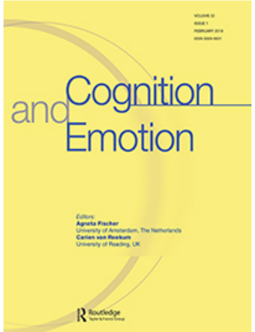

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BRIEF ARTICLE

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Emotional capture by fearful expressions varies with psychopathic traits

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ABSTRACT
Task-irrelevant emotional expressions are known to capture attention, with the extent of "emotional capture" varying with psychopathic traits in antisocial samples. We investigated whether this variation extends throughout the continuum of psychopathic traits (and co-occurring trait anxiety) in a community sample. Participants ($N = 85$) searched for a target face among facial distractors. As predicted, angry and fearful faces interfered with search, indicated by slower reaction times relative to neutral faces. When fear appeared as either target or distractor, diminished emotional capture was seen with increasing affective-interpersonal psychopathic traits. However, moderation analyses revealed that this was only when lifestyle-antisocial psychopathic traits were low, consistent with evidence suggesting that these two facets of psychopathic traits display opposing relationships with emotional reactivity. Anxiety did not show the predicted relationships with emotional capture effects. Findings show that normative variation in high-level individual differences in psychopathic traits influence automatic bias to emotional stimuli.

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Emotional capture; attention; psychopathic traits; anxiety

There is now a large body of research showing that threat-related stimuli have a tendency to attract visual attention (e.g. Cisler, Bacon, & Williams, 2009). Recent work has shown that attentional capture by emotion ("emotional capture") occurs in response to task-irrelevant facial expressions (see Carreité, 2014, for a review), and occurs irrespective of whether emotion is presented in a target location or as a peripheral distractor (Hodsoll, Viding, & Lavie, 2011). Thus, emotional capture occurs both when attention is allocated endogenously during search, and when attention is automatically reoriented by an emotional distractor.

Individuals high in psychopathic traits show atypical processing of affective stimuli. Psychopathy is typically conceptualised as comprising two correlated but separable facets: affective-interpersonal traits include shallow affect, deceptiveness, low guilt and empathy; while lifestyle-antisocial traits include antisocial, impulsive and irresponsible behaviour (Blair & Viding, 2008; Hare, 2003). High levels of affective-interpersonal psychopathic traits have been repeatedly associated with fearlessness and diminished reactivity to others' emotions; particularly fear (Blair, 2015). Thus individuals high in these traits are often characterised as having a fundamental fear deficit (Blair et al., 2004; Veit et al., 2013). An alternative line of enquiry suggests that these individuals are characterised by a more general information processing deficit. According to the Response Modulation Theory (Newman & Lorenz, 2003), individuals high in psychopathic traits have difficulty shifting attention from goal-relevant information in order to monitor and potentially use other important information. More recently, affective and attention-based theories of psychopathy have been integrated in the Impaired Integration Model (Hamilton, Hiatt Racer, & Newman, 2015), which proposes that abnormalities in neural connectivity lead to difficulties in binding different stimulus features into a unified percept. As a consequence, fewer attentional resources are available to

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be "captured" by complex, peripheral or less relevant stimuli.

According to this formulation, psychopathic traits should be associated with emotion-specific deficits if emotional stimuli are multidimensional or secondary to the current attentional focus (Hamilton et al., 2015). Recent work is in line with this account. For example, a study in adolescents with high levels of callous-unemotional traits (similar to adult affective-interpersonal traits) demonstrated reduced emotional capture in this group by task-irrelevant emotional expressions, regardless of whether the emotion appeared as target or distractor (Hodsoll, Lavie, & Viding, 2014). This suggests a deficit in automatic or "bottom-up" allocation of attention to emotion in an extreme sample regardless of whether the spatial focus of attention is oriented towards the affective stimulus. This is in line with several recent studies suggesting that individuals high in affective-interpersonal/callous-unemotional traits show reduced automatic orienting to emotional stimuli (e.g. Sylvers, Brennan, & Lilienfeld, 2011; Verona, Sprague, & Sadeh, 2012).

Research has shown that psychopathic traits are continuously distributed throughout the population (Paulhus, Neumann & Hare, in press), and that emotional processing varies with levels of these traits (e.g. Seara-Cardoso, Neumann, Roiser, McCrory, & Viding, 2012). However, few studies have investigated whether bottom-up attentional emotional processing varies continuously with these traits in an adult community sample. Carolan, Jaspers-Fayer, Asmaro, Douglas, and Liotti (2014) compared community samples selected for high and low levels of psychopathic traits using Electroencephalography (EEG) during an emotional Stroop task. No behavioural differences were found between the groups, but EEG evidence was suggestive of decreased emotional capture in the group with high levels of psychopathic traits. Relatedly, Anderson and Stanford (2012) found reduced emotion-dependent effects on event-related potentials on an emotional picture-viewing task as a function of psychopathic traits. However, it is unclear whether behavioural (as opposed to neural) effects reported with individuals sampled from the extreme end of the continuum extend continuously throughout the population in addition to in pre-selected groups.

In contrast to affective-interpersonal traits, lifestyle-antisocial traits are associated with increased emotional reactivity to negative stimuli in both clinical (Hicks & Patrick, 2006) and general (Seara-Cardoso et al., 2012) samples. Psychopathic traits also often co-occur with trait anxiety, with anxiety levels particularly associated with antisocial behaviour dimensions of psychopathy (e.g. Ali, Amorim, & Chamorro-Premuzic, 2009). Relatedly, some researchers distinguish between "primary" and "secondary" psychopathy. Compared to primary psychopaths, secondary psychopaths have been characterised as more anxious, fearful, impulsive and reactively aggressive (Ali et al., 2009). Although these high-anxious secondary subtypes show equivalent levels of affective-interpersonal traits to low-anxious primary subtypes, they show hypervigilant attentional orienting to negative emotion, while primary psychopaths show reduced orienting (e.g. Zeier & Newman, 2013). Studies investigating anxiety in isolation generally find it to be associated with a hypervigilant attentional system, including an increased tendency to orient attention towards fearful and angry expressions (Richards, Benson, Donnelly, & Hadwin, 2014).

Thus, both trait anxiety and lifestyle-antisocial traits are associated with hypervigilant attention and emotional hyperreactivity, while affective-interpersonal traits are associated with emotional hyporeactivity, particularly to fear (Blair et al., 2004). Several recent studies have revealed distinct, opposing contributions of affective-interpersonal and lifestyle-antisocial components to emotional reactivity within the same individuals, particularly when unique variance associated with each trait is inspected after controlling for the other. Effects have been seen both in clinical/subclinical (Hicks & Patrick, 2006; Sebastian et al., 2012) and community (Carré, Hyde, Neumann, Viding, & Hariri, 2013; Hodsoll, unpublished thesis; Seara-Cardoso et al., 2012) samples. For example, Seara-Cardoso et al. (2012), found that unique variance associated with affective-interpersonal traits was associated with lower propensity to feel empathic concern, whereas unique variance associated with lifestyle-antisocial traits was associated with greater propensity to feel concern for the distress of others within the same individuals. Moreover, one recent study in a community sample found an interaction between these traits on a decision-making task in the presence of emotional pictures, such that reduced distraction by emotion was associated with higher affective-interpersonal traits (specifically "fearlessness") only when participants scored low on "carefree non-planfulness", related to impulsivity (Maes & Brazil, 2015).

We extend this literature to explore relationships between emotional capture (i.e. variation in reaction times (RTs) attributable to attention capture by emotional stimuli) and affective-interpersonal, lifestyle-antisocial and anxious traits in an adult community sample. Based on previous research we predicted that affective-interpersonal traits would be negatively associated with emotional capture (across distractors and targets). Given previous work suggesing reduced automatic orienting of attention to emotion, particularly fear, in individuals high in affective-interpersonal psychopathic traits (Sylvers et al., 2011), we predicted that effects would be strongest in the presence of fearful faces. We additionally predicted that lifestyle-antisocial and anxious traits would be positively associated with emotional capture. In line with recent preliminary evidence suggesting an interaction between psychopathic traits in their effects on emotional distraction (Maes & Brazil, 2015), we also predicted that affective-interpersonal traits would only be associated with emotional capture where lifestyle-antisocial traits and/or anxiety are low.

Method

Participants

Eighty-five university students (33 males) aged 18–35 ($M = 20.86$, $SD = 3.05$) were recruited from Royal Holloway University of London, and received course-credit or £3 for participation. The study complied with APA ethical standards and there were no exclusion criteria. A power analysis indicated that 82 participants were needed to have 80% power for detecting an effect size of 0.30 (based on the average effect size attained by Hodsoll et al., 2014) when employing the traditional $\alpha = .05$ criterion of statistical significance.

Stimuli and procedure

Task procedures and design followed Hodsoll et al. (2011). The experiment was conducted using a 15-inch Windows laptop. Viewing distance (60 cm) was maintained with a chin-rest. Stimuli consisted of 12 grey-scale faces of six (three female and three male) identities from the NimStim (http://www.macbrain.org/resources.htm). Each face measured 2.1 cm by 1.7 cm. Faces were presented on a black background in a virtual triangle with the centre of each image placed at 1.3 cm from the central fixation cross. Fixation was presented for 500 ms followed by the search displays, presented until the participant responded or for up to 3 seconds.

On each trial participants saw three faces, and searched for one target face among two distractors. The target was either male amongst female distractors or vice versa: target gender was randomly allocated across participants. Participants indicated with a key press whether the target tilted (15°) to the left or right. Error feedback was given by a short tone. Participants completed three blocks (angry, fearful and happy, with order counterbalanced across participants) of 96 trials, preceded by 24 practice trials. Within each block, an emotional face was present on 72 trials. Of these, 24 contained an emotional target and 48 contained an emotional distractor. The remaining 24 trials consisted of all-neutral faces. Trial order, location of specific identities and stimulus orientation were randomised. Facial identities were also randomised, with the constraint that target faces did not repeat on two successive trials. The task was presented using Delosis Psytools (Delosis, London) and was on average 8 minutes long (duration varied due to the self-paced nature of the task). RTs and error rates were measured, RTs 2.5 standard deviations above and below each participant's mean were removed.

Assessment of psychopathic traits

The Self-Report Psychopathy Scale-III Short Form (SRP-III-SF; Paulhus et al., in press) is a 29-item measure assessing psychopathic traits in non-incarcerated populations. The SRP-III-SF uses 29 of the 64 items from the SRP and is correlated 0.92 with the full version (Paulhus et al., in press). Like the Psychopathy Checklist-Revised (PCL-R), the SRP-III-SF is organised into four facets – interpersonal, affective, lifestyle and antisocial, which are modelled into two factors; core interpersonal and affective features of psychopathy ("affective-interpersonal") and antisocial traits and impulsive lifestyle ("lifestyle-antisocial"). Items are rated on a 5-point Likert scale, with total score indicating overall levels of psychopathic personality traits. The maximum possible SRP-III-SF total score is 145. The SRP has shown evidence of good construct validity and reliability in community samples (Carré et al., 2013; Paulhus, Neumann, & Hare, in press; see Gordts, Uzieblo, Neumann, Van den Bussche, & Rossi, 2015, for a discussion on the psychometric properties of the SRP) and strongly correlates with the PCL-R (Paulhus et al., in press). In the present sample, SRP-III-SF total scores ranged between 29 and 101 ($M = 52.50$; $SD = 14.03$), affective-interpersonal scores ranged between 14 and 49 ($M = 24.78$; $SD = 8.89$), lifestyle-antisocial scores varied between 14 and 47

($M = 24.02$; $SD = 6.54$), thus presenting a similar distribution to a previously reported distribution from a larger sample of adults from the general population (Seara-Cardoso et al., 2012). Cronbach's alpha for the total SRP scale was 0.88, comparable to that found in a larger sample ($\alpha = 0.84$; Gordts et al., 2015). For the subscales, alpha coefficients were 0.86 for affective-interpersonal facet and 0.75 for the lifestyle-antisocial facet, demonstrating good internal consistency. For the calculation of the lifestyle-antisocial facet, the item "I was convicted of a serious crime" was not included in the score as this was directed at offenders (Paulhus et al., in press).

Assessment of anxiety

The State-Trait Anxiety Inventory (STAI; Spielberger, Gorssuch, Lushene, Vagg, & Jacobs, 1983) was used, which comprises of two subscales containing 20 items each, rated on a four-point scale. The State Anxiety scale evaluates the current state of anxiety, asking how respondents feel "right now", whereas the Trait Anxiety scale evaluates relatively stable aspects of anxiety, asking respondents how they feel "generally". Internal consistency coefficients have been high for the scale; ranging from 0.86 to 0.95 (Spielberger et al., 1983). Analyses focused on trait anxiety as the study hypotheses concerned dispositional anxiety.

Data analysis

All analyses were conducted using SPSS version 21.0. For the behavioural task results, correct mean RTs for each participant were entered into repeated-measures ANOVAs with the following factors and levels: Emotion (angry, fear, happy) and Condition (target, distractor, all-neutral). To clarify, the "target" condition comprised emotional targets among neutral distractors, the "distractor" condition comprised neutral targets among emotional distractors, and the "all-neutral" condition comprised neutral targets among neutral distractors. Pairwise comparisons between the conditions were also performed, with Bonferroni correction applied for the number of comparisons within each independent variable or interaction term.

We then conducted bivariate correlations between reaction time variables (mean RT differences between emotion and neutral conditions, as well as RTs for individual conditions) and psychopathic traits/anxiety, with our strongest a priori hypothesis regarding a relation between RTs to fearful stimuli and affective-interpersonal traits. Partial correlations between RTs and each SRP-III-SF factor after controlling for the other were also conducted in order to investigate the contributions of unique variance associated with each facet. To examine whether the lifestyle-antisocial traits moderated the association affective-interpersonal traits and fear-related RTs, a moderation analysis was conducted using Hayes (2012) *PROCESS* macro (Model 1) for SPSS to obtain bias-corrected 95% confidence intervals. Bonferroni correction was not used for the individual difference analyses (correlations and moderation), given our strong a priori hypotheses regarding fear, and the total number of possible analyses which would render this correction over-conservative.

Results

One participant was excluded due to at-chance error rates.

A 3 × 3 Condition (target, distractor, neutral) × Emotion (angry, fear, happy) repeated-measures ANOVA on mean correct RTs (Figure 1) revealed a main effect of Condition ($F(2,168) = 4.04$, $p = .019$, partial $\eta^2 = .05$). RTs were significantly slower in emotional distractor trials ($M = 930$ ms, $SD = 189$) compared with all-neutral trials (neutral trials interspersed within emotion blocks) ($M = 913$, $SD = 198$: $t(84) = 3.01$, $p = .01$). There were no differences between emotional distractor and target trials ($p = .63$) and target and all-neutral trials ($p = .42$).

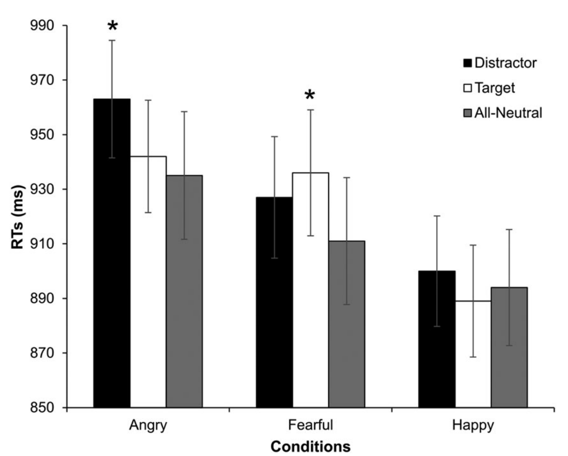

Figure 1. Mean RTs (milliseconds) to correctly locate the target (male or female) face which was either emotional (target), neutral in the presence of an emotional distractor (distractor) or neutral in the presence of other neutral faces (all-neutral) (* indicates a significant difference in reaction time compared to all-neutral trials $p < .05$, Bonferroni corrected).

There was also a main effect of Emotion (F(2,168) = 14.37, p < .001, partial η^2 = .15). RTs in the happy condition (M = 894, SD = 186) were significantly faster than the angry (M = 947, SD = 196, t(84) = 5.59, p < .001) and fearful (M = 925, SD = 205, t(84) = 2.85, p = .016) conditions.

The Condition × Emotion interaction was significant (F(4, 336) = 2.87, p = .023, partial η^2 = .03). Within the angry block, there was a main effect of Condition (F(2,168) = 4.97, p = .008, partial η^2 = .06), with pairwise comparisons showing longer RTs on angry distractor trials (M = 963, SD = 198) compared with all-neutral (M = 935, SD = 216; t(84) = 2.94, p = .013) and angry target (M = 942, SD = 190; t(84) = 2.63, p = .031) trials. RTs on angry target and all-neutral trials did not differ. There was also a main effect of Condition in the fear block (F(2,168) = 3.56, p = .031, partial η^2 = .04). RTs were significantly longer on fearful target (M = 936, SD = 213) than all-neutral trials; (M = 911, SD = 214; t(84) = 2.50, p = .044), but there was no significant difference between fearful distractor (M = 927, SD = 205) and all-neutral trials (t(84) = 1.77, p = .24). Target and distractor conditions did not differ. There was no main effect of Condition for happy trials (F(2,168) = .87, p = .42, partial η^2 = .01).

Overall error rates were low (M = 4.98%, SD = 4.61) and did not significantly differ across trials and conditions. Missed trials were also low (M = .89%, SD = 1.88).

Relationships with psychopathic traits

There was a significant negative correlation between total SRP-III-SF score and mean RTs in the presence of fearful distractors (r(83) = −0.22, p = .046). There were also significant negative correlations between affective-interpersonal traits and mean RTs to fearful target (r(83) = −0.22, p = .045) and distractor (r(83) = −0.23, p = .038) trials, that is, as predicted, higher affective-interpersonal scores were associated with faster RTs, suggesting reduced interference by fearful stimuli as these traits increased. No relationships were seen in any of the angry, happy or all-neutral conditions, or between psychopathic traits and RT differences between emotional and all-neutral conditions.

No hypothesised positive relationships were found between lifestyle-antisocial traits and RTs during emotional conditions (across fearful, angry, happy distractors and targets), nor were there significant associations between emotional capture and unique variance associated with either facet after controlling for the other. However, it was hypothesised that reactivity associated with lifestyle-antisocial traits might moderate the effect of affective-interpersonal traits; such that reduced RT interference by fearful distractors and targets with increasing affective-interpersonal traits (detailed above) would hold only when lifestyle-antisocial traits were low, that is, when there was no competing source of emotional reactivity. Moderation analysis showed that lifestyle-antisocial scores moderated the relationship between RTs during the fearful distractor condition and affective-interpersonal traits (b = 2.62, 95% CI [0.254, 4.985], t = 2.30, p = .03; Figure 2). As predicted, the negative relationship between RTs and affective-interpersonal scores held only when lifestyle-antisocial scores were low (b = −19.74, 95% CI [−35.840, −3.643], t = −2.44, p = .017), and was not significant when these traits were moderate or high.

However, when lifestyle-antisocial scores were high, RTs were uniformly *fast* (regardless of affective-interpersonal score), whereas it was predicted that emotional capture in these participants would render RTs universally slow, as such traits are generally associated with high emotional reactivity which would be predicted to impair performance. We explored whether a speed–accuracy trade-off specific to participants with high lifestyle-antisocial scores might underlie this finding, since one feature of the lifestyle-antisocial facet of psychopathy is heightened

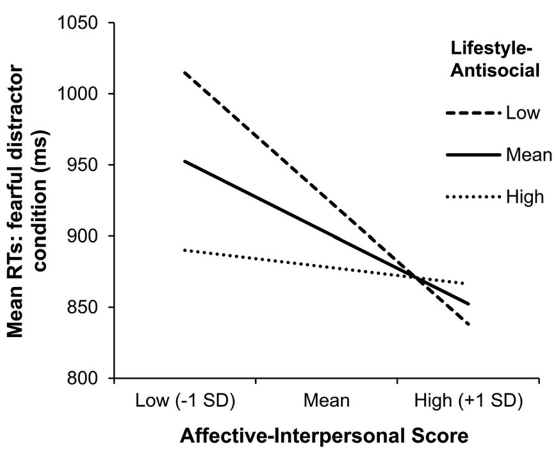

Figure 2. Graph showing that the relationship between mean RTs (milliseconds) during correct trials in the fearful distractor condition and SRP-III-SF affective-interpersonal traits is moderated by levels of SRP-III-SF lifestyle-antisocial traits. The negative relationship between RTs and affective-interpersonal traits only holds when lifestyle-antisocial traits are low.

impulsivity. Participants in the top tertile for lifestyle-antisocial traits showed a negative correlation between error rates and RTs in the fearful distractor condition ($r(40) = -0.40$, $p = .008$), that is, those with faster RTs also made more errors; while there was no correlation for the lowest tertile ($r(41) = .09$, $p = .575$). These correlation coefficients were significantly different ($z = 2.29$, $p = .022$). This suggests a tendency to trade accuracy for speed in those with the highest levels of lifestyle-antisocial traits, potentially contributing to relatively fast mean RTs in this group.

No moderation was seen when RTs in the fearful target condition was the dependent variable ($p = .121$) nor when RTs for the all-neutral trials presented within the fearful block was the dependent variable ($p = .110$). Relatedly, there were no moderation effects seen in any of the conditions in the angry block (all $ps > .103$) or the happy block (all $ps > .438$).

Anxiety

No predicted positive correlations were found between trait anxiety and RTs for individual conditions.

There were negative correlations between trait anxiety and RTs for happy distractor trials ($r(83) = -0.231$, $p = .033$), all-neutral trials during the happy block ($r(83) = -0.218$, $p = .045$) and all-neutral trials during the fearful block ($r(83) = -0.218$, $p = .045$). The negative correlation with fearful distractor RTs was marginal ($r(83) = -0.211$, $p = .053$). Trait anxiety was not significantly correlated with any of the angry conditions ($ps > .069$). No interactions between anxiety and psychopathic traits were found.

Discussion

In line with predictions, emotional capture by fearful faces varied with psychopathic traits in a community sample, with a similar pattern of results to those found in an antisocial sample using the same task (Hodsoll et al., 2014). Most importantly, emotional capture by fearful stimuli (both target and distractor faces) was reduced in those with higher levels of affective-interpersonal psychopathic traits, associated at the extreme end of the continuum with low affective reactivity and empathy. Additionally, when fear was presented as a distractor, this effect held only when lifestyle-antisocial traits were low.

Task main effects and interactions replicated many of the effects demonstrated by Hodsoll et al. (2011). As found previously, mean RTs to angry distractors were significantly longer compared to all-neutral and angry target faces. We also found emotional capture by fearful stimuli relative to all-neutral faces, with longest RTs in the fearful condition seen in response to fearful target faces. One explanation for our findings comes from evolutionary accounts of threat processing (Öhman, Flykt, & Esteves, 2001). Compared to angry facial expressions which depict direct threat, fearful expressions indicate indirect threat; thus an adaptive action would be to rapidly shift attention away from a fearful face and into the local visual environment in order to locate the source of the threat. Consistent with this notion, it could be that RTs were longer when identifying the target face in the present study as attention was directed first to the fearful target, then elsewhere in the environment, reflecting a "bottom-up" shift in attention, followed by a "top down" shift back to the target. Another possibility is that effects for fearful distractors appeared weaker because they were more strongly modulated by individual differences, discussed below. Similar to Hodsoll et al. (2011), we also found that emotional capture (specifically slower RTs) occurred only for negative stimuli; however, we did not replicate their finding of a facilitatory effect (i.e. faster RTs) for happy faces.

As predicted, the extent of emotional capture by fearful faces (both as distractors and targets) decreased with increasing affective-interpersonal traits. This supports previous studies showing reduced attention to emotional stimuli in extreme samples (e.g. Hodsoll et al., 2014; Sylvers et al., 2011; Verona et al., 2012), and extends these findings to show a continuous effect in a general sample. It further supports the notion that those high in affective-interpersonal traits may have particular difficulty processing fear (Blair et al., 2004; Veit et al., 2013), as the findings involving interpersonal-affective traits did not extend to the angry condition, despite anger capturing attention in the sample overall. This is in line with meta-analytic findings showing that the processing of angry expressions remains intact while fear and sadness processing are impaired in individuals with psychopathy (Dawel, O'Kearney, McKone, & Palermo, 2012; Marsh & Blair, 2008).

Contrary to previous findings (e.g. Seara-Cardoso et al., 2012), the lifestyle-antisocial facet did not correlate positively with RTs in the angry and fearful conditions, and there were no associations between emotional capture and unique variance associated with either facet after controlling for the other. However, moderation analysis showed that the negative relationship between affective-interpersonal traits and RTs in the presence of fearful distractors held only when lifestyle-antisocial traits were low. This is in line with Maes and Brazil's (2015) findings of differential relationships between affective-interpersonal traits and emotional distraction depending on levels of lifestyle-antisocial traits.

One possible interpretation is that, if lifestyle-antisocial psychopathic traits are high, greater reactivity associated with antisocial behaviour counteracts diminished reactivity associated with affective-interpersonal traits (Maes & Brazil, 2015). Faster RTs in participants high in lifestyle-antisocial traits regardless of affective-interpersonal trait scores may well have resulted from a speed–accuracy trade-off (Wickelgren, 1977) specific to these participants. This may reflect greater impulsivity, which is strongly associated with lifestyle-antisocial aspects of psychopathy (Hare, 2003). This moderation effect was not found for the fearful target condition, and the only previous study to report a similar effect (Maes & Brazil, 2015) also found it in the presence of emotional distractor stimuli (emotional pictures), although no equivalent target condition was included. The specificity of this effect requires further investigation.

It is worth noting that the range of SRP-III-SF scores seen in the present study are very similar to those previously seen in seen in community samples, enabling comparisons across studies (e.g. Seara-Cardoso et al., 2012). However, while a strength of this study is that it extends findings from the clinical range to a community sample, future research could use a broader sample, including participants across the typical and atypical range of psychopathic traits.

We note that we did not see the hypothesised relationships with psychopathic traits when looking at RT difference scores (emotion – neutral), which would have represented the strongest evidence for individual differences in emotional capture. However, relationships between RTs and affective-interpersonal scores were only found in the presence of fearful distractors/targets, and not all-neutral trials presented within the same block. This suggests some specificity for diminished emotional capture by fear, as opposed to a more general speeding effect across the entire fear block in those with higher affective-interpersonal traits. The predicted moderation effect was also only seen in response to fearful distractors, and not for any other condition or emotion. Another potential limitation is that our individual difference findings would not survive multiple comparison correction across all correlations conducted. However, it is worth noting that significant results were seen only for analyses for which we had the strongest a priori hypotheses (i.e. those involving fear), and in the predicted direction. A final limitation is that we did not measure IQ. Although it is unlikely that IQ would drive the observed results, future studies should include this measure to rule it out as a potential confound.

Regarding anxiety, we predicted that trait anxiety would be associated with increased RTs, particularly in response to negative stimuli. However, this relationship was not seen, either for individual conditions or difference scores relative to neutral. For some individual conditions, anxiety was associated with faster RTs. A potential explanation is that trait anxious individuals rapidly scan the environment (Eysenck, 1992) which may result in faster performance on aspects of visual search. Given that reaction time measures as implemented in the current task cannot fully delineate the time course and components of attentional bias, this explanation is speculative. A more direct and continuous measurement of overt visual attention, such as eye tracking, may provide an important supplement to these measures, particularly in the characterisation of specific effects concerning emotional distractors vs. targets.

In sum, we replicate the majority of the emotional capture effects observed by Hodsoll et al. (2011), and demonstrate that attentional capture by fearful faces is reduced with increasing levels of affective-interpersonal psychopathic traits in a community sample. This effect was moderated by lifestyle-antisocial traits, but not by commonly co-occurring trait anxiety. Overall, variation in emotional capture across the normative continuum of psychopathic traits appears in line with findings at the clinical end of the spectrum.

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References

Ali, F., Amorim, I. S., & Chamorro-Premuzic, T. (2009). Empathy deficits and trait emotional intelligence in psychopathy and Machiavellianism. *Personality and Individual Differences*, *47*(7), 758–762.

Anderson, N. E., & Stanford, M. S. (2012). Demonstrating emotional processing differences in psychopathy using affective ERP modulation. *Psychophysiology*, *49*(6), 792–806.

Blair, R. J. R. (2015). Psychopathic traits from an RDoC perspective. *Current Opinion in Neurobiology*, *30*, 79–84.

Blair, R. J. R., Mitchell, D. G. V., Peschardt, K. S., Colledge, E., Leonard, R. A., Shine, J. H., … & Perrett, D. I. (2004). Reduced sensitivity to others' fearful expressions in psychopathic individuals. *Personality and Individual Differences*, *37*(6), 1111–1122.

Blair, R. J. R., & Viding, E. (2008). Psychopathy. In M. Rutter, D. Bishop, D. Pine, S. Scott, J. Stevenson, E. Taylor, & A. Thapar (Eds.), *Rutter's child and adolescent psychiatry* (5th ed., pp. 852–863). Chichester: John Wiley & Sons.

Carolan, P. L., Jaspers-Fayer, F., Asmaro, D. T., Douglas, K. S., & Liotti, M. (2014). Electrophysiology of blunted emotional bias in psychopathic personality. *Psychophysiology*, *51*(1), 36–41.

Carré, J. M., Hyde, L. W., Neumann, C. S., Viding, E., & Hariri, A. R. (2013). The neural signatures of distinct psychopathic traits. *Social Neuroscience*, *8*(2), 122–135.

Carreité, L. (2014). Exogenous (automatic) attention to emotional stimuli: A review. *Cognitive, Affective and Behavioral Neuroscience*, *14*, 1228–1258.

Cisler, J. M., Bacon, A. K., & Williams, N. L. (2009). Phenomenological characteristics of attentional biases towards threat: A critical review. *Cognitive Therapy and Research*, *33*(2), 221–234.

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 & Biobehavioral Reviews*, *36*(10), 2288–2304.

Eysenck, M. W. (1992). *Anxiety: The cognitive perspective*. Hove: Psychology Press.

Gordts, S., Uzieblo, K., Neumann, C., Van den Bussche, E., & Rossi, G. (2015). Validity of the self-report psychopathy scales (SRP-III full and short versions) in a community sample. *Assessment*, 1–18. doi: 10.1177/1073191115606205

Hamilton, R. K., Hiatt Racer, K., & Newman, J. P. (2015). Impaired integration in psychopathy: A unified theory of psychopathic dysfunction. *Psychological Review*, *122*(4), 770–791.

Hare, R. D. (2003). *Hare psychopathy checklist – revised* (2nd ed.). Toronto, ON: Multi Health Systems.

Hayes, A. F. (2012). *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modelling* [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf

Hicks, B. M., & Patrick, C. J. (2006). Psychopathy and negative emotionality: Analyses of suppressor effects reveal distinct relations with emotional distress, fearfulness, and anger-hostility. *Journal of Abnormal Psychology*, *115*(2), 276–287.

Hodsoll, S. *Attention to emotional faces: Basic phenomena and individual differences related to psychopathic traits* (Unpublished doctoral thesis). University College London, London, UK.

Hodsoll, S., Lavie, N., & Viding, E. (2014). Emotional attentional capture in children with conduct problems: The role of callous-unemotional traits. *Frontiers in Human Neuroscience*, *8*(570), 1–7.

Hodsoll, S., Viding, E., & Lavie, N. (2011). Attentional capture by irrelevant emotional distractor faces. *Emotion*, *11*(2), 346–353.

Maes, J. H. R., & Brazil, I. A. (2015). Distraction from cognitive processing by emotional pictures: Preliminary evidence for an association with interactions between psychopathy-related traits in a non-clinical sample. *Personality and Individual Differences*, *75*, 53–58.

Marsh, A. A., & Blair, R. J. R. (2008). Deficits in facial affect recognition among antisocial populations: A meta-analysis. *Neuroscience & Biobehavioral Reviews*, *32*(3), 454–465.

Newman, J. P., & Lorenz, A. R. (2003). Response modulation and emotion processing: Implications for psychopathy and other dysregulatory psychopathology. In R. J. Davidson, K. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 904–929). Oxford: Oxford University Press.

Öhman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: detecting the snake in the grass. *Journal of Experimental Psychology: General*, *130*(3), 466–478.

Paulhus, D. L., Neumann, C. S., & Hare, R. D. (in press). *Manual for the self-report psychopathy scale* (4th ed.). Toronto: Multi-Health Systems.

Richards, H. J., Benson, V., Donnelly, N., & Hadwin, J. A. (2014). Exploring the function of selective attention and hypervigilance for threat in anxiety. *Clinical Psychology Review*, *34*(1), 1–13.

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.

Sebastian, C. L., McCrory, E. J., Cecil, C. A., Lockwood, P. L., De Brito, S. A., Fontaine, N. M., & 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.

Spielberger, C. D., Gorssuch, R. L., Lushene, P. R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Sylvers, P. D., Brennan, P. A., & Lilienfeld, S. O. (2011). Psychopathic traits and preattentive threat processing in children a novel test of the fearlessness hypothesis. *Psychological Science*, *22*(10), 1280–1287.

Veit, R., Konicar, L., Klinzing, J. G., Barth, B., Yilmaz, Ö., & Birbaumer, N. (2013). Deficient fear conditioning in psychopathy as a function of interpersonal and affective disturbances. *Frontiers in Human Neuroscience*, *7*(706), 1–12.

Verona, E., Sprague, J., & Sadeh, N. (2012). Inhibitory control and negative emotional processing in psychopathy and antisocial personality disorder. *Journal of Abnormal Psychology*, *121*(2), 498–510.

Wickelgren, W. A. (1977). Speed-accuracy trade-off and information processing dynamics. *Acta Psychologica*, *41*, 67–85.

Zeier, J. D., & Newman, J. P. (2013). Feature-based attention and conflict monitoring in criminal offenders: Interactive relations of psychopathy with anxiety and externalizing. *Journal of Abnormal Psychology*, *122*(3), 797–806.