Accurate Identification of Fear Facial Expressions Predicts Prosocial Behavior

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The fear facial expression is a distress cue that is associated with the provision of help and prosocial behavior. Prior psychiatric studies have found deficits in the recognition of this expression by individuals with antisocial tendencies. However, no prior study has shown accuracy for recognition of fear to predict actual prosocial or antisocial behavior in an experimental setting. In 3 studies, the authors tested the prediction that individuals who recognize fear more accurately will behave more prosocially. In Study 1, participants who identified fear more accurately also donated more money and time to a victim in a classic altruism paradigm. In Studies 2 and 3, participants' ability to identify the fear expression predicted prosocial behavior in a novel task designed to control for confounding variables. In Study 3, accuracy for recognizing fear proved a better predictor of prosocial behavior than gender, mood, or scores on an empathy scale.

Keywords: prosocial behavior, fear, facial expression, accuracy, nonverbal sensitivity

The fear facial expression is a distress cue that is universally displayed and recognized among human populations. However, not all individuals process and respond to this cue equally well. In particular, consistent selective impairments in identifying the fear facial expression have been found in populations marked by antisocial behavior and a lack of empathy (e.g., Blair, Colledge, Murray, & Mitchell, 2001; Kropp & Haynes, 1997; Montagne et al., 2005; Stevens, Charman, & Blair, 2001). This suggests that a relationship exists between the ability to process the fear expression specifically and the possession of antisocial and prosocial tendencies.

We hypothesized that individual differences in the ability to recognize the fear expression would predict differences in antisocial or prosocial behavior in a laboratory setting. To our knowledge, this relationship has not previously been shown. In this article, we present the results of three studies that suggest that the ability to recognize the fear facial expression predicts prosocial behavior in healthy young adults.

Facial Expression Recognition and Behavioral Tendencies

Facial expressions are useful guides for understanding the experiences of others around us and for directing our own behavior in adaptive ways. The ability to process—decode, interpret, and respond to—emotional facial expression is a critical component of emotional intelligence, which is described as the "accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living" (Mayer, DiPaolo, & Salovey, 1990, p. 772) and is generally considered essential for effective social functioning (Montagne et al., 2005). As such, it is not surprising that numerous attempts have been made to determine the correlates of this crucial skill. Although it is clear that the effectiveness of emotional expression processing varies among individuals, efforts to find consistent and robust relationships between this skill and ostensibly relevant variables, including empathy, gender, and personality traits, have met with mixed success (Cunningham, 1977; Hall, 1979; Hall, Gaul, & Kent, 1999; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979). This is particularly interesting with regard to empathy. Facial expression recognition would seem a logical predictor of this trait; however, this relationship has never to our knowledge been clearly demonstrated.

Difficulties in finding consistent correlates with facial expression recognition may stem from the fact that separable mechanisms drive the recognition of different expressions. Neuroscience and psychiatry research have frequently shown that separate pro-

cesses within the brain are associated with the recognition of different emotional expressions (e.g., Adolphs, Tranel, Damasio, & Damasio, 1994; Adolphs et al., 1999; Blair, Jones, Clark, & Smith, 1997; Phillips et al., 1997; Sprengelmeyer, Rausch, Eysel, & Przuntek, 1998; Whalen et al., 1998), making the ability to recognize separate expressions not a unitary skill but a collection of related but dissociable skills. (It should be noted, however, that other studies have failed to find distinct substrates for processing different expressions; e.g., Fitzgerald et al., 2006; Winston, O'Doherty, & Dolan, 2003.) The results of these studies suggest that individuals can be selectively impaired (or selectively gifted) in recognizing particular expressions but not other expressions. This would help to explain why correlations among accuracy levels for recognizing basic expressions are generally not high. It also helps to explain the mixed success in finding correlates between various behavioral and personality variables and emotional expression recognition as a whole.

Attempts to discern correlates of the ability to recognize specific emotional expressions have met with better success. In particular, the ability to recognize the fear facial expression is robustly and reliably correlated with psychiatric and behavioral diagnoses of antisocial tendencies. A recent meta-analysis that aggregated data from 19 prior studies assessing the relationship between antisocial tendencies and emotion recognition found that antisocial tendencies are significantly and specifically related to the ability to recognize fear but not to the ability to recognize emotions such as anger, disgust, and happiness (Marsh & Blair, 2006). Across studies, antisocial populations showed deficits in recognizing fear expressions. These deficits were greater, in terms of both percent accuracy and effect size, than deficits for recognizing five other basic emotional expressions.

This relationship between fear recognition and antisocial tendencies has been alternately explained in terms of a violence inhibition mechanism (VIM; Blair, 2001; Blair et al., 1997) or a concern mechanism (Nichols, 2001). The VIM specifies that humans and other social species evolved with a predisposition to inhibit aggressive behaviors in response to distress cues (e.g., fearful and sad facial expressions). These cues signal the expresser to be experiencing negative emotions and to be showing submission rather than aggressive challenge. The emotional response that is activated by the VIM in response to distress cues is thought to be necessary for moral socialization (Blair, 2005). Blair hypothesized the nature of this emotional response to be aversive, although other evidence suggests that distress cues do not elicit primarily aversive emotional responses (Hess, Blairy, & Kleck, 2000; Marsh, Ambady, & Kleck, 2005). More recently, the VIM has been adapted into a cognitive neuroscience model called the integrated emotional systems model (Blair, 2005).

The concern mechanism is a hypothetical process thought to be triggered by the mere attribution of a negative affective or hedonic state to another. This attribution, as suggested by Nichols, produces altruistic motivation in the typical individual. Nichols developed the concern mechanism construct after assessing the relevant developmental, cognitive, and clinical literature and concluding that it is not elaborate perspective-taking abilities but rather intact affective systems that are required for generating empathy. Nichols reviewed data that suggested that no elaborate cognitive processing beyond the ability to identify another's emotional state is required to generate empathy or concern. Evidence

for this notion includes the fact that individuals with notoriously poor perspective-taking abilities (e.g., toddlers and autistic children) still seem to experience concern for others, although their ability to act intelligently on their concern may be deficient. Both of these mechanisms share a presumption that, in typical individuals, the correct interpretation of another's distress cues leads to emotional processes—alternately termed *empathy*, *sympathy*, or *concern*—that decrease the likelihood of antisocial behavior and increase the likelihood of prosocial behavior. Both also predict that the ability to correctly process distress-relevant cues will be associated with decreased antisocial tendencies and increased prosocial tendencies.

Both the VIM and the concern mechanism predict that individual differences in recognizing the fear facial expression may predict differences in prosocial behavior in a laboratory setting. Although this hypothesis has not to our knowledge been empirically tested, relevant data from a number of prior studies converge to support notion that fear recognition will predict prosocial behavior.

First, the results of the meta-analysis discussed previously (Marsh & Blair, 2006) show that individual differences in general antisocial tendencies—including criminality, psychopathy, and aggressiveness—are associated with decreases in the ability to recognize the fear expression. Antisocial tendencies are often associated with a lack of prosocial traits such as experiencing empathy or remorse, so these studies suggest that fear recognition could also be associated with prosocial behavior. Second, a long tradition of research on bystander intervention has confirmed that the clarity or interpretability of a target's distress predicts a bystander's likelihood of helping in an experimental setting (Clark & Word, 1974; Shotland & Huston, 1979). This suggests that prosocial behavior increases as the likelihood of correctly interpreting a distress cue increases. Third, Marsh and Ambady (in press) found that the more correctly subjects identified the fear facial expression, the more prosocially they responded to story vignettes preceded by fear expression primes in a study that had been performed hours earlier. (A control condition using neutral expression primes indicated that the fear expression primes did not affect subjects' later recognition of fear expressions.) These results suggest a link between fear expression recognition and prosocial responding. However, this study measured self-reported sympathy and desire to provide help, which are not always predictive of actual prosocial behavior (Eisenberg & Miller, 1987).

The Present Research

In the present research, we assessed whether individual differences in accuracy for recognizing the fear facial expression would predict differences in prosocial behavior in a laboratory setting. Prosocial behavior generally means "behavior for the benefit of another," the stem *pro* and root *socius* signifying roughly "for a companion" (*American Heritage Dictionary*, 2000). Although this term is sometimes used interchangeably with *altruism*, prosocial behavior more often refers to the other-directed action itself, whereas altruism usually refers to the selfless motivation that may drive such a behavior (see Batson, 1998). The extent to which several variables (e.g., empathy or sympathy, feelings of oneness with a target, and negative mood reduction) motivate prosocial behavior has been extensively researched and is not the focus of

the present article. Instead, the focus here is on predicting the behavior itself; thus, the term *prosocial behavior* is used.

In Study 1, we tested the extent to which accuracy for identifying fear would predict donations of money and time behavior in a classic prosocial behavior paradigm. In Studies 2 and 3, it was predicted that accuracy for identifying the fear expression would predict prosocial behavior in a novel paradigm designed to minimize the occurrence of mood-related effects and other variables that could potentially confound a study on individual differences in prosocial behavior.

Study 1

The paradigm used in Study 1 is a benchmark in altruism research. In this paradigm, developed by Coke, Batson, and McDavis (1978) and used successfully by subsequent researchers (e.g., Maner et al., 2002), participants heard what they believed to be a recording of an actual radio broadcast featuring the story of a young woman whose parents were recently killed. After the broadcast concluded, participants were given the opportunity to pledge money or time to help the woman raise her young siblings. It was hypothesized that the unique variance associated with fear expression recognition would predict prosocial behavior, as indexed by pledged donations of money, time, or both.

Method

Participants. Twenty-eight individuals (19 female, 9 male) participated in this study. The majority of the participants were undergraduates (mean age = 19.77, SD = 4.34). Fourteen participants (50%) identified themselves as Caucasian, 9 (32%) as Asian or Asian American, 3 (11%) as Latino, 1 as African American, and 1 participant declined to provide information about her race.

Stimuli. Participants all heard a cassette recording of what they were told was a radio broadcast taken from the programming of the Tufts University radio station. The broadcast began with the voice of an announcer, who described the plight of a student at Tufts University named Katie Banks. Katie's parents, the announcer explained, had been killed in a car accident, leaving Katie to take care of her younger siblings. However, Katie was having trouble making ends meet while she was a college student, and she feared that she might either have to give up care of her siblings or leave school. Katie's voice was then heard describing her situation in more detail. The script for the broadcast was taken directly from the broadcast used by Coke et al. (1978), with certain biographical details changed to reflect Katie's being a student in the Boston area.

After hearing the recording but before being asked for donations, participants completed a number of scales, including an emotional identification checklist, the Behavior Identification Form (Vallacher & Wegner, 1989), and questions about participants' impressions of Katie, in approximation of the procedure used by Coke et al. Responses on these scales were not the focus of the present research and are not discussed here further. At the end of the study, after having been asked to donate to Katie, participants also completed a paper-and-pencil version of the Diagnostic Assessment of Nonverbal Accuracy (Nowicki & Duke, 1994). This measure contains 24 photos of adults' facial expressions of anger, fear, happiness, and sadness that participants are

asked to identify in a multiple-choice format. Participants also completed a manipulation check and provided demographic information.

Procedure. The procedure paralleled that used by Coke et al. (1978) as closely as was possible. Informed consent was obtained for all participants at the outset of the study. Next, the experimenter explained to participants that the study would be examining people's reactions to radio broadcasts and that a real broadcast was being used to improve the validity of the data. Participants were randomly divided into two conditions, empathy and control, and the experimenter remained blind to condition during the experiment. As a manipulation, participants were given one of two sets of instructions to read before listening to the cassette. The instructions asked participants either to empathize with the person speaking on the tape or to focus on more technical aspects of the broadcast. After participants had finished reading the instructions, the experimenter then began the cassette recording and left the room. After participants listened to the tape, the experimenter returned and, in accordance with previous studies, said:

> Here are three questionnaires for you to fill out regarding the broadcast. Please fill them out in the order that they're stapled in the packet. Also, please do not spend a lot of time on any one question—just give us your gut response. Go as quickly as you can, but try to be as accurate and honest as you can as well. Again, please just open the door when you're done.

The experimenter then went on to explain the instructions for the first two questionnaires. On reaching the third document, which was a letter ostensibly written by Katie Banks, the experimenter feigned confusion and said:

> Since I was going to give this to you at some point anyway, I guess I should go ahead and explain it now. This is a letter from the woman you just heard. The reason I am giving it to you is that the professor in charge of the study had to ask for her permission to use her broadcast in the study. Since she gave her permission, the professor thought it would be nice to do something for her. For that reason, he asked me to give this letter to all the people that participate in our study. Let me ask you to go ahead and complete these questionnaires and if I haven't returned with the third questionnaire by the time you're finished, go ahead and read the letter and decide what you want to do about it.

The letter ostensibly written by Katie to explain her need for help was accompanied by pledge forms and by manila envelopes to protect participants' confidentiality. The dependent variables of interest were participants' pledges of money and time to help Katie. After they had completed the experiment, all participants were paid and debriefed, and any questions they had were addressed.

Results

Recall that our hypothesis was that the unique variance accounted for by fear recognition accuracy would predict individual differences in prosocial behavior. In other words, those participants who most successfully identified fear were predicted to behave the most prosocially.

To test the hypothesis, first we calculated an index of accuracy for recognizing the various facial expressions. Participants' accu-

racy for recognizing the various facial expressions was calculated using an analysis of unbiased hit rates (Wagner, 1993). The procedure calculates the conventional percentage accuracy hit rate multiplied by 1 minus the rate of false alarms and then normalizes the score using an arcsine transformation. Then the expected value due to chance guessing is calculated, analogous to calculating expected values for a chi-square analysis. Thus, all accuracy scores used in the analysis represented that which would be expected above the accuracy expected due to chance guessing.

Two multiple regression analyses were computed, with accuracy for recognizing fear, sadness, anger, happiness, and experimental condition as predictor variables in each. The dependent measures in the two regression analyses were, respectively, pledges of hours and pledges of money. One participant in the empathy condition had pledged $400, and this extreme outlier (>5 SD from the mean) was removed before calculating the regression involving pledges of money. The interitem correlations among the accuracy scores for the four emotional facial expressions were calculated to protect against multicollinearity and were found to be acceptably low: None exceeded $r = .80$, with a single-item intraclass correlation of $r = .56$. Again, it was predicted that accuracy for recognizing the fear expression would predict the amount of money and time pledged but that accuracy for recognizing happiness, sadness, and anger would not.

The results of both regressions confirmed the study hypotheses. In both cases, the accuracy with which participants recognized the fear expression significantly and positively predicted their donations of time and money, respectively, to Katie. In the first regression, three variables significantly predicted donations of time. The first, corroborating the findings of Coke et al. (1978) and subsequent experimenters, was experimental condition. Participants who had been asked to empathize with Katie donated more than control participants did, $t(22) = 3.79$, $p < .005$, $\beta = 0.67$. This indicated that the study procedure had matched the original study procedure reasonably well. Second, as predicted, participants' ability to recognize the fear expression significantly predicted the magnitude of their donations, $t(22) = 2.90$, $p < .01$, $\beta = 0.81$. Third, the ability to recognize the happy expression predicted donations, but in the negative direction, so that greater accuracy was associated with reduced donations, $t(22) = 4.04$, $p < .005$, $\beta = 1.18$.

In the second regression, two variables emerged as significant predictors of donations of money. The first, as predicted, was

accuracy for recognizing the fear expression, $t(21) = 3.53$, $p < .005$, $\beta = 1.17$. The second, as in the prior regression, was accuracy for recognizing happiness, again in the negative direction, $t(21) = 2.17$, $p < .05$, $\beta = 0.54$ (see Table 1).

Discussion

The accuracy with which participants in this study could identify the fear facial expression emerged as the most reliable predictor of their prosocial behavior. Here, prosocial behavior was indexed by how much time and money participants were willing to pledge to a young woman whose voice they heard on a tape. This study thus supports the hypothesis that the ability to recognize the fear expression is related to the tendency to behave prosocially toward others.

Prior studies on bystander intervention suggest that when a perceiver can correctly identify a victim's distress in a given situation, the bystander is more likely to behave prosocially toward that individual at that particular time. The results from the present study support the notion that the relationship between distress recognition and prosocial behavior is more general. Here, it was not the case that the ability to recognize a fear expression predicted prosocial behavior toward *that* expresser. Rather, the average accuracy with which participants could identify several individuals' fear expressions predicted how prosocially they would respond to another woman whose voice they heard on a tape in a separate context. This suggests that the ability to recognize the fear expression is associated with some latent intraindividual variable related to prosocial behavior.

In this study, recognizing happiness predicted *less* prosocial behavior in terms of donations of both time and money. No prior evidence exists to suggest that any relationship exists between recognition of happiness facial expressions and empathy-based behavior. None of the studies that has found a relationship between fear recognition and antisocial tendencies also found a relationship between happiness recognition and antisocial behavior (Blair & Cipolotti, 2000; Blair & Coles, 2000; Carr & Lutjemeier, 2005; Dadds et al., in press; Kropp & Haynes, 1987; Montagne et al., 2005; Walker, 1981; Woodbury-Smith et al., 2005). Thus, the present finding may be due to either statistical chance or to a third variable. The cause was most likely not a ceiling effect; although happiness is typically the easiest expression to recognize, the mean for happiness accuracy in this study was not disproportionately

Table 1

Accuracy for Recognizing Four Basic Expressions and Experimental Condition as Predictors of Prosocial Responding (Time and Money Donations)

Predictor variable	Time			Money		
	b	β	$t(22)$	b	β	$t(21)$
Condition	7.24	0.67	3.79*	−0.46	−0.03	−0.15
Anger	5.80	0.28	1.39	−3.95	−0.15	−0.67
Fear	17.20	0.81	2.90***	31.36	1.17	3.53***
Happiness	−24.11	−1.19	−4.04***	−22.82	−0.85	−2.17*
Sadness	−0.41	−0.03	−0.12	−5.38	−0.26	−1.16

Note. Overall model (time): $F(5, 22) = 4.44$, $p < .005$; adjusted $R^2 = .39$. Overall model (money): $F(5, 21) = 3.41$, $p < .05$; adjusted $R^2 = .32$.
* $p < .05$.   *** $p < .005$.

high, nor was the standard deviation disproportionately low. It is plausible that this result arose instead from a mood congruence effect, given previous findings suggesting that sensitivity to mood-congruent external stimuli increases (Lembke & Ketter, 2002; Terwogt, Kremmer, & Stegge, 1991), that negative mood increases helping behavior (Cialdini & Kenrick, 1976; Cialdini et al., 1987), and that positive mood may affect moral decision-making (Valdesolo & DeSteno, 2006). Perhaps participants most saddened by Katie's plight were both least sensitive to happiness and most likely to donate. One weakness of this explanation is that mood congruence should have predicted a strong relationship between accuracy for sadness and prosocial behavior, which was not found.

Nonetheless, in Study 2, we endeavored to create a means of measuring prosocial behavior that would be less susceptible to mood effects and other possible sources of error variance likely affecting results in the present paradigm (e.g., participants' personal finances and schedules, which could skew pledges of money and time, respectively). These variables are most potentially problematic in a paradigm testing individual differences in prosocial behavior, which the paradigm used in Study 1 was not intended to do.

Study 2

In Study 2, we retested the prediction that the ability to recognize the fear expression predicts prosocial behavior tendencies. The novel paradigm used to test this prediction was designed to minimize some of the limitations of the paradigm used in Study 1, such as a dependent variable sensitive to mood or a participant's finances or schedule. In Study 2, participants were divided into experimental and control conditions. Participants in both conditions were asked to perform the same task, but this task was only framed as prosocial in the experimental condition. It was hypothesized that only the behavior of participants in the prosocial-framing condition would be associated with the accuracy of fear recognition.

Method

Participants. Fifty-six participants (20 male, 36 female) participated in this study. The majority of the participants were undergraduates (mean age = 22.79 years, SD = 6.37). Twenty-nine participants (52%) identified themselves as Caucasian, 19 (34%) as Asian or Asian American, 1 as Black or African American, 1 as Latino, and 3 identified themselves as more than one race. Three participants declined to provide information about their race.

Apparatus. The study was conducted in a private, sound-attenuated laboratory room by an experimenter blind to experimental condition. We presented the study on a standard desktop personal computer using the MediaLab program.

Procedure. Participants were recruited to participate in, as they were told, two short studies involving rating faces. The order in which the tasks were presented was counterbalanced across participants. In one study, the participants completed a standard emotion recognition task, using a large and well-validated set of emotional expressions, which included expressions acquired from Ekman and Friesen (1976). Sixty-eight expressions of anger, disgust, fear, happiness, sadness, and surprise, along with neutral expressions, were presented onscreen in grayscale at approximately 4 in. × 6 in. (10.16 cm × 15.24 cm). All expressions had

originally been validated by acquiring intensity ratings on 7-point scales; intensity ratings for the included expressions were at least 3 points higher for the intended emotion than any other emotion (Elfenbein, Mandal, Ambady, Harizuka, & Kumar, 2002). Participants identified each expression in a forced-choice paradigm that included the six aforementioned emotions, as well as a neutral option. They were instructed to carefully consider what each person seemed to have been feeling and to try to understand that individual's emotional experience. After participants completed this task, the experimenter returned to the testing room.

A second consent form was signed before the "second study" to reinforce the notion that the tasks were separate. For this task, participants were asked to judge the facial attractiveness of a series of photographs of young adults presented on screen on a 7-point scale ranging from *highly unattractive* (1) to *highly attractive* (7). These individuals were not the same individuals whose facial expressions were rated, and all showed neutral expressions. Each participant read one of two sets of onscreen instructions. This was the key manipulation designed to frame the task as a prosocial one to participants in the experimental condition. In the prosocial-framing condition, the instructions stated that this was a study assessing how people respond to feedback about their own attractiveness. The individuals being judged were part of the study, the instructions stated, and each individual would be told how attractive or unattractive strangers judged him or her to be. In the control condition, the instructions stated that the attractiveness judgments were required to validate the set of stimulus photographs.

This is a novel paradigm for assessing prosocial behavior. It was designed on the basis of the assumption that prosocial behavior encompasses intentional behaviors likely to enhance another person's positive affect or reduce or prevent negative affect. This definition includes giving compliments or other positive feedback. Positive feedback should be more likely to enhance positive affect and prevent negative affect than negative feedback. This paradigm benefits from ecological validity in that most people are exposed daily to situations in which they care about others' judgments of their own appearance. The average person can be expected to recognize that making negative judgments about someone's personal appearance can cause distress, whereas positive judgments can provide pleasure (Davison & McCabe, 2006; Patrick, Neighbors, & Knee, 2004). This design also benefits from its independence from variables related to personal finances or schedules. Finally, it benefits from assessing aggregate data rather than relying on a single data point per participant. Error variance due to idiosyncratic evaluations of any individual targets is thus reduced. It was predicted that participants who were more prosocial would give more positive feedback on average than less prosocial participants, but only in the prosocial-framing condition. If a variable unrelated to empathy were driving this effect, it was predicted that fear recognition would be associated with attractiveness judgments in both conditions.

After completing the two tasks, participants provided demographic information and answered questions about completing the study, including questions designed to assess other factors that could affect attractiveness judgments, such as how closely participants paid attention to the faces in each task, how interesting they found the faces in each task, how difficult they found each task, how much they enjoyed looking at faces in general, and whether they believed their social abilities were being evaluated during either tasks. It was hypothesized that some of these variables might

be associated with fear recognition or attractiveness ratings, but none would mediate the effect between the variables in either condition. Finally, participants completed a mood questionnaire, the Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988). All participants were then debriefed, thanked for their time, and paid.

Results

Before calculating the results, we removed the data of 1 participant in the prosocial-framing condition. This participant indicated in the space provided for comments at the end of the study that she had not believed the cover story regarding the attractiveness ratings (this was the only participant to indicate disbelief). Then, as in Study 1, we calculated participants' accuracy for recognizing each of the six emotional expressions using the unbiased hit rate method.

To assess whether fear recognition predicted prosocial behavior, we first compared the raw correlations between accuracy for recognizing fear and attractiveness ratings in the prosocial-framing and control conditions. The results confirmed the study hypothesis: In the prosocial-framing condition, the correlation between accuracy for recognizing fear and the attractiveness ratings was positive, $r(25) = .37$, $p = .059$; whereas in the control condition, the relationship was slightly negative, $r(26) = -.10$, ns. These correlations between the variables were significantly different from one another across the two conditions, as assessed by taking a simple difference score, $r(25) = .47$, $p < .05$ (Ferguson, 1966) or by comparing the normalized correlation coefficients, $Z = 1.70$, $p < .05$, one-tailed (Rosenthal & Rosnow, 1991).

Post hoc comparisons of the relationship between expression accuracy and prosocial ratings across the two conditions were also conducted for the remaining emotional expressions. All showed no differences in the correlations across conditions, with the exception of sadness. Similar to fear recognition, sadness recognition and prosocial behavior were positively correlated in the prosocial-framing condition, $r(25) = .40$, $p < .05$; whereas in the control condition they were not, $r(26) = -.19$, ns. Again, the accuracy for identifying sadness was significantly more positively related to prosocial ratings in the prosocial-framing condition than to those in the control condition, $r(25) = .59$, $p < .05$; $Z = 2.17$, $p < .05$, one-tailed.

Next, as in Study 1, we calculated a simultaneous multiple regression to assess the extent to which variance associated with accuracy for each of the six facial expressions of emotion (anger, disgust, fear, happiness, sadness, and surprise) would predict the prosocial behavior. Because of the difference in the relationships between the predictors and predicted variable across the two conditions, we calculated the regression as an interaction by multiplying the condition variable by the accuracy score variable. Again, to protect against multicollinearity, the interitem correlations among the accuracy scores for the six emotional facial expressions were calculated and were found to be acceptably low: None exceeded $r = .50$, with an average correlation of $r = .13$.

The regression results once again supported the study hypothesis. Accuracy for identifying the fear facial expression predicted attractiveness ratings in the empathy condition, $t(49) = 2.06$, $p < .05$, $\beta = .47$. In addition, accuracy for recognizing sadness predicted attractiveness ratings as well, $t(49) = 2.09$, $p < .05$, $\beta = .66$. For no other expression did the accuracy of recognition predict participants' attractiveness ratings (all $ps > .15$; see Table 2). It

Table 2
Accuracy for Recognizing Six Basic Expressions as Predictors of Prosocial Responding

Predictor variable	Attractiveness ratings		
	b	β	$t(49)$
Anger	−1.49	−0.64	−1.32
Disgust	0.08	0.03	0.13
Fear	2.43	0.47	2.06*
Happiness	−0.88	−0.53	−1.37
Sadness	1.64	0.66	2.09*
Surprise	1.89	0.42	1.44

Note. Overall model: $F(6, 49) = 1.94$, $p = .09$; adjusted $R^2 = .09$.
* $p < .05$.

can be noted that happiness was not a significant predictor of prosocial ratings in this study.

Finally, answers to the follow-up questions and PANAS presented after the study were assessed. First, differences between experimental and control groups were assessed to confirm that participants in the two groups did not vary in terms of any of the tested variables that might affect attractiveness ratings. The t tests confirmed that there were no group differences in how much participants paid attention to the faces in either condition, how difficult they found either task, how interesting they found the faces in either task, the degree to which they believed either task reflected upon their social abilities, how much they enjoyed looking at faces in general, or negative or positive PANAS scores (all $ps > .05$). We also calculated the correlations between these variables and attractiveness ratings across conditions and found no significant relationship between any of the variables and ratings of attractiveness (all $ps > .05$).

Examining the two conditions separately, we found that only one variable (attention paid to the facial expressions of emotion) was correlated with both fear recognition ($r = .50$, $p < .05$) and attractiveness ratings ($r = .45$, $p < .05$) in the prosocial-framing condition, making this variable a possible candidate for mediating the relationship between the latter two variables. (Neither this variable nor any of the other variables was correlated with fear recognition or attractiveness ratings in the control condition.) However, the results of a Sobel test indicated that this variable was not an effective mediator; Sobel $= 1.47$, $p > .10$.

Discussion

In this study, as in Study 1, participants who could most accurately identify the fear facial expression responded the most prosocially in the rating task. It is important that, however, this was only true for participants for whom the task was framed as a prosocial one—who believed their judgments would be shown to the people being rated. For participants who were told that the judgments were merely intended to validate the stimulus set, no relationship between the magnitude of the judgments and accuracy for recognizing fear was seen. On the basis of this disparity between conditions, one can conclude that the relationship between fear recognition and ratings in the experimental condition was dependent on the prosocial-framing instructional manipulation, not on a baseline relationship between fear recognition and perceptions of

attractiveness. Thus, the results of this task can be interpreted as supporting the results of Study 1. Both studies indicate that individual differences in the ability to identify the fear expression predict differences in the tendency to behave prosocially.

A relationship between sadness recognition and prosocial behavior was also seen. As with fear, accuracy for sadness predicted attractiveness ratings only when these ratings were prosocially framed. This finding corroborates previous findings regarding the relationship of fear and sadness recognition to social behaviors. Although the meta-analysis described previously found fear recognition to be the best predictor of antisocial tendencies, sadness recognition was the next best predictor of these tendencies, albeit generally less frequently and less strongly associated (see Blair & Coles, 2000; Blair et al., 2001; Walker, 1981). This is logical, as sadness and fear expressions are perhaps the clearest distress cues of all the facial expressions, and empathy is generally considered a response to others' distress or potential distress (Decety & Chaminade, 2002; Nichols, 2001). Why the relationship between fear recognition and prosocial tendencies is more reliable and robust than the relationship between sadness recognition and prosocial tendencies is unclear. It may pertain to fear being a more urgent and more vivid form of distress than sadness (Preston & de Waal, 2002).

It can be noted that the results of this study suggested that happiness, although somewhat negatively associated with prosocial behavior, was no longer a significant predictor of prosocial behavior in this study, as assessed with either raw correlations or regression analysis. This may have resulted from the study design affecting mood less than the design of Study 1. No mood effects were found across condition, and PANAS scores indicated that neither positive nor negative mood was associated with the recognition of fear or with attractiveness ratings. These findings also suggest that mood does not mediate the relationship between fear recognition and prosocial behavior.

Given that this was a novel paradigm for assessing prosocial behavior, multiple methods were included to assess its validity. First, a control condition was included in which participants were asked to perform the same behavior (judging attractiveness) as in the experimental condition but were administered instructions that made the task irrelevant to prosocial behavior. Again, the lack of a relationship between fear recognition and attractiveness ratings in the control condition suggests that no link exists between fear recognition and objective perceptions or assessments of attractiveness. Thus, fear recognition in the experimental condition seems to have been tied not to actual perceptions of appearance but instead to the desire to be kind or prosocial in assessing appearance. To improve our ability to eliminate alternate explanations for the link between fear recognition and prosocial ratings, we also included several manipulation check variables at the end of the study. The results suggested that all of these items—ratings such as participants' interest in or attention to the faces—could be ruled out as alternate explanations. None of these variables differed across the two conditions or were able to account for the relationship between fear and attractiveness ratings.

One piece of evidence that would further enhance our confidence in the paradigm would be a measure confirming that prosocial motivation is associated with the relationship between fear recognition and attractiveness ratings. Thus, in Study 3, we repeated the attractiveness-rating task using the prosocial-framing instructions and in this study asked participants to rate how important it was to be kind

when rating attractiveness. They were also asked to rate the importance of accuracy and to rate the difficulty of the task. It was hypothesized that if participants perceived the task to be relevant to prosocial behavior, their assessment of the importance of kindness would be correlated with their attractiveness ratings. Whether this variable mediated the relationship between fear recognition and prosocial ratings was also tested. Ratings of the importance of accuracy and of task difficulty were predicted be unrelated to the association between fear recognition and prosocial responding.

Study 3

In Study 3, we repeated the procedure devised in Study 2 with all participants receiving the prosocial-framing instructions. In this study, we also included a question that would help to assess participants' desire to behave prosocially ("How important was it to you to be kind when rating attractiveness?") We also included were measures that have been previously associated with prosocial behavior (e.g., an empathy scale) to compare their effectiveness in predicting prosocial behavior as compared with the effectiveness of fear recognition for predicting prosocial behavior.

Method

Participants. Thirty-two individuals (18 female, 14 male) participated in this study. The majority of the participants were undergraduates (mean age = 24.15 years, SD = 7.62). Twenty participants (63%) identified themselves as Caucasian, 8 (25%) as Asian or Asian American, 1 as African American, and 3 participants declined to provide information about their race.

Apparatus. The study was conducted in a private, sound-attenuated laboratory room by an experimenter blind to experimental condition. We presented the study on a standard desktop personal computer using the MediaLab program.

Procedure. The design and procedure of Study 3 mirrored that of Study 2, but all participants received the prosocial-framing instructions. After completing the attractiveness task, participants completed three questionnaires: the PANAS, an empathy questionnaire (Mehrabian & Epstein, 1972), and the short version of the Rational–Experiential Inventory, which has been linked to the formation of favorable interpersonal relationships (Epstein, Pacini, Denes-Raj, & Heier, 1996).[1]

Participants also rated how important it was to them to be kind when making their judgments, how important it was to them to be accurate, and how difficult the attractiveness judging task was. It was hypothesized that, if prosocial motivation is associated with increased attractiveness ratings, then ratings of kindness would predict the magnitude of these ratings. Correlations between either of the other two variables and attractiveness ratings would suggest nonempathic processes elicited these ratings.

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[1] Because of a computer error, data for these three questionnaires were not available for 7 of the participants. However, no differences in recognition of any expression were found between these groups (all $ps > .40$), and the correlation between fear recognition and prosocial responding was identical across groups (both $rs = .57$).

Results

Again, we calculated participants' accuracy for recognizing the various facial expressions using an analysis of unbiased hit rates. Next, to protect against multicollinearity, we calculated the inter-item correlations among the accuracy scores for the six emotional facial expressions and found them to be acceptably low: None exceeded $r = .50$, with a single-item intraclass correlation of $r = .23$. The average of participants' attractiveness ratings across the 28 targets was then calculated.

Finally, we calculated a simultaneous multiple regression to assess the extent to which variance associated with accuracy for each of the six facial expressions of emotion (anger, disgust, fear, happiness, sadness, and surprise) would predict prosocial behavior, as indexed by the attractiveness ratings. The results of this regression supported the hypothesis (see Table 3). Of the six expressions, only the accuracy with which participants recognized the fear expression significantly predicted ratings of attractiveness, $t(25) = 3.12$, $p < .01$; $\beta = 0.57$. There was no significant relationship between attractiveness ratings and accuracy for recognizing any of the remaining five emotional expressions.

Testing other measures against fear recognition. A second regression was then calculated. This regression was intended to compare the predictive power of accuracy for recognizing the fear facial expression with other variables potentially associated with prosocial behavior. In this regression, the five predictor variables were participant gender, empathy score, score on the experiential scale, negative mood (from the PANAS), positive mood (PANAS), and accuracy score for identifying the fear facial expression. None of the correlations between any two of these items exceeded $r = .31$, with a single-item intraclass correlation of $r = .04$. The only individual variable that significantly predicted attractiveness scores was accuracy for recognizing the fear facial expression, (see Table 4). For all other predictor variables, $p > .15$. Individual correlation analyses also confirmed that none of these measures predicted attractiveness ratings (all $ps > .05$).

Testing mediators of prosocial ratings. Recall that participants answered three follow-up questions following the prosocial rating task: how important it was for them to be *kind* when rating attractiveness, how important it was to be *accurate*, and how *difficult* the task was. Only assessments of how important it was to be kind were associated with the magnitude of the ratings themselves, $r(30) = .55$, $p < .005$; and with fear recognition accuracy,

Table 3
Accuracy for Recognizing Six Basic Expressions as Predictors of Prosocial Responding

	Attractiveness ratings		
Predictor variable	b	β	t(25)
Anger	−0.02	−0.01	−0.03
Disgust	0.44	0.23	1.27
Fear	1.55	0.57	3.12**
Happiness	−0.65	−0.21	−1.19
Sadness	0.39	0.19	1.12
Surprise	−0.34	−0.08	−0.05

Note. Model: $F(6, 25) = 3.41$, $p = .01$; adjusted $R^2 = .32$.
** $p < .01$.

Table 4
Accuracy for Recognizing Six Basic Expressions as Predictors of Prosocial Responding

	Attractiveness ratings		
Predictor variable	b	β	t(18)
Fear recognition	1.30	0.47	2.32*
Empathy scale	0.00	0.07	0.37
Experiential scale	0.04	0.27	1.42
Gender	−0.22	−0.27	−1.31
Negative emotion	−0.01	−0.13	−0.66
Positive emotion	0.00	0.02	0.13

Note. Model: $F(6, 18) = 2.42$, $p = .07$; adjusted $R^2 = .26$.
* $p < .05$.

$r(30) = .49$, $p < .01$ (all other $ps < .30$, *ns*). The results of a Sobel test suggest that participants' desire to be kind mediated the relationship between fear recognition and attractiveness ratings, Sobel = 1.82, $p = .069$, at a marginal level of significance.

General Discussion

The results of the three studies discussed here consistently support the hypothesis that the ability to recognize the fear facial expression predicts individual differences in prosocial behavior. In Study 1, participants who recognized fear more accurately pledged greater donations of money and time to help a victim in need. In Studies 2 and 3, participants who recognized fear more accurately made more prosocial (more positive) judgments about others. In Study 2, the relationship between fear and interpersonal judgments only held when the judgments were framed as a form of prosocial behavior. When they were framed as a means of stimulus validation, there was no relationship seen between fear recognition and interpersonal judgments. Together, these three studies provide evidence for a relationship between the ability to recognize the fear facial expression and prosocial behavior. The results presented here suggest that not only does recognition of the fear facial expression predict antisocial behavior-relevant psychiatric diagnoses, but also that fear facial expression recognition is relevant to (a) *pro*social tendencies, (b) the behavior of adults drawn from the general population, and (c) actual behavior in an experimental setting.

Several prior studies have suggested a link between the ability to recognize the fear facial expression and antisocial tendencies (Blair & Cipolotti, 2000; Blair & Coles, 2000; Carr & Lutjemeier, 2005; Dadds et al., in press; Kropp & Haynes, 1987; Montagne et al., 2005; Walker, 1981; Woodbury-Smith et al., 2005). Moreover, a meta-analysis that aggregated the results of these studies indicates that this relationship is more robust than the relationship between antisocial tendencies and the recognition of any of the other five basic expressions (Marsh & Blair, 2006). Explanations for this connection generally refer to the notion that distress cues are a means of inhibiting or preventing antisocial behavior (Blair, 2001; Blair et al., 1997) or eliciting prosocial behavior (Marsh & Ambady, in press).

Blair and colleagues (Blair, 2001; Blair et al., 1997) have proposed a developmental model to account for this effect. According to this model, normal socialization of a child consists of

the pairing of harmful actions with the aversive stimulus of the victim's resulting distress cues. Through classical conditioning, this pairing reduces the likelihood of harmful future behaviors. In individuals less sensitive to distress cues, antisocial behaviors are more likely to persist. These individuals (e.g., psychopaths) are also less likely to experience prosocial emotions such as empathy and guilt. Nichols (2001), on the other hand, has hypothesized the existence of a concern mechanism, whereby the perception of a distress cue automatically elicits feelings of concern that lead to increased helping in healthy individuals. These models are not identical, but they share considerable overlap. They are also both consistent with the findings of the present study in that they suggest that individuals less prone to experiencing states associated with prosocial behavior (e.g., empathy, concern, and guilt) are less able to recognize distress cues such as the fear facial expression.

The VIM model in particular also suggests that general fear sensitivity may be associated with prosocial behavior. Many investigators have linked temperaments characterized alternately as fearless (Kochanska, Murray, & Coy, 1997; Lykken, 1995), reduced in sensitivity to negative reinforcement (Blair et al., 1997; Gray, 1987; Newman et al., 2005), or low in constraint or effortful control (Rothbart, Ahadi, & Hershey, 1994) to heightened antisocial behavior and diminished empathy and remorse. Although these various conceptualizations are not identical, they all support the notion that aversive cues do not appropriately modulate the behavior of individuals whose behavior is marked by antisociality and a lack of empathy. It has been suggested that the fearfulness trait simply indexes the integrity of neural systems required for empathy induction (Blair, 2005). Although these models are largely restricted to explaining antisocial behavior, potential links to prosocial behavior are clear. In particular, that low fear sensitivity is associated with reduced empathy suggests that high sensitivity to fear-relevant or aversive cues may be associated with increased prosocial behavior. The present data cannot directly confirm this possibility. However, future research incorporating measures of fear sensitivity such as the Behavioral Inhibition Scale, the Behavioral Activation Scale (Carver & White, 1994), and the Harm Avoidance Scale (Lykken, 1995; Tellegen, 1982) may enhance the understanding of the relationship between fear expression recognition and prosocial behavior.

Research in this vein may also help to clarify the relationship between fearfulness and the perception and recognition of fear expressions. A number of investigators have suggested that a perceiver must simulate or reconstruct the experience of a target in order to interpret that target's emotional state (Adolphs, 2002; Decety & Chaminade, 2003; Preston & de Waal, 2002). These models predict that an individual who cannot appropriately simulate the experience of fear would be unable to identify this emotion in others (Adolphs & Tranel, 2000; Dimberg & Öhman, 1996; Meltzoff & Moore, 1997; but see Hess & Blairy, 2001). Inability to identify the emotion would thereby reduce the likelihood of responding appropriately (i.e., prosocially) to it. Indeed, individuals such as psychopaths are marked by diminished capacity to experience fear and to recognize and respond appropriately to this emotion in others. On the basis of these models, one possible explanation for the present data may be that individuals with a normal or heightened capacity for experiencing fear are best able to simulate this emotion upon perceiving or imagining it, leading

to an improved ability to recognize the emotional expression in others. Given that the correct identification of another's distress cue is thought to "trigger an affective response that generates the motivation to help a person in distress" (Nichols, 2001, p. 444), the ability to correctly identify fear may then lead to an empathic response and correspondingly prosocial behavior.

Predicting Individual Differences in Prosocial Behavior

The aforementioned theories suggest that considerable stability in prosocial tendencies may exist in individuals across situations. Indeed, research on monozygotic and dizygotic twins has indicated that genes may account for up to 50% of the variance among individuals in prosocial tendencies (Rushton, Fulker, Neal, Nias, & Eysenck, 1986) and antisocial behavior tendencies (Viding, Blair, Moffitt, & Plomin, 2005). However, personality or behavioral variables predictive of individual differences have generally proven elusive. Comprehensive early studies did not find that any of a number of variables tested (e.g., social desirability, Machiavellianism, intelligence, and authoritarianism) reliably predicted prosocial behavior. Although this was then taken to mean that prosocial behavior was primarily situationally determined, increased predictive power was later obtained using a composite measure of traits such as social responsibility and prosocial values (see Batson, 1998, for review). However, although self-reported personality variables predict self-reported prosocial behavior relatively well, they do not predict actual prosocial behavior very well, and unfortunately, self-reported prosocial behavior is not generally a good indicator of actual prosocial behavior either (Eisenberg & Miller, 1987).

The inconsistency of the link between self-reported empathy in particular and prosocial and antisocial behavior (see Eisenberg & Miller, 1987; Miller & Eisenberg, 1988) may seem surprising, given that empathy (or sympathy, or concern) is generally thought to be closely related to prosocial behavior. Affective empathy is usually defined as experiencing a concerned emotional state generated by another's distress or distressing situation (Batson, 1998; Davis, 1983; Eisenberg & Miller, 1987; Hoffman, 1981; Nichols, 2001). Given that empathy is defined as *feeling* in response to another's distress, and prosocial behavior is defined as *acting* in response to another's actual or potential distress, it seems highly unlikely that the two variables are not closely related.

However, it may be difficult for individuals to accurately report their own empathy levels relative to the general population. For some abilities, individuals at the bottom end of the bell curve are so impaired that they are unable even to recognize their own impairments (Kruger & Dunning, 1999). It may be the case that people who are particularly nonempathic are unable to recognize their lack of empathy. This may explain why self-reported empathy is only intermittently predictive of actual prosocial behavior. The results of Study 3 were consistent with this pattern. Although the Mehrabian and Epstein empathy scale is well validated and contains questions regarding the extent to which the respondent is affected by others' distress, answers to this scale were not closely correlated with the dependent measure of prosocial behavior.

In contrast, answers to the question, "How important was it to you to be kind in rating attractiveness?" were a very effective predictor of actual prosocial behavior, and in addition, this variable appeared to mediate the relationship between fear recognition and

prosocial behavior better than any of the other variables tested in Studies 2 and 3. In this case, it appears that a prosocial motivation more immediately relevant to the behavior being assessed was a better predictor than a general set of attitudes toward others' distress (as is typically measured on empathy scales, including the scale used in Study 3). This is in accordance with a large body of psychology research that indicates that attitudes directly relevant to the behavior at hand and presented at the same level of specificity as the behavior will best predict that behavior (for reviews, see Kim & Hunter, 1993; Schuman & Johnson, 1976).

In all likelihood, multiple emotional, cognitive, and personality processes are associated with the link between expression recognition and prosocial or antisocial behavior. Although this research attempted to assess several variables that have been hypothesized to account for empathically driven behavior in the past, such as gender, mood, and self-reported empathy, other mediating or moderating variables also likely play a role. For example, recent research suggests that theory of mind (TOM) may play a role in mediating the expression recognition–prosocial behavior relationship. Corden et al. (2006) linked deficits in fear expression recognition with impaired TOM. This study contradicts the results of prior research on psychopathic and autistic individuals, which have shown TOM and fear recognition to be dissociable: Psychopathy is associated with fear recognition deficits but not TOM deficits, whereas the reverse is true for autism (Nichols, 2001). However, TOM remains a construct that may be relevant to the present research and to prosocial behavior in general; this clearly merits further exploration. For example, although TOM may not be involved in the urge to behave prosocially, TOM may aid in deciding what behavior a target person requires or would prefer. Other relevant constructs that may clarify the relationship between fear recognition and prosocial behavior include psychopathy—as measured by scales such as the Psychopathic Personality Inventory (Lilienfeld & Andrews, 1996)—or intellectual ability, which has been shown to be negatively correlated with nonpsychopathic antisocial behavior (Moffitt et al., 1993; Trzesniewski et al., 2006) but positively correlated with severity of psychopathy symptoms (Cleckley, 1976; Johansson & Kerr, 2005).

Researchers wanting to clarify the nature of the relationship between the empathy and pro-social behavior may also be well served by using measures of empathy that are not based on self-report. For example, the manipulation of empathic feeling has proven to be an effective means of affecting prosocial behavior (e.g., Coke et al., 1978). Some previous studies have also shown particular facial expressions or autonomic states to accompany empathic feelings; these measures may provide a means for more reliable measure of individual differences. Techniques such as electroencephalography, skin conductance, fMRI (functional magnetic resonance imaging), and other measures of emotional response might broaden the options for empathy researchers. Such studies could also potentially discern whether other emotional states, such as distress or sadness, predict prosocial behavior better than empathy in some circumstances or for some individuals (see Cialdini et al., 1987; Eisenberg, 2002; Eisenberg et al., 1989).

Given the commonly cited relationship between empathy and prosocial behavior, it may seem surprising that we dealt with empathy only briefly in these studies. The primary reason for this is that empathy is a motivation for prosocial behavior, and our primary goal in this article was to predict prosocial behavior rather than explore the motivations underlying it. Moreover, the relationship between empathy and prosocial behavior has been exhaustively researched, yet the precise nature of the relationship between the variables remains elusive.

Specificity of the Relationship Between Prosocial Behavior and Fear Recognition

In the present studies, accuracy for recognizing fear expression was a significantly better predictor of prosocial behavior than the remaining five expressions. We thus conclude that the relationship between prosocial behavior and facial expression recognition is largely specific to fear expressions. However, accuracy for the sadness expression also effectively predicted prosocial behavior in one study. This finding was not replicated in Study 3. However, several prior studies have shown antisocial individuals to be deficient in recognizing sadness expressions, although to a lesser extent than for fear expressions (Marsh & Blair, 2006). The two expressions may be processed by overlapping neural mechanisms (Blair et al., 1999; Whalen et al., 1998). That sadness recognition may be an effective predictor of antisocial behavior is also in accordance with some ethologists' theories on the evolutionary origins of distress cues. Preuschoft (2000) has stated:

> It is . . . questionable of what use the communication of sadness can be in the absence of a compassionate and caregiving environment. The evolution of displays of sadness should be closely tied to the evolution of altruism. (p. 4)

Sadness and fear are both clear indicators of distress (Fridlund, 1994), and so the findings of Study 2 suggest that prosocial behavior may be associated with sensitivity to facial distress cues other than the fear expression. (However, whether the effect would generalize to other distress cues, e.g., weeping or emotion, expressed through the voice or body remains unclear.) Notably, however, prosocial behavior seems to be specifically related to facial expressions that signal distress, compared with positive emotional states such as happiness or negative emotional states not relevant to distress, such as disgust or anger.

It remains unclear, however, why antisociality and prosociality are more strongly and reliably associated with the recognition of fear expressions than with the recognition of sadness expressions. Perhaps the sadness expression's effects are less intense than those of the fear expression. As mentioned previously, fear may be associated with the fulfillment of urgent needs and eliciting rapid action from perceivers, whereas sadness may be associated with less pressing needs, such as food (Preston & de Waal, 2002). In addition, the fear facial expression may possess infantile appearance characteristics such as wide eyes and high brows that make it particularly effective means of eliciting caring behavior from perceivers (Marsh, Adams, & Kleck, 2005). Babyish appearance characteristics are less evident in the sadness expression. Finally, sadness expressions may be easier to recognize because they contain a clearly identifiable marker (i.e., a downturned mouth), whereas fear does not. This might alter the process of sadness recognition and thus its association with prosocial or antisocial tendencies. Thus, although both fear and sadness expressions may be associated with prosocial behavior, elements of the need associated with the expression and the appearance of the expression

itself may strengthen the association between fear expressions and prosocial behavior.

That fear is generally a difficult expression to recognize does not seem to account for the relationship between recognizing this expression and prosocial behavior. Results of prior studies have confirmed that fear recognition rates in healthy individuals are approximately equivalent to disgust recognition rates (Calder et al., 2003; Camras & Allison, 1985; Ekman et al., 1987). However, disgust recognition is unrelated to antisocial behavior (Marsh & Blair, 2006), or prosocial behavior, as in this study. In addition, in the present studies, although fear expressions were associated with the lowest recognition rates in Study 3, they showed the second highest recognition rates in Study 1. Thus, that the association between fear recognition and prosocial behavior can be accounted for by the difficulty of recognizing fear expressions is not supported.

Conclusions

The studies presented here provide evidence to suggest that the tendency to exhibit prosocial behavior is associated with the ability to accurately interpret the fear facial expression. The fear expression is thought to be a universal, innate feature of human communication. The ability to identify and respond appropriately to this expression is thought to be universal and innate as well. Given the relationship found here between the ability to identify the fear expression and prosocial behavior, the fear expression and sensitivity to this expression may provide a starting point for further research investigating universal and innate aspects of prosocial behavior.

References

Adolphs, R. (2002). Neural systems for recognizing emotion. *Current Opinions in Neurobiology, 12,* 169–177.

Adolphs, R., & Tranel, D. (2000). Emotion recognition and the human amygdala. In J. P. Aggleton (Ed.), *Amygdala: A functional analysis* (pp. 587–630). Oxford, United Kingdom: Oxford University Press.

Adolphs, R., Tranel, D., Damasio, H., & Damasio, A. (1994). Impaired recognition of emotion in facial expressions following bilateral damage to the human amygdala. *Nature, 372,* 669–672.

Adolphs, R., Tranel, D., Hamann, S., Young, A. W., Calder, A. J., Phelps, E. A., et al. (1999). Recognition of facial emotion in nine individuals with bilateral amygdala damage. *Neuropsychologia, 37,* 1111–1117.

American heritage dictionary. (4th ed.). (2000). Retrieved January 30, 2004, from http://www.dictionary.com

Batson, C. D. (1998). Altruism and prosocial behavior. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 282–316). New York: McGraw-Hill.

Blair, R. J. (2001). Neurocognitive models of aggression, the antisocial personality disorders, and psychopathy. *Journal of Neurology, Neurosurgery, & Psychiatry, 71,* 727–731.

Blair, R. J. (2005). Applying a cognitive neuroscience perspective to the disorder of psychopathy. *Developmental Psychopathology, 17,* 865–891.

Blair, R. J. R., & Cipolotti, L. (2000). Impaired social response reversal: A case of "acquired sociopathy." *Brain, 123,* 1122–1141.

Blair, R. J. R., & Coles, M. (2000). Expression recognition and behavioural problems in early adolescence. *Cognitive Development, 15,* 421–434.

Blair, R. J. R., Colledge, E., Murray, L., & Mitchell, D. G. V. (2001). A selective impairment in the processing of sad and fearful expressions in children with psychopathic tendencies. *Journal of Abnormal Child Psychology, 29,* 491–498.

Blair, R. J. R., Jones, L., Clark, F., & Smith, M. (1997). The psychopathic individual: A lack of responsiveness to distress cues? *Psychophysiology, 34,* 192–198.

Blair, R. J. R., Morris, J. S., Frith, C. C., Perrett, D. I., & Dolan, R. J. (1999). Dissociable neural responses to facial expressions of sadness and anger, *Brain, 122,* 883–893.

Calder, A. J., Keane, J., Manly, T., Sprengelmeyer, R., Scott, S., Nimmo-Smith, I., et al. (2003). Facial expression recognition across the adult life span. *Neuropsychologia, 41,* 195–202.

Camras, L. A., & Allison, K. (1985). Children's understanding of emotional expressions and verbal labels. *Journal of Nonverbal Behavior, 9,* 84–94.

Carr, M. B., & Lutjemeier, J. A. (2005). The relation of facial affect recognition and empathy to delinquency in youth offenders. *Adolescence, 40,* 601–619.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67,* 319–333.

Cialdini, R. B., & Kenrick, D. T. (1976). Altruism as hedonism: A social development perspective on the relationship of negative mood state and helping. *Journal of Personality and Social Psychology, 34,* 907–914.

Cialdini, R. B., Schaller, M., Houlihan, D., Arps, K., Fultz, J., & Beaman, A. L. (1987). Empathy-based helping: Is it selflessly or selfishly motivated? *Journal of Personality and Social Psychology, 52,* 749–758.

Clark, R. D., & Word, L. E. (1974). Where is the apathetic bystander? Situational characteristics of the emergency. *Journal of Personality and Social Psychology, 29,* 279–287.

Cleckley, H. M. (1976). *The mask of sanity.* St. Louis, MO: Mosby

Coke, J. S., Batson, C. D., & McDavis, K. (1978). Empathic mediation of helping: A two-stage model. *Journal of Personality and Social Psychology, 36,* 752–766.

Corden, B., Critchley, H. D., Skuse, D., & Dolan, R. J. (2006). Fear recognition ability predicts differences in social cognitive and neural functioning in men. *Journal of Cognitive Neuroscience, 18,* 889–897.

Cunningham. (1977). Personality and the structure of the nonverbal communication of emotion. *Journal of Personality, 45,* 564–584.

Dadds, M. R., Perry, Y., Hawes, D. J., Merz, S., Riddell, A. C., Haines, D. J., et al. (in press). Attention to the eyes reverses fear recognition deficits in psychopathy. *British Journal of Psychiatry, 189,* 280–281.

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44,* 113–126.

Davison, T. E., & McCabe, M. P. (2006). Adolescent body image and psychosocial functioning. *Journal of Social Psychology, 146,* 15–30.

Decety, J., & Chaminade, T. (2002). Neural correlates of feeling sympathy. *Neuropsychologia, 1483,* 1–12.

Dimberg, U., & Öhman, A. (1996). Behold the wrath: Psychophysiological responses to facial stimuli. *Motivation & Emotion, 20,* 149–182.

Eisenberg, N. (2002). Distinctions among various modes of empathy-related reactions: A matter of importance in humans. *Behavioral & Brain Sciences, 25,* 33–34.

Eisenberg, N., Fabes, R. A., Miller, P. A., Fultz, J., Shell, R., Mathy, R. M., & Reno, R. R. (1989). Relation of sympathy and personal distress to prosocial behavior: A multimethod study. *Journal of Personality and Social Psychology, 57,* 55–66.

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin, 101,* 91–119.

Ekman, P., & Friesen, W. (1976). *Pictures of facial affect.* Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., et al. (1987). Universals and cultural differences

in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53,* 712–717.

Elfenbein, H. A., Mandal, M. K., Ambady, N., Harizuka, S., & Kumar, S. (2002). Cross-cultural patterns in emotion recognition: Highlighting design and analytical techniques. *Emotion, 2,* 75–84.

Epstein, S., Pacini, Ro, Denes-Raj, V., & Heier, H. (1996). Individual differences in intuitive-experiential and analytical-rational thinking styles. *Journal of Personality and Social Psychology, 71,* 390–405.

Ferguson, G. A. (1966). *Statistical analysis in psychology and education.* New York: McGraw-Hill.

Fitzgerald, D. A., Angstadt, M., Jelsone, L. M., Nathan, P. J., & Phan, K. L. (2006). Beyond threat: Amygdala reactivity across multiple expressions of facial affect. *Neuroimage, 30,* 1441–1448.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view.* New York: Academic Press.

Gray, J. A. (1987). *The psychology of fear and stress.* New York: Cambridge University Press.

Hall, C. W., Gaul, L., & Kent, M. (1999). College students' perception of facial expressions. *Perceptual & Motor Skills, 89,* 763–777.

Hall, J. A. (1979). Gender, gender roles, and nonverbal communication skills. In R. Rosenthal (Ed.), *Skill in nonverbal communication* (pp. 31–67). Cambridge, MA: Oelgeschlager, Gunn, & Hain.

Hess, U., & Blairy, S. (2001). Facial mimicry and emotional contagion to dynamic emotional facial expressions and their influence on decoding accuracy. *International Journal of Psychophysiology, 40,* 129–141.

Hess, U. Blairy, S., & Kleck, R. E. (2000). The influence of expression intensity, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior, 24,* 265–283.

Hoffman, M. L. (1981). Is altruism part of human nature? *Journal of Personality and Social Psychology, 40,* 121–137.

Johansson, P., & Kerr, M. (2005). Psychopathy and intelligence: A second look. *Journal of Personality Disorders, 19,* 357–369.

Kim, M. S., & Hunter, J. E. (1993). Attitude–behavior relations: A meta-analysis of past research—focusing on attitudinal relevance and topic. *Journal of Communication, 43,* 101–142.

Kochanska, G., Murray, K., & Coy, K. C. (1997). Inhibitory control as a contributor to conscience in childhood: From toddler to early school age. *Child Development, 68,* 263–277.

Kropp, J. O., & Haynes, O. M. (1987). Abusive and nonabusive mothers' ability to identify general and specific emotion signals of infants. *Child Development, 58,* 187–190.

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77,* 1121–1134.

Lembke, A., & Ketter, T. A. (2002). Impaired recognition of facial emotion in mania. *American Journal of Psychiatry, 159,* 302–304.

Lilienfeld, S. O., & Andrews, B. P. (1996). Development and preliminary validation of a self-report measure of psychopathic personality traits in noncriminal populations. *Journal of Personality Assessment, 66,* 488–524.

Lykken, D. T. (1995). *The antisocial personalities.* Mahwah, NJ: Erlbaum.

Maner, J. K., Luce, C. L., Neuberg, S. L., Cialdini, R. B., Brown, S., & Sagarin, B. J. (2002). The effects of perspective taking on motivations for helping: Still no evidence for altruism. *Personality & Social Psychology Bulletin, 28,* 1601–1610.

Marsh, A. A., Adams, R. B. Jr., & Kleck, R. E. (2005). Why do fear and anger look the way they do? Form and social function in facial expressions. *Personality & Social Psychology Bulletin, 31,* 73–86.

Marsh, A. A., & Ambady, N. (2007). The influence of the fear facial expression on prosocial responding. *Cognition & Emotion, 21,* 225–247.

Marsh, A. A., Ambady, N., & Kleck, R. E. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviors. *Emotion, 5,* 119–124.

Marsh, A. A., & Blair, R. J. R. (2006). *Antisocial behavior is associated with specific deficits in recognition of the fear facial expression: A meta-analysis.* Manuscript submitted for publication.

Mayer, J. D., DiPaolo, M., & Salovey, P. (1990). Perceiving affective content in ambiguous visual stimuli: A component of emotional intelligence. *Journal of Personality Assessment, 54,* 772–781.

Mehrabian, A., & Epstein, N. (1972). A measure of emotional empathy. *Journal of Personality, 40,* 525–543.

Meltzoff, A. N., & Moore, M. K. (1997). Explaining facial imitation: A theoretical model. *Early Development & Parenting, 6,* 179–192.

Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological Bulletin, 103,* 324–344.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100,* 674–701.

Montagne, B., van Honk, J., Kessels, R. P. C., Frigerio, E., Burt, M., van Zandvoort, M. J. E., et al. (2005). Reduced efficiency in recognizing fear in subjects scoring high on psychopathic personality characteristics. *Personality & Individual Differences, 38,* 5–11.

Newman, J. P., MacCoon, D. G., Vaughn, L. J., & Sadeh, N. (2005). Validating a distinction between primary and secondary psychopathy with measures of Gray's BIS and BAS constructs. *Journal of Abnormal Psychology, 114,* 319–323.

Nichols, S. (2001). Mindreading and the cognitive architecture underlying altruistic motivation. *Mind & Language, 16,* 425–455.

Nowicki, S., & Duke, M. P. (1994). Individual differences in the nonverbal communication of affect: The Diagnostic Analysis of Nonverbal Accuracy Scale. *Journal of Nonverbal Behavior, 18,* 9–35.

Patrick, H., Neighbors, C., & Knee, C. R. (2004). Appearance-related social comparisons: The role of contingent self-esteem and self-perceptions of attractiveness. *Personality & Social Psychology Bulletin, 30,* 501–514.

Phillips, M. L., Young, A. W., Senior, C., Brammer, M., Andrew, C., Calder, A. J., et al. (1997). A specific neural substrate for perceiving facial expressions of disgust. *Nature, 389,* 495–498.

Preston, S. D., & de Waal, F. B. M. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences, 25,* 1–72.

Preuschoft, S. (2000, Spring). Primate faces and facial expressions. *Social Research.* Retrieved on November 18, 2005, from http://www.findarticles.com/p/articles/mi_m2267/is_1_67/ai_62402557

Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L., & Archer, D. (1979). *Sensitivity to nonverbal communications: The PONS Test.* Baltimore: Johns Hopkins University Press.

Rosenthal, R., & Rosnow, R. L. (1991). *Essentials of behavioral research: Methods and data analysis* (2nd ed.). New York: McGraw-Hill.

Rothbart, M. K., Ahadi, S. A., & Hershey, K. L. (1994). Temperament and social behavior in childhood. *Merrill-Palmer Quarterly, 40,* 21–39.

Rushton, J. P., Fulker, D. W., Neale, M. C., Nias, D. K. B., & Eysenck, H. J. (1986). Altruism and aggression: The heritability of individual differences. *Journal of Personality and Social Psychology, 50,* 1192–1198.

Schuman, H., & Johnson, M. P. (1976). Attitudes and behavior. *Annual Review of Sociology, 2,* 161–207.

Shotland, R. L., & Huston, T. L. (1979). Emergencies: What are they and do they influence bystanders to intervene? *Journal of Personality and Social Psychology, 37,* 1822–1834.

Sprengelmeyer, R., Rausch, M., Eysel, U. T., & Przuntek, H. (1998). Neural structures associated with recognition of facial expressions of basic emotions. *Proceedings of the Royal Society of London Biological Sciences, 265B,* 1927–1931.

Stevens, D., Charman, T., & Blair, R. J. R. (2001). Recognition of emotion in facial expressions and vocal tones in children with psychopathic tendencies. *Journal of Genetic Psychology, 162,* 201–211.

Tellegen, A. (1982). *Brief manual for the Multidimensional Personality Questionnaire.* Unpublished manuscript, Department of Psychology, University of Minnesota.

Terwogt, M. M., Kremer, H. H., & Stegge, H. (1991). Effects of children's emotional state on their reactions to emotional expressions: A search for congruency effects. *Cognition & Emotion, 5,* 109–121.

Trzesniewski, K. H., Moffitt, T. E., Caspi, A., Taylor, A., & Maughan, B. (2006). Revisiting the association between reading achievement and antisocial behavior: New evidence of an environmental explanation from a twin study. *Child Development, 77,* 72–88.

Valdesolo, P., & DeSteno, D. (2006). Manipulations of emotional context shape moral judgment. *Psychological Science, 17,* 476–477.

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology, 57,* 660–671.

Viding, E., Blair, R. J., Moffitt, T. E., & Plomin, R. (2005). Evidence for substantial genetic risk for psychopathy in 7-year-olds. *Journal of Child Psychology & Psychiatry, 465,* 592–597.

Wagner, H. L. (1993). On measuring performance in category judgment studies on nonverbal behavior. *Journal of Nonverbal Behavior, 17,* 3–28.

Walker, E. (1981). Emotion recognition in disturbed and normal children: A research note. *Journal of Child Psychology & Psychiatry, 22,* 263–268.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070.

Whalen, P. J., Shin, L. M., McInerney, S. C., Fischer, H., Wright, C. I., & Rauch, S. L. (1998). A functional MRI study of human amygdala responses to facial expressions of fear versus anger. *Emotion, 1,* 70–83.

Winston, J. S., O'Doherty, J., & Dolan, R. J. (2003). Common and distinct neural responses during direct and incidental processing of multiple facial emotions. *NeuroImage, 20,* 84–97.

Woodbury-Smith, M. R., Clare, I. C. H., Holland, A. J., Kearns, A. Staufenberg, E., & Watson, P. (2005). A case-control study of offenders with high functioning autistic spectrum disorders. *Journal of Forensic Psychiatry & Psychology, 16,* 747–763.