general mental ability; because our sample consisted mostly of highly educated young adults, it cannot be ruled out that our findings could be partly explained by levels of general mental ability that were likely higher than levels typically reported by individuals scoring on the high end of the psychopathic continuum (e.g., incarcerated offenders).

Confidence in our findings is given by the highly powered statistical approach to detect the investigated effects, and to the consistency of the null findings across two measures of psychopathy, that is, for both the LSRP and the YPI methods of operationalization. This is especially meaningful because different conceptualizations of psychopathy – which in turn underlie different assessment methods – often capture traits that bear different relationships with some external correlates, but this was not the case for gaze cueing. In this regard, it is important to mention that the LSRP callous and the YPI callous-unemotional scales were not significantly related to one another, despite purportedly sharing conceptual overlap. The lack of correlation between the two callousness scales was surprising and could be attributed to two main reasons. First, the LSRP and YPI were originally based on different conceptualizations of psychopathy, the former aiming to distinguish purported "primary" and "secondary" psychopathic traits, and the latter aiming at paralleling three of the four factors of the Psychopathy Checklist-Revised (Hare, 2003). Second, the three-factor structure of the LSRP used in the present study was empirically derived from the original LSRP items but the original factor structure of the LSRP did not include a standalone callousness factor. In fact, the LSRP callousness scale consists only

of four reverse-keyed items and has acceptable but less convincing evidence of construct validity compared to the other two LSRP scales (Christian & Sellbom, 2016; Garofalo et al., 2019). Concretely, these reasons reflect substantial differences in the item content of the two callousness scales, despite the similar names. For example, one key difference between the two scales is that the YPI, but not the LSRP, emphasizes unemotionality within its items. More generally, while the YPI subscale includes items capturing remorselessness and unemotionality alongside callousness, the LSRP items capture (not) taking into account others' rights and feelings (three out of four items) and lying. The consistency of findings across different assessment methods may reassure about the lack of meaningful relations between callousness traits and gaze cueing irrespective of the way they are measured.

Limitations of the present study need to be acknowledged. First, the relatively small sample size calls for replication in broader samples. Relatedly, the relatively low number of trials limited the reliability of the task, which could be remedied in future studies by using extended assessment methods, although the linear mixed modelling approach used in the present study partially tempers this concern. In addition, future studies should examine the impact of general mental ability (Olderbak et al., 2018; Smeijers et al., 2020) in the relationship between psychopathy and gaze cueing. Second, the choice to focus only on male participants may have influenced the results given that men, on average, are less sensitive to eye gaze than women (Bayliss et al., 2005). Third, our task only included static emotional expressions (i.e., expressions that would appear from the beginning of picture presentation), reducing ecological validity (Dalmaso et al., 2020b). Fourth, the assessment of psychopathy relied exclusively on self-reports, even though these were examined in association with a laboratory task and therefore, shared method variance did not bias the main hypotheses testing. Finally, the relatively low inter-correlations between psychopathy subscales may be due to range restriction in scores that may have unduly influenced the results.

Keeping these limitations in mind, the present study provided tentative evidence that psychopathic traits are unrelated to individual differences in the tendency to follow gaze cues, with the potential advantage of identifying potential threats in the environment to a usual extent. Emotional displays did not alter this association, suggesting that processing facial emotional information does not impair nor enhance the gaze cueing tendencies in relation to psychopathic traits. Subject to replication, our findings may call for some reconsideration of gaze cueing effects in psychopathy, and should lead to refinements in theoretical arguments, given that our results do not fit with any mainstream theoretical prediction.

References

Andershed, H., Kerr, M., Stattin, H., & Levander, S. (2002). Psychopathic traits in non-referred youths: A new assessment tool. In E. Blaauw & L. Sheridan (Eds.), *Psychopaths: Current international perspectives*. Elsevier.

Baskin-Sommers, A. R., Curtin, J. J., & Newman, J. P. (2011). Specifying the attentional selection that moderates the fearlessness of psychopathic offenders. *Psychological Science*, *22*(2), 226–234. https://doi.org/10.1177/0956797610396227

Baskin-Sommers, A. R., & Newman, J. P. (2014). Psychopathic and externalizing offenders display dissociable dysfunctions when responding to facial affect. *Personality Disorders: Theory, Research, and Treatment*, *5*(4), 369–379. https://doi.org/10.1037/per0000077

Bayliss, A. P., di Pellegrino, G., & Tipper, S. P. (2005). Sex differences in eye gaze and symbolic cueing of attention. *The Quarterly Journal of Experimental Psychology Section A*, *58*(4), 631–650. https://doi.org/10.1080/02724980443000124

Bayliss, A. P., Schuch, S., & Tipper, S. P. (2010). Gaze cueing elicited by emotional faces is influenced by affective context. *Visual Cognition*, *18*(8), 1214–1232. https://doi.org/10.1080/13506285.2010.484657

Bedford, R., Pickles, A., Sharp, H., Wright, N., & Hill, J. (2015). Reduced Face Preference in Infancy: A Developmental Precursor to Callous-Unemotional Traits? *Biological Psychiatry*, *78*(2), 144–150. https://doi.org/10.1016/j.biopsych.2014.09.022

Blair, R. J. R. (2003). Neurobiological basis of psychopathy. *The British Journal of Psychiatry*, *182*(1), 5–7. https://doi.org/10.1192/bjp.182.1.5

Blair, R. J. R. (2013). Psychopathy: Cognitive and neural dysfunction. *Dialogues in Clinical Neuroscience*, *15*(2), 181–190. https://doi.org/ttps://doi.org/10.31887/DCNS.2013.15.2/rblair

Brinkley, C. A., Diamond, P. M., Magaletta, P. R., & Heigel, C. P. (2008). Cross-Validation of Levenson's Psychopathy Scale in a Sample of Federal Female Inmates. *Assessment*, *15*(4), 464–482. https://doi.org/10.1177/1073191108319043

Brinkley, C. A., Schmitt, W. A., Smith, S. S., & Newman, J. P. (2001). Construct validation of a self-report psychopathy scale: Does Levenson's self-report psychopathy scale measure the same constructs as Hare's psychopathy checklist-revised? *Personality and Individual Differences*, *31*(7), 1021–1038. https://doi.org/10.1016/S0191-8869(00)00178-1

Brook, M., Brieman, C. L., & Kosson, D. S. (2013). Emotion processing in Psychopathy Checklist-assessed psychopathy: A review of the literature. *Clinical Psychology Review*, *33*(8), 979–995. https://doi.org/10.1016/j.cpr.2013.07.008

Christian, E., & Sellbom, M. (2016). Development and Validation of an Expanded Version of the Three-Factor Levenson Self-Report Psychopathy Scale. *Journal of Personality Assessment*, *98*(2), 155–168. https://doi.org/10.1080/00223891.2015.1068176

Cleckley, H. (1941). *The mask of sanity*. Mosby.

Cooke, D. J., Michie, C., Hart, S. D., & Clark, D. A. (2004). Reconstructing psychopathy: Clarifying the significance of antisocial and socially deviant behavior in the diagnosis of psychopathic personality disorder. *Journal of Personality Disorders*, *18*(4), 337–357. https://doi.org/10.1521/pedi.18.4.337.40347

Dadds, M. R., Allen, J. L., Oliver, B. R., Faulkner, N., Legge, K., Moul, C., Woolgar, M., & Scott, S. (2012). Love, eye contact and the developmental origins of empathy v. Psychopathy. *British Journal of Psychiatry*, *200*(3), 191–196. https://doi.org/10.1192/bjp.bp.110.085720

Dadds, M. R., El Masry, Y., Wimalaweera, S., & Guastella, A. J. (2008). Reduced eye gaze explains "fear blindness" in childhood psychopathic traits. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(4), 455–463. https://doi.org/10.1097/CHI.0b013e31816407f1

Dadds, M. R., Jambrak, J., Pasalich, D., Hawes, D. J., & Brennan, J. (2011). Impaired attention to the eyes of attachment figures and the developmental origins of psychopathy. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *52*(3), 238–245. https://doi.org/10.1111/j.1469-7610.2010.02323.x

Dadds, M. R., Perry, Y., Hawes, D. J., Merz, S., Riddell, A. C., Haines, D. J., Solak, E., & Abeygunawardane, A. I. (2006). Attention to the eyes and fear-recognition deficits in child psychopathy. *The British Journal of Psychiatry: The Journal of Mental Science*, *189*, 280–281. https://doi.org/10.1192/bjp.bp.105.018150

Dalmaso, M., Castelli, L., & Galfano, G. (2020a). Early saccade planning cannot override oculomotor interference elicited by gaze and arrow distractors. *Psychonomic Bulletin & Review*, *27*(5), 990–997. https://doi.org/10.3758/s13423-020-01768-x

Dalmaso, M., Castelli, L., & Galfano, G. (2020b). Social modulators of gaze-mediated orienting of attention: A review. *Psychonomic Bulletin & Review*, *27*(5), 833–855. https://doi.org/10.3758/s13423-020-01730-x

Dawel, A., McKone, E., O'Kearney, R., Sellbom, M., Irons, J., & Palermo, R. (2015). Elevated levels of callous unemotional traits are associated with reduced attentional cueing, with no specificity for fear or eyes. *Personality Disorders*, *6*(3), 216–228. https://doi.org/10.1037/per0000108

Dawel, A., O'Kearney, R., McKone, E., & Palermo, R. (2012). Not just fear and sadness: Meta-analytic evidence of pervasive emotion recognition deficits for facial and vocal expressions in psychopathy. *Neuroscience and Biobehavioral Reviews*, *36*(10), 2288–2304. https://doi.org/10.1016/j.neubiorev.2012.08.006

DeLisi, M. (2009). Psychopathy is the Unified Theory of Crime. *Youth Violence and Juvenile Justice*, *7*(3), 256–273. https://doi.org/10.1177/1541204009333834

Demetriou, C. A., & Fanti, K. A. (2021). Are Children High on Callous-Unemotional Traits Emotionally Blind? Testing Eye-Gaze Differences. *Child Psychiatry and Human Development*. https://doi.org/10.1007/s10578-021-01152-3

D'Entremont, B., Hains, S. M. J., & Muir, D. W. (1997). A demonstration of gaze following in 3- to 6-month-olds. *Infant Behavior and Development*, *20*(4), 569–572. https://doi.org/10.1016/S0163-6383(97)90048-5

Drayton, L. A., Santos, L. R., & Baskin-Sommers, A. (2018). Psychopaths fail to automatically take the perspective of others. *PNAS Proceedings of the National Academy of Sciences of the United States of America*, *115*(13), 3302–3307. https://doi.org/10.1073/pnas.1721903115

Edens, J. F., Marcus, D. K., Lilienfeld, S. O., & Poythress, N. G., Jr. (2006). Psychopathic, not psychopath: Taxometric evidence for the dimensional structure of psychopathy. *Journal of Abnormal Psychology*, *115*(1), 131–144. https://doi.org/10.1037/0021-843X.115.1.131

Ekman, P., & Friesen, W. V. (1976). *Pictures of Facial Affect*. Consulting Psychologists Press.

Freeth, M., & Bugembe, P. (2019). Social partner gaze direction and conversational phase; factors affecting social attention during face-to-face conversations in autistic adults? *Autism*, *23*(2), 503–513. https://doi.org/10.1177/1362361318756786

Frischen, A., Bayliss, A. P., & Tipper, S. P. (2007). Gaze cueing of attention: Visual attention, social cognition, and individual differences. *Psychological Bulletin*, *133*(4), 694–724. https://doi.org/10.1037/0033-2909.133.4.694

Galfano, G., Dalmaso, M., Marzoli, D., Pavan, G., Coricelli, C., & Castelli, L. (2012). Eye gaze cannot be ignored (but neither can arrows). *Quarterly Journal of Experimental Psychology (2006)*, *65*(10), 1895–1910. https://doi.org/10.1080/17470218.2012.663765

Garofalo, C., & Neumann, C. S. (2018). Psychopathy and Emotion Regulation: Taking Stock and Moving Forward. In M. DeLisi (Ed.), *Routledge International Handbook of Psychopathy and Crime* (pp. 76–97). Routledge.

Garofalo, C., Neumann, C. S., Kosson, D. S., & Velotti, P. (2020). Psychopathy and emotion dysregulation: More than meets the eye. *Psychiatry Research*, *290*, 113160. https://doi.org/10.1016/j.psychres.2020.113160

Garofalo, C., Neumann, C. S., & Velotti, P. (2020). Psychopathy and Aggression: The Role of Emotion Dysregulation. *Journal of Interpersonal Violence*, 0886260519900946. https://doi.org/10.1177/0886260519900946

Garofalo, C., Noteborn, M. G. C., Sellbom, M., & Bogaerts, S. (2019). Factor Structure and Construct Validity of the Levenson Self-Report Psychopathy Scale (LSRP): A Replication and Extension in Dutch Nonclinical Participants. *Journal of Personality Assessment*, *101*(5), 481–492. https://doi.org/10.1080/00223891.2018.1519830

Gehrer, N. A., Zajenkowska, A., Bodecka, M., & Schönenberg, M. (2021). Attention orienting to the eyes in violent female and male offenders: An eye-tracking study. *Biological Psychology*, *163*, 108136. https://doi.org/10.1016/j.biopsycho.2021.108136

Gillespie, S. M., Garofalo, C., & Centifanti, L. C. M. (2021). Variants of psychopathy in male and female civil psychiatric patients: Latent profile analyses of the MacArthur violence risk dataset. *Journal of Criminal Justice*, *72*, 101748. https://doi.org/10.1016/j.jcrimjus.2020.101748

Gillespie, S. M., Jones, A., & Garofalo, C. (2023). Psychopathy and dangerousness: An umbrella review and meta-analysis. *Clinical Psychology Review*, *100*, 102240. https://doi.org/10.1016/j.cpr.2022.102240

Gillespie, S. M., Kongerslev, M. T., Sharp, C., Bo, S., & Abu-Akel, A. M. (2018). Does Affective Theory of Mind Contribute to Proactive Aggression in Boys with Conduct Problems and Psychopathic Tendencies? *Child Psychiatry and Human Development*, *49*(6), 906–916. https://doi.org/10.1007/s10578-018-0806-8

Gillespie, S. M., Rotshtein, P., Beech, A. R., & Mitchell, I. J. (2017). Boldness psychopathic traits predict reduced gaze toward fearful eyes in men with a history of violence. *Biological Psychology*, *128*, 29–38. https://doi.org/10.1016/j.biopsycho.2017.07.003

Gillespie, S. M., Rotshtein, P., Chapman, H., Brown, E., Beech, A. R., & Mitchell, I. J. (2019). Pupil reactivity to emotional faces among convicted violent offenders: The role of psychopathic traits. *Journal of Abnormal Psychology*, *128*(6), 622–632. https://doi.org/10.1037/abn0000445

Gillespie, S. M., Rotshtein, P., Wells, L. J., Beech, A. R., & Mitchell, I. J. (2015). Psychopathic traits are associated with reduced attention to the eyes of emotional faces among adult male non-offenders. *Frontiers in Human Neuroscience*, *9*. https://doi.org/10.3389/fnhum.2015.00552

Guay, J.-P., Ruscio, J., Knight, R. A., & Hare, R. D. (2007). A taxometric analysis of the latent structure of psychopathy: Evidence for dimensionality. *Journal of Abnormal Psychology*, *116*(4), 701–716. https://doi.org/10.1037/0021-843X.116.4.701

Hamilton, R. B., & Newman, J. P. (2018). The response modulation hypothesis: Formulation, development, and implications for psychopathy. In C. J. Patrick (Ed.), *Handbook of psychopathy, 2nd ed* (pp. 80–93). The Guilford Press.

Hare, R. D. (2003). *Manual for the Psychopathy Checklist-Revised* (2nd ed.). Multi-Health System.

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

Hoppenbrouwers, S. S., Bulten, B. H., & Brazil, I. A. (2016). Parsing fear: A reassessment of the evidence for fear deficits in psychopathy. *Psychological Bulletin*, *142*(6), 573–600. https://doi.org/10.1037/bul0000040

Hubble, K., Bowen, K. L., Moore, S. C., & van Goozen, S. H. M. (2015). Improving negative emotion recognition in young offenders reduces subsequent crime. *PLoS ONE*, *10*(6). https://doi.org/10.1371/journal.pone.0132035

Jones, A. P., Laurens, K. R., Herba, C. M., Barker, G. J., & Viding, E. (2009). Amygdala hypoactivity to fearful faces in boys with conduct problems and callous-unemotional traits. *The American Journal of Psychiatry*, *166*(1), 95–102. https://doi.org/10.1176/appi.ajp.2008.07071050

Keysers, C., & Gazzola, V. (2021). Emotional contagion: Improving survival by preparing for socially sensed threats. *Current Biology*, *31*(11), R728–R730. https://doi.org/10.1016/j.cub.2021.03.100

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

Lockwood, P. L., Bird, G., Bridge, M., & Viding, E. (2013). Dissecting empathy: High levels of psychopathic and autistic traits are characterized by difficulties in different social information processing domains. *Frontiers in Human Neuroscience*, *7*, 760. https://doi.org/10.3389/fnhum.2013.00760

Lozier, L. M., Cardinale, E. M., VanMeter, J. W., & Marsh, A. A. (2014). Mediation of the relationship between callous-unemotional traits and proactive aggression by amygdala response to fear among children with conduct problems. *JAMA Psychiatry*, *71*(6), 627–636. https://doi.org/10.1001/jamapsychiatry.2013.4540

Newman, J. P., Curtin, J. J., Bertsch, J. D., & Baskin-Sommers, A. R. (2010). Attention moderates the fearlessness of psychopathic offenders. *Biological Psychiatry*, *67*(1), 66–70. https://doi.org/10.1016/j.biopsych.2009.07.035

Olderbak, S. G., Mokros, A., Nitschke, J., Habermeyer, E., & Wilhelm, O. (2018). Psychopathic men: Deficits in general mental ability, not emotion perception. *Journal of Abnormal Psychology*, *127*(3), 294–304. https://doi.org/10.1037/abn0000340

Pecchinenda, A., Pes, M., Ferlazzo, F., & Zoccolotti, P. (2008). The combined effect of gaze direction and facial expression on cueing spatial attention. *Emotion*, *8*(5), 628–634. https://doi.org/10.1037/a0013437

Pecchinenda, A., & Petrucci, M. (2016). Emotion Unchained: Facial Expression Modulates Gaze Cueing under Cognitive Load. *PLOS ONE*, *11*(12), e0168111. https://doi.org/10.1371/journal.pone.0168111

Posner, M. I. (1980). Orienting of attention. *The Quarterly Journal of Experimental Psychology*, *32*(1), 3–25. https://doi.org/10.1080/00335558008248231

Reidy, D. E., Kearns, M. C., DeGue, S., Lilienfeld, S. O., Massetti, G., & Kiehl, K. A. (2015). Why psychopathy matters: Implications for public health and violence prevention. *Aggression and Violent Behavior*, *24*, 214–225. https://doi.org/10.1016/j.avb.2015.05.018

Salekin, R. T., Andershed, H., & Clark, A. P. (2018). Psychopathy in children and adolescents: Assessment and critical questions regarding conceptualization. In C. J. Patrick (Ed.), *Handbook of Psychopathy* (2nd ed., pp. 479–508). Guilford.

Salekin, R. T., Chen, D. R., Sellbom, M., Lester, W. S., & MacDougall, E. (2014). Examining the factor structure and convergent and discriminant validity of the Levenson Self-Report Psychopathy Scale: Is the two-factor model the best fitting model? *Personality Disorders: Theory, Research, and Treatment*, *5*(3), 289–304. https://doi.org/10.1037/per0000073

Seara-Cardoso, A., & Viding, E. (2015). Functional Neuroscience of Psychopathic Personality in Adults. *Journal of Personality*, *83*(6), 723–737. https://doi.org/10.1111/jopy.12113

Sebastian, C. L., McCrory, E. J. P., Cecil, C. A. M., Lockwood, P. L., De Brito, S. A., Fontaine, N. M. G., & Viding, E. (2012). Neural Responses to Affective and Cognitive Theory of Mind in Children With Conduct Problems and Varying Levels of Callous-Unemotional Traits. *Archives of General Psychiatry*, *69*(8), 814–822. https://doi.org/10.1001/archgenpsychiatry.2011.2070

Sellbom, M. (2011). Elaborating on the construct validity of the Levenson self-report psychopathy scale in incarcerated and non-incarcerated samples. *Law and Human Behavior*, *35*(6), 440–451. https://doi.org/10.1007/s10979-010-9249-x

Sellbom, M., Lilienfeld, S. O., Fowler, K. A., & McCray, K. L. (2018). The self-report assessment of psychopathy: Challenges, pitfalls, and promises. In C. J. Patrick (Ed.), *Handbook of psychopathy* (2nd ed.). Guilford.

Shamay-Tsoory, S. G., Harari, H., Aharon-Peretz, J., & Levkovitz, Y. (2010). The role of the orbitofrontal cortex in affective theory of mind deficits in criminal offenders with psychopathic tendencies. *Cortex*, *46*(5), 668–677. https://doi.org/10.1016/j.cortex.2009.04.008

Shepherd, S. M., & Strand, S. (2016). The utility of the Psychopathy Checklist: Youth Version (PCL: YV) and the Youth Psychopathic Trait Inventory (YPI)—Is it meaningful to measure psychopathy in young offenders? *Psychological Assessment*, *28*(4), 405–415. https://doi.org/10.1037/pas0000182

Smeijers, D., Benbouriche, M., & Garofalo, C. (2020). The Association Between Emotion, Social Information Processing, and Aggressive Behavior: A Systematic Review. *European Psychologist*, *25*(2), 81–91. https://doi.org/10.1027/1016-9040/a000395

Song, Z., Jones, A., Corcoran, R., Daly, N., Abu-Akel, A., & Gillespie, S. M. (2023). Psychopathic traits and theory of mind task performance: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*, *151*, 105231. https://doi.org/10.1016/j.neubiorev.2023.105231

Tipples, J. (2002). Eye gaze is not unique: Automatic orienting in response to uninformative arrows. *Psychonomic Bulletin & Review*, *9*(2), 314–318. https://doi.org/10.3758/BF03196287

Uzieblo, K., Verschuere, B., & Crombez, G. (2006). *The Dutch translation of Levenson's Self Report of Psychopathy*. Ghent: University of Ghent.

Uzieblo, K., Verschuere, B., Van den Bussche, E., & Crombez, G. (2010). The validity of the psychopathic personality inventory—Revised in a community sample. *Assessment*, *17*(3), 334–346. https://doi.org/10.1177/1073191109356544

Wells, L. J., Gillespie, S. M., & Rotshtein, P. (2016). Identification of Emotional Facial Expressions: Effects of Expression, Intensity, and Sex on Eye Gaze. *PLOS ONE*, *11*(12), e0168307. https://doi.org/10.1371/journal.pone.0168307

Psychopathy and gaze cueing

Highlights

- Socio-affective functioning is central to psychopathy
- Associations between psychopathic traits and gaze cueing are debated
- Psychopathic traits were associated with intact gaze cueing tendency
- Emotional vs. neutral expression did not alter the results

Psychopathy and gaze cueing

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