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Short Communication

Uncaring young adults show reduced vigilance for others' fearful expressions☆,☆☆

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ABSTRACT

A core feature of psychopathy is the presence of callous-unemotional (CU) traits, which are associated with deficient recognition of others' distress and aggression. Competing etiological theories suggest such traits stem from either a fearless temperament or anomalies in selective attention. While CU traits are multidimensional, the role of individual CU dimensions (callous, uncaring, unemotional) in selective attention to others' emotional expressions remains unexamined in adults. The present study thus examined whether CU traits predict reduced attention to fear and other (angry and happy) emotional expressions, and if so, whether this deficit reflects reduced vigilance or faster disengagement from such stimuli. Eighty two undergraduate students (ages 18–35, 56% female), completed a measure of CU traits and a probe discrimination task in which attention was measured by reaction times to probes appearing in locations previously occupied by either an emotional expression (fear, happy, or sad) or a neutral expression. In contrast to callousness or unemotional CU traits, uncaring traits were uniquely inversely associated with attention to fearful faces, specifically for reduced vigilance. Attention to angry or happy faces was unrelated to CU dimensions. Uncaring CU traits may reduce attending to others' fearful expressions, potentially impairing recognition of others' distress.

1. Introduction

Despite decades of research, mechanisms underlying callous-unemotional (CU) traits remain poorly understood. CU traits comprise core affective features of psychopathy, a broader constellation of "primary" affective (e.g., callous) and interpersonal (e.g., manipulative) traits and "secondary" behavioral (e.g., impulsive) traits associated with antisociality (Cleckley, 1941). CU traits include lack of guilt, empathy, remorse or concern about one's own performance; shallow affect; and using others for personal gain (Frick, O'Brien, Wootton, & McBurnett, 1994).

Lykken's (1957) low-fear model proposes that fearlessness predisposes individuals to develop psychopathic traits, as evidenced by deficits in conditioning paradigms and responses to others' fear relative to other emotions (Dadds, El Masry, Wimalaweera, & Guastella, 2008). Blair's (1995) related violence inhibition model (VIM) proposes that failure to experience others' nonverbal distress cues prevents the natural tendency to inhibit aggressive behaviors. In contrast, the response modulation hypothesis (RMH; e.g., Baskin-Sommers, Curtin, & Newman, 2011) suggests psychopathic fear insensitivity reflects an early selective attention bottleneck: secondary stimulus features not central to one's current goal and response set go unprocessed, including important social or emotional information.

Attentional anomalies relate broadly to affective-interpersonal psychopathic traits in youth and adults (e.g., Kimonis, Frick, Fazekas, & Loney, 2006; Zeier, Maxwell, & Newman, 2009), However, few RMH studies consider specific psychopathy dimensions, such as CU traits, or how well RMH applies to sub-clinical psychopathy in non-forensic contexts (Smith & Lilienfeld, 2015). Further, an unresolved question is whether attentional neglect is specific to fear- or threat-related expressions as predicted by Lykken's low fear model, or broadly to all non-target stimuli as the RMH suggests (Smith & Lilienfeld, 2015).

Importantly, while CU traits reflect a core affective psychopathy domain, they are themselves multidimensional, reflecting three distinguishable dimensions: *uncaring* (disregard for others' feelings or one's performance), *callous* (i.e., lack of remorse and disregard for responsibilities), and *unemotional* (i.e., lack of emotional expression; Byrd, Kahn, & Pardini, 2013; Frick, 2004). The uncaring dimension corresponds to nonviolent delinquency, emotional deficits, and aggression, and the callous dimension also predicts aggression (Kimonis et al., 2008). In contrast, the unemotional dimension is more commonly associated with sensation seeking than with antisocial behavior (e.g., Byrd et al., 2013; Kimonis, Branch, Hagman, Graham, & Miller, 2013). Considered in the

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context of Blair's (1995) VIM, these distinctions suggest that affective or attentional deficits may underlie callous and uncaring traits in particular, and interfere with normal aggression inhibition. Therefore, we examined the role of particular CU dimensions.

Supporting the importance of attention, high CU children improve in fear recognition when attending to the eyes (e.g., Dadds et al., 2008). Similarly, fear-potentiated startle in psychopathic adults is eliminated by having them overtly attend to threat-related stimulus features (Baskin-Sommers et al., 2011). In these studies, emotional stimuli were presented consecutively and thus did not concurrently compete for attention in a bottom-up (automatic, stimulus-driven) fashion the way more naturally occurring stimuli would. However, a facial orientation judgment task that included simultaneous display of faces demonstrated that youth with elevated CU traits do not experience normal bottom-up attentional capture by emotional faces, regardless of the expressed emotion (e.g., happy) (Hodsoll, Lavie, & Viding, 2014).

Probe discrimination tasks (e.g., Mogg & Bradley, 2002) are used to measure preferential processing of emotional stimuli (attention bias; AB) when neutral stimuli are competing for attentional resources in a bottom-up fashion the context of a goal-directed response set (target discrimination). A more nuanced way to examine AB is to distinguish vigilance from disengagement (Koster, Crombez, Verschuere, & De Houwer, 2004). *Vigilance* refers to prioritized orienting to emotional stimuli (i.e. facilitation), whereas *disengagement* refers to the ability to shift attention away from the emotional stimuli, versus dwelling on them (Koster et al., 2004). While vigilance and disengagement are not typically distinguished in RMH paradigms, this model suggests difficulty redistributing attention, which could reflect excessive dwelling, reduced vigilance for non-target stimuli, or both. Previously observed physiological anomalies supporting the RMH (e.g., startle; Baskin-Sommers et al., 2011) may reflect either or both aspects of AB. Youth with psychopathic traits show reduced vigilance for distressing images (e.g., Kimonis et al., 2006), but when given more time to attend to non-target stimuli (thus overriding reduced vigilance), psychopathic adults demonstrate normal fear-potentiated startle (Levenston, Patrick, Bradley, & Lang, 2000). Thus, vigilance may be the specific attentional deficit related to CU traits. But to our knowledge, there are no published studies examining the relationship between CU traits and vigilance to, or disengagement from, facial emotion expressions in adults.

To address some of these gaps, we investigated associations between CU trait dimensions and AB to emotional faces on a facial-stimulus probe discrimination task in young adults in the community. Based on aforementioned findings for uncaring and callous dimensions and on the VIM, we expected these CU dimensions to correspond to reduced attention to fearful faces, unlike unemotional traits. We also explored whether this AB would be accounted for by reduced vigilance for non-target expressions as predicted by the RMH, or by quicker disengagement. The probe task uses various emotional expressions, permitting a novel test of the RMH prediction that those with elevated CU traits should show reduced attention to all non-target emotional faces in the context of goal-directed response set (i.e. discriminating probe targets), regardless of the emotion expressed in the non-target prime stimuli (i.e. fearful, angry, or happy expressions). In contrast, the low-fear model predicts specific insensitivity to fearful and perhaps threat-related (i.e. angry) but not positive (happy) expressions.

2. Method

2.1. Participants

Participants were recruited from an undergraduate sample at a public southeastern U.S. university as part of a larger study. Only participants who completed all relevant measures were included in the data analysis ($N = 82$; 36 male). Participants ranged from 18 to 35 years of age ($M = 19.35$, $SD = 2.17$). The sample contained 67 White, 2 Black, 6 Asian, and 7 other or multiracial participants.

2.2. Measures

2.2.1. The Inventory of callous-unemotional traits (ICU; Frick, 2004)

The ICU is a 24-item self-report questionnaire with a 4-point Likert sale. It is validated for use with young adults, corresponding as expected with other self-report psychopathy scales designed for community samples (Byrd et al., 2013; Kimonis et al., 2013). Scales measure Uncaring (e.g., "I work hard on everything I do," eight items, $\alpha = 0.75$), Callousness (e.g., "The feelings of others are unimportant to me," nine items, $\alpha = 0.77$), and Unemotional (e.g., "I do not show my emotions to others," five items, $\alpha = 0.84$).

2.2.2. Face probe discrimination task

Presented using E-Prime 2.0 (Psychology Software Tools, Inc., 2012, Pittsburgh, PA), after a central fixation cue, an emotional expression and neutral expression pair were presented for 500 ms in the top or bottom location, counterbalancing the location (adapted from Mogg & Bradley, 2002). Two male and two female adult Caucasian models (Tottenham et al., 2009) were used for emotional expression pairs (fearful/neutral, angry/neutral, happy/neutral, neutral/neutral), with 10 practice trials followed by 128 counterbalanced trials (4 emotion pairings × 4 models × 2 prime locations × 2 probe locations × 2 probe types) presented in pre-randomized order. The target probe (E or F) subsequently appeared in the congruent (emotional face) or incongruent (neutral face) location. The E-Prime serial response box was used to measure reaction time (RT) and accuracy in identifying probes. Interstimulus intervals (500–1500 ms) were randomized.

Trials with inaccurate responses and those reflecting impulsive (<300 ms) or delayed (>2000 ms) responding were removed. AB scores were derived by subtracting the RT for congruent trials from the RT for incongruent trails. Positive AB scores reflect increased attention to emotional faces. Vigilance was computed by subtracting RTs on congruent trials from RTs on neutral/neutral trials, with higher positive values indicating greater vigilance. Disengagement was computed by subtracting RTs on neutral/neutral trials from RTs on incongruent trials, with higher positive values indicating slower disengagement (longer dwelling).

2.3. Procedure

Institutional Review Board (IRB) approval was obtained for this study, and informed consent was obtained from every participant. As part of a larger study, participants completed questionnaires via online survey and then completed the probe discrimination task in lab. Participants received extra credit in their psychology courses and were entered into a raffle for nominal cash prizes.

3. Results

Univariate outliers (values ± 3 SD from the mean), were first Winsorized. Then multivariate outliers (identified with Mahalanobis distances) were removed prior to analyses to prevent undue influence. Regression analyses were computed for each emotional expression (angry, happy, fearful) separately. To identify unique effects of CU dimensions, AB, vigilance, and disengagement scores were regressed onto Callousness, Uncaring, and Unemotional scores, which were entered simultaneously.

Descriptive statistics and correlations are presented in Table 1. Sex correlated with callousness ($r_{pb} = 0.22$, $p = 0.004$) with males reporting higher callousness. Demographic variables (sex, race, age) were otherwise unrelated to variables of interest. In regressions, Uncaring inversely predicted AB for fearful faces ($\beta = -0.29$, $p = 0.020$), due only to vigilance ($\beta = -0.28$, $p = 0.027$) and not disengagement ($\beta = -0.06$, $p = 0.631$). In contrast, CU dimensions did not predict AB, vigilance, or disengagement processes for happy or for angry faces (all $ps > 0.05$; Table 2). Because data showed slight deviation from