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The Role of Emotion Recognition in Empathy

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In the present investigation, we document the association between multimodal emotion recognition and state and trait empathy. We assessed participants' ($N = 342$) capacities for emotion recognition—across 13 emotions expressed in the face, voice, and body—as well as their state- and trait-like empathic tendencies. Emotion recognition accuracy predicted greater state-like empathic responses to targets' expressions of emotions, as evident in higher reports of emotion-specific shared emotion and sympathy. Emotion recognition accuracy also predicted validated self-report measures of trait-like empathy, providing further evidence for the critical role of emotion recognition in empathy.

Keywords: emotion recognition, multimodal expression, empathy

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Emotional expression and recognition are a grammar of social living. Brief emotion expressions in the body, face, and voice structure social interactions between caregivers and children, friends, romantic partners, and individuals within social hierarchies and collectives (Eibl-Eibesfeldt, 1989; Keltner et al., 2022; van Kleef & Côté, 2022). The capacities of expressing emotional states in observable behavior and recognizing emotion from such expressions solve a basic problem in social interaction: They allow people to know others' mental states in the service of coordinating interdependent behavior (Hess & Fischer, 2013; Keltner & Kring, 1998; McCullough & Reed, 2016; Zaki & Ochsner, 2016).

Grounded in these ideas, emotion recognition has proven to be central to social dynamics, including between and within culture interactions (Elfenbein & Ambady, 2002; Elfenbein et al., 2007; Laukka & Elfenbein, 2021; Matsumoto et al., 2009), emotional intelligence (Brackett et al., 2011; Mayer et al., 2003), and—the focus of this research—empathy (e.g., Zaki et al., 2009). In the present investigation, we examine the links between emotion recognition and state-like empathic responses to targets expressing emotion and trait-like empathy. We do so across multimodal expressions of emotion (face, voice, and body), arrays of different positive and negative emotions, and ethnically diverse expressions. Our work provides evidence that emotion recognition is a contributor to empathic responses.

Emotion Recognition: A Multimodal Approach

A first arc in the study of emotion recognition can be thought of beginning with the Ekman and Friesen research in New Guinea (Ekman et al., 1969). The emotion recognition studies that followed, now numbering in the hundreds, have examined whether people can recognize prototypical expressions of six states—anger, disgust, fear, happiness, sadness, and surprise (for reviews and commentaries, see Barrett et al., 2019; A. Cowen et al., 2019; Ekman et al., 1969; Elfenbein & Ambady, 2002; Matsumoto et al., 2008; Russell, 1994). Within this empirical tradition, participants have been asked to match emotion-specific words or situations to facial expressions or interpret the faces in a free response format (Haidt & Keltner, 1999; Kollareth et al., 2023). Meta-analyses reveal some reliable capacity for people to recognize these emotions from six prototypical facial expressions (Elfenbein & Ambady, 2002), although there is controversy about the strength of such effects (Barrett et al., 2019; A. Cowen et al., 2019; Durán & Fernández-Dols, 2021; Russell, 1994; but see Witkower et al., 2023). Those six emotions and prototypical facial muscle configurations, though, represent only a small portion of the emotional states expressed in the face, voice, and body (e.g., A. S. Cowen & Keltner, 2021).

A second arc in the study of emotional expression has been to study multiple modalities of expression and the recognition of a

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much wider array of emotional states (Keltner et al., 2019; Monroy et al., 2022; Mortillaro & Dukes, 2018; Sauter, 2017). Top-down, concept-driven empirical work has documented that people can express and recognize self-conscious emotions like embarrassment, pride, and shame (Keltner, 1995; Tracy & Matsumoto, 2008; Tracy & Robins, 2007; Widen et al., 2011); attachment-related emotions such as love, sexual desire, and sympathy (Cordaro et al., 2018; Gonzaga et al., 2006); epistemological emotions such as awe, confusion, and interest (Campos et al., 2013; Shiota et al., 2003); and savoring emotions such as contentment (Campos et al., 2013; Cordaro et al., 2018). More bottom-up, data-driven studies of thousands of naturalistic expressions across multiple cultures and more open-ended response formats converge with these findings, showing that people recognize upward of 25 distinct emotions in the face (A. S. Cowen & Keltner, 2020), the voice (Brooks et al., 2023; A. S. Cowen et al., 2018), and full body expressions (Monroy et al., 2022).

Alongside this broadening of emotions of interest in the field, the study of emotion recognition has moved from a narrow focus on one modality of expression (i.e., the face) to examine other modalities. For example, studies have begun to document the emotion-related signal value of gaze (Graham & LaBar, 2007; Lobmaier et al., 2008; Sander et al., 2007; Semyonov et al., 2021), head orientation (Nelson & Russell, 2011b), posture (Dael et al., 2012), tactile contact (Hertenstein et al., 2006), dynamic body movement (Atkinson et al., 2004; Crane & Gross, 2007; Gross et al., 2010; Nelson & Russell, 2011a; Wallbott, 1998), voice (Cordaro et al., 2016; Juslin & Laukka, 2003; Sauter, Eisner, et al., 2010; Simon-Thomas et al., 2009), and full-bodied dynamic movements (Monroy et al., 2022). Some of this work has been replicated in cross-cultural studies (Brooks et al., 2023; Cordaro et al., 2016, 2018, 2020; Elfenbein & Ambady, 2002; Laukka & Elfenbein, 2021).

These developments raise an intriguing question we address in the present investigation: Are the capacities to recognize emotion in the face, voice, and body similarly predictive of empathy responses? The present investigation allows for the examination of this important issue, largely ignored in the field.

Emotion Recognition and Empathy

Empathy is a multicomponent capacity and process involving the sharing and understanding of others' emotional states (though there is no consensus on a definition; see Cuff et al., 2016; Hall & Schwartz, 2019; Ickes, 1993; Preston & de Waal, 2002; Preston & Hofelich, 2012; Zaki & Ochsner, 2016). Sharing others' emotional states, or taking on the sensorimotor, visceral, and affective states of another person, is posited to be an affective facet of empathy; and understanding or mentalizing about others' emotions—drawing inferences about another person's internal states (intentions, beliefs, and emotions)—is argued to be a cognitive facet of empathy (Zaki, 2014; Zaki & Ochsner, 2016).

Rich empirical traditions have documented the role of empathy in physiological similarity (Levenson & Ruef, 1992), prosocial tendencies and altruism (Andreychik & Lewis, 2017; Batson & Shaw, 1991; Eisenberg & Miller, 1987; Sze et al., 2012; Van Lange, 2008), cooperation (Batson & Moran, 1999), tolerance (Butrus & Witenberg, 2013), social power (Hogeveen et al., 2014; Kraus & Keltner, 2009), and social civility (i.e., decreased aggression; de Kemp et al., 2007; Lovett & Sheffield, 2007; Richardson et al., 1994). Enhanced empathy has been found to improve social relationships, as documented in relationship satisfaction in romantic couples (for review, see Sened et al., 2017), physician–patient relations (Riess et al., 2012), and intergroup relations (Batson et al., 1997; Finlay & Stephan, 2000; Nadler & Liviatan, 2006). Empathy is central to social life.

Within theoretical accounts of empathy (e.g., de Waal, 2008; Ickes, 1993; Preston & de Waal, 2002; Preston & Hofelich, 2012; Zaki & Ochsner, 2016), it is presupposed, often tacitly, that the understanding and sharing of others' emotional states—that is, empathy—is enabled by the recognition of the other person's emotions. For example, some theorists posit that low-level empathic processes are perceiving and recognizing others' emotional expressions (i.e., the perception–action model; Preston & de Waal, 2002; Preston & Hofelich, 2012). This is consistent with other claims suggesting that emotion recognition is essential to mentalize about others' mental states (Zaki, 2014; Zaki & Ochsner, 2016). Mentalizing others' mental states and mind perception more directly involves making inferences from observations of a target's behavior, including emotional expression (Zaki, 2014; Zaki & Ochsner, 2016). There are, of course, other pathways to empathy, such as shared appraisals of the emotional context (e.g., Zaki, 2014), but emotion recognition is a likely precursor of the empathic process.

This assumption is reflected in the empirical study of empathy. One widely considered approach relies on self-reports of sharing and understanding of others' emotions, in which participants are simply asked to report on whether they detected and felt another individual's emotions (e.g., "When someone else is feeling excited, I tend to get excited too. … I can tell when others are sad even when they do not say anything"; Spreng et al., 2009, p. 71). Another tradition has focused on the observers' perceptions of others' emotional states, in particular, the accuracy with which observers report on a target's emotions and thoughts (i.e., empathic accuracy; Ickes, 1993; Zaki & Ochsner, 2016). In this body of work, studies have examined empathic accuracy in the lab in dyadic interactions between romantic couples, friends, and strangers (Ickes et al., 1990; Levenson & Ruef, 1992; Sened et al., 2017; Zerwas et al., 2021) or in perceivers' ratings of a stranger's emotional experience (positive or negative) from a video recording (e.g., Zaki et al., 2008). Critical, then, to a theoretical understanding of empathy (and emotion recognition) is the accuracy with which a perceiver identifies a target's emotion from observable behavior (Hall & Colvin, 2011; Hall et al., 2016).

Empirical work supports this theoretical analysis. For example, studies of behavioral mimicry and synchrony find that people routinely mirror others' laughter, anger displays, smiles, and blushes in an emotion-specific fashion (Dimberg et al., 2000; Van der Graaff et al., 2016; for review, see Hess & Fischer, 2013), suggesting that the behavioral pathway to the sharing and understanding of others' feelings begins in some form of recognition, implicit or explicit, of others' emotional states. The literature on emotional convergence—the tendency for people to converge in their emotional reactions to shared events—is similarly suggestive. Namely, studies find that roommates in shared living spaces (Anderson et al., 2003), teammates in sports (Totterdell, 2000), individuals within social networks (Fowler & Christakis, 2008), and individuals sharing within digital platforms (Garcia & Rimé, 2019) often converge over time in the emotions they experience in response to specific events. The dynamic convergence in emotional experience between individuals—a form of sharing others'

emotions—is likely to arise, in part, as the result of the recognition of emotions in others.

Empirical studies in clinical samples provide further evidence for the central thesis of this investigation and that the recognition of emotion predicts empathic response. For example, neuroimaging studies have found that brain lesions in the right somatosensory-related cortices—areas of the brain associated with self-other representation and empathy-related responses (for a review of other related areas, see Zaki & Ochsner, 2011)—impaired emotion recognition of facial expressions (Adolphs et al., 2000). Individuals with emotion recognition deficits, such as those diagnosed with autism spectrum disorder (Griffin et al., 2021; Sucksmith et al., 2013), show difficulties sharing and understanding others' emotional states (for review, see Trevisan & Birmingham, 2016).

Despite the centrality of the assumption that emotion recognition predicts increased empathic response, relatively little work has systematically examined this assertion. Past work has primarily focused on the relationship between emotion recognition and trait-like empathy (for reviews, see Hall et al., 2009; Murphy & Lilienfeld, 2019). For example, past studies found that the tendency to feel concern for others (e.g., Besel & Yuille, 2010; Israelashvili et al., 2020; Olderbak & Wilhelm, 2017) or take others' perspective (e.g., Israelashvili et al., 2019; but see Olderbak & Wilhelm, 2017; Sunahara et al., 2022) was associated with greater accuracy of emotion recognition. Here, we expand on this work by examining multifaceted measures of empathy—including state and trait measures—across a wide range of emotions, across different expression modalities, and across different ethnic groups.

The Present Investigation

Translating 25 years of empirical science on the multimodal expression of positive and negative emotions, we measured emotion recognition—across 13 emotions in the face, voice, and body—and examined its association with trait and state empathy. Based on theoretical and methodological approaches to emotion recognition and empathy, for each target expression, we asked participants to report on the situation likely to produce such expression, the emotion category that best fits the expression, and—to capture state-like empathy—their *own* feelings of the target emotion, as well as their sympathy, distress, and joy. We hypothesized that the ability to recognize emotions in the face, voice, and body would be related to greater state and trait empathic responses.

Method

Participants

Participants were 342[1] undergraduate students (M_{age} = 20.91, SD = 3.09; 70% female, 16% male, 3% other, 11% no response) from the University of California, Berkeley who participated in the current research in exchange for credit in a psychology course. This sample size was decided based on past work on emotion recognition and trait empathy (Hall et al., 2009; Israelashvili et al., 2019; Murphy & Lilienfeld, 2019; Olderbak & Wilhelm, 2017), and our sample size provides 80% power to detect an effect size of .13. The sample demographics were 50% Asian American (n = 172), 16% European American/White (n = 56), 11% Hispanic/Latin American (n = 39), 1% African American/Black (n = 3), 8% mixed ethnicities (n = 28), 1% other ethnicities (n = 5), and 11% no response (n = 39).

Procedure

Participants engaged in a two-part online study conducted via the Qualtrics online platform. Participants first completed an initial survey in which they provided informed consent and completed personality and demographic questionnaires. A day later, participants received a link for Part 2 of the study, which randomly assigned them to a version of the emotion recognition test (see details below). Participants had 72 hr to start and complete the test in one sitting, which took about an hour to complete on average ($M_{across\ versions}$ = 62 min, SD = 33). Before starting the emotion recognition test, participants completed a technology check to ensure that they were able to hear the audio and see the images. If they passed the technology test, participants were allowed to proceed with the study. Participants were instructed to wear headphones during the audio portion of the study. In each version, participants made judgments for all 13 emotions in three modalities in random order. See Supplemental Figure S1 for a sample of the test and more details in the measures section. After completing the study, participants were thanked and compensated with course credit for their participation. This procedure was approved by the authors' institutional review board at the University of California, Berkeley.

Measures

Initial Measures

Trait Empathy. Trait empathy was assessed with the Interpersonal Reactivity Index (IRI; Davis, 1980) and the Toronto Empathy Questionnaire (TEQ; Spreng et al., 2009).

The IRI (Davis, 1980, 1983) consists of 28 items assessing people's empathic tendencies across four domains: Empathic Concern (EC), Perspective Taking (PT), Personal Distress, and Fantasy. Participants indicated their agreement on a scale from 1 (*does not describe me well*) to 5 (*describes me very well*) to statements such as *I often have tender, concerned feelings for people less fortunate than me* (EC; α = .78; M = 3.93, SD = 0.60); *I sometimes try to understand my friends better by imagining how things look from their perspective* (PT; α = .75; M = 3.71, SD = 0.60); *I sometimes feel helpless when I am in the middle of a very emotional situation* (Personal Distress; α = .75; M = 2.94, SD = 0.65); and *I daydream and fantasize, with some regularity, about things that might happen to me* (Fantasy; α = .77; M = 3.69, SD = 0.72).

The TEQ (Spreng et al., 2009) consists of 16 statements in which participants answered how frequently they feel or act within a certain manner on topics such as "I find that I am 'in tune' with other people's moods" and "When someone else is feeling excited, I tend to get excited too." Participants answered these statements from a scale from 1 (*never*) to 5 (*always*; α = .87; M = 3.00, SD = 0.47).

[1] Due to a technical error, 38 participants were not able to be linked with their initial survey. As a result, all initial measures only contain 304 participants.

Materials

Multimodal Stimuli

The stimulus set consisted of 13 emotions expressed across three modalities—body, face, and voice (in photograph or audio format)—and by one female and one male poser for each emotion in each modality. The 13 emotions, documented in past studies of emotional expression (e.g., for relevant review, see Keltner et al., 2019) included anger, amusement, contentment, desire, disgust, embarrassment, fear, interest, pain, pride, sadness, surprise, and sympathy. The stimuli were obtained from published studies with different response formats (Cordaro et al., 2020; A. S. Cowen et al., 2018; Monroy et al., 2022). The facial stimuli were photographs of facial expressions of emotion from the shoulders up to the top of the head (Cordaro et al., 2020). The voice stimuli were audio clips that ranged from 3 to 10 s in length (A. S. Cowen et al., 2018). The body stimuli were obtained from dynamic full body expressions in which targets, standing and unconstrained, were asked to express a wide array of emotions in any fashion they deemed appropriate (Monroy et al., 2022). Static photos from these dynamic bodily expressions were obtained and modified to include a gray circle covering the face (see Supplemental Figure S2 for an example). Importantly, in the service of creating a more diverse emotion recognition test than those currently available in the field, we created three versions with targets from the following backgrounds: (a) Asian American, (b) African American/Latin American, and (c) European American.[2] The audio stimuli for vocal expressions were the same for all versions.[3] See Supplemental Material for additional details on stimuli.

Recognition Task

For the emotion recognition task, we used two judgment formats well validated in the field, emotion situations/stories and emotion categories. For each target expression, participants were asked to (a) match the expression to an appropriate situation and (b) rate categories of emotion in terms of their correspondence to the feeling expressed by the target. For each target expression, participants (i.e., decoders) were first shown a stimulus (image or audio) in random order, then asked what made the person in the image/audio feel that way, and to choose from one of four situations, the situation that was most appropriate. This method has been similarly used in past investigations (Camras & Allison, 1985; Cordaro et al., 2020; Dashiell, 1927; Ekman & Cordaro, 2011; Ekman et al., 1969; Sauter, Eisner, et al., 2010; Simon-Thomas et al., 2009). Emotion stories add critical information about the situation within which a subjective experience arises, which allows for more nuanced communication than what a single word can convey (Russell, 1991). The situations were derived from past studies (Cordaro et al., 2016, 2018, 2020; Monroy et al., 2022; Sauter, Eisner, et al., 2010; Simon-Thomas et al., 2009) and included a situation for the target emotion, a closely related emotion, a least related emotion, and "none of these" (see Supplemental Table S1 for emotion situations). Participants could also indicate that they could not see or hear the image or audio. See Supplemental Figure S1 for an example. The same emotion situations were used in assessing emotion recognition across the three modalities (e.g., answer choices for anger were the same for the body, face, and voice but were always randomized for each modality). See Supplemental Materials for additional details.

After selecting the situation that best fit the target expression, participants then rated how much each of four emotion terms captured the feeling expressed in the target expression (face or voice or body). For each target expression, participants rated the target emotion, the closest related emotion, the second closest related emotion, and the emotion least similar to the target expression (see Supplemental Table S1 for emotion categories). They made these ratings on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Participants could also indicate that they could not see or hear the expression. The emotion terms were presented in random order and preserved across assessments of emotion recognition across the three modalities. See Supplemental Figure S1 for an example.

State Empathy

To capture how participants felt in response to each expression, participants were shown a stimulus (image or audio) in random order, and then they were asked how the person's expression made them feel. This question included five answer choices on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*): *This person's emotion … (1) makes me feel the same way they do, (2) makes me feel concerned and sympathy for them, (3) makes me feel distress, (4) makes me feel joy*, and *(5) does not make me feel any way in particular*. These items were derived from conceptual analyses that decompose empathy into several related responses: feeling the same emotion (from the TEQ; Spreng et al., 2009), EC and Personal Distress (from the IRI; Davis, 1980), and "joy" as a measure of positive empathy. We also included a neutral statement, "Does not make me feel any way in particular." Each statement was always presented in the same order, and we once again included an option to indicate that they could not see or hear the expression. The same statements were presented for all emotions and modalities. See Supplemental Figure S1 for an example.

Transparency and Openness

Materials used in this study are either commonly known and publicly available or included in the Supplemental Materials. All materials and measures used in this study are reported here or in the Supplemental Materials. Data and syntax associated with this

[2] Note that most emotion recognition tests in the field include only White/Caucasian expressers (e.g., the Geneva Emotion Recognition Test, the multimodal emotion recognition test; Bänziger et al., 2009; Schlegel et al., 2014).

[3] Given the nature of our stimuli, obtained from published studies, there were slight variations in these tests: the second version of the test consisted of African American facial expressions and Latin American bodily expressions; the Asian American test did not include female facial expression of desire and interest; the European American test included no female facial expression of interest; and the African American test included no male facial expression of amusement, fear, sadness, surprise, and sympathy. Also, due to a technical error (i.e., disgust stimuli were used instead of fear), all fear vocalizations for males were excluded from analyses across the three tests for the situation labeling task. Across the three versions, there were a total of nine expressions missing in the situation selection format and eight missing from the category selection format. Given our analytical approach, these variations were inconsequential.

article are available at https://osf.io/v8m6q/?view_only=96d9b58f0a094519a3f408f659721254 (Monroy et al., 2025). This study's design and its analyses were not preregistered.

Data Analytic Plan

All statistical analyses were performed using RStudio in the R programming environment (Version 4.3.0). Our preliminary analyses included examination of missing data and data exclusion based on the planned specified criteria (i.e., failed attention checks).

For our primary analyses, we used both between-person and within-person approaches. We used a between-person approach to examine the relationships between emotion recognition and trait empathy measures. In our analyses of the relationships between emotion recognition and state empathy, we used hierarchical linear modeling (HLM). The repeated measures design resulted in a two-level hierarchical structure with judgment ratings (13,334) nested in participants, and we included random intercepts and random slopes for participants. We fitted our models using the *lme4* and *lmerTest* packages (Versions 1.1-33 and 3.1-3). A strength of a multilevel modeling approach is that it allows for the examination of within-person effects, where we can test whether changes in recognition ratings are associated with changes in state empathy. That is, when people recognize a target's emotion, do they also report feeling more empathy? To examine within-person effects, we person-centered emotion judgments, where outcomes represent changes in a variable from that person's own average.

Results

Preliminary Analyses

From the original sample of 421 participants who completed the initial survey and the emotion recognition and empathy measures, we removed those who failed to follow the instructions—that is, participants who failed attention checks placed throughout the survey (total 79; see Supplemental Materials for more detail). The remaining 342 participants (81% of total *N*) provided a total of 13,334 individual ratings. This final sample ($N = 342$) was used for all descriptive statistics and analyses.

Emotion Recognition Accuracy Across Three Modalities

We first examined emotion recognition accuracy in our situation labeling format. We found that people were able to recognize all emotions except surprise at above chance levels in at least one modality, and all except surprise and pride in two or more modalities. We adopted a minimal criterion for emotion recognition of 25% or chance accuracy (e.g., see Cordaro et al., 2020; Sauter, Eisner, et al., 2010). Within each modality, there was some variability in recognition accuracy, in keeping with past studies on gradients of recognition (Haidt & Keltner, 1999): in expressions in the face, all emotion were recognized except for surprise; in expressions in the voice, surprise, pride, and sympathy were *not* recognized at above chance levels; and there was a much wider range in recognition accuracy in body expressions, for example, anger, fear, and pain were reliably recognized, whereas disgust was not. See Supplemental Section 2 and Supplemental Table S2 for accuracy rates for each emotion across the three modalities.[4] We note that these observed levels of recognition accuracy, particularly in the face and voice, were comparable to levels of reliable identification in studies of single modalities in past research (e.g., Cordaro et al., 2016, 2020; Sauter, Eisner, et al., 2010; Simon-Thomas et al., 2009). The overall accuracy across all emotions and modalities was 57% (see Table 1 for each modality).

Primary Analyses

Emotion Recognition and State Empathy

Building on the literature of emotion recognition and empathy, we examined the link between emotion recognition and state empathy. Namely, when viewing each of the 78 expressions (13 emotions expressed by two people; see Footnote 3), did the perceiver's accurate recognition of the specific emotion (e.g., pain in the voice or pride in facial behavior) predict (a) their shared feeling in response to the target's expressive behavior and (b) feelings of sympathy/concern?

We first examined whether overall emotion recognition accuracy ($\alpha = .82$) would predict reports of feeling the *same* emotion as the target expression. To do so, we created an overall emotion recognition composite—across both recognition formats,[5] the 13 emotions, and three modalities—and tested this question using two-level HLM. Consistent with the hypothesis, overall emotion recognition predicted a greater empathic response in terms of feeling the same emotion ($\beta = 0.15$, 95% CI [.13, .16], $p < .001$). The recognition of emotion predicted greater feelings of sympathy/EC ($\beta = 0.19$, 95% CI [.18, .21], $p < .001$), as well as more distress ($\beta = 0.16$, 95% CI [.15, .18], $p < .001$), and less joy (i.e., positive empathy; $\beta = -0.04$, 95% CI [−.05, −.02], $p < .001$).[6] These results suggest that the more people recognized a target's emotion, the more empathy they felt (see Supplemental Table S3 for correlations for each specific emotion).

We next tested our hypothesis—that accurate emotion recognition would predict greater empathic responses in our state empathy measure—for the positive and negative emotions in two-level HLMs. Positive emotions included amusement, contentment, desire, interest, and pride ($\alpha = .69$). Negative emotions included anger, disgust, embarrassment, fear, pain, sadness, surprise,[7] and sympathy ($\alpha = .76$). We found that the recognition of negative and positive emotions showed divergent pathways to empathy, except for feeling the same emotion ($ps < .001$). The recognition of negative emotions predicted more sympathy/EC, more distress, and less joy ($ps < .001$). On the other hand, the recognition of positive emotions predicted feeling less sympathy/EC, less distress, and more joy ($ps < .001$). See Figure 1 for models' statistics and for the correlation between

[4] Confusion matrices were not created because item responses were from a selection of alternatives instead of a fixed list of responses, which is required for confusion matrices.

[5] In all models for Hypothesis 2, we used an overall emotion recognition score of situation and category selection (*z* scored).

[6] Of note, these relationships were similar regardless of emotion recognition format—situation or category selection. For example, models predicting feeling the same emotion ($\beta_{Situation} = 0.11$, 95% CI [.09, .12]; $\beta_{Category} = 0.15$, 95% CI [.13, .16]) and feelings of sympathy/concern ($\beta_{Situation} = 0.17$, 95% CI [.16, .19]; $\beta_{Category} = 0.16$, 95% CI [.15, .18]) showed comparable results.

[7] Although surprise can be thought of as a neutral valence emotion, we include it with the negative emotions because in expression studies in the face and voice, it is often confused with fear (Ekman et al., 1969; Simon-Thomas et al., 2009).

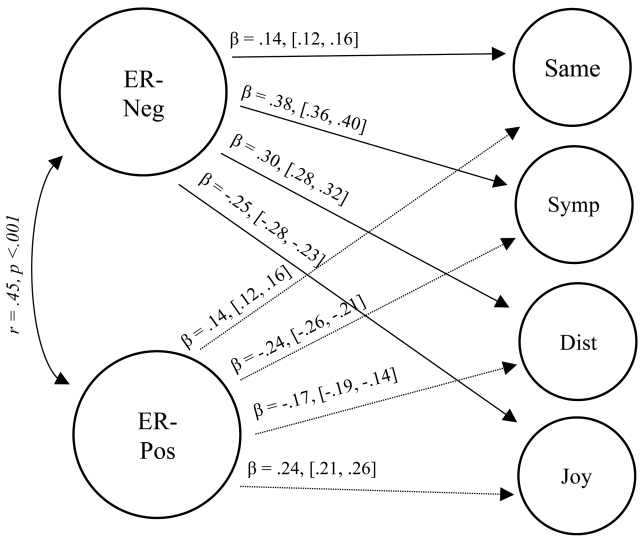
Table 1
Emotion Recognition Descriptive Statistics and Zero-Order Correlations

Modality	*M* (*SE*)	*r*							
		1	2	3	4	5	6	7	8
1. Body (s)	36.05 (0.56)	—							
2. Face (s)	64.74 (0.66)	.28	—						
3. Voice (s)	70.40 (0.46)	.35	.34	—					
4. Body (c)	3.60 (0.02)	.48	.20	.26	—				
5. Face (c)	4.39 (0.02)	.21	.47	.29	.46	—			
6. Voice (c)	4.42 (0.01)	.14	.24	.35	.44	.62	—		
7. Overall (s)	57.07 (0.41)	.73	.78	.71	.41	.45	.32	—	
8. Overall (c)	4.14 (0.01)	.35	.37	.36	.79	.85	.81	.49	—

Note. Values represent averages across all 13 emotions. Situation (s) labeling is presented in percentages, and category (c) selection is presented in the actual values (which ranged from 1 to 5). Pearson correlations (*r*) across all measures per modality are presented on the right side of the table. All correlations were significant at $p \leq .011$. *SE* = standard error.

emotion recognition of negative and positive emotions. Of note, in interaction models by valence, all interactions were significant (*p*s < .001), except for feeling the same emotion ($p = .314$)—in which the recognition of negative and positive emotions similarly predicted feeling more of the same emotion (see Supplemental Table S4 for model outputs). These findings suggest that when people recognized a person's negative emotions, they felt more sympathy and concern for them, but this was not the case, very sensibly, in the recognition of expressions of positive emotional states (see Figure 1).

Figure 1
Emotion Recognition and State Empathy



Note. Results of different bivariate hierarchical linear models. Emotion recognition accuracy rates represent emotion recognition across formats, modalities, and either negative or positive emotions. ER-Neg denotes emotion recognition of negative emotions, ER-Pos denotes emotion recognition of positive emotions. State empathy measures indicate the following: feeling the same emotion (Same), sympathy (Symp), distress (Dist), and joy/positive (Joy). The two-headed arrow illustrates the correlation (*r*) between ER-Neg and ER-Pos (done with aggregates), and one-headed arrows illustrate how regressions were conducted between emotion recognition and empathic responses. All estimates are standardized and significant at $p <$ .001. Values within brackets indicate 95% confidence intervals.

In the examination of each modality separately—face, voice, and body—for positive and negative emotions, we found results that converged with our analyses based on the composite measures of overall positive and negative emotion (*p*s < .001). See Table 2 for models' statistics.

These findings suggest that while the valence of an expression may not be as crucial to feel what other people feel, it is important to motivate sympathy and concern for others. Our data also suggest that the recognition of expressions of negative emotions, regardless of modality, is associated with increased sympathy and concern for the individual expressing the emotion.

Emotion Recognition and Trait Empathy

Finally, we tested the link between emotion recognition and empathy with trait-based empathy measures. We found that, consistent with past work, overall emotion recognition—across emotions, modalities, and type of measurement (see Footnote 3)—was positively related to all self-report measures of trait empathy—IRI's EC, PT, and Fantasy (F), and the TEQ measure (*p*s ≤ .028). The one exception was that overall emotion recognition was not related to the IRI Personal Distress (IRI-PD) subscale ($p = .272$). In the examination of positive and negative emotions, we found that the capacity to recognize emotion from positive and negative expressions was positively associated with self-reports of trait empathy (*p*s ≤ .039), except in the relationships between IRI-PD and the recognition of positive expressions ($p = .559$), and IRI-PT and the recognition of negative expressions ($p = .089$). See Table 3 for models' statistics.

In the examination of state and trait empathy, we observed that in general, our state empathy measure correlated in the expected direction with trait empathy measures. For example, the tendency to feel EC for others (IRI-EC) was positively related to feeling sympathy for others' negative emotions ($r = .18$, $p = .002$). The tendency to feel EC for others (IRI-EC; $r = -.18$, $p = .002$) and take others' perspective (IRI-PT; $r = -.14$, $p = .016$) was negatively related to feeling joy/positive for others' negative emotions. Trait Personal Distress (IRI-PD) was positively associated with feeling distress for positive ($r = .12$, $p = .033$) and negative expressions ($r = .14$, $p = .015$). We did not find any associations between feeling the same emotion and trait measures. There was variability in the relationships across all empathy measures, but generally, all measures, except feeling the same emotion, were associated in the assumed direction (see Supplemental Table S5).

Discussion

Empathy—the understanding and sharing of others' feeling states—is central to social processes, from the formation of romantic bonds to the trust felt between medical doctor and patient to how people arrive at prosocial and moral judgments. Empathy is theorized to arise through different processes, from the implicit imitation of others' behavior to an understanding of the social context of the target of empathy (de Waal, 2008; Zaki, 2014). One widely assumed, yet little investigated, pathway to empathy is emotion recognition—the reliable inference of another person's emotions

Table 2
Recognition of Negative and Positive Emotions and State Empathy by Modality

	Same			Sympathy			Distress			Joy		
Modality	β	CI	*p*	β	CI	*p*	β	CI	*p*	β	CI	*p*
Negative												
Voice	0.05	[0.03, 0.08]	<.001	0.39	[0.36, 0.42]	<.001	0.33	[0.29, 0.36]	<.001	−0.44	[−0.48, −0.39]	<.001
Face	0.10	[0.08, 0.13]	<.001	0.29	[0.26, 0.32]	<.001	0.22	[0.19, 0.25]	<.001	−0.23	[−0.26, −0.19]	<.001
Body	0.16	[0.14, 0.19]	<.001	0.43	[0.40, 0.47]	<.001	0.29	[0.26, 0.32]	<.001	−0.15	[−0.18, −0.12]	<.001
Positive												
Voice	0.07	[0.03, 0.10]	<.001	−0.05	[−0.08, −0.02]	.002	−0.08	[−0.11, −0.04]	<.001	0.06	[0.02, 0.10]	.002
Face	0.10	[0.06, 0.14]	<.001	−0.08	[−0.12, −0.04]	<.001	−0.12	[−0.16, −0.07]	<.001	0.13	[0.09, 0.17]	<.001
Body	0.07	[0.04, 0.11]	<.001	−0.23	[−0.27, −0.19]	<.001	−0.17	[−0.21, −0.14]	<.001	0.17	[0.13, 0.21]	<.001

Note. Results of different bivariate hierarchical linear models. All estimates are standardized. CIs indicate 95% confidence intervals.

from their expressive behavior. In the present work, we build on past literature by examining multimodal emotion recognition—in the face, voice, and body—and its role in state- and trait-related empathy.

Building on recent discoveries of emotion recognition with a multimodal approach—face, voice, and body—we examined recognition within each modality. We found that people were able to recognize amusement, anger, contentment, desire, disgust, embarrassment, fear, interest, pain, sadness, and sympathy at above chance levels in two or more modalities. The emotion recognition accuracy rates from this study are comparable to those of past studies with similar paradigms (e.g., Cordaro et al., 2016, 2020), with an overall accuracy across modalities of 57%.

The recognition of emotion varied by emotional state: Across all modalities, expressions of pain, sadness, and anger were among the most recognized; and expressions of surprise and pride were the least recognized and most often confused with others (e.g., pride with triumph). Bodily expressions were the largest source of variability, as evident by their low accuracy rates. This is consistent with past work suggesting that emotions are expressed in multiple patterns of bodily behavior (Dael et al., 2012) and raises important questions about the relative contribution of the body, compared to the face and voice, in the recognition of emotion. Emotion recognition of body expressions—deprived of facial and vocal cues and context—might be more challenging than in other modalities, for example, when a vocal expression is not accompanied by a bodily expression. This set of possibilities warrants future inquiry.

Our primary aim was to examine the link between emotion recognition and empathy—which we measured in terms of state-like responses to the target expressing emotion and in trait-like tendencies captured with validated self-report measures. The results of this study indicated that the ability to accurately recognize emotions across 13 emotions and three modalities was related to feeling the same emotion as the target, feelings of sympathy/concern for the target, and feelings of distress, but less joy (i.e., positive empathy). The recognition of negative emotions proved to be a strong predictor of empathic responses to targets expressing negative emotions, in terms of feeling the same emotion as the person expressing the emotion, more sympathy/concern for the person, as well as more distress, and less joy. The recognition of positive emotions showed opposite results—less sympathy/concern for the person expressing the emotion, less distress, and more joy—except for feeling the same emotion.

These findings suggest that recognizing positive or negative emotions may trigger a similar emotional response (i.e., feeling the same emotion as others) and that recognizing others' negative emotions in particular leads to greater empathy-related feelings of sympathy and concern for others. These findings make the important point that empathic processes differ depending on whether the target is expressing positive or negative emotions. Here, we note the highly contrived nature of the study context—participants were judging targets' posed emotions from photographs or audio. It will be important to extend these findings to more naturalistic paradigms central to the study of empathy (e.g., Ickes et al., 1990; Levenson & Ruef, 1992; Zaki et al., 2008).

Table 3
Emotion Recognition and Trait Empathy

	Overall			Negative			Positive		
Trait	β	CI	*p*	β	CI	*p*	β	CI	*p*
EC	0.14	[0.03, 0.25]	.015	0.12	[0.01, 0.23]	.037	0.12	[0.01, 0.23]	.035
PT	0.13	[0.01, 0.24]	.028	0.10	[−0.02, 0.21]	.089	0.12	[0.01, 0.23]	.035
PD	0.06	[−0.05, 0.18]	.272	0.12	[0.01, 0.23]	.039	−0.03	[−0.15, 0.08]	.559
FS	0.20	[0.09, 0.31]	.001	0.18	[0.06, 0.29]	.002	0.16	[0.05, 0.27]	.004
TEQ	0.17	[0.06, 0.28]	.002	0.15	[0.04, 0.26]	.009	0.15	[0.04, 0.26]	.009

Note. Emotion recognition is first displayed in an overall measure of emotion recognition (across all emotions, modalities, and measurements), then by positive and negative emotion composites. Trait empathy measures: the Interpersonal Reactivity Index is displayed first, by its subscales—EC, PT, PD, FS; followed by the TEQ. CI = confidence interval; EC = Empathic Concern; PT = Perspective Taking; PD = Personal Distress; FS = Fantasy; TEQ = Toronto Empathy Questionnaire.

With respect to trait-like empathy, we found converging evidence that the ability to recognize emotion in the face, voice, and body was significantly and, modestly, related to self-report trait-like tendencies toward empathy. These findings are consistent with past work suggesting that trait empathy, such as the tendency to feel concern (e.g., Israelashvili et al., 2020; Olderbak & Wilhelm, 2017) or take others' perspective (e.g., Israelashvili et al., 2019; but see Olderbak & Wilhelm, 2017; Sunahara et al., 2022), is associated with greater accuracy of emotion recognition of expressions portrayed in still images of the face (see Israelashvili et al., 2020), the eyes (i.e., the Reading the Mind in the Eyes Test; Baron-Cohen et al., 2001), and dynamic videos of Caucasian actors producing pseudo speech vocalizations (i.e., the Geneva Emotion Recognition Test; Schlegel et al., 2014). Here, we expand on these findings using multimodal (face, voice, and body) and more diverse stimuli—including expressions from African Americans, Asian Americans, European Americans, and Latin Americans.

It is important to note here that the relations between emotion recognition and trait empathy were modest (ranging from .06 to .20); they are not the same social process. A critical next step in this kind of research is to explore the relative contributions that other factors than simple emotion recognition play in giving rise to empathic response, including implicit emotion mimicry (Hess & Fischer, 2013) and understanding of social context (e.g., Hess et al., 2022; Kraus et al., 2012; Zaki, 2014). For instance, with measures of behavioral mimicry added to a study such as this one, evidence might inform not only the relative contributions of mimicking and labeling others' expressions to empathic response but also speak to the dynamic unfolding of empathic response. For example, whether implicit mimicry processes precede and potentiate the more conceptual act of labeling an emotional expression.

The aforementioned discussion speaks to a central question in the study of empathic processes: how the more emotional and cognitive dimensions of empathy (mentioned in the introduction) interact to produce shared feelings or empathy. Clearly, more implicit measures—behavioral mimicry, physiological synchrony—and attention to the temporal unfolding of the empathic response will be important to such efforts to chart these separate processes. We also note that our findings on state- and trait-like empathy might be informative as well to an understanding of the emotional and cognitive dimensions of empathy. For example, our findings show divergent pathways from recognizing positive and negative emotions to the sympathy/concern facet of the state empathy measure, but not for trait empathic concern (IRI-EC). This might be in part due to the context and temporality of the measurement procedures: Trait measures assess how people tend to generally feel, whereas state measures assess feelings in the moment in response to a specific target. The different patterns of results in this study for state and trait empathy converge with more general assessments in the literature: in the examination of empathy, temporality and context matter (e.g., Hess et al., 2022; Kraus et al., 2012; Zaki, 2014). Future studies should build on this work and examine whether trait or state empathy similarly or differently predict not only the specificity of empathic response but also its emotional and cognitive underpinnings.

Limitations and Future Directions

Several limitations of the present investigation warrant consideration. First, although our encoders (targets) were ethnically diverse, our sample of decoders (judges) consisted of a college sample and was not as ethnically diverse. It will be important for future research to study more diverse samples with respect to age, ethnicity, and education. Such a focus would enable the examination of between- and within-group differences in the emotion recognition and empathy link (e.g., Elfenbein & Ambady, 2002). Second, there were limitations on the emotion recognition task itself, including the stimuli and the length of the task. The body stimuli were modified versions of validated dynamic full body expressions (Monroy et al., 2022), but they showed low accuracy rates, thus suggesting the need for further validation. Given the length of the study (a bit over an hour), the emotion recognition response format for each target expression was short. Future research should include all emotions of interest in the response format. Also, given the length of the test and evidence suggesting that empathy can be cognitively effortful, leading people to sometimes choose to avoid it (e.g., Cameron et al., 2019; Zaki, 2014), it is possible that effort, exertion, and conscientiousness might have influenced participants' emotion recognition and state empathy responses. Last, we note that our methods cannot speak to issues of causality. Future work can examine the causal link between emotion recognition and empathy using experimental and behavioral measures, ideally with a more ecologically valid design, one in which the context of empathic response can be closely considered (e.g., Hess et al., 2022; Kraus et al., 2012; Zaki, 2014).

Conclusion

The present study reveals that there is a general capacity to recognize emotion from different modalities of expressive behavior and that this capacity is related to state-like empathic responses to other people and trait-like tendencies to report the sharing and understanding of others' emotions.

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