Published in final edited form as:

J Pers Disord. 2018 August ; 32(4): 543–561. doi:10.1521/pedi_2017_31_314.

Unique and Interactive Associations between Maltreatment and Complex Emotion Recognition Deficits and Psychopathic Traits in an Undergraduate Sample

Rebecca Waller, PhD^{1,2}, Hannah K. McCabe¹, Hailey L. Dotterer¹, Craig S. Neumann, PhD³, and Luke W. Hyde, PhD^{1,4,5}

¹Department of Psychology, University of Michigan, Ann Arbor, MI, USA

²Addiction Center, Department of Psychiatry, University of Michigan, Ann Arbor, MI, USA

³Department of Psychology, University of North Texas, TX, USA

⁴Institute for Social Research, University of Michigan, Ann Arbor, MI, USA

⁵Center for Human Growth and Development, University of Michigan, Ann Arbor, MI, USA

Abstract

Psychopathy is defined by affective and interpersonal deficits, defiant lifestyle, and antisocial behaviors. Poor recognition of emotions and childhood maltreatment are two risk factors implicated in psychopathy. The current study examined whether childhood maltreatment and complex emotion recognition deficits showed unique and interactive associations with psychopathic traits among 261 undergraduate students. Results indicate that maltreatment was related to higher general psychopathy scores within a bifactor model comprising a general psychopathy factor and four specific factors tapping underlying dimensions of psychopathy (i.e., affective, interpersonal, lifestyle, and antisocial). A significant interaction emerged whereby maltreatment was related to higher antisocial factor scores among individuals showing poor recognition of positive emotions. In an intriguing interaction, more maltreatment was related to lower interpersonal factor scores among individuals with low/mean levels of neutral emotion recognition. The interaction of positive emotion recognition deficits and maltreatment highlights a potential intervention target among antisocial individuals who have experienced maltreatment.

Keywords

Assessment; Bifactor; Emotion Recognition; Psychopathy; Maltreatment

Psychopathy is defined by a constellation of complex personality and behavioral traits, including deficits in affective and interpersonal functioning, deviant lifestyle, and antisocial and delinquent acts (Hare & Neumann, 2008). Due to the disproportionate amount of violence and crime associated with psychopathy (Patrick, 2007), research has attempted to

Correspondence: Rebecca Waller, Department of Psychology, 530 Church Street, University of Michigan, Ann Arbor, MI 48109, USA; rewaller@umich.edu.

Conflict of interest statement: No conflicts declared.

better define and measure psychopathy, as well as establish factors that increase risk for its development. However, psychopathy has remained an elusive construct to define, made harder by the fact that items tapping psychopathy load onto separate but correlated, personality (i.e., affective-interpersonal) and behavioral (i.e., criminal or irresponsible lifestyle) factors (Hare et al., 1990). There is also debate in the field about the extent to which variance in items that load onto these separate factors contribute to an overarching “general” psychopathy factor, which is salient when studying psychopathy among community samples where expression of individual factors may be lower. Recent research has examined psychopathy outside of incarcerated, male-only populations by using self-report questionnaire measures in community samples with wider distributions of psychopathic traits (Dotterer et al., 2016; Neumann, Schmitt, Carter, Embley, & Hare, 2012), which could help to improve the search for risk factors. In the current study, we focused on the unique and interactive relationship of two potential risk factors for psychopathy in a sample of undergraduate students: complex emotion recognition deficits (Blair, Leibenluft, & Pine, 2014) and experience of maltreatment (Schimmenti, Di Carlo, Passanisi, & Caretti, 2015).

Complex Emotion Recognition Deficits and Psychopathic Traits

Poor emotion recognition has long been implicated in the development of psychopathic traits (Marsh & Blair, 2008), with the ability to recognize facial expressions thought to be crucial for effective social functioning (Montagne et al., 2005). One explanation for why individuals with psychopathic traits persist in violence is that they do not learn to associate harmful actions with the aversive feelings that should be evoked by recognizing negative emotional cues from others in response to their antisocial behaviors (Blair et al., 2014). However, the literature examining the relationship between emotion recognition deficits and psychopathy is mixed. While some studies have reported that individuals high on psychopathic traits have difficulties recognizing fear and sadness (e.g., Blair et al., 2004; Marsh & Blair, 2008), others report that those high in psychopathic traits are better at recognizing basic facial expressions (Del Gaizo & Falkenbach, 2008), or report no relationship between emotion recognition deficits and psychopathy (Glass & Newman, 2006).

These discrepant findings could have arisen because studies assessed different target populations. For example, the emotion recognition deficits of criminal psychopaths may differ from those associated with psychopathic traits among normative populations. Indeed, in a meta-analysis, Marsh and Blair (2008) found that antisocial individuals are consistently worse at recognizing emotions than control populations. Individuals higher on psychopathic traits in normative populations may also exhibit fewer criminal behaviors because they are better at recognizing emotions. Moreover, less is known about psychopathic traits in females (although see Verona & Vitale, 2006) and gender differences have been reported for both emotion recognition (Thayer & Johnsen, 2000) and psychopathic traits (e.g., Neumann et al., 2012). Thus, the extent to which emotion recognition is related to psychopathy among normative samples with equal numbers of males and females requires further exploration.

It is also noteworthy that much of the existing literature has focused on examining deficits in recognizing the six basic emotions: fear, sadness, happiness, disgust, anger, and surprise.

However, paradigms using complex emotions (e.g., “Reading the Mind in the Eyes Task”; Baron-Cohen, Wheelwright & Jolliffe, 1997) are thought to be better tests of emotion recognition because they require greater processing and social insight. Thus, individuals with psychopathic traits may display adequate *basic* emotion processing, but deficient *complex* emotion processing (or the reverse). Moreover, the direction of effects may be contingent on emotion valence (positive, negative, or neutral) or focus (whole face vs. eyes only). For example, callous-unemotional traits (i.e., related to the affective/interpersonal psychopathy factor) are correlated with poor recognition of fear and distress (Marsh & Blair, 2008), but these deficits disappear when participants are explicitly told to orient to the eyes (Dadds et al., 2006). Thus, the relationship between psychopathic traits and poor emotion recognition may differ if participants are presented with complex emotions featuring eyes only. Moreover, although studies exist that have examined the relationship between complex emotion recognition and psychopathic traits, these have typically focused on incarcerated male populations with mixed findings. For example, psychopathic offenders performed equally well in identifying complex emotions compared to healthy, non-psychopathic individuals (Richell et al., 2003). Affective-interpersonal scores were also specifically related to *improved* recognition of neutral expressions whereas antisocial-lifestyle traits were related to poorer recognition of negative and neutral expressions (Sandvik, Hansen, Johnsen, & Laberg, 2014). Currently, it is not known whether the findings from these two studies of complex emotion recognition and psychopathy generalize to non-offender samples, especially when different facets of psychopathic traits are examined separately. Examining psychopathy in non-offender samples, including undergraduate samples is warranted given that, even at low levels, such personality traits are harmful and toxic.

Maltreatment, Emotion Recognition Deficits, and Psychopathic Traits

It is also important to consider the role that early experiences and socialization play in the development of psychopathy. In particular, childhood maltreatment is strongly implicated in risk pathways to psychopathic traits (Schimmenti et al., 2015). Childhood maltreatment is thought to undermine emotion regulation development, including the process of expressing, understanding, and communicating emotions, which in turn could influence the emergence of the harmful personality and behavioral traits associated with psychopathy (Montagne et al., 2005). However, studies have yet to examine whether maltreatment and emotion recognition deficits are independently associated with psychopathic traits by examining their unique relationships within a single model. Moreover, studies have not tested potential interactions of emotion recognition deficits and maltreatment, which might help to further explain the inconsistent findings reported in prior studies that have typically not accounted for maltreatment. An examination of how childhood maltreatment and emotion recognition deficits potentiate each other in risk pathways fits within a person-by-context interaction framework for understanding the development of aggression and psychopathy (e.g., Meier, Robinson, Wilkowski, 2006). For example, a bias towards misinterpreting neutral faces as being more negative (i.e., hostility bias; Dodge & Crick, 1990) or misinterpreting positive faces as being neutral might be particularly harmful in the context of maltreatment, exacerbating risk for the development of psychopathic traits.

Modeling Heterogeneity in the Psychopathy Construct

Finally, to address complexities posed by the heterogeneity in the psychopathy construct, studies need to consider both specific psychopathy facets (i.e., affective, interpersonal, lifestyle, and antisocial dimensions) and general psychopathy. One way to parse such heterogeneity is within a bifactor approach, which simultaneously models multidimensionality (i.e., specific personality/behavioral factors) and unidimensionality (i.e., overarching factor) to represent the psychopathy construct. Bifactor models include a “general” factor that captures shared variance across *all items*, while simultaneously modeling variance captured by “specific” factors within *subsets of items*. Bifactor models have been used to assess intelligence (Carroll, 1993) by specifying overarching constructs (general intelligence), as well as separable, orthogonal components (verbal vs. spatial intelligence). Recently, burgeoning evidence has also highlighted the utility of bifactor models for conceptualizing psychopathology, particularly psychopathy (e.g., Debowska, Boduszek, Kola, & Hyland, 2014; Waller et al., 2015). In particular, several recent studies have established a bifactor as the best way to model psychopathy within community samples, with items modeled both as different and specific dimensions (e.g., affective, interpersonal, lifestyle, and antisocial specific factors), while simultaneously representing a distinct and broad construct of general psychopathy (e.g., Dotterer et al., 2016; Neumann, Hare, & Pardini, 2015). However, research is needed to determine whether risk factors differentially predict these specific versus general aspects of the psychopathy construct.

The Present Study

The current study investigated whether childhood maltreatment and complex emotion recognition deficits were independently and interactively related to psychopathic traits in an undergraduate sample. Our primary goal was to examine unique relationships between childhood maltreatment, emotion recognition deficits, and psychopathic traits. To isolate potentially divergent relationships, we examined pathways within a bifactor framework that parsed variance in general versus specific components of psychopathy. We hypothesized that childhood maltreatment and poor complex emotion recognition would be uniquely related to higher general psychopathy scores. Our second goal was to examine whether the interactions between experience of maltreatment and complex emotion recognition deficits were related to general and specific psychopathy factors. Based on a person-by-context framework, we hypothesized that childhood maltreatment would be related to higher general psychopathy more strongly among individuals showing poorer recognition of complex emotions.

Methods

Participants

Participants were 261 college students (58% female) from a large Midwestern university recruited through the psychology subject pool and compensated with course credit. Gender was included as a covariate. The sample included a majority of students who reported their race/ethnicity to be European-American ($n = 187$; 71.6%), but included students who reported being African American ($n = 11$; 4.2%), Asian American ($n = 39$; 14.9%), Hispanic or Latino ($n = 5$; 1.9%), multiracial/biracial ($n = 13$; 5%), or “other” ($n = 5$; 1.9%), with

missing data for race/ethnicity for one participant. As race/ethnicity has been shown to influence rates of psychopathy (Sullivan & Kosson, 2006), race/ethnicity was included as a covariate to identify unique effects of maltreatment or emotion recognition deficits. Race/ethnicity grouping was recoded as a dichotomous variable (European-American vs. non-European-American). The mean age of the sample was 18.84 years old ($SD=1.00$). Students also provided information about family income, which was included as a covariate in analyses. Annual family income was coded as a semi-continuous variable on a 9-point scale: 1 = < \$9000; 4 = \$50,000-74,999; 9 = > \$250,000). Participants completed the study using an online survey tool during a 60-minute computer session in which participants responded to a battery of questionnaires. Participants gave written informed consent.

Measures

Childhood maltreatment—Childhood maltreatment was assessed using scores on the Childhood Trauma Questionnaire (CTQ; Bernstein, Ahluvalia, Pogge, & Handelsman, 1997), a 25-item retrospective self-report measure that consists of five subscales: emotional abuse (e.g., “I thought my parents wished I had never been born”), physical abuse (e.g., “family members hit me so hard that it left me with bruises or marks”), sexual abuse (e.g., “someone tried to touch me in a sexual way, or tried to make me touch them”), emotional neglect (e.g., reverse-coded, “people in my family felt close to each other”), and physical neglect (e.g., “I didn’t have enough to eat”). Participants rated each item on a 5-point Likert scale ranging from 1 (never true) to 5 (very often true). The construct validity and reliability of the CTQ has previously been demonstrated in community samples (Scher, Stein, Asmundson, McCreary & Forde, 2001). To generate a valid measure of retrospectively-reported maltreatment across abuse and neglect (Scher et al., 2001), we computed a summed score of all items, which showed high internal consistency ($\alpha=.91$).

Psychopathic Traits—Psychopathic traits were assessed using the Self-Report of Psychopathy-Short Form (SRP-SF-IV; Paulhus, Neumann, & Hare, 2016; Neumann & Pardini, 2014). The SRP-SF is a 29-item self-report measure assessing the four factors of psychopathy: interpersonal (“Can beat a lie detector”), affective (“never feel guilty over hurting others”), lifestyle (“Done dangerous things just for the thrill of it”), and antisocial behavior (e.g., “Tried to hit someone with a vehicle”). Items are rated on a 5-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). Consistent with previous studies (Dotterer et al., 2016; Neumann & Pardini, 2014), the SRP-SF demonstrated acceptable internal consistency for total scores and three of the subscales (total score, $\alpha=.89$; interpersonal, $\alpha=.80$; affective, $\alpha=.70$; lifestyle, $\alpha=.76$), with lower than acceptable internal consistency for the antisocial subscale ($\alpha=.69$). Although we used summed scores for descriptives and bivariate correlations, the remaining analyses modeled SRP-SF items as a four-bifactor model based on a previously validated model in four independent samples of undergraduate and high-risk young adults (Dotterer et al., 2016).

Complex Emotion recognition—Complex emotion recognition was assessed using the “Reading the Mind in the Eyes Task” (Baron-Cohen, et al., 1997). Participants were shown a black-and-white picture of a model’s eyes expressing an emotion (e.g., cautious, defiant). Participants were then asked to choose which emotion was being expressed out of four

options. The task is self-paced, and total scores represent the number of emotions correctly identified. To determine classifications emotions, we conducted a pilot study ($n=17$) and presented participants with the 36 eyes from the task labeled with the correct target adjective. Each participant ranked the stimuli on a Likert scale ranging from 1 (very negative), to 4 (neutral), to 7 (very positive). To classify stimuli as negative or positive relative to neutral, we followed the example of prior studies that have used this stimulus set (e.g., Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005) and ran t-tests to compare ratings for each stimuli relative to a mean rating of 4. Stimuli with mean ratings significantly higher than 4 were classified as positive and stimuli with mean ratings significantly lower than 4 were classified as negative. All other stimuli were classified as neutral. Final classifications consisted of 16 negative emotions (upset, insistent, worried, uneasy, despondent, regretful, accusing, skeptical, doubtful, defiant, hostile, serious, concerned, distrustful, nervous, and suspicious), 6 positive emotions (playful, desire, friendly, flirtatious, confident, and anticipating), and 9 neutral emotions (contemplative, thoughtful, decisive, tentative, pensive, reflective, cautious, preoccupied, and fantasizing).

Analytic Strategy

All models were run in Mplus vs. 7.2 (Muthen & Muthen, 2014). To estimate the bifactor model, we specified 29 SRP items to simultaneously load onto a general psychopathy factor and one of four specific factors using mean and variance adjusted weighted least squares estimation (WLSMV) consistent with a prior study in a separate though similar sample (Dotterer et al., 2016). Note that a basic requirement of this model is that the specific factors are set to be orthogonal to the general factor. Model fit was evaluated using the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). RMSEA values less than or equal to .08, CFI values greater than .95 and TLI values greater than or equal to .90 were used to indicate good fit to the data. Our first study aim was to test whether childhood maltreatment and recognition of complex emotions were related to psychopathic traits, within a bifactor framework controlling for gender, race, and income. Our second study aim was to test whether interactions between childhood maltreatment and emotion recognition deficits were related to psychopathic traits. To minimize multiple comparisons, we ran a single multivariate model that included all main effects and interaction terms between maltreatment and positive, negative, and neutral emotion recognition. We probed significant interactions at mean levels and 1 *SD* above and below the mean using an online tool to identify regions of significance (Preacher, Curran, & Bauer, 2006)

Results

Preliminary Analysis

Before testing our primary hypotheses, we confirmed the fit of the four-bifactor model. Consistent with previous results (Dotterer et al., 2016), the four bifactor model demonstrated excellent model fit ($\chi^2=481.45$, $df=297$, $p<.001$; CFI=.95, RMSEA =.05) with moderate-high loadings of all items on the general psychopathy factor (Figure 1). The model fit for a four-correlated factor model had acceptable, though less than ideal fit, and was worse than that of the four bifactor model ($\chi^2=699.23$, $df=318$, $p<.001$; CFI=.89, RMSEA =.07). The

four bifactor model was preferred because it provided better fit to the data and enabled us to parse variance in general versus specific factors of psychopathy.

Descriptive and zero-order associations

Descriptive and zero-order associations between study variables are presented in Table 1. First, there were modest-moderate bivariate correlations between maltreatment and poorer recognition of positive, negative and neutral complex emotions (range, $r=.17-.22$, $p<.01$). Second, using manifest summed scores that did not parse variance in general versus specific psychopathy factors, there were notable relationships between poorer recognition of positive, neutral, and negative expressions and higher antisocial facet scores (range, $r=.16-.25$, $p<.05$). Third, poorer recognition of complex positive expressions was related to higher total summed psychopathy scores ($r=.14$, $p<.05$) and higher affective psychopathy facet scores ($r=.15$, $p<.05$). Finally, in bivariate associations, childhood maltreatment was moderately related to higher scores for the total and all four subfactor psychopathy scales (range, $r=.20-.33$, $p<.001$).

Aim 1: Are childhood maltreatment or complex emotion recognition uniquely related to psychopathic traits within a bifactor framework?

Having established significant bivariate correlations, we examined unique relationships of maltreatment and complex emotion recognition deficits with general and specific psychopathy factors within a single multivariate model that accounted for the overlap of positive, negative, and neutral emotion recognition, and race, gender, and family income (Table 2). As hypothesized, greater childhood maltreatment was related to higher general psychopathy factor scores. However, there were no *unique* associations between positive, negative, or neutral emotion recognition deficits and general psychopathy scores after controlling for the effects of maltreatment and within the bifactor framework (i.e., once variance in the specific factors had been parsed). In contrast to the bivariate associations (see above), lower childhood maltreatment was related to higher interpersonal specific factor scores after parsing variance in the general psychopathy factor. Moreover, in contrast to the bivariate associations, once variance in the general factor had been parsed, there were no independent associations between emotion recognition and the specific affective, interpersonal, lifestyle, or antisocial factor scores.

Aim 2: Is the interaction of maltreatment and emotion recognition deficits related to psychopathic traits within a bifactor framework?

To address our second aim, we included interaction terms in the same multivariate model outlined above (Table 2). There were two significant interaction terms. First, the interaction of maltreatment and positive emotion recognition was significantly related to antisocial behavior. Specifically, childhood maltreatment was related to higher antisocial behavior at low ($B=.37$, $SE=.13$, $p<.01$) but not mean ($B=.14$, $SE=.09$, $p=.12$) or high ($B=-.09$, $SE=.12$, $p=.45$) levels of positive emotion recognition (Figure 2). Second, the interaction of maltreatment and neutral emotion recognition was related to interpersonal factor scores. Childhood maltreatment was related to lower interpersonal scores at mean ($B=-.23$, $SE=.07$, $p<.001$) and low ($B=-.45$, $SE=.10$, $p<.001$), but not high ($B=-.02$, $SE=.08$, $p=.83$) levels of neutral emotion recognition (Figure 3).

Discussion

We examined relationships between childhood maltreatment, emotion recognition deficits, and psychopathic traits. Our findings advance knowledge about these relationships by focusing on complex emotional expressions presented as “eyes only” and by parsing variance in general versus specific components of psychopathy to isolate divergent associations with risk mechanisms. In line with our hypothesis, experience of childhood maltreatment was related to higher general psychopathy scores. Additionally, poorer recognition of positive emotions was uniquely related to higher specific antisocial behavior scores in the context of childhood maltreatment. Contrary to what might be expected, maltreatment was related to lower specific interpersonal scores when general psychopathy was parsed, but only for individuals with mean or low neutral emotion recognition skills.

Childhood Maltreatment and Emotion Recognition Deficits: Independent Associations

Our findings further establish experience of childhood maltreatment as a risk factor for psychopathic traits (Schimmenti et al., 2015). The current study also extends previous research by establishing the relationship between childhood maltreatment and psychopathic traits within the context of a bifactor modeling framework in a non-offender sample. Consistent with the literature, experience of childhood maltreatment was related to higher general psychopathy factors scores even in a sample where rates of antisocial behavior and psychopathy might be considered relatively low. This association likely arises because of the centrality of the parent-child relationships to socialization processes. Children who experience maltreatment may fail to learn socially appropriate ways to react to different types of situations, and may be more likely to resort to aggressive or dominating behaviors in daily life, as captured across all items within the general psychopathy factor (Schimmenti et al., 2015).

In contrast to the hypothesized association found between maltreatment and higher general psychopathy scores, we found that lower maltreatment was related to higher specific interpersonal scores. To interpret this finding, we speculate that once variance in general psychopathy is parsed, including the most negative and harmful aspects of the construct (Hare & Neumann, 2008), the variance remaining in items indexing the interpersonal factor may capture something akin to boldness, an ability to be charming or exhibit social dominance, which arise in the context of *low* childhood maltreatment (i.e., items loading on specific factor included “*flattery*” and “*people are easily fooled*”). This explanation is consistent with the Triarchic psychopathy model, where the phenotypic disposition of “boldness” may confer positive outcomes when considered in isolation from the harmful behaviors captured in the other psychopathy phenotypes, “disinhibition” and “meanness” (Patrick, Fowles, & Krueger, 2009). This explanation is also supported by work showing that individuals scoring the highest on all four facets of psychopathy present with the most severe profiles on critical correlates of psychopathy, suggesting that high levels on one facet alone may not be sufficient to confer psychopathy (Neumann, Vitacco, & Mokros, 2015). Future studies are needed to test the hypothesis that within a bifactor framework, a general factor corresponds to the most toxic portions of psychopathic personality, but once this variance is parsed, some of the orthogonal specific factors may be less harmful. Moreover, in bivariate

models, we found that poorer recognition of negative, neutral, and positive emotions was related to higher antisocial behavior specific factor scores. However, these simple correlations disappeared within a multivariate model that included maltreatment, and after parsing variance in general psychopathy factor scores and other specific factors. Thus, the findings of prior studies reporting links between poorer recognition of negative emotions and antisocial behavior may be accounted for by other variables, such as experience of maltreatment or co-occurring psychopathic traits.

Interactions between Childhood Maltreatment and Emotion Recognition Deficits

When testing interactions of childhood maltreatment and emotion recognition deficits, we found evidence that childhood maltreatment was related to higher antisocial behavior facets scores within the bifactor model, specifically among individuals with poor recognition of positive emotions. This interaction suggests that one mechanism (i.e., person-by-context interaction) through which maltreatment places children at risk for serious antisocial behavior is via their ability to recognize, interpret, encode, and act upon positive social stimuli, which might otherwise have provided positive reinforcement for prosocial behavior. In community samples, the antisocial features of psychopathy become particularly important compared to general offender samples and are highly discriminatory (Neumann et al., 2015). Thus, the items that loaded on the specific antisocial factor after parsing variance in general psychopathy may be indicative of more severely antisocial individuals, even in our low-risk undergraduate sample (e.g., *“attached some intentionally”* and *“carried a weapon”*). Our findings fit with social information processing theories and the centrality of hostile attribution biases to the emergence of antisocial behavior (Dodge & Crick, 1990). In this case, failure to recognize positive emotional expressions coupled with repeated exposure to abuse or neglect may represent interactive risk mechanisms in the emergence of reactive and dysregulated forms of aggression and antisocial behavior (Dodge & Crick, 1990). At the same time, the results suggest that enhanced ability to recognize positive emotions may serve as a protective factor against the development of antisocial behavior in the context of childhood maltreatment. This finding provides empirical support for treatment approaches for antisocial behavior that seek to reduce aggression and anger by improving positive emotion recognition (e.g., Penton-Voak et al., 2013).

In contrast, higher childhood maltreatment predicted lower interpersonal specific factor scores, but only among individuals with poor recognition of neutral faces. We note again that the significant relationship between higher childhood maltreatment and lower interpersonal scores only emerged in the context of the bifactor model and not in bivariate associations, where more maltreatment predicted higher interpersonal scores (i.e., contrasting findings in Tables 1 and 2). On one hand, the significant interaction thus suggests that lower interpersonal factor scores arise specifically among individuals who are poorer at recognizing neutral expressions of emotion, which could undermine their ability to be charming or exhibit social dominance (i.e., variance remaining in this factor once general psychopathy factor variance is parsed). On the other hand, being highly skilled at recognizing neutral emotions appears to confer advantages in terms of having higher levels of interpersonal traits once general psychopathy factor variance is parsed, even in the context of high levels of childhood maltreatment. This interpretation may help to explain the

sometimes contradictory and counterintuitive characteristic used to describe the psychopathy construct. For example, the idea of an individual who is high on psychopathy and may have experienced maltreatment also being charming, socially dominant, and skilled at interpreting complex neutral emotions is consistent with some of the original writings of Cleckley, who described individuals high on psychopathy as making “*a distinctly positive impression when first encountered*” (p. 339) or showing “*extraordinary poise*” (p. 340) in social situations (Cleckley, 1941, 1988). Importantly, the distinct emotion recognition processes and interactions with maltreatment in the prediction of antisocial versus interpersonal factor scores provides further support for the use of a bifactor framework to delineate unique risk pathways leading to specific facets of psychopathy. The use of the bifactor modeling approach to identify these intriguing and divergent patterns of relationships may also help to explain some of the contradictory findings noted in prior studies.

Limitations

The current study had several strengths. First, we employed a task that tested complex emotion recognition based on assessing the eyes only, which helps to eliminate potential ceiling effects common to tasks that assess the whole face for basic emotions and provides a better test of the emotional expressions encountered in typical daily social interactions (Baron-Cohen et al., 1997). We used a bifactor modeling approach to parse unique risk mechanisms leading to separable components of psychopathy, while also modeling the overall psychopathy construct. Despite these strengths, we highlight several limitations. First, we examined associations in a sample of majority female (58%) college undergraduates. The mean SRP total psychopathy score was 54.70, which is generally comparable with other studies of community samples or college students (Carré, Hyde, Neumann, Viding, & Harii, 2013), but lower than means obtained among offender samples (Neumann, Hare, & Pardini, 2015). These values indicate that findings may not generalize beyond low risk community samples or college students. Moreover, concerns have been raised about the extent to which undergraduates represent the community more broadly (Henrich, Hein, & Norenzayan, 2010), and thus results may not generalize beyond undergraduates. Second, although we employed the widely-used CTQ (Bernstein et al., 1997) to assess childhood maltreatment, it was reported retrospectively and relationships were examined within a cross-sectional design. This retrospective reporting may have biased the severity of maltreatment reported and may not have fully captured the maltreatment experienced in our sample. Moreover, our design was cross-sectional; prospective, longitudinal designs are needed to confirm the directionality of the relationships between childhood maltreatment, emotion recognition, and psychopathic traits identified in this study (e.g., Dodge, Pettit, Bates, & Valente, 1995). Third, both the CTQ and our measure of psychopathic traits relied on self-report, whereas emotion recognition was assessed via a computerized task. Thus, shared method variance may have inflated the magnitude of associations between maltreatment and psychopathic traits, which may have obscured relationships between emotion recognition and psychopathic traits in multivariate models when compared to bivariate models. Fourth, we note that maltreatment is indicated in the etiology of wide range of psychopathologies, including internalizing and externalizing problems (McCrory, De Brito, & Viding, 2012). Future studies capable of accounting for other co-occurring forms of psychopathology are needed to isolate the specificity of

relationships in relation to psychopathy. Finally, we draw attention to the item loadings across the bifactor model. Although the bifactor model provided superior fit to the data relative to a correlated four-factor model, once variance in a general psychopathy factor was parsed, some of the specific factor loadings were rendered non-significant. For example, the items “do not feel bad about hurting others” (affective) and “enjoy scamming people” (interpersonal) did not load on their respective specific factors, suggesting that these items may be better indicators of general manifestations of psychopathy, at least in this low-risk, undergraduate sample. Future studies that include alternative measures tapping the interpersonal and affective components of psychopathy are needed to replicate the nature and direction of the current findings.

Clinical Implications and Future Directions

This current study examined the relationships between childhood maltreatment, emotion recognition deficits, and psychopathy, and advances our understanding of underlying risk mechanisms for psychopathy. General versus specific factors of psychopathy were differentially related to childhood maltreatment and its interaction with emotion recognition deficits. A better understanding of these differential pathways from early negative experiences in childhood and person-by-context interactions leading to harmful psychopathic personality traits in young adulthood can better inform intervention efforts. For example, improved recognition of complex positive emotions was identified as a protective mechanism in the link between maltreatment and antisocial traits, and thus may be useful as a target for intervention via skill-building workshops for highly antisocial youth. Future research using larger, more diverse samples from community, clinical, and forensic settings could determine if the relationships found in the current study extend across the full spectrum of psychopathy.

Acknowledgments

This research was supported by Grant **L40MH108392** to L.W. Hyde. R. Waller was supported in her efforts by a NIAAA T32 Fellowship in the Addiction Center, Department of Psychiatry, University of Michigan (**2T32AA007477-24A1**).

References

- Adolphs R, Baron-Cohen S, Tranel D. Impaired recognition of social emotions following amygdala damage. *Journal of Cognitive Neuroscience*. 2002; 14:1264–1274. DOI: 10.1162/089892902760807258 [PubMed: 12495531]
- Baron-Cohen S, Wheelwright S, Jolliffe AT. Is there a “language of the eyes”? Evidence from normal adults, and adults with autism or Asperger syndrome. *Visual Cognition*. 1997; 4:311–331. DOI: 10.1080/713756761
- Bernstein DP, Ahluvalia T, Pogge D, Handelsman L. Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1997; 36:340–348. DOI: 10.1097/00004583-199703000-00012 [PubMed: 9055514]
- Blair RJR, Leibenluft E, Pine DS. Conduct disorder and callous–unemotional traits in youth. *New England Journal of Medicine*. 2014; 371:2207–2216. DOI: 10.1056/NEJMra1315612 [PubMed: 25470696]
- Blair RJR, Mitchell DGV, Peschardt KS, Colledge E, Leonard RA, Shine JH, Perrett DI. Reduced sensitivity to others’ fearful expressions in psychopathic individuals. *Personality and Individual Differences*. 2004; 37:1111–1122. DOI: 10.1016/j.paid.2003.10.008

- Carré JM, Hyde LW, Neumann CS, Viding E, Hariri AR. The neural signatures of distinct psychopathic traits. *Social Neuroscience*. 2013; 8:122–135. DOI: 10.1080/17470919.2012.703623 [PubMed: 22775289]
- Carroll J. The unitary g problem once more: On Kranzler and Jensen. *Intelligence*. 1993; 17:15–16. DOI: 10.1016/0160-2896(93)90034-3
- Cleckley H. *The mask of sanity: an attempt to reinterpret the so-called psychopathic personality*. Oxford, UK: Mosby; 1941. Original work published 1988
- Dadds MR, Perry Y, Hawes DJ, Merz S, Riddell AC, Haines DJ, Abeygunawardane AI. Attention to the eyes and fear-recognition deficits in child psychopathy. *The British Journal of Psychiatry*. 2006; 189:280–281. DOI: 10.1192/bjp.bp.105.018150. [PubMed: 16946366]
- Debowska A, Boduszek D, Kola S, Hyland P. A bifactor model of the Polish version of the Hare Self-Report Psychopathy Scale. *Personality and Individual Differences*. 2014; 69:231–237. DOI: 10.1016/j.paid.2014.06.001
- Del Gaizo AL, Falkenbach DM. Primary and secondary psychopathic-traits and their relationship to perception and experience of emotion. *Personality and Individual Differences*. 2008; 45:206–212. DOI: 10.1016/j.paid.2008.03.019
- Dodge KA, Crick NR. Social information-processing bases of aggressive behavior in children. *Personality and Social Psychology Bulletin*. 1990; 16:8–22. DOI: 10.1177/0146167290161002
- Dodge KA, Pettit GS, Bates JE, Valente E. Social information-processing patterns partially mediate the effect of early physical abuse on later conduct problems. *Journal of Abnormal Psychology*. 1995; 104:632–643. DOI: 10.1037/0021-843X.104.4.632 [PubMed: 8530766]
- Dotterer HL, Waller R, Neumann CS, Shaw DS, Forbes EE, Hariri AR, Hyde LW. Examining the factor structure of the Self-Report of Psychopathy Short Form across four young adult samples. *Assessment*. 2016; epub ahead of print. doi: 10.1177/1073191116640355
- Glass SJ, Newman JP. Recognition of facial affect in psychopathic offenders. *Journal of Abnormal Psychology*. 2006; 115:815. doi: 10.1037/0021-843X.115.4.815 [PubMed: 17100539]
- Hare R, Harpur T, Hakstian A, Forth A, Hart S, Newman J. The revised Psychopathy Checklist: Reliability and factor structure. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*. 1990; 2(3):338–341. DOI: 10.1037/1040-3590.2.3.338
- Hare RD, Neumann CS. Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology*. 2008; 4:217–246. DOI: 10.1146/3.022806.091452
- Harkness K, Sabbagh M, Jacobson J, Chowdrey N, Chen T. Enhanced accuracy of mental state decoding in dysphoric college students. *Cognition & Emotion*. 2005; 19:999–1025. DOI: 10.1080/02699930541000110
- Henrich J, Heine SJ, Norenzayan A. Most people are not WEIRD. *Nature*. 2010; 466:29–29. DOI: 10.1038/466029a [PubMed: 20595995]
- Luke N, Banerjee R. Differentiated associations between childhood maltreatment experiences and social understanding: A meta-analysis and systematic review. *Developmental Review*. 2013; 33:1–28. DOI: 10.1016/j.dr.2012.10.001
- Marsh AA, Blair RJR. Deficits in facial affect recognition among antisocial populations: a meta-analysis. *Neuroscience & Biobehavioral Reviews*. 2008; 32:454–465. DOI: 10.1016/2007.08.003 [PubMed: 17915324]
- McCrary E, De Brito SA, Viding E. The link between child abuse and psychopathology: a review of neurobiological and genetic research. *Journal of the Royal Society of Medicine*. 2012; 105:151–156. DOI: 10.1258/2011.110222. [PubMed: 22532655]
- Meier BP, Robinson MD, Wilkowski BM. Turning the other cheek agreeableness and the regulation of aggression-related primes. *Psychological Science*. 2006; 17:136–142. DOI: 10.1111/j.1467-9280.2006.01676.x [PubMed: 16466421]
- Montagne B, van Honk J, Kessels RP, Frigerio E, Burt M, van Zandvoort MJ, de Haan EH. Reduced efficiency in recognizing fear in subjects scoring high on psychopathic personality characteristics. *Personality and Individual Differences*. 2005; 38:5–11. DOI: 10.1016/2004.02.008.
- Muthén LK, Muthén BO. *Mplus*. Los Angeles, CA: Muthén & Muthén; 2014.

- Neumann CS, Hare RD. Psychopathic traits in a large community sample: links to violence, alcohol use, and intelligence. *Journal of Consulting and Clinical Psychology*. 2008; 76:893–899. DOI: 10.1037/0022-006X.76.5.893 [PubMed: 18837606]
- Neumann CS, Schmitt DS, Carter R, Embley I, Hare RD. Psychopathic traits in females and males across the globe. *Behavioral Sciences & The Law*. 2012; 30:557–574. DOI: 10.1002/bsl.2038 [PubMed: 22996170]
- Neumann CS, Pardini D. Factor structure and construct validity of the Self-Report Psychopathy (SRP) scale and the youth psychopathic traits inventory (YPI) in young men. *Journal of Personality Disorders*. 2014; 28:419–433. DOI: 10.1521/pedi_2012_26_063 [PubMed: 22984856]
- Neumann CS, Vitacco MJ, Mokros A. Using both Variable-Centered and Person-centered approaches to understanding psychopathic personality. In: Gacono CB, editor *The Clinical and Forensic Assessment of Psychopathy: A Practitioners Guide*. 2nd. Mahwah, NJ: Lawrence Erlbaum; 2015.
- Neumann CS, Hare RD, Pardini DA. Antisociality and the construct of psychopathy: Data from across the globe. *Journal of Personality*. 2015; 83:678–692. DOI: 10.1111/jopy.12127 [PubMed: 25181550]
- Patrick C. Antisocial personality disorder and psychopathy. In: O'Donohue W, Fowler KA, Lilienfeld SO, editors *Personality disorders: Toward the DSM-V*. Thousand Oaks, CA: Sage Publications, Inc; 2007. 109–166.
- Patrick C, Fowles D, Krueger R. Triarchic conceptualization of psychopathy: Developmental origins of disinhibition, boldness, and meanness. *Development and Psychopathology*. 2009; 21:913–938. DOI: 10.1017/S0954579409000492 [PubMed: 19583890]
- Paulhus DL, Neumann CS, Hare RD. *Manual for the Self-Report Psychopathy (SRP) scales*. Toronto: Multi-Health Systems; 2016.
- Penton-Voak IS, Thomas J, Gage SH, McMurran M, McDonald S, Munafò MR. Increasing recognition of happiness in ambiguous facial expressions reduces anger and aggressive behavior. *Psychological Science*. 2013; 24:688–697. DOI: 10.1177/0956797612459657 [PubMed: 23531485]
- Preacher KJ, Curran PJ, Bauer DJ. Computational tools for probing interaction effects in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*. 2006; 31:437–448. DOI: 10.3102/10769986031004437
- Richell RA, Mitchell DGV, Newman C, Leonard A, Baron-Cohen S, Blair RJR. Theory of mind and psychopathy: can psychopathic individuals read the 'language of the eyes'? *Neuropsychologia*. 2003; 41:523–526. DOI: 10.1016/S0028-3932(02)00175-6 [PubMed: 12559146]
- Sandvik AM, Hansen AL, Johnsen BH, Laberg JC. Psychopathy and the ability to read the "language of the eyes": Divergence in the psychopathy construct. *Scandinavian Journal of Psychology*. 2014; 55:585–592. DOI: 10.1111/sjop.12138 [PubMed: 24954681]
- Scher CD, Stein MB, Asmundson GJ, McCreary DR, Forde DR. The childhood trauma questionnaire in a community sample: Psychometric properties and normative data. *Journal of Traumatic Stress*. 2001; 14:843–857. DOI: 10.1023/A:1013058625719 [PubMed: 11776429]
- Schimmenti A, Di Carlo G, Passanisi A, Caretti V. Abuse in Childhood and Psychopathic Traits in a Sample of Violent Offenders. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2015; 7:340–347. DOI: 10.1037/tra0000023
- Sullivan EA, Kosson DS. Ethnic and cultural variations in psychopathy. In: Patrick CJ, Patrick CJ, editors *Handbook of Psychopathy*. New York, NY, US: Guilford Press; 2006. 437–458.
- Thayer J, Johnsen BH. Sex differences in judgement of facial affect: A multivariate analysis of recognition errors. *Scandinavian Journal of Psychology*. 2000; 41:243–246. DOI: 10.1111/1467-9450.00193 [PubMed: 11041306]
- Verona E, Vitale J. Psychopathy in Women: Assessment, Manifestations, and Etiology. In: Patrick CJ, Patrick CJ, editors *Handbook of Psychopathy*. New York, NY, US: Guilford Press; 2006. 415–436.
- Waller R, Wright AG, Shaw DS, Gardner F, Dishion TJ, Wilson MN, Hyde LW. Factor structure and construct validity of the Parent-Reported Inventory of Callous-Unemotional Traits among high-risk 9-year-olds. *Assessment*. 2015; 22:561–580. DOI: 10.1177/1073191114556101 [PubMed: 25371449]

Figure 1. Factor structure of four-bifactor model showing 29 SRP items loading onto general and specific factors of psychopathy

Note: † $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$. CFI = .95, TLI = .94; RMSEA = .05. The full items could not be reproduced here, because they are copyrighted by MultiHealth Systems, Inc. Note that item 2 (gang involvement) and item 20 (convicted of a serious crime) were removed consistent with a prior study in an independent sample assessing a comparable population (see Dotterer et al., 2016)

Figure 2. High levels of childhood maltreatment are related to higher antisocial behavior scores only for individuals with low positive emotion recognition skills

Note. ** $p < .01$. Simple slopes plotted at mean levels, 1 SD above the mean, and 1 SD below the mean for positive emotion recognition, using the online tool developed by Preacher et al. (2006). Childhood maltreatment was related to higher antisocial behavior scores at low ($B = .37$, $SE = .13$, $p < .01$) but not mean ($B = .14$, $SE = .09$, $p = .12$) or high ($B = -.09$, $SE = .12$, $p = .45$) levels of positive emotion recognition. Region of significance indicated by grey shading (standardized child maltreatment scores $> .45$, $n = 53$).

Figure 3. High levels of childhood maltreatment are related to lower interpersonal deficit scores only for individuals with low or mean neutral emotion recognition skills

Note. ** $p < .001$. Simple slopes plotted at mean levels, 1 SD above the mean, and 1 SD below the mean for positive emotion recognition, using the online tool developed by Preacher et al. (2006). Childhood maltreatment was related to significantly lower interpersonal scores at mean ($B = -.23$, $SE = .07$, $p < .001$) and low ($B = -.45$, $SE = .10$, $p < .001$) but not high ($B = -.02$, $SE = .08$, $p = .83$) levels of neutral emotion recognition. Region of significance indicated by grey shading (standardized child maltreatment scores $> .61$, $n = 39$).

Table 1

Zero-order correlations between study variables.

	Covariates					Psychopathic traits – general versus specific factors					Complex emotion recognition		
	<i>M</i> (<i>SD</i>)	Range	Gender	Race	Annual family income	General Psychopathy	Affective	Inter-personal	Lifestyle	Antisocial	Positive	Negative	Neutral
Psychopathic Traits													
General psychopathic traits	54.70 (14.30)	29-113	.31***	.08	-.09								
Specific affective traits	13.78 (4.33)	7-28	.40***	.02	-.02	.85***							
Specific interpersonal traits	14.64 (5.18)	7-32	.24***	.11	-.08	.86***	.64***						
Specific lifestyle traits	15.61 (4.88)	7-31	.19**	.001	-.05	.84***	.61***	.59***					
Specific antisocial traits	10.48 (3.18)	8-25	.14*	.15*	-.10	.67***	.39***	.44***	.46***				
Emotion Recognition													
Positive	4.10 (1.32)	0-6	-.09	-.17*	.11	-.14*	-.15*	-.10	-.08	-.16*			
Negative	10.87 (2.89)	0-16	-.12 [†]	-.16*	.10	-.04	.01	-.03	.04	-.18**	.39***		
Neutral	9.40 (2.60)	0-14	-.08	-.18*	.11	-.11 [†]	-.09	-.03	-.05	-.25***	.52***	.57***	
Experience Of Maltreatment													
Childhood Maltreatment	9.61 (11.13)	0-60	.14*	.11	-.14*	.33***	.27***	.20**	.26***	.41***	-.19**	-.17**	-.22**

 $p < .001$,**
 $p < .01$,*
 $p < .05$,[†]
 $p < .10$.

Note that for the purposes of interpreting bivariate correlations, we created summed scores for the general versus specific factors using SRP items (i.e., “true zero-order scores” that have not parsed variance in general factor). However, for subsequent models, we examined associations between childhood maltreatment and complex emotion recognition within the context of the bifactor model – thus we estimated and extracted latent factors for the general factor and each of the specific factors.

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Table 2

Multivariate models testing unique associations between emotion recognition deficits and childhood maltreatment and a four-bifactor model of psychopathic traits

All outcomes examined in single multivariate model									
General Psychopathy		Specific Affective		Specific Interpersonal		Specific Lifestyle		Specific Antisocial	
B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β	B (SE)	β
<i>Main Effects</i>									
Childhood maltreatment	.02 (.01)	.22**	-.002 (.004)	-.03	-.01 (.004)	.01 (.004)	.07	.01 (.004)	.15
Positive emotion recognition	-.06 (.04)	-.08	-.06 (.04)	-.11	-.04 (.03)	-.07	-.06	-.02 (.03)	-.06
Negative emotion recognition	.04 (.02)	.11	.03 (.02)	.11	.01 (.02)	.04	.06	-.02 (.02)	-.09
Neutral emotion recognition	-.01 (.03)	-.02	.02 (.02)	.06	.01 (.003)	.05	.03	-.01 (.02)	-.06
<i>Interaction Terms</i>									
Maltreatment $\times$ Positive emotion recognition	.001 (.004)	.01	.003 (.003)	.06	-.003 (.003)	-.05	.10	-.01 (.003)	-.24**
Maltreatment $\times$ Negative emotion recognition	-.001 (.001)	-.03	.001 (.001)	.02	.001 (.001)	-.002	.001 (.001)	-.001 (.001)	-.06
Maltreatment $\times$ Neutral emotion recognition	.001 (.002)	-.01	-.002 (.002)	-.07	.01 (.001)	.22**	-.01	-.001 (.002)	-.05

Note.

** $p < .01$.

All associations examined a single model (i.e., controlling for overlap of positive, negative, and neutral and emotion recognition, and modeling main and interaction terms simultaneously) within the bifactor framework using extracted latent factors based on modeling presented in Figure 1. Note that a basic requirement of this model is that the specific factors are set to be orthogonal to the general factor. We also controlled for the effects of gender, race, and income on outcome variables (i.e., general and specific factor scores) and on predictor variables (i.e., childhood maltreatment, emotion recognition deficits, and their interaction terms) (Table 1).