



Would I lie to you? “leakage” in deceptive facial expressions relates to psychopathy and emotional intelligence

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ABSTRACT

This was the first investigation of individual differences in adopting deceptive universal emotional expressions. We hypothesized that psychopathic traits would lead to a heightened ability to suppress emotional expressions and exhibit less “leakage” of inconsistent emotions during deceptive displays. Further, we predicted that emotional intelligence (EI) would lead to a heightened ability to simulate emotional expressions. Participants ($N = 100$) viewed emotionally arousing (happy, sad, fearful, disgusting) images, responding to each with a genuine or deceptive expression. Each video frame (30/sec) was coded for emotion (in)consistent with the intended expression (365,550 frames coded for 2437 expressions). As predicted, psychopathic traits – specifically, high levels of interpersonal manipulation – were related to shorter durations of unintended emotional “leakage” during deceptive expressions. In contrast, the erratic lifestyle element of psychopathy predicted greater emotional inconsistency during deceptive displays. Individuals higher in EI – specifically, the ability to perceive and express emotion – feigned emotions more convincingly than others but were not more immune to emotional leakage.

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1. Introduction

In various life contexts, people conceal their true emotions in their facial expressions, with either altruistic or selfish intentions. For example, the presence of concealed but subtly communicated contempt is highly predictive of divorce (Gottman, Levenson, & Woodin, 2001). The consequences of emotional deception also can be powerful in legal contexts where the perceived sincerity of a criminal's emotional display/remorse informs critical decisions pertaining to their future (Porter, ten Brinke, & Wilson, 2009; ten Brinke, McDonald, Porter, & O'Connor, 2011).

Emotional deception via the alteration of facial expressions can occur in three ways (Ekman & Friesen, 1975): simulating an expression involves adopting an expression in the absence of any real emotion; masking an emotion involves replacing a felt emotion with a different emotional expression; and neutralizing an expression involves concealing a felt emotion with a neutral face. Although such deceptive expressions typically are successful in fooling the observer (e.g., Porter & ten Brinke, 2008; Porter, Juodis, ten Brinke, Klein, & Wilson, 2010), research has suggested that emotional deception may be detectable; for example, research has differentiated muscle actions involved in real “Duchenne” smiles and fake smiles (e.g., Ekman, Davidson, & Friesen, 1990;

Jaffe, 2011). Darwin (1872) posited that certain facial muscles cannot be: (a) intentionally activated in the absence of genuine emotion or, (b) suppressed in the presence of genuine – particularly, potent – emotion. Collectively, these two propositions form the *inhibition hypothesis* (Ekman, 2003, 2009), a proposal with major theoretical and applied implications but one that has hardly been examined (cf. Porter & ten Brinke, 2008; Porter, ten Brinke and Wallace, submitted). Reflecting the paucity of research in the area, no research has examined the influence of individual differences on emotional deception abilities. We predict that two specific individual differences that relate to “expertise” in the communication of facial expressions – the ability to adopt convincing emotional displays and avoid the problem of emotional “leakage” (one's true emotion involuntarily leaking out on the face) – are emotional intelligence (EI) and psychopathy.

1.1. Emotional intelligence and facial expressions

While we think that leakage will occur to some degree in all people (Porter & ten Brinke, 2008), we hypothesize that EI (Salovey & Grewal, 2005) will be associated with an enhanced ability to simulate facial expressions and consequently demonstrate proficiency in emotional deception. It has been argued that two of the core skills related to EI – the identification and *management* of emotion – develop in tandem (Mayer, Roberts, & Barsade, 2008). Thus, individuals high in EI who have the ability to effectively perceive emotions in others also should have a heightened ability to control

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their own expressions (e.g., adopt a convincing false smile). *Elfenbein et al. (2010)* found a positive correlation between emotion recognition ability and the similarity of deliberately simulated with genuine emotional expressions (also see *Kenny, 1994*). Although EI was not measured in these participants, the findings were consistent with our prediction of a relation between EI and voluntary control of facial expressions.

1.2. Emotional intelligence and psychopathy

Recently, a number of studies have investigated the relation between psychopathy and emotional intelligence, most of which have indicated a negative relationship (*Grieve & Mahar, 2010; Visser, Bay, Cook, & Myburgh, 2010*). Given that psychopathy is a heterogeneous disorder, it is unsurprising that the negative relationship with EI (and its components) appears to be dependent on psychopathy sub-type, or specific traits associated with the diagnosis (*Vidal, Skeem, & Camp, 2010*). For example, *Malterer, Glass, and Newman (2008)* found that both the affective-interpersonal and impulsive-antisocial dimensions of psychopathy are associated with deficits on a global measure of emotional intelligence. However, *Pham, Ducro, and Luminet (2010)* reported that affective-interpersonal characteristics of psychopathy were associated with enhanced emotional perception and regulation. Impulsive-antisocial characteristics too were related to emotional perception, but not regulation.

Outside of the recent interest in the relation between psychopathy and emotional intelligence, research has addressed the psychopath's ability to recognize and identify emotion. Whereas numerous studies have shown that psychopathic individuals have problems recognizing negative emotional expressions in others, especially fear and sadness (e.g., *Blair et al., 2004; Fairchild, van Goozen, Calder, Stollery, & Goodyer, 2009; Hasting, Tangney, & Stuewig, 2008*), *Book, Quinsey, and Langford (2007)* found no deficit in identifying emotional expressions for psychopaths; instead they were more accurate than others in judging the emotional intensity for facial expressions in general and, more specifically, for fearful faces. Further, *Woodworth and Waschbusch (2008)* found that while children with higher levels of psychopathic features were less accurate in identifying sad expressions, they were more accurate in labeling fear than were other children. Again, an examination of particular psychopathic features appears to elucidate the seemingly contradictory findings. *Del Gaizo and Falkenbach (2008)* found that interpersonal-affective scores predicted accuracy of recognition of fearful faces, in particular. In sum, it appears that interpersonal-affective features of psychopathy may be associated with the enhanced recognition of fearful expressions (potentially to facilitate manipulation) and emotional regulation, while impulsive-antisocial features do not. No research has addressed the relation between psychopathy and the ability to feign various emotions.

1.3. Psychopathy and facial expressions

Some psychopathic individuals are chameleon-like actors and appear to use their acting skills to effectively manipulate others in various interpersonal contexts. In corporate settings, white-collar criminals with psychopathic characteristics, such as *Bernard Madoff*, often find easy victims by appearing trustworthy, empathetic, and kind. Psychopathic offenders can readily feign remorse and a pro-social attitude to manipulate their way into lower sentences (i.e., manslaughter rather than murder), permissions to appeal their sentences, and undeserved conditional release (*Hakkanen-Nyholm & Hare, 2009; Porter & Woodworth, 2007*). Despite their much longer criminal histories and poorer conditional release histories, psychopaths are 2.5 times more likely than

non-psychopaths to be released when they apply for parole (*Porter et al., 2009*). Further, these decisions are faulty; psychopathic offenders in both studies spent fewer successful days on release compared to non-psychopaths released (*Porter et al., 2009; Ruback & Hopper, 1986*). In fact, extended interpersonal contact with a psychopath can lead to less accurate perceptions of psychopathic traits (*Fowler, Lilienfeld, & Patrick, 2009*).

Despite evidence that psychopathic individuals are successful manipulators, the manner in which they deceive and manipulate others is open to question. Psychopathy arguably is associated with effective emotional deception. The psychopath's distinctive lack of emotional experience may prevent emotional "interference" in feigning emotional displays. That is, because of the lack of real emotion, there may be less genuine emotion "leaking" onto the false face during a fabricated emotional display. In support of this prediction, *Herpetz et al. (2001)* found that psychopathic offenders exhibited fewer and less intense facial expressions in response to pleasant and unpleasant emotional images relative to controls. We predict that psychopathic individuals, particularly those with strong interpersonal-affective features of the disorder, will have an advantage when attempting to control their facial expressions during deception because of their lack of emotion; such individuals may express less "leakage" of genuine emotion during deception. However, due to emotional recognition deficits and a lack of understanding of what a sincere expression "looks like", these individuals will not necessarily be proficient at creating a facial expression consistent with the feigned emotion.

1.4. The present study

We hypothesize that EI and psychopathy (and facets of each) are inversely related and reflect two ends of an affective continuum. Thus, while we expect that both emotionally intelligent and psychopathic individuals are likely to be effective emotional deceivers, they will be successful for opposite reasons. In accordance with *Darwin's (1872)* inhibition hypotheses, we predict that the interpersonal-affective features of psychopathy will be related to less inconsistent emotional "leakage" due to a lack of genuine emotional experience. In contrast, we predict that emotional intelligence will be associated with a heightened ability to simulate emotional expressions (i.e., increased consistent emotion in feigned expressions).

2. Methods

2.1. Participants

Undergraduate participants ($N = 100$; 25 male, 75 female; M age = 20.78) attending a Canadian university were recruited through an online research participant pool and provided genuine and deceptive emotional displays. Participants received course credit for completion. Another 27 volunteers were naïve observers judging the veracity of each display in real time (to increase participants' motivation to provide convincing expressions).

2.2. Materials

The images used to evoke emotion in this study were chosen from the International Affective Picture System (IAPS) (*Lang, Bradley, & Cuthbert, 1999*). These images have been normed on emotional valence, arousal, and the discrete emotion type that they evoke in viewers (*Mikels et al., 2005*); images were selected based on these ratings. Images primarily evoking sadness, disgust, fear, happiness, and no emotion were considered for use as stimuli.

Emotional images then were chosen based on IAPS valence and arousal norms.

2.3. Procedure

A 27-inch monitor was used to display the images. While viewing emotional images, participants were recorded using a 30-frame per second HD camcorder. The design of the room was such that the participants sat approximately one meter away from the display on which they viewed a timed Powerpoint presentation of images. The camcorder was situated directly behind the display to record the participant's face with a direct field of view. The naïve observer sat behind the camcorder and to the participant's right field of view.

While being evaluated by the observer, participants viewed a timed slideshow of happy, sad, fearful, disgusting and emotionally neutral images (presented in randomized blocks). Each was displayed for 5 s with a 5 s break between images to allow the participants to return to a neutral face. Participants were instructed to produce facial expressions that were *genuine* (felt emotion will be expressed), *simulated* (expressed emotion with no emotion felt), *masked* (felt emotion will be covered by opposing emotional expression), or *neutralized* (despite presence of a felt emotion, no emotion will be expressed on the face) while they viewed each image. For additional methodology information, see Porter and ten Brinke (2008) and Porter et al. (submitted). Participants were monitored by the naïve observers – who recorded whether they believed that each expression observed was sincere or insincere – and were videotaped (at a rate of 30 frames per second) for later analysis.

2.4. Emotion expression analysis

Participants' facial responses were video-recorded and, subsequently, each 1/30th-second frame was analyzed (by highly trained coders unaware of expression veracity) for the presence and duration of emotion consistent/inconsistent with the intended universal expression in each of the upper and lower face. In total, over the course of three years, 365,550 frames were manually coded in 2437 expressions. Coding of the expressions was conducted using a highly reliable coding procedure developed for the Porter and ten Brinke (2008) study. Each frame of the videotaped clips was analyzed (150 frames/each 5-s clip) for the presence and duration of the universal emotional expressions in the upper and lower face. Extensively trained coders were blind to the veracity of the emotions they were analyzing but aware of the emotions participants intended to portray. Coding required classifying the emotion exhibited in each facial region and recording the frame/time at which these expressions began and ended.

Training in this method involves facial musculature recognition, memorization of facial action units associated with universal emotions, and identification of the universal emotions. To facilitate training, we have created a detailed reference guide that includes numerous examples of each emotion and the main muscle movements involved. Training was complemented by practice with the Facial Action Coding System (FACS; Ekman & Friesen, 1976; Ekman, Friesen, & Hagar, 2002). So that we could assess the coders' knowledge level after training, coders viewed a slide show of 50 faces from the Pictures of Facial Affect (POFA; Ekman & Friesen, 1976) database and classified the emotion expressed in each. Additionally, they viewed 48 videos in a micro-expression task similar to that used by Frank and Ekman (1997). Each of these videos included a 1/25-s glimpse of one still picture of facial affect embedded within another, different expression, and coders were asked to classify the emotion in the image. Coders obtained accuracy rates above 95% on both tasks. Finally, they practiced frame-by-frame vi-

deo analysis of emotional facial expressions by coding the video of a sample participant until they were able to attain nearly perfect reliability. Inter-rater reliability was measured statistically by having the coders analyze the complete videos of the same 13 participants.

2.5. Measures

Trait Emotional Intelligence Questionnaire – Short Form (TEIQue-SF; Cooper & Petrides, 2010; Petrides & Furnham, 2006). Participants completed the TEIQue-SF, a reliable (Cronbach's alpha of .89 and .92 for females and males, respectively) and valid (Mikolajczak, Luminet, Leroy, & Roy, 2007) 30-item measure of trait emotional intelligence tapping four factors: well-being, self-control, emotionality and sociability. Items are responded to on a 7-point Likert-type scale. The TEIQue-SF measure has good psychometric properties (e.g., Petrides & Furnham, 2003).

Self-Report Psychopathy Scale (SRP-4; Paulhus, Neumann, & Hare, in press): The SRP-4 is a 64-item self-report measure of psychopathic traits, designed to be a self-report counterpart to the Psychopathy Checklist-Revised (PCL-R, Hare, 2003). The SRP-4 is the only self-report measure of psychopathy that maps onto the four facets of psychopathy encompassed by the PCL-R: Antisocial Behaviour, Interpersonal Manipulation, Cold Affect, and Impulsive Thrill-Seeking. The SRP-4 has been shown to have good reliability (Cronbach's alpha = .81) and has been validated on university student samples (Paulhus et al., in press).

3. Results

3.1. Coding reliability

Each analyzed the complete videos of 13 participants (49,350 frames, each coded twice – once for the upper, and once for lower face emotional expression). Inter-rater reliability was "good" (as defined, e.g., by Cicchetti & Sparrow, 1981; Fleiss, 1981) on all indices. The coders demonstrated good reliability in coding the duration of inconsistent emotion, $r(714) = .69, p < .001$. Agreement on the dichotomously coded presence/absence of inconsistent emotion was acceptable, Kappa = .68, $p < .001$, with agreement on 86.8% of all codes. The raters averaged 90.6% agreement on the number of inconsistent frames per expression (i.e., the number of frames in which they coded an emotion other than the one the participant intended to express). Disagreement in coding a frame as inconsistent was infrequent; out of 150 frames per expression, the coders agreed on an average of 137.15 and 137.60 frames for the upper and lower face, respectively.

3.2. The relation between psychopathy and EI

A series of planned Pearson correlations was conducted to examine the relationship between psychopathic traits (SRP-4 total + sub-scale scores) and EI (TEIQue-SF total + factor scores) (refer to Table 1 for descriptive statistics). As reflected by the correlation between the total SRP-4 and TEIQue-SF scores, psychopathy and EI were negatively related ($r = -.29, p < .05$). Total SRP-4 scores were negatively related to two of the four TEIQue-SF factor scores: well-being ($r = -.27, p < .05$) and emotionality ($r = -.43, p < .001$). There were strong relations between the SRP-4 interpersonal manipulation sub-scale and four of the five TEIQue-SF scores: total ($r = -.38, p < .001$), well-being ($r = -.48, p < .001$), self-control ($r = -.22, p < .05$), and emotionality ($r = -.38, p < .001$). The SRP-4 cold affect scale was related to the well-being ($r = -.22, p < .05$) and the emotionality ($r = -.42, p < .001$) factors of the TEIQue-SF. Finally, the SRP-4 erratic lifestyle factor was negatively associated

Table 1
Descriptive statistics of questionnaire total and sub-scale scores.

	Mean	Standard deviation
SRP-4 total	141.77	28.62
Interpersonal manipulation	40.73	10.66
Callous affect	34.22	8.30
Erratic lifestyle	42.17	9.47
Criminal tendencies	24.03	7.29
TEIQue-SF total	149.47	20.84
Well-being	35.42	5.26
Self-control	28.30	5.30
Emotionality	41.78	6.84
Sociability	29.92	5.10

with the emotionality sub-scale of the TEIQue-SF ($r = -.33$, $p < .001$).

3.3. The relation between EI and facial expressions

A series of planned Pearson correlations was conducted to examine the relationship between EI and the mean duration of (in)consistent emotion in genuine or deceptive expressions. Total scores were positively related to the duration of consistent emotional expression during deceptive portrayals ($r = .17$, $p < .05$). Further, emotionality factor scores were positively related to the duration of consistent emotional expression in both genuine ($r = .20$, $p < .05$) and deceptive ($r = .19$, $p < .05$) emotional displays. Unexpectedly, TEIQue-SF total and well-being factor scores were positively related to duration of inconsistent frames in genuine expressions, $r = .18$, $p < .05$ and $r = .18$, $p < .05$, respectively. There were no significant relationships between participants' EI and naïve judge accuracy, $ps > .05$; observers were at chance in evaluating the three negative emotions and slightly above chance for happiness expressions.

3.4. The relation between psychopathy and facial expressions

A series of planned Pearson correlations was conducted to examine the relationship between psychopathic traits and the mean duration of (in)consistent emotion in genuine or deceptive expressions. Although total SRP-4 scores were unrelated to all emotional expression variables ($ps > .05$), the interpersonal manipulation sub-scale was negatively correlated with the duration of inconsistencies in both genuine ($r = -.35$, $p < .01$) and deceptive ($r = -.27$, $p < .05$) emotional expressions. Further, the erratic lifestyle sub-scale was positively related to the duration of emotional inconsistency during deceptive displays, $r = .22$, $p < .05$. There were no relationships between participants' SRP-4 scores and naïve judge accuracy, $ps > .05$.

4. Discussion

As posited by Darwin (1872) and Ekman (2006), involuntary facial actions can betray hidden emotions via leakage in falsified expressions. However, proficient readers of others' emotions also may have greater control over their own expressions than others. Here, individuals higher in EI displayed more convincing deceptive emotions; they were able to simulate intended emotions convincingly, and maintain these displays for longer. An enhanced ability to perceive and express emotion, in particular, predicted successful emotional fabrication. Specifically, emotionality was related to longer displays of consistent emotional expression during deception. However, this ability did not eliminate emotional leakage; although higher EI participants were better at simulating false emotions, they were not better at concealing felt emotions. In fact,

participants scoring high on the well-being factor displayed longer leakage during both genuine and deceptive emotions, likely related to trait happiness (i.e., uncontrolled smiling).

Complementing previous findings by Malterer et al. (2008), psychopathic traits were found to be negatively correlated with EI. Given that affective experience is at the core of each construct, it appears that these traits may sit at opposite ends of an emotional continuum. Importantly, the ability to perceive and express emotion was negatively related to interpersonal manipulation. Thus, while both constructs may conceivably be associated with enhanced emotional deception, this ability likely manifests in different ways. Reflecting the notion that emotional intelligence and psychopathy lie at opposite ends of an affective continuum, EI was associated with increased consistent expression, and psychopathy, with decreased inconsistent expression, during deceptive emotion.

As hypothesized, interpersonal-affective psychopathic traits – namely, interpersonal manipulation – was associated with decreased leakage of inconsistent emotion during deceptive emotional expressions. The ability to stifle inappropriate leakage may allow psychopathic individuals to effectively manipulate potential victims and legal decision-makers. Management of one's emotional presentation may assist the psychopath in controlling the potential victim's reaction, establishing and maintaining a coercive relationship. Unsurprisingly, not all facets of psychopathy are associated with proficient emotional deceit; impulsiveness (as measured by the erratic lifestyle sub-scale) was related to increased emotional leakage during deceit. Further, total psychopathy scores were not related to emotional expression. These results suggest that specific facets of psychopathy are associated with proficiency with affective experience, including emotional deception, rather than the entirety of the psychopathy construct. Future research should consider aptitude for emotional deceit in psychopathic sub-types and offender groups (e.g., white-collar vs. violent criminals).

Although emotionally intelligent and psychopathic participants did display particularly convincing, deceptive emotions, they did not fool naïve judges more often than other participants. This null result may be related to the poor accuracy rates of deception detectors (at, or only slightly above, chance; Bond & DePaulo, 2006; Porter & ten Brinke, 2008) and their lack of empirically-valid knowledge about cues to deceit. Thus, while emotionally intelligent or psychopathic deceivers may be particularly convincing to the trained eye, naïve observers overlook these cues and continue to take un-educated guesses about credibility.

Consideration should be given to limitations of the current study. First, undergraduate participants may be less skilled than experienced deceivers. Follow-up research with criminal populations is necessary. Further, participants' motivation to successfully deceive was low relative to high-stakes, real-world lies. In addition, due to the low representation of males in our sample, we were unable to examine the effect of gender. While these limitations provide avenues for future research, it appears that the ability to feign convincing emotional displays is mediated by affective personality traits, including EI and psychopathy. These findings are of relevance to legal decision-makers and provide insight into psychopaths' ability to manipulate others.

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