



# Boldness psychopathic traits predict reduced gaze toward fearful eyes in men with a history of violence



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## ABSTRACT

Research with developmental and adult samples has shown a relationship of psychopathic traits with reduced eye gaze. However, these relationships remained to be investigated among forensic samples. Here we examined the eye movements of male violent offenders during an emotion recognition task. Violent offenders performed similar to non-offending controls, and their eye movements varied with the emotion and intensity of the facial expression. In the violent offender group Boldness psychopathic traits, but not Meanness or Disinhibition, were associated with reduced dwell time and fixation counts, and slower first fixation latencies, on the eyes compared with the mouth. These results are the first to show a relationship of psychopathic traits with reduced attention to the eyes in a forensic sample, and suggest that Boldness is associated with difficulties in orienting attention toward emotionally salient aspects of the face.

## 1. Introduction

Facial expressions of emotion represent a crucial component of human social interaction, allowing the observer to infer another's emotional state (Frith, 2009; Keltner, 2003), and adjust their behaviour accordingly (Blair, 2003). Children and adults affected by disorders of social and affective functioning, including psychopathy, often show difficulties in recognizing others' emotional expressions (Dawel, O'Kearney, McKone, & Palermo, 2012; Marsh & Blair, 2008). When categorizing expressions, attention is typically directed toward critical facial features, most notably the eyes and the mouth (Eisenbarth & Alpers, 2011; Wells, Gillespie, & Rotshtein, 2016). A failure to attend to these regions may lead to difficulties in judging the expressed emotion. Although psychopathic traits in children and non-offenders are associated with atypical eye scan paths for emotional faces (Dadds, El Masry, Wimalaweera, & Guastella, 2008; Gillespie, Rotshtein, Wells, Beech, & Mitchell, 2015), these relationships are yet to be tested in a forensic sample.

Psychopathy is best understood as a collection of personality traits that vary along a continuum in the general population (Coid, Yang, Ulrich, Roberts, & Hare, 2009). These traits include elevated levels of antisocial behaviour, a callous disregard for others, and a deceitful and manipulative interpersonal style (Hare, 2003), and are often prominent in clinical and forensic samples (Skeem, Polaschek, Patrick, & Lilienfeld, 2011). A triarchic conceptual framework describes psychopathy along three core dimensions that have been reliably identified and

distinguished in clinical and non-clinical samples, namely Boldness, Meanness, and Disinhibition (Patrick, Fowles, & Krueger, 2009). Boldness refers to psychologically adaptive traits emphasised by Cleckley (1941), and includes venturesomeness, fearlessness, and interpersonal dominance (Patrick et al., 2009). Boldness explains a key difference between psychopathy and antisocial personality disorder [ASPD] (Wall, Wygant, & Sellbom, 2015), and contributes over and above Meanness and Disinhibition to the prediction of clinical psychopathy (Venables, Hall, & Patrick, 2014). Meanness entails a callous disregard for others, empathy problems, and a tendency toward exploiting others (Drislane & Patrick, 2016). The Disinhibition dimension refers to impulse control problems, emotional reactivity, poor behavioural restraint, and irresponsibility (Patrick et al., 2009).

Several prominent accounts of psychopathy emphasise the presence of emotion recognition impairments in relation to the fearless and unempathic features (e.g., Boldness, Meanness) of the disorder (Blair, 2005, 2008; Moul, Killcross, & Dadds, 2012). These difficulties have been observed among adult male psychopaths, and in relation to the broader psychopathy phenotype in both adults and children (Blair et al., 2004; Dolan & Fullam, 2006; Dadds et al., 2008; Hastings, Tangney, & Stuewig, 2008; Kosson, Suchy, Mayer, & Libby, 2002; Prado, Treeby, & Crowe, 2015). Although it is theorized by Blair (2005, 2008) that impairments in recognizing others' distress cues (fear and sadness) are of particular importance in psychopathy, a recent meta-analysis suggests that these difficulties are pervasive across fear, sad, happy, and surprise emotional expressions (Dawel et al., 2012).

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Neurobiologically inspired models of psychopathy propose that the disorder is characterized by functional impairments in areas related to emotion processing, including the amygdala (Blair, 2008), and the extended limbic system (Kiehl, 2006). Support for these models comes from studies that have shown a reduced amygdala response to fearful expressions in both adults and children/adolescents with increasing psychopathic traits (Decety, Skelly, Yoder, & Kiehl, 2014; Jones, Laurens, Herba, Barker, & Viding, 2009; Lozier, Cardinale, VanMeter, & Marsh, 2014).

The successful decoding of different emotional expressions depends on visual attention toward emotionally salient aspects of the face, most notably the eyes and the mouth (Eisenbarth & Alpers, 2011; Smith, Cottrell, Gosselin, & Schyns, 2005; Wells et al., 2016). The precise pattern of eye movements is thought to be dependent upon the emotion expressed, and attention is often guided toward the most diagnostic facial features for a given emotion (e.g., the widened eye whites of fearful expressions) (Schurgin et al., 2014; Smith et al., 2005; Wells et al., 2016). While attention to these regions is likely to be modified by conscious control, even briefly presented faces trigger very early, potentially reflexive eye movements toward diagnostic regions of the face (Gamer & Büchel, 2009; Scheller, Büchel, & Gamer, 2012). Again, reflexive eye movements in these studies were more commonly toward the eyes than away from the eyes, and varied with the type of expression. Psychopathy related impairments in emotion recognition may therefore reflect reduced attention to the eye region of emotional faces.

In support of this hypothesis, children with elevated callous-unemotional (CU) traits, referring to the affective dimension of psychopathy, show impaired fear recognition and a reduced number and length of fixations on the eye region (Dadds et al., 2008). When instructed to fixate the eye region, these children showed normalized levels of performance (Dadds et al., 2008). A similar pattern of performance has also been observed in a patient with bilateral amygdala dysfunction (Adolphs et al., 2005), and is taken as support for amygdala based models of psychopathy. More recent evidence from non-offending adult males has shown that the interpersonal and affective features of psychopathy are associated with reduced attention to the eyes, and that the number of fixations on the eye region is positively correlated with fear accuracy (Gillespie, Rotshtein, Wells et al., 2015). Another study with non-offenders has shown that equivalent measures of Boldness, but not Meanness, are associated with reduced face exploration during a face perception task (Boll & Gamer, 2016).

In the present study we examined eye scan paths for emotional faces among adult male violent offenders, and assessed the relationship of distinct psychopathic traits with attention to the eyes. For comparison we also recruited a community control group of non-offending adult males. Because psychopathy consists of a number of positively related dimensions, suppressor effects in statistical analyses may obscure understanding of the unique correlates of distinct psychopathic traits. Thus, we aimed to model these dimensional traits simultaneously in a way that can account for their covariance (Hicks & Patrick, 2006; Lozier et al., 2014). We also measured levels of negative affect, including anxiety and depression, as differences in emotional face processing and attentional allocation have been observed in these disorders (Buckner, Maner, & Schmidt, 2010; Easter et al., 2005; Kohler, Hoffman, Eastman, Healey, & Moberg, 2011). One earlier study suggests that psychopathy primarily affects the perception of moderate intensity expressions (Hastings et al., 2008). Therefore in the current experiment we manipulated the intensity of the emotional expression by morphing each prototypical expression (100%) with the neutral expression of the same person. Thus, participants classified expressions at 90% and 55% intensities (see Gillespie, Rotshtein, Wells et al., 2015; Gillespie, Rotshtein, Satherley, Beech, & Mitchell, 2015; Gillespie, Mitchell, Satherley, Beech, & Rotshtein, 2015; Wells et al., 2016).

We predicted that the preference for information from the eye region would be absent among violent offenders, and that they would show an absence of stimulus driven effects on eye scan paths. Moreover,

we predicted that distinct psychopathic traits related to a lack of empathy and fearlessness, namely Meanness and Boldness, would be associated with a pattern of impaired emotion recognition, and reduced attention to the eyes relative to the mouth. We tested these relationships across various parameters of attention to the eyes and the mouth: overall dwell time, fixation count, and first fixation time. The analyses focused on the average response across all emotions, and also specifically on the processing of fearful expressions, given findings that the eye region is of particular importance for recognizing fear (Smith et al., 2005; Whalen et al., 2004). Furthermore, at least one prominent theory of psychopathy proposes that psychopaths are characterized by particular deficits in recognizing others' distress cues (Blair, 2005, 2008).

## 2. Method

### 2.1. Participants

Thirty male violent non-sex offenders, aged between 32 and 50 years ( $M = 35.1$ ,  $SD = 11.8$ ), were recruited from HMP Grendon, UK. All participants had normal or corrected to normal vision. The majority of participants were White Caucasian ( $n = 19$ , 63%). Index offences included, but were not limited to, murder ( $n = 17$ ) or attempted murder ( $n = 2$ ), and wounding with intent ( $n = 3$ ). Case file histories showed that no participants had a pre-diagnosed mental health problem, although one participant was taking antidepressant medication. The number of any previous convictions ranged from 0 to 31 ( $M = 9$ ,  $SD = 10$ ), and the number of previous violent convictions ranged from 0 to 14 ( $M = 2$ ,  $SD = 3$ ). All participants signed their fully informed consent. Ethical approval for the study was granted by the University of Birmingham Committee for Ethical Review, and access was approved by the National Offender Management Service for England and Wales, and the HMP Grendon Research Advisory Group.

Eye movement data were also collected from an approximately age matched community control group of 25 adult males, aged 18–69 years ( $M = 37.88$ ,  $SD = 18.29$ ), to assess the typicality of the eye movements observed in the violent offender sample. The comparison group was recruited from the community using online advertisements and participants received a monetary payment for taking part. None of the control group participants reported a history of convictions for either violent or sexual offences.

### 2.2. Materials

#### 2.2.1. Facial expression stimuli

We used a selection of the facial stimuli developed by Gillespie and colleagues (Gillespie, Rotshtein, Wells et al., 2015; Gillespie, Rotshtein, Satherley et al., 2015; Gillespie, Mitchell et al., 2015; Wells et al., 2016) consisting of male and female expressions displayed at varying degrees of intensity. These stimuli consisted of five male and five female Caucasian models, selected from the NimStim Face Stimulus Set (Tottenham et al., 2009; <http://www.macbrain.org/resources.htm>), showing each of seven different expressions: neutral, angry, disgust, fear, happy, sad, and surprise. Emotional and neutral images from the same model were morphed to create images of varying levels of emotional intensity (see Gillespie, Rotshtein, Wells et al., 2015; Gillespie, Rotshtein, Satherley et al., 2015; Gillespie, Mitchell et al., 2015) for details of the morphing procedure. Images used in the current study consisted of each emotion, for each model, displayed at moderate (55% expressive) and high (90% expressive) intensity. The neutral expression was also included for each model so that participants were not only viewing emotional faces. Stimuli had a resolution of  $504 \times 624$  pixels. The positioning of each image on the canvas was manipulated such that the eyes and the mouth appeared in the same location across all stimuli.

#### 2.2.2. Measures

The Triarchic Psychopathy Measure (Driscoll, Patrick, & Arsal,

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