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Psychopathic Traits Associate Differentially to Anger, Disgust and Fear Recognition among Men and Women

Lauren A. Delk[1] · Leonardo Bobadilla[2] · Elizabeth N. Lima[3]

Abstract Psychopathy is characterized by deficits in empathy and violation of the rights of others. Recent data link psychopathy-based lack of empathy to deficits in emotion recognition (ER), in particular fear and sadness. However, questions remain about emotions like anger and disgust and some studies even report a positive relationship between psychopathy and ER. Notably, the overwhelming majority of these studies have been conducted only with men, and studies in the general population suggest that women have better ER than men. To our knowledge, only two small studies have explicitly examined ER and psychopathy among women and they did find deficits in anger and disgust recognition. Therefore, mixed findings about ER and psychopathy may be due to gender differences that need to be clarified. This study aimed at bridging this gap using a large sample of 129 male (49 %) and 132 female (51 %) participants who completed psychopathy self-reports, and a computerized facial ER task. Among women there were deficits and advantages in ER: High social dominance and lack of anxiety traits were related to decreased fear and anger recognition respectively. Traits characterized by impulsiveness and rebelliousness were associated with better disgust and anger recognition respectively. For men, psychopathic traits characterized by ruthless manipulation of others, as well as lack of fear, were related to deficits recognizing anger. These results suggest that among women some psychopathic traits may confer an advantage in ER and give impetus for studies examining gender differences in the neurobiological substrates and manifestation of the syndrome.

Keywords Gender · Psychopathy · Emotion recognition · Empathy · PPI

Introduction

Psychopathic individuals are selfish, manipulative, grandiose, and have documented deficits in empathy that are associated with chronic antisocial behavior (Cleckley 1941; Hare 2003; Miller and Eisenberg 1988). It is particularly important to understand what personality and neurobiological factors relate to these empathy deficits because they are considered to be one of the core features of psychopathy, which strongly predicts maladaptive outcomes such as number of arrests, criminal charges, likelihood of being charged with a serious offense, and obstruction of justice (Kahn et al. 2013). However, the literature has three notable areas that require further investigation. The first is reconciling inconsistent relationships between psychopathic traits and recognition of empathy-related emotions. Secondly, the current literature is lacking in female samples which limits conclusions about gender differences and psychopathy (Forouzan and Cooke 2005; Verona and Vitale 2006). Finally, there is significant debate in the field regarding the factor structure of recently created psychopathy personality questionnaires and what they

Elizabeth N. Lima is now at the Charles George V.A. Medical Center, Asheville, NC.

✉ Lauren A. Delk
ladelk@vt.edu

[1] Department of Psychology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, USA

[2] Forensic Track, Pacific University School of Professional Psychology, Hillsboro, OR 97123, USA

[3] Department of Psychology, Florida State University, Tallahassee, FL 32306, USA

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may imply for the conceptualization of the construct (e.g., Marcus et al. 2013; Salekin et al. 2014).

With regard to gaps in the data on how psychopathic traits relate to emotion recognition, theoreticians and previous research suggest that lack of empathy in psychopathy is related to difficulties recognizing emotions posited to be most likely to inhibit aggressive behavior such as fear and sadness (e.g., Blair et al. 1997; Blair et al. 2004). A recent meta-analysis found that psychopathic interpersonal/affective factors in particular were indeed most related to deficits in recognition of fear and sadness, but also to deficits in recognition of positive emotions (Dawel et al. 2012). Unexpectedly, the authors did not find corresponding deficits with recognition of anger or disgust, but noted that this could have been due to limited power. In addition, they reference a prior meta-analysis by Wilson et al. (2011) which *did* find deficits specific to anger and disgust.

It should be noted that anger and disgust are particularly relevant to the understanding of psychopathy. Trait anger is associated with various facets of psychopathy, is predictive of aggression (e.g, Edens and McDermott 2010; Hare 2003), and deficits in anger recognition have been reported among boys with early conduct disorder symptoms (Fairchild et al. 2009). For its part, various facets of disgust have been theoretically and empirically linked to morality judgements (e.g., Rozin et al. 1999) and individual differences in the tendency to experience disgust are related to variations in moral judgments (Chapman and Anderson 2013). Disgust is also related to neural substrates that differ from fear recognition, and given psychopathy's relationship to impaired moral judgement and behavior, understanding disgust could be potentially illuminating in further understanding the syndrome's neurobiological substrates (Phillips et al. 1998).

Another limitation to understanding emotion recognition deficits in psychopathy is a low number of studies including females. Of the 22 studies in Dawel et al. (2012) meta-analysis, only seven included females. Two samples were 100 % female ($N = 28$ and 25), one was 68 % female ($N = 175$, 119 women), another was 47 % female ($N = 32$, 15 women). The final three samples ranged from 19 % to 29 % female (6, 11, and 12 women). Notably, while Dawel et al.'s (2012) meta-analysis did not find significant relationships between psychopathy and anger or disgust, some of these studies with women *did* report a relationship between impaired recognition of anger and disgust and psychopathy (Eisenbarth et al. 2008; Fairchild et al. 2010). Therefore, it is possible that an association between psychopathy and anger and disgust deficits are present in women, but the effects were not detected by Dawel et al. (2012) due to the lower number of women. On the other hand, it could be that the anger and disgust deficits are present for both genders but was undetected due to the low overall power available for the meta-analysis.

Notably, the low number of women in these samples is representative of the general psychopathy literature. Addressing this gap is important because leading researchers have called for more explicit examination of how psychopathy may manifest differently between men and women (Verona and Vitale 2006). This is particularly relevant in the case of empathy and emotion recognition. In general, there is significant evidence that women perform better than men in emotion recognition tasks and that there may be differences in neural processing of emotions between genders (Christov-Moore et al. 2014; Schulte-Rüther et al. 2008). However, among women, a wider array of psychopathic traits may be related to empathy deficits, relative to men (Zágon and Jackson 1994). Therefore, in the general population women may perform better in empathy skills tasks, but among women with elevated psychopathic traits empathy deficits may be present and may be related to deficient recognition of anger and disgust (Eisenbarth et al. 2008; Fairchild et al. 2010; Zágon and Jackson 1994). More data with larger female samples are needed to determine if this is the case.

The third consideration to address in order to better understand emotion recognition deficits in psychopathy are discrepancies in the factor structure of recently created self-report psychopathy personality questionnaires, and what these differences may mean for the construct at large (e.g., Marcus et al. 2013; Salekin et al. 2014). The Psychopathy Personality Inventory (PPI; Lilienfeld and Andrews 1996) is one such measure and it has received significant research attention recently. The PPI was created to assess psychopathy traits (e.g., coldheartedness, Machiavellianism, social dominance, lack of forethought, and rebelliousness) identified by Cleckley and other influential theoreticians as central to the construct, without directly assessing antisocial behavior, making it ideal for use in community settings (Lilienfeld and Andrews 1996). Different two-factor structures of the PPI and its short form (PPI-SF) have been widely used in community (Benning et al. 2003) and college samples (Wilson et al. 1999). More recently, Neumann et al. (2008) proposed a three-factor structure developed from an incarcerated sample. Varying reported factor structures has led to a lively debate regarding what factor structure (if any) may best represent the PPI, with some proposals suggesting that its lower order scales may be most informative in examining the nomological network of the construct (e.g., Lilienfeld et al. 2012; Marcus et al. 2013; Miller and Lynam 2012).

The current study aims at bridging gaps in the emotion recognition and psychopathy literature by examining the relationship between psychopathic traits and emotion recognition in a large sample of women and men. The study employed a non-forensic, mixed-gender sample to determine if reported deficits in clinical samples extend to the general population, and it examines the relationship between alternative factor structures of the PPI to elucidate whether reported mixed

findings in the area may be related to varying factor conceptualizations of the construct.

Based on the results from Dawel et al. (2012) we expected that interpersonal/affective psychopathic traits would be related most strongly to deficits recognizing fear and sadness among men and women, and less so to other negative emotions like anger and disgust. We also expected interpersonal/affective traits to be related to deficits recognizing happiness and surprise but, again, not as strongly as fear and sadness. On the other hand, based on work by Eisenbarth et al. (2008), as well as Fairchild et al. (2010), we expected that impulsive/antisocial psychopathy traits would be related to deficits in recognition of anger and disgust among women but not among men.

Materials and Methods

Participants were students at a University in the Southeastern United States who received course credit for their participation. The current study's sample was comprised of 129 men (49 %) and 132 women (51 %) with an average age of 19.49 (SD = 2.88). The ethnic composition of the sample was 69 % European American; 13 % African American; 12 % Latino; 6 % other. Currently, there are no published clinical cut points for this version of psychopathy self-report (Tonnaer et al. 2013). However, when applying cut scores identified by Lee and Salekin (2010) for the top third of their large college sample (136 points for men and 126 points for women), 7 men (5 %) and 15 women (11 %) in this study fall into the "high psychopathy" group.

Procedures

Participants were recruited through the university's psychology department participant pool. Upon arriving to the computer lab, participants read and signed a consent form approved by the institution's IRB committee. Informed consent was obtained from all individual participants included in the study. Then, participants were seated at a computer where they completed the emotional processing task and self-report measures (using a computer-based format). Participants received course credit for their participation.

Instruments

Psychopathy Psychopathic features were assessed with the Psychopathic Personality Inventory – Short Form (PPI-SF; Lilienfeld and Hess 2001), a 56-item self-report measure with a 1–4 Likert-type scale. The PPI correlates moderately-highly with self-report, structured interview, and peer-rated measures of psychopathy (Lilienfeld and Andrews 1996), and the short-form of the PPI correlates highly with the full form (r = .90; Lilienfeld

and Hess 2001). We examined two alternative reported two-factor structures (Benning et al. 2003; Wilson et al. 1999) and Neumann et al.'s 2008 three-factor structure. In addition, we also examined the relationship between each of the eight PPI scales in relation to the emotional recognition task's dependent variables. The PPI-SF as a whole achieved a Cronbach's alpha of .78. The alpha for Factor I, often called Fearless Dominance, was .83, while Factor II (referred to as Self-Centered Impulsivity) achieved an alpha of .81 (using Wilson et al. 1999; For Benning et al. 2003, Cronbach's alphas were .81 and .84, respectively). Neumann's three factor structure achieved Cronbach's alphas of .82 (Fearless–Impulsive-Antisociality), .85 (High Extraversion Low Neuroticism), and .62 (Callous-Indifferent). The Cronbach's alphas of the individual scales ranged from .57 (Coldheartedness) to .83 (Stress Immunity).

Facial Recognition Task The facial emotion recognition task was developed by Frigerio and colleagues (Frigerio et al. 2002). Participants were seated in front of a screen and a computer program displayed an image of a person's face with a neutral expression that slowly changed into a specified emotion (happy, angry, sad, afraid, disgusted, or surprised). The program morphed from neutral at 0 % to displaying 100 % of the target emotion in increments of 10 %, at a steady rate. Participants were asked to identify the emotion by pressing appropriately labeled keys at regular intervals throughout the animation process and were scored based on accuracy at the end of the stimuli presentation. Following the protocol of previous studies (Frigerio et al. 2002; Hastings et al. 2008), this study used accuracy scores when the target emotion was completely presented (at 100 %). The images included facial pictures of four individuals (two male and two female). There were six variations of emotion including happiness, surprise, anger, disgust, fear, and sadness which were presented randomly four times each (once per model, 24 images total).

Analysis

The trials on the emotion recognition task received 1 point if the participant identified the correct emotion and 0 points if incorrect. The scores for the four trials of the six emotions (24 trials total) in the face identification task were averaged so that each participant had a percentage of correct answers for every emotion. Univariate outliers for dependent and independent variables were fenced, and Mahalanobis distances were computed to remove multivariate outliers. The multivariate outlier removal was computed specifically for each set of analyses; the two factor models, Neumann et al.'s (2008) three factor model, and the individual scales. The sample was also divided by gender, and the percentage correct for each emotion was correlated with the PPI-SF and its respective factors/scales. Finally, regression analyses testing for interactions between

Table 1 Means and standard deviations of the psychopathy personality inventory

	Men		Women	
Scale	M	SD	M	SD
Psychopathic personality inventory - factor 1	88.14	11.46	80.96	12.67
$_x$ Social Potency	19.19	4.06	19.85	4.27
• Coldheartedness	15.19	3.16	13.68	3.05
† Fearlessness	18.51	4.92	15.36	4.90
† Impulsive Nonconformity	15.21	3.61	13.88	3.72
$_x$ Stress Immunity	20.12	3.82	18.19	4.53
Psychopathic personality inventory – factor 2	42.95	7.78	41.84	7.73
† Machiavellian Egocentricity	16.27	3.78	15.32	3.53
† Blame Externalization	13.04	3.95	13.90	4.01
• Carefree Nonplanfulness	13.64	3.06	12.62	3.14
Neumann's three factor model				
† Fearless-impulsive-antisociality	62.93	10.76	58.46	10.11
$_x$ High Extraversion and Low Neuroticism	39.31	6.72	38.05	7.40
• Callous–Indifferent	28.83	4.39	26.30	4.55
Benning's two factor model				
Factor 1 (Impulsive nonconformity, blame externalization, machiavellian egocentricity, carefree nonplanfulness)	58.07	9.64	55.70	9.18
Factor 2 (social potency, fearlessness, stress immunity)	57.82	9.19	53.40	9.89

The scales of the PPI that comprise each of Neumann's three factors are notated with corresponding symbols

factors/scales and gender were conducted using Hayes PROCESS macro (Hayes 2013) with bootstrapping.

Results

The scores on the PPI-SF for two factors, three factors and individual scales all fell within normal distributions for both men and women. See Table 1 for means and standard deviations on the PPI-SF factors and scales. Neither the two-factor solution by Wilson et al. (1999) nor Benning et al. (2003) were related to facial emotion recognition among men or women (Table 2). On the other hand, Neumann et al.'s (2008) three factor model did evince relationships to facial recognition that were partially consistent with our hypotheses that interpersonal/affective traits would be related to emotion recognition deficits and that there would be gender differences. Specifically, the Callous-Indifferent factor was related to poorer recognition of disgust ($r = -.20$,

Table 2 Correlations of Neumann's psychopathic personality inventory factors and identification of emotional expressions by gender

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Fearless-impulsive-antisociality	-	-.14	.10	-.02	-.14	-.04	.02	-.07	.05
2. High extraversion/ Low neuroticism	-.05	-	.01	-.01	.02	.03	-.03	.02	.01
3. Callous–indifferent	.02	.02	-	-.13	.13	-.09	-.20*	-.01	-.04
4. Surprise	.14	-.06	-.02	-	-.03	.08	.24**	.18**	.13
5. Anger	.04	-.19*	.13	.08	-	.08	.00	.24**	.28**
6. Sad	.00	.05	.12	.00	.16	-	.28**	.12	.17
7. Disgust	.21*	-.05	-.09	.07	.14	.26**	-	.20*	.19*
8. Fear	.13	-.17*	.10	35*	.33**	.21*	.24**	-	.21*
9. Happy	-.06	.05	.02	-.06	.06	.10	-.01	.07	-

Intercorrelations for male participants ($n = 129$) are presented above the diagonal, and intercorrelations for female participants ($n = 132$) are presented below the diagonal. Fearless-Impulsive-Antisociality factor includes Impulse Nonconformity, Blame Externalization, Fearlessness, and Machiavellian Egocentricity; High Extraversion/Low Neuroticism factor includes Social Potency and Stress Immunity; Callous-Indifferent factor includes Coldheartedness and Careless Nonconformity

*$p < .05$ **$p < .01$

Table 3 Correlations of psychopathic personality inventory scales and identification of emotional expressions by gender

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. SP	-	.45**	.03	-.28**	.25**	.24*	-.24**	-.09	.04	.01	.04	-.01	.02	-.06
2. SI	.43**	-	-.09	-.43**	.22*	.15	-.22*	-.33**	-.06	.03	.00	-.04	.01	.09
3. IN	.16	.15	-	.21*	-.13	.53**	.33**	.22*	.00	.05	-.13	-.11	-.03	-.07
4. BE	-.27**	-.33**	.26**	-	-.14	.01	.16	.45*	-.07	.00	.10	.07	-.08	-.04
5. CH	.10	.28**	.03	-.20*	-	-.08	.00	-.06	-.15	.09	-.08	-.16	-.09	-.10
6. FL	.19*	.23**	.51**	-.01	-.02	-	.14	.13	.00	-.19*	-.10	-.04	-.04	.00
7. CN	-.16	-.16	.06	.10	.10	.03	-	.18*	-.04	.10	-.04	-.12	.07	.04
8. ME	-.12	-.33**	.09	.51**	-.14	-.20*	.22**	-	.02	-.19*	.05	.13	-.02	-.04
9. Surprise	-.14	.03	.15	.10	.07	.00	.07	.13	-	-.03	.08	.24**	.18*	.01
10. Anger	-.13	-.20*	-.06	-.03	.02	.10	.17*	.07	.08	-	.08	.00	.24**	.28**
11. Sad	.04	.05	.01	.01	.08	.08	.08	-.13	.00	.16	-	.28**	.12	.17
12. Disgust	-.02	-.06	.23**	.15	.11	.14	.03	.01	.07	.14	.26**	-	.20*	.19*
13. Fear	-.25**	-.06	.14	.01	.08	.03	.08	.07	.35**	.33**	.21*	.24**	-	.21*
14. Happy	-.02	.10	-.02	-.08	-.02	-.01	.05	-.05	-.06	.06	.10	-.01	.07	-

Intercorrelations for male participants ($n = 129$) are presented above the diagonal, and intercorrelations for female participants ($n = 132$) are presented below the diagonal. SP = Social Potency; SI = Stress Immunity; IN = Impulse Nonconformity; BE = Blame Externalization; CH = Coldheartedness; FL = Fearlessness; CN = Careless Nonconformity; ME = Machiavellian Egocentricity

*$p < .05$ **$p < .01$

$p = .025$) among men, while among women the High Extraversion/Low Neuroticism factor was related to poorer recognition of fear and anger ($r = -.17$, $p = .046$, and $r = -.19$, $p = .028$, respectively). Contrary to expectation, among women the Fearless-Impulsive-Antisociality factor was related to *better* recognition of disgust ($r = .21$, $p = .015$, see Table 2).

An examination of the individual PPI-SF scales showed that also consistent with hypotheses, among women Stress Immunity was related to poor recognition of anger ($r = -.20$, $p = .021$) while Social Potency was significantly related to poorer recognition of fear ($r = -.25$, $p = .004$). Unexpectedly, among women Impulse Nonconformity was related to better recognition of disgust ($r = .23$, $p = .009$), and Carefree Nonplanfulness related to better recognition of anger ($r = .17$, $p = .049$). Also consistent with expectation, among men Machiavellian Egocentricity and Fearlessness were related to poorer recognition of anger ($r = -.19$, $p = .033$ and $r = -.19$, $p = .032$, respectively, see Table 3).

Because we predicted that there would be gender differences, we tested regression analyses for moderating effects of gender on the relationship between various scales of the PPI and emotion recognition scores, controlling for significant covariates (variables that correlated with both predictor and outcome variables). Regression analysis showed that gender

Fig. 1 Fearlessness and machiavellian egocentricity predict identification of angry expressions, moderated by gender. *Note.* The x-axis is displaying the percentage correct for angry expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean
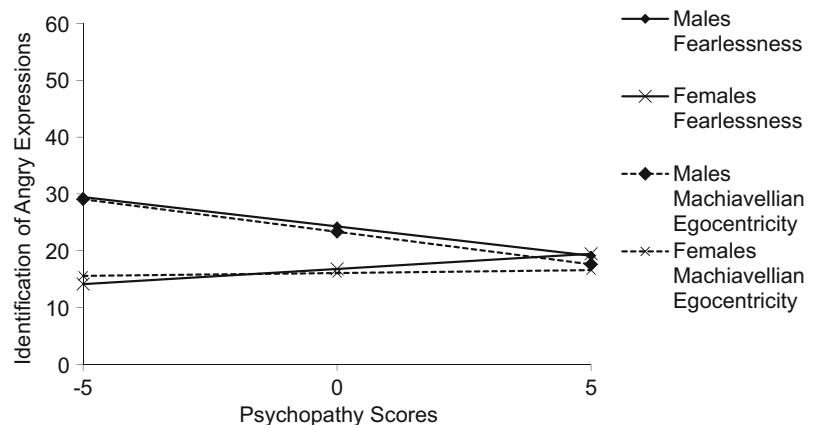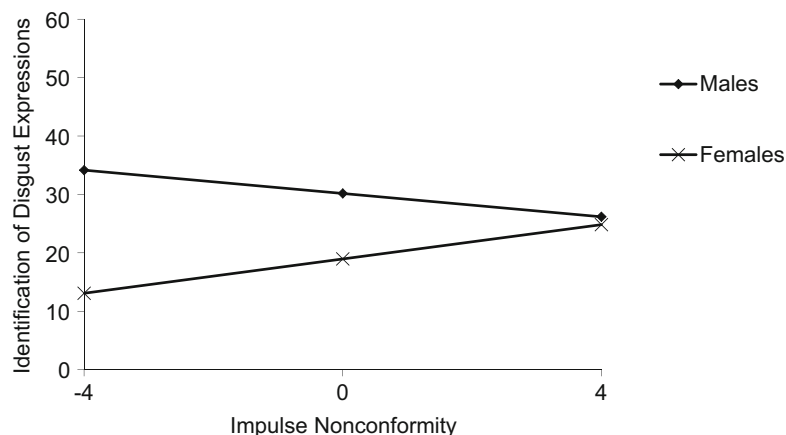

Note. The x-axis is displaying the percentage correct for angry expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean.

Fig. 2 Social potency predicts identification of afraid expressions, moderated by gender. *Note.* The x-axis is displaying the percentage correct for fear expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean
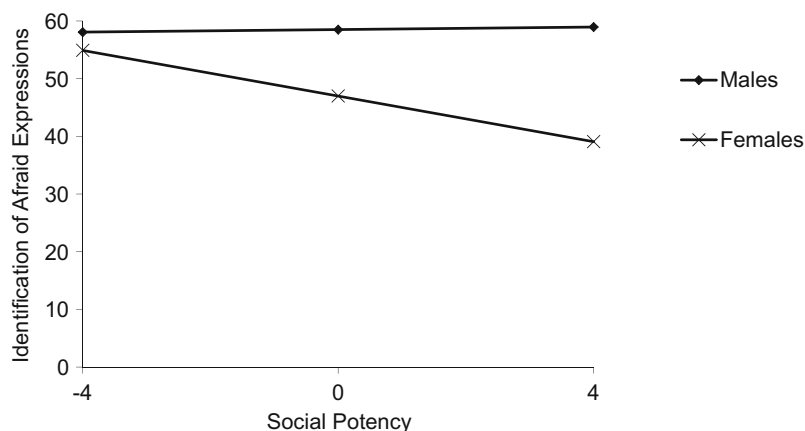
Note. The x-axis is displaying the percentage correct for fear expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean.

interacted significantly with Fearlessness and Machiavellian Egocentricity in the identification of anger (both controlling for Carefree Nonplanfulness; β = 0.24, p = .007, and β = 0.19, p = .025, respectively; Fig. 1), with Social Potency in the identification of fear (β = −0.20, p = .022; Fig. 2), and with Impulse Nonconformity in identification of disgust (β = 0.25, p = .005; Fig. 3). Further examination indicated that Fearlessness and Machiavellian Egocentricity significantly predict poorer anger recognition in men (b = −1.00, p = .013, and b = −1.56, p = .003, respectively), but not women (b = .52, p = .191, and b = .14, p = .806, respectively). Social Potency significantly predicted poorer fear recognition in women (b = −1.89, p = .002), but not for men (b = .11, p = .867). Finally, Impulse Nonconformity significantly predicted better disgust recognition in women (b = 1.59, p = .015), but not for men (b = −1.08, p = .106).

To determine if similar patterns are demonstrated in individuals with high levels of psychopathic traits as in the sample at large, we examined the top quartile of scores for our sample. This process identified 30 men (total PPI score of 141 or greater) and 32 women (total PPI score of 133 or greater). Consistent with hypothesis, among the men in this subsample there were only negative (and stronger) relationships between emotion recognition and psychopathic traits, although it included new ones not detected in the original analysis. First, there was a negative correlation between Social Potency and recognition of happiness (r = −.36, p = .050), and between Blame Externalization and fear recognition (r = −.49, p = .006). Additionally, there was a negative relationship between Impulse Nonconformity and disgust (r = −.42, p = .021). Somewhat consistent with the finding that Neumann's Callous-Indifferent factor was negatively related

Fig. 3 Impulse nonconformity predicts identification of disgust expressions, moderated by gender. *Note.* The x-axis is displaying the percentage correct for disgust expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean

Note. The x-axis is displaying the percentage correct for disgust expressions and the y-axis is displaying psychopathy scores after they are mean centered, ± 1 standard deviation from the mean.

to disgust recognition in the whole sample, Carefree Nonplanfulness was related to poorer disgust recognition among the more highly psychopathic men ($r = -.44$, $p = .016$). Finally, consistent with findings from whole sample, Fearlessness was again associated with anger recognition deficits in men ($r = -.47$, $p = .009$).

Among the most highly psychopathic women, and consistent with findings in the whole sample, there were both negative and positive relationships between psychopathic traits and emotion recognition. First, consistent with expectation, Neumann's Fearless-Impulsive-Antisociality factor was negatively related to anger recognition ($r = -.38$, $p = .031$). Unexpectedly, Neumann's Callous-Indifferent factor was *positively* related to anger recognition ($r = .38$, $p = .033$), and Coldheartedness was also unexpectedly positively related to recognition of surprise ($r = .42$, $p = .018$).

Discussion

Studies have linked psychopathy with difficulties identifying negative emotions, in particular sadness and fear (e.g. Dawel et al. 2012). The majority of these studies have only included men, although some small studies including psychopathic women have found deficits associated with recognition of anger and disgust (Eisenbarth et al. 2008; Fairchild et al. 2010). These findings stand in contrast of data suggesting that in the general population women perform better than men in some emotion recognition tasks (Kirkland et al. 2013; Thompson and Voyer 2014). Altogether, these data suggest that gender may play a role as a moderator of emotion recognition, including among psychopathic persons. This study aimed at contributing to the extant literature by examining psychopathy and emotion recognition in a large, mixed-gender, community sample and examining the relationship between broad and narrow facets of psychopathy with an objective emotion recognition measure.

Based on extant data, we hypothesized that interpersonal/affective psychopathic traits would be related most strongly to deficits recognizing fear and sadness among men and women. We also expected these traits to be related to deficits recognizing happiness and surprise, but not as strongly as fear and sadness. On the other hand, we expected that both interpersonal/affective and impulsive/antisocial psychopathy traits would be related to deficits in recognition of anger and disgust but only among women, not men.

There was mixed support for the hypotheses based on factor structures and scales of the PPI and gender. First, contrary to expectations, neither of the interpersonal/affective or impulsive/antisocial factors from either of the two-factor model solutions of the PPI (Benning et al. 2003, or Wilson et al. 1999) significantly related to emotion recognition, regardless of gender. On the other hand, interpersonal/affective factors

from Neumann et al.'s (2008) three-factor PPI model were related to some emotion recognition deficits in hypothesized ways but there were also unexpected, opposite relationships for men and women on this three-factor model and some of the PPI's original individual scales and emotion recognition.

First, with regard to disgust recognition among men the Callous-Indifferent factor, which is composed of two scales (Coldheartedness and Carefree Nonplanfulness) and putatively taps lack of emotion and nonchalance, was related to poorer disgust recognition. This is likely driven by the significant relationship between Carefree Nonplanfulness and disgust in men with high levels of psychopathy in this sample. These findings are important because as previously mentioned, disgust reactivity has been linked to morality judgements (e.g., Rozin et al. 1999), and people typically display a disgust reaction to more egregious moral transgressions (e.g., raping, stealing, and killing). In addition, lower reactivity to disgust has been reported among male psychopathic criminals (Kosson et al. 2002). Taken together, these findings suggest that at least among men, disgust reactivity may underlie psychopathic coldness and callousness which in turn may facilitate their willingness to engage in social transgressions, in particular more heinous ones. However, among women there was an unexpected, positive relationship between Neumann et al.'s Fearless-Impulsive-Antisociality Factor and disgust recognition. This relationship is particularly striking because among men, every scale that composes this factor was negatively related to disgust. Previous studies have reported positive relationships between PPI impulsivity facets of psychopathy and neuroticism (e.g., Benning et al. 2005). One possibility for our results is that women may have a higher sensitivity to disgust cues, a very basic emotion that underlies neuroticism (Druschel and Sherman 1999) and thus it is related to better disgust recognition even among psychopathic women. However, this hypothesis and how it affects the manifestation of psychopathy in women needs to be tested further. Nonetheless, this discrepancy between men and women highlights the importance of considering gender differences and the possibility that psychopathy may be related to *enhanced* emotion recognition in women.

Second, Neumann et al.'s (2008) High Extraversion/Low Neuroticism factor, which most closely represents the interpersonal social dominance and lack of anxiety aspects of psychopathy, was negatively related to fear and anger recognition among women. Social Potency, which is a scale of this factor, also negatively predicted fear recognition in women. These findings are notable because these traits have frequently been associated with positive life outcomes like academic and professional achievement (e.g., Benning et al. 2005) leading some researchers to question whether they belong to the nomological network of psychopathy (c.f., Lilienfeld et al. 2012; Miller and Lynam 2012). Recently, Blonigen (2013) proposed that these traits may have a curvilinear relationship to adaptive

and maladaptive outcomes, such that higher than average scores in these traits may be related to positive life outcomes, but very high levels could be related to maladaptive outcomes like lack of empathy for others. Future research should examine whether the association between these socially dominant and low anxiety traits and reduced anger recognition among women is associated with adaptive or maladaptive outcomes. Finally, deficits identifying fear are among the most robust in the male psychopathy literature (e.g. Dadds et al. 2006). Our results extend the connection between some interpersonal/ affective psychopathic traits and fear recognition deficits among women in the community. Again, future research should focus on whether these deficits are associated with adaptive or maladaptive outcomes in women.

Third, previously proposed and frequently used PPI two-factor models (Benning et al. 2003; Wilson et al. 1999) did not relate to emotion recognition tasks. In addition, some of the individual scales that compose these two individual factors were sometimes related to emotion recognition in opposite directions suggesting that the conglomeration of the scales within the two factor models suppresses the relationships to emotion recognition. This is notable because while there is evidence for external validity of these two factor structures for outcomes such as antisocial behavior and poor academic achievement in male samples (Mullins-Nelson et al. 2006; Patrick et al. 2006; Uzieblo et al. 2007), the current study suggests that the two factor models may not reliably predict emotion recognition in psychopathy, especially among women. Given that Neumann et al.'s (2008) three-factor model evinced more theoretically consistent relationships, the current findings give impetus to future studies that compare external validity correlates between competing factor structures and could support triarchic conceptualizations of psychopathy (Cooke and Michie 2001; Neumann et al. 2008; Patrick et al. 2009). However, Neumann et al.'s model may not be ideal as some of its factors have low internal consistency (i.e., Callous-Indifference) and the way it combines facets of psychopathy may cloud understanding of correlating behaviors. Thus, further research on the factors of the PPI is necessary.

Finally, our findings also support calls to examine lower order scales of the PPI as they may provide more fine grained insights into the relationship between personality aspects of psychopathy and various relevant clinical outcomes (Miller and Lynam 2012). In this study, Machiavellian Egocentricity and Fearlessness were negatively related to anger recognition among men, not women. This was also the case for Blame Externalization and fear recognition. As previously mentioned, Fearlessness has already been fairly well established as a predictor of impaired emotion recognition. Our data suggest that manipulative and irresponsible personality facets of psychopathy are also related to deficits in recognition of emotions theoretically central to the callous and aggressive aspects of psychopathy. In particular, typically developed ability to

recognize anger helps individuals to more readily assess the effect that their actions have on others and halt their behaviors (e.g., de-escalating argument upon realizing anger from others), thus promoting prosociality. Therefore, individuals with deficits in this ability may engage in more aggressive interactions since they are unaware of their impact on others, leading to higher incidence of mutual retaliation. These type of findings are along the lines of other studies that have shown stronger relationships between Machiavellian Egocentricity and proactive aggression than other psychopathic facets, including Fearlessness (e.g., Bobadilla et al. 2012).

The current study has strengths, in particular its use of a larger male and female sample, and the use of objective measures of emotion recognition. Along with these strengths, the study also has some limitations that must be mentioned. First, the magnitude of the correlations for the whole sample were relatively small and replication is necessary. However, the associations for the upper quartile analyses were much stronger, ameliorating this concern to a degree and lending some confidence to our conclusions. A second limitation is that, as the focus of this study was on gender moderation, corrections were not made for Type 1 error at the bivariate correlation level, and due to the number of correlations it is possible that there are some spurious results. Although, analyses examining the gender interactions did employ bootstrapping to correct for Type 1 error with minimal effect to the results. A third limitation is that generalizations of this study may only be made for cognitive empathy (i.e. recognition of emotion) and not necessarily for affective empathy (i.e., feeling others' emotions). A final limitation is that we did not control for comorbid psychopathology which occurs in college samples, particularly related to substance use (White et al. 2005). Future studies should take measures to control for such covariates.

Despite these limitations and need for replication, the study makes various contributions. First, our study is the first to show a relationship between recently identified Callous-Indifferent and High Extraversion/Low Neuroticism PPI factors (Neumann et al. 2008) which encompass interpersonal/ affective aspects of psychopathy and disgust and fear recognition deficits in men and women respectively. Moreover, this study's findings suggest important gender differences: Psychopathic traits may be associated with both deficient and improved emotion recognition for women, while among men they are only related to deficits. Specifically, among women psychopathic traits characterized by social dominance and lack of anxiety were related to anger recognition deficits while those characterized by impulsive rebelliousness and unsentimentality or nonchalance were associated with *better* recognition of disgust and anger, respectively.

Appropriate socialization for individuals includes the ability to understand others' emotions. The findings from this study could suggest some implications for treatment. Among

women with high impulsive/rebellious psychopathic traits empathy may not be as impaired and such strengths may be useful. Conversely, among men with manipulative and fearless psychopathic traits, trying to develop empathy would be counterproductive. Rather, since they show deficits recognizing anger, interventions may be aimed at improving the recognition of this emotion. However, these possibilities require testing. In sum, this study supports tri-partite conceptualizations of psychopathy in particular in the study of empathy, and suggests that high psychopathic traits may not represent a generalized empathy deficit for women.

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