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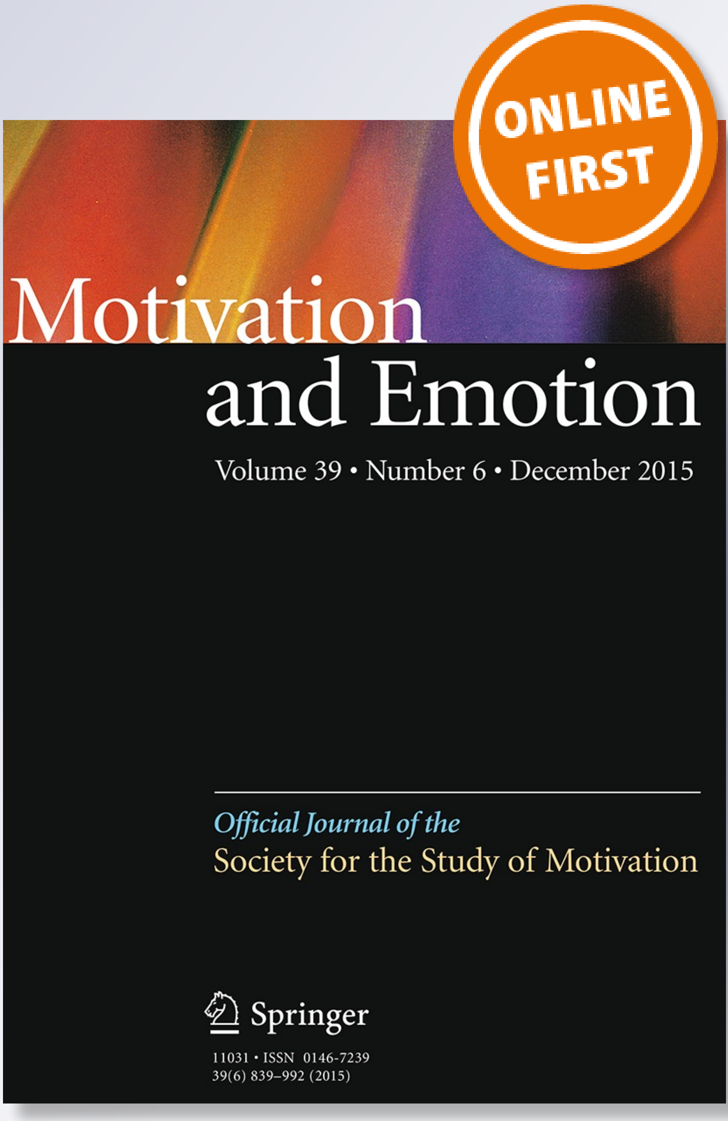

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ORIGINAL PAPER

Empathy, emotion dysregulation, and enhanced microexpression recognition ability

Elena Svetieva[1,2] · **Mark G. Frank**[1]

Abstract The present study examined empathy and emotion dysregulation, two individual traits related to the perception and experience of others' emotions, and the recognition of both spontaneous and standardized microexpressions of emotion. Ninety-three participants viewed a stimulus set of natural (spontaneous) microexpressions in addition to completing a standardized test of microexpression recognition ability, as well as completing questionnaires on empathy and emotion dysregulation. Results indicate that emotion dysregulation is associated with enhanced microexpression recognition, particularly recognition of anger microexpressions, but that this enhanced recognition was only observed for standardized microexpressions. Empathy was associated with increased recognition of anger microexpressions in the natural stimulus set only, and was not associated with overall microexpression recognition accuracy in either the natural stimulus set or the standardized test. The present findings inform understanding of intrapersonal affective traits in subtle emotion recognition, and theoretical and practical implications are discussed in both clinical and deception detection contexts.

Keywords Microexpression recognition · Emotion dysregulation · Empathy · Emotion expression recognition

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Introduction

A typical human expression of emotion is stated to last between .5 s and 4 s (Ekman 2007; Hess and Kleck 1990). However, there has been increasing interest in expressions of emotion that are much briefer. First documented by Haggard and Isaacs (1966), these emotion expressions have since been termed microexpressions, and have been documented to appear on the human face for less than 1/2 s (Ekman and Friesen 1969). Microexpressions are thought to be a by-product of both the voluntary and involuntary mechanisms of emotion expression in humans, where the individual's desire to control the expression of a certain emotion is compromised by the involuntary impulse that emanates from emotion centers in the brain to express that very emotion (Frank and Svetieva 2015). For this reason, microexpressions are thought to occur more frequently when individuals are deceiving. The focus on microexpressions has typically tended to circulate around their utility in detecting deception, with some evidence suggesting that microexpressions occur more often during certain deception types and contexts, and that individuals who are able to spot and correctly interpret such expressions are also better able to detect deception in others (Ekman and O'Sullivan 1991; Frank and Ekman 1997).

Given the emphasis that has been placed on microexpressions as an important spontaneous marker of concealed affect (e.g. Ekman 1985/2001), and the tendency to present microexpression recognition as a rare, but trainable skill, that can also improve other outcomes in the interpersonal and professional realm (e.g. Hurley 2011; Matsumoto and Hwang 2011), it is important to understand and examine some individual characteristics that may be contribute to this skill. Existing work is limited but suggests that deception detection ability is influenced by some demographic and experiential factors, including age, gender, and investigative/law enforcement experience (O'Sullivan and Ekman 2004). Other research has explored the related question of how individual characteristics relate to the trainability in microexpression recognition (Hurley et al. 2014).

At the same time, there is no research that examines trait-based characteristics that are associated with enhanced microexpression recognition ability. This limits our understanding of microexpressions within the context of established research on emotion expression recognition, but also prevents a more comprehensive understanding of deception detection, and the constituent abilities and acuities that underlie this rare, but desirable skill. To the extent that microexpressions represent subtle emotion communication, individual characteristics related to emotion experience and sensitivity may influence microexpression recognition, particularly in everyday contexts. A natural starting place for inquiry therefore is to examine the individual traits that have been previously observed to be associated with superior ability to recognize emotion expression in others. Empathic ability, theory of mind, and emotional intelligence for example are all related constructs that are based largely in the ability of a person to understand, using nonverbal information, how others are feeling and what they may be thinking (Baron-Cohen 1997; Petrides and Furnham 2003; Salovey and Mayer 1990).

The present study examines two individual traits, empathy and emotion dysregulation, that have typically been associated in emotion recognition contexts, in order to observe their association with the recognition of emotion microexpressions, both in natural and standardized presentation modalities.

Empathy

Empathy is the ability to understand (cognitive empathy) and feel (affective empathy) the mental and emotional states of others (Decety and Meyer 2008). Cognitive empathy is closely linked to individuals' capacity to form theory of mind and see the world from another person's perspective, whereas affective empathy reflects the ability to feel concordant emotion (Blair 2005). As such, the ability to infer how others are feeling based on their facial expressions of emotion is an important indicator of cognitive empathy, though it does not also necessarily indicate the presence of affective empathy. Cognitive and affective empathy therefore are thought to be related but also distinct constructs (Davis 1983), with cognitive empathy encapsulating the process of recognizing, inferring, and labeling of others' inner states based on their outward expressions and behavior (Baron-Cohen 1997).

At the same time, existing research suggests that while identifying the emotion expression of others may be seen as an element of cognitive empathy, affective empathy plays a larger part when identifying emotion expressions that are presented at very brief durations (e.g. 50 ms; Besel and Yuille 2010). When emotions are presented as brief durations, judgments are thought to rely on more intuitive, biologically based emotional processing, rather than higher order cognitive processes (Besel and Yuille 2010). No research so far has tested this relationship with emotion microexpressions, either using standardized stimuli or natural emotion microexpressions. Our first set of hypotheses are therefore that empathy, and in particular affective empathy, will be associated with enhanced recognition of emotion microexpressions.

Emotion dysregulation

Emotion dysregulation is defined as the marked and usually maladaptive emotional response to everyday social and interpersonal stimuli. Newhill et al. (2010) suggest that emotion dysregulation is composed of three factors: (1) emotional sensitivity, (2) a heightened emotional response and (3) a slow return to baseline (i.e. the down-regulation of both highly positive and aversive emotional states). In other words, emotion dysregulation reflects the individual's tendency to acutely experience the vicissitudes of his/her emotional responses to situations and other people.

Emotion dysregulation is also the core characteristic of the set of intra and interpersonal impairments that define the clinical category of Borderline Personality Disorder (BPD; Glenn and Klonsky 2009). The inability to regulate both positive and negative emotions means that individuals with BPD suffer from marked instability in both moods and relationships (APA 2000, 2013) and that the way they notice and respond to emotion stimuli in their environment is key to this process (Glenn and Klonsky 2009). In fact, much of our understanding of how emotion dysregulation may impact perceptions of others' mental states and emotions comes from research in individuals with BPD.

Given the interpersonal difficulties that individuals with BPD face, researchers began examining the possibility that these difficulties result from deficits in how individuals with BPD perceive emotion expressed by others. Rather than a deficit however, paradoxically, studies find that BPD is actually associated with increased performance in some interpersonal emotion perception tasks. This includes inferring people's emotional states from their nonverbal communication (Frank and Hoffman 1986), and subtle facial features (Fertuck et al. 2009), superior emotion recognition accuracy (Wagner and Linehan 1999), and more emotion expression sensitivity even when compared to healthy controls (Lynch et al. 2006). The findings also suggest a bias towards the perception of anger specifically and negative emotion generally (Domes et al. 2008; Domes et al. 2009). These findings suggest that although individuals with BPD suffer mainly from an inability to regulate their own emotional responses, sensitivity to others' emotional communication is likely a key factor in this process. For example, through processes of both contagion and appraisal, an increased ability to recognize anger and threat expressions in others may in turn increase the frequency and intensity of anger experiences on the part of the (emotionally dysregulated) perceiver.

At the same time, Roepke et al. (2012) suggest that any enhanced emotion recognition observed in BPD becomes less pronounced when dealing with more complex, natural, and ecologically valid stimuli. For example, even when individuals with BPD show normal emotion recognition using standard stimuli, they show an impaired ability to recognize higher-level emotional information, such as when faces and voices are presented together (Minzenberg et al. 2006). These findings suggest that any emotion recognition advantage associated with emotion dysregulation may be limited to simple, standardized emotion stimuli.

The research on atypical populations provides an insight into how more typical populations process and regulate emotions. The present study therefore looked at the possibility that in normal populations, emotion dysregulation affects processing of emotion information in the environment, such that it will be associated with heightened ability to recognize subtle emotion communication by others, specifically emotion microexpressions. Additionally, we hypothesize that the association between emotion dysregulation and enhanced recognition ability will be particularly observed in negative and threatening stimuli, namely, anger microexpressions. Based on the existing research, it is also possible to hypothesize that any superior emotion microexpression recognition accuracy observed in relation to emotion dysregulation will be limited to standardized microexpressions, and will not necessarily be observed in natural, spontaneously produced microexpressions.

In sum, the purpose of the present study is to examine whether individual traits in the sensitivity to emotion information in one's environment are associated with enhanced recognition of microexpressions of emotions. As naturally occurring subtle emotion communication, microexpressions represent an ecologically valid test-bed for examining existing laboratory research on the association between individual traits in understanding others (empathy), and traits related to regulating one's own emotion experience (emotion dysregulation), with enhanced recognition of emotion expression. We examine these traits in a nonclinical population in both a standardized microexpression test and a set of natural emotion microexpression.

We offer several hypotheses that are based on prior research in the association between individual affective traits and emotion expression recognition. With respect to empathy we predict empathy will be positively associated with recognition of emotion microexpressions (H1), and that affective empathy, as a subtype of empathy more strongly implicated in recognizing brief emotion expressions, will be more strongly associated with this recognition advantage (H2). Secondly we examine nonclinical self-reported trait levels of emotion dysregulation and predict that they will be positively associated with recognition of emotion microexpressions (H3), but that any recognition ability will be particularly observed with respect to recognition of anger microexpressions (H4) and will be limited to standardized microexpressions rather than natural, spontaneously produced microexpressions (H5).

Method

Participants and design

The study was advertised both in undergraduate communication classes (in exchange for course credit) as well as the university campus at large (in exchange for a $10 gift card) at a large public university in the northeast/great lakes. Ninety-three participants completed the study; $M_{\text{age}} = 22.17$, $SD = 4.79$, 58.1 % female, 55.9 % White, 17.2 % Asian/Pacific Islander, 7.5 % Hispanic, 5.4 % African American/Caribbean, 5.4 %. 3.2 % Middle Eastern, and 5.4 % other.

Materials

Stimulus videos

The natural microexpression stimulus set was created from previously coded videofootage by multiple FACS-certified coders. The initial sample featured 114 speakers. All speakers were taking part in an interview (where the interviewer was not visible in the recording). An initial search identified microexpression instances i.e. emotion expressions by the speaker less than .6 s in duration from onset (frame where expression first appears) to offset (frame where expression first fades) and which exhibited key action units for each emotion expression, based on the EMFACS system and emotion dictionary (Ekman et al. 1994). The videos represented the basic emotion types according to the dictionary.

The stimulus set did not include surprise expressions because there were no instances of naturally occurring surprise microexpressions. It is likely that fear and surprise both have the same initial action potential expressed on the face which over time becomes differentiated between the two emotions (Jack et al. 2014). For example, both fear and surprise expressions commence with an initial widening of the eyes that is only with time differentiated between fear (which is often associated with lifting and pulling together of the eyebrows, and/or lip stretch) and surprise (which is often associated with a lowered jaw and mouth opening) (Jack et al. 2014). Given the brevity of microexpressions, it is therefore unlikely that the expression would have a long enough duration to take the form of a "surprise" expression. Similarly, individuals typically have more control over the lower part of the face (Rinn 1984), and may be more able to suppress or control the jaw lowering and mouth opening that are necessary facial actions for an expression to be classified as surprise.

Differential control over the muscles in the lower versus upper part of the human face also mean that expressions varied in terms of intensity. In general, happiness microexpressions were of lower intensity that negative emotion microexpressions (see Table 1). Given happiness microexpressions involve the lower part of the face only (AU12; lip corner puller), an area over which individuals tend to have greater voluntary control (Rinn 1984), natural

Table 1 Action units present at apex of each stimulus microexpression

Emotion	Sender	Action units at apex
Sadness	M1	1C + 4B
	M2	1B + 4B
	F1	11C
	F2	1A + 7C
Anger	M1	10D + 17D +23C
	M2	4C + 5B + 31B
	F1	17C + 23C
	F2	5A + 23D
Happiness	M1	12B
	M2	12A
	F1	7B + 12B
	F2	7B + 12B
Disgust	M1	4D + 7D + 10B
	M2	R9C + 15C + 23C
	F1	6B + 7C + 9C
	F2	10B
Fear	M1	20B + 21B
	M2	20B
	F1	1B + 2B + 4B
	F2	20B

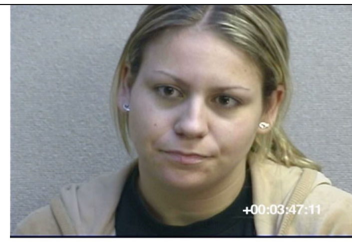
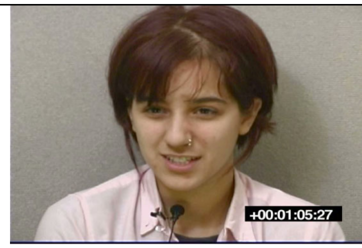
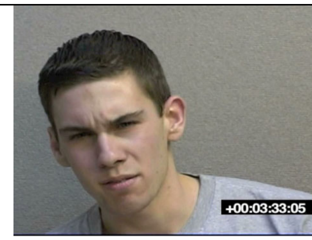
happiness microexpressions are more likely to be of lower intensity. Finally, contempt microexpressions were excluded because consultation with the FACS investigator guide (Ekman et al. 1978, 2002); EMFACS (Ekman et al. 1994), other published research (Ekman and Friesen 1986; Ekman and Heider 1988; Rosenberg et al. 1998; Ekman 2003); emotion dictionaries (Levenson 2005) as well as professional FACS/emotion coders, found no precise specification and consensus as to the action units involved in contempt expressions, including whether the relevant action units (AU 12, AU 14) are always expressed unilaterally and/or bilaterally.

The final stimulus set was chosen based on (a) emotion representativeness (using the emotion rules above), (b) clarity (absence of other expression onset that could not be edited out, and visibility) and (c) confirmation by an expert in microexpressions (the second author). Note that the absence of other emotion expression onset did not preclude the existence of other action units or head positions that remained before, during and after the microexpression. For example, one individual had a head tilt during the microexpression (see Fig. 1). Two stimulus examples were chosen from both male and female senders for each emotion.

Stimulus videos were then edited from the entire interview to show the full onset and offset of each expression (from evidence of the first action unit in the microexpression, until first evidence that the expression fades), resulting in stimulus clips that ranged from 1 to 3 s in length. The final stimulus set therefore contained 20 microexpression samples, with four examples (two male and two female) of each emotion expression, with an average duration of 12.7 frames (.4 s). Table 1 indicates the action units present at the peak of each microexpression stimulus.

The stimulus videos were presented using standard stimulus presentation software (MediaLab Inc.) and presented using a 5 (emotion: anger, fear, sadness, happiness and disgust) $\times$ 2 (presentation condition: neutral, microexpression) block randomization design. For every stimulus individual (4 stimulus individuals for each emotion), participants were presented either with the microexpression footage, or footage where the individual showed no emotion expression (neutral). In addition to providing baseline estimates of "neutral" emotion recognition, this design also had other advantages: (1) it prevented any one stimulus individual's microexpression from exerting disproportionate influence on the emotion perception of the other microexpressions in the set, (2) prevented any one stimulus individual from biasing the average accuracy obtained for each emotion category (e.g. in the case of more "easy" to judge individuals) and (3) prevented external cues from influencing the judgment and inflating accuracy (e.g. an individual deciding that because

Fig. 1 Example still images of natural microexpression stimuli, at the apex of the microexpression

Emotion	Female	Male
Anger		
Disgust		

they have already made several "fear" judgments, that they should choose another emotion in the subsequent stimulus, or deducing that an emotion that has not appeared yet is more likely). Recognition accuracy was therefore calculated as the proportion of times the participant endorsed the correct emotion, based on the number of times they were presented with that emotion.

Emotion judgment task

In response to each stimulus video, participants are asked to indicate "which, if any, emotion expression you see appear on the individual's face" using a modified, forced choice paradigm (Frank and Stennett 2001) which includes the five emotion expressions studied as well as the options *none of the above*, and *no emotion*. This response choice format has been shown to both replicate the general pattern of agreement in universal emotion expression judgment, but to also remove artifactual agreement for expressions that are novel and/or not recognized as readily (Frank and Stennett 2001). An overall accuracy score was computed by dividing the total number of correct judgments by the number of items (20). Mean accuracy ranged from 0 to .75, $M = .12$, $SD = .15$. Accuracies for each emotion category are sadness $M = .17$ $SD = .34$, anger $M = .11$, $SD = .25$, fear $M = .10$, $SD = .28$, happiness $M = .09$, $SD = .24$, disgust $M = .10$, $SD = .23$.

Microexpression test (METT)

Participants completed a 14-item microexpression recognition test, available as part of the Microexpression Training Tool (METT; Ekman 2003). The METT contains a standardized pretest for microexpression recognition featuring 2 items for 7 universal emotions (sadness, happiness, anger, contempt, disgust, fear and surprise) presented at speeds 1/15th of a second, with both a forward and backward neutral mask. Responses are indicated on an answer sheet using a forced choice set of the seven universal emotions (as listed above). Due to experimenter error, eight participants in the study did not complete the METT. Mean accuracy ranged from .21 to 1.0, $M = .70$, $SD = .16$. Individual accuracies for each emotion category are sadness $M = .66$ $SD = .32$, anger $M = .69$, $SD = .32$, fear $M = .71$, $SD = .37$, happiness $M = .89$, $SD = .22$, disgust $M = .59$, $SD = .38$.

Basic Empathy Scale (BES; Jolliffe and Farrington 2006)

After the experimental task, participants completed a 20-item scale designed to assess basic empathy levels, with questions assessing both cognitive empathy (e.g. *When someone is feeling 'down' I can usually understand how they feel;* and *I can usually realize quickly when a friend is angry.*) and affective empathy [e.g. *I tend to feel scared when I am with friends who are afraid*, and *Other people's feelings don't bother me at all* (reversed)]. Participants indicated their response on a 1–5 scale, where 1 = *strongly disagree*, and 5 = *strongly agree.* Scores were normally distributed, and the scale produced an overall $\alpha = .79$ (unless otherwise indicated, all reliability estimates are based on Cronbach's α); the subsections for the cognitive empathy factor $\alpha = .59$; and the affective empathy factor α = .76. See Table 2 for descriptive statistics and inter-correlations among trait measures.

General Emotion Dysregulation Measure (GEDM; Newhill et al. 2004, 2010)

The GEDM is 13-item scale measuring emotion dysregulation, i.e. the tendency to experience more prominent affective highs and lows. The scale measures three aspects of dysregulation: emotional sensitivity (e.g. *Other people tell me that I'm "too sensitive" or that I "overreact" to emotional issues*), a higher emotional response (e.g. *I often feel overwhelmed by my emotions)*, and a slow return to baseline (e.g. *When I get emotional about something, I have a hard time settling down*). Participants indicated their response on a 1–5 scale where 1 = *strongly disagree*, and 5 = *strongly agree*. Scores were normally distributed, overall scale α = .90; with the subscales for emotion sensitivity α = .76, emotional response α = .80, and slow return to baseline α = .80.

Procedure

Participants were greeted and told they will be participating in a study on "Judging others from brief video clips". All participants completed the study individually, on a computer in a private room and seated in front of the monitor. An introductory period explained the details of the study and gave individuals an example of a video and of the response set. The stimulus videos were presented using a block randomization—i.e. participants saw each sender only once, and the condition (i.e. whether they saw the microexpression or neutral expression stimulus clip) was randomly determined. The order in which senders appeared was also randomized. There was no sound accompanying the videos.

Participants then completed the empathy (BES) and emotion dysregulation (GEDM) scale (these two scales were presented in random order), the METT and demographics measures. This particular order was chosen so that participants would not receive emotion expression cues from the METT (a relatively easier and more recognizable test) that would influence their recognition for the natural microexpression set. Although no time limit was given for each emotion judgment (either during the natural microexpression set or the METT test), participants were encouraged to not spend too long on any one item. The experimented lasted 30 min. At the end of the experiments participants were debriefed and thanked.

Results

Data preparation and preliminary analyses

Although traits scores for the BES and GEDM were normally distributed, overall accuracy scores for the natural microexpression set were positively skewed (skewness = 1.56, kurtosis = 2.66), including accuracy scores for each emotion microexpression type (all Kolgorov–Smirnov *Zs* > 1.4, *ps* < .001). METT accuracy scores were negatively skewed. Figure 2 shows the frequency distributions of accuracy scores for both the METT and the natural microexpression set. See Table 3 for correlations between the METT and natural microexpression set for each emotion type.

As expected, accuracy in the METT (*M* = .70, *SD* = .16) was generally higher than accuracy in the natural microexpression set (*M* = .12, *SD* = .15), a finding consistent with previous research comparing recognition accuracy for standardized/posed versus spontaneous emotion expressions (Motley and Camden 1988). Given the violations of normality, and the danger of both Type I error rates and reduced power, accuracy scores were rank transformed using Rankit's formula (Bishara and Hittner 2012), and correlations between the trait scores and accuracy for the METT and the natural microexpression set are presented in Table 4.

Table 2 Descriptives and bivariate correlations among trait measures

		M	SD	2	3	4	5	6	7	8
1	Gender (M = 1, F = 2)			.17	.20	.15	.08	.38***	.09	.46***
2	General Emotion Dysregulation	2.98	.74		.88***	.93***	.86***	.36***	.14	.39***
3	Emotion sensitivity	2.93	.85			.70***	.66***	.42***	.10	.50***
4	Emotion response	3.16	.76				.72***	.33**	.17	.34**
5	Slow return to baseline	2.67	.91					.17	.08	.19
6	Empathy	3.81	.38						.70***	.90***
7	Cognitive empathy	4.00	.36							.34**
8	Affective empathy	3.64	.56							

N = 93. Correlations greater than .21 are significant at the $p < .05$ level

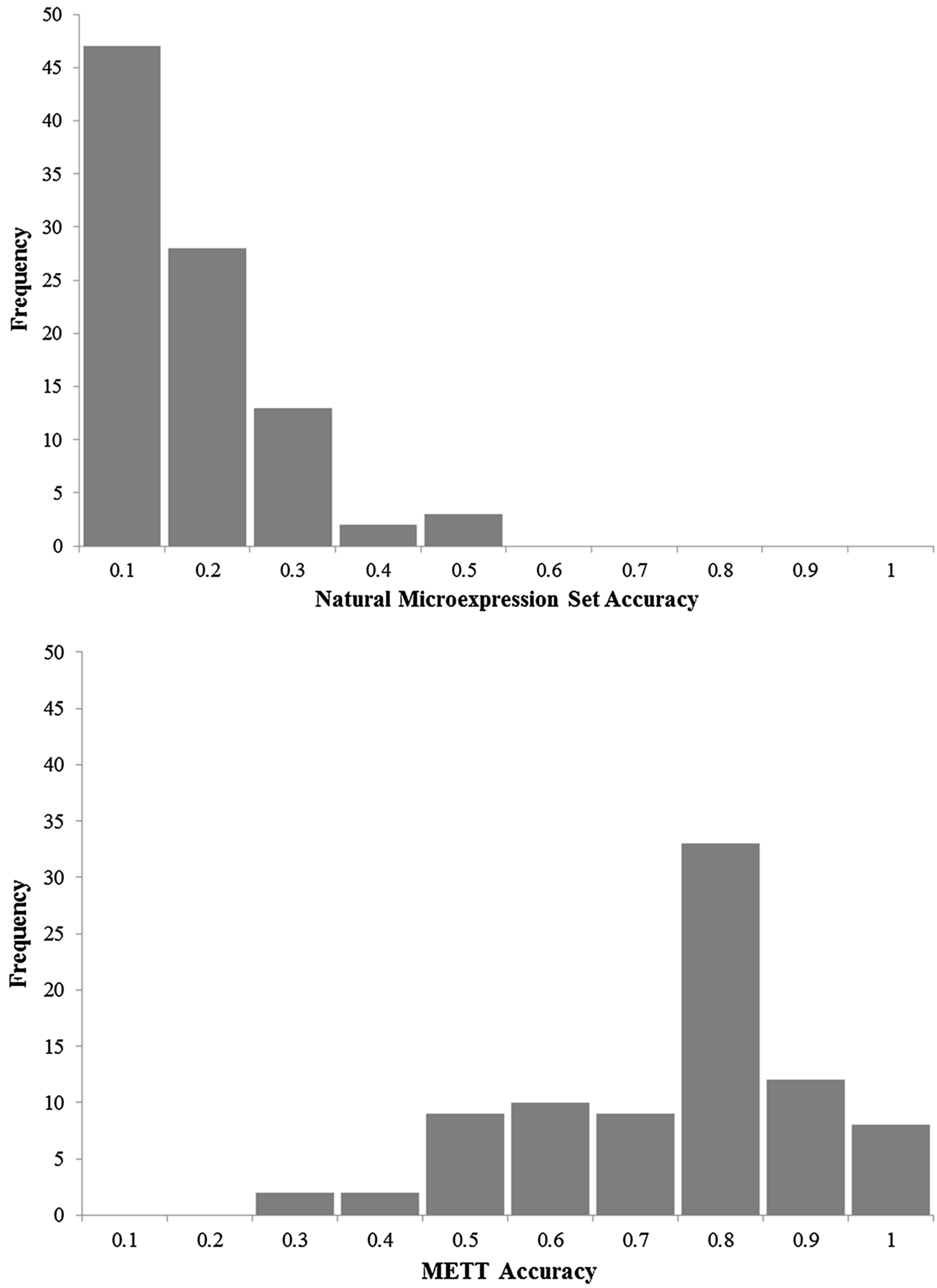


Fig. 2 Frequency histogram of overall recognition accuracy both in the standardized (METT) test and the natural microexpression set. N = 93 (natural microexpression set), N = 85 (METT)

Empathy and microexpression recognition accuracy

In general the association between empathy and overall microexpression accuracy was weak and nonsignificant, both for the standardized METT and the natural microexpression set. See Table 4 for correlation coefficients. Affective empathy was however significantly associated with recognizing anger microexpressions in the natural set $r(90) = .253$, $p = .015$, with no such association observed between empathy and METT anger microexpressions (Table 4).

An exploratory analysis of the other emotion types showed that empathy was not associated with accuracy in recognizing any other emotion types in the natural set, or recognition accuracy in other emotion types in the METT; all rs $< .15$, all ps $> .06$.

Emotion dysregulation and microexpression recognition accuracy

Emotion dysregulation was positively associated with accuracy in the METT $r(83) = .22$, $p = .039$, but not accuracy in the natural microexpression set $r(90) = .106$, ns. Moreover, emotion dysregulation was specifically associated with enhanced recognition of anger microexpressions in the METT $r(83) = .286$, $p = .008$. The correlation between emotion dysregulation and natural anger microexpressions was nonsignificant, $r(90) = .034$, ns.

Finally, neither emotion dysregulation nor basic empathy was associated with misclassifying neutral stimulus videos as having emotion expression present, all $ps > .3$.

Gender

Gender was not associated with emotion dysregulation but females did tend to score higher on basic empathy $r(91) = .38$, $p < .001$. When looking at affective and cognitive empathy separately, the relationship only held for affective empathy $r(91) = .46$, $p < .001$. See Table 2.

Overall, while there were no association between gender and METT accuracy, females tended to be more accurate than males in the natural microexpression task $r(90) = .294$, $p = .004$. When looking at separate emotion types, this gender effect in recognition accuracy was observed only for natural anger microexpressions, $r(89) = .329$, $p = .001$. See Table 4.

Table 3 Bivariate correlations between METT accuracy and natural microexpression set accuracy

	Natural Set					
	Overall	Anger	Disgust	Fear	Happy	Sad
METT						
Overall	.073					
(Reduced set)*	.105					
Anger		.148				
Disgust			−.060			
Fear				−.144		
Happy					−.196	
Sad						.311

* Reduced set represents overall accuracy in the METT using only the five emotion represented in the natural set

Cluster analyses

There was no evidence of a consistent association between accuracy in recognizing microexpressions in the METT versus the recognition of natural microexpression set. This was true of both recognition accuracy overall and the recognition accuracy of specific emotion microexpressions. In sum, naturally occurring microexpressions have a form that is different, and much less recognizable, than universal expressions of emotion presented at microexpression speed. We used cluster analyses therefore to both identify and classify individuals according to their recognition accuracy in both the METT and the natural microexpression task. Cluster analysis makes no assumptions about the distribution of the data but instead can identify groups or subtypes within a set of cases, based on their similarity across a states number of variables—in this case recognition accuracy in the METT and the natural microexpression set.

We utilized a two-step cluster analysis with a log-likelihood distance measure and Schwarz's Bayesian Criterion as the clustering criterion (i.e. we did not a priori specify the number of cluster to be formed). The analysis produced 3 natural clusters, with a good overall silhouette measure of cohesion and separation >.5, and the ratio of largest to smallest cluster <2. Group 1 (n = 25) exhibited low accuracy in both the standardized METT ($M = .53$,

Table 4 Bivariate correlations between trait and microexpression recognition accuracy (on rank transformed accuracy scores)

	Overall		Anger	
	METT accuracy (N = 85)	Natural ME set (N = 93)	Anger (METT)	Natural anger ME
Gender (M = 1, F = 2)	.174	.294	.106	.329
General Emotion Dysregulation	.224	.106	.286	.194
Emotion sensitivity	.195	.135	.245	.180
Emotion response	.223	.052	.249	.207
Slow return to baseline	.164	.117	.277	.108
Empathy	.105	.158	.118	.188
Cognitive empathy	−.083	.006	.018	−.014
Affective empathy	.187	.186	.119	.253

N ranges from 85 to 93. Correlations greater than .210 are significant at the $p = .05$ level

SD = .12) and the natural microexpression set (*M* = .05, *SD* = .07); Group 2 (n = 35) consisted of individuals that exhibited high METT accuracy (*M* = .80, *SD* = .07) but low accuracy in the natural microexpression set (*M* = .03, *SD* = .05); and Group 3 (n = 24) was characterized by both high METT accuracy (*M* = .75, *SD* = .13), and high accuracy in the natural microexpression set (*M* = .29, *SD* = .12). See Fig. 3 for mean accuracy of each group across both microexpression recognition tasks.

This analysis suggests that there are individuals who exhibit substantially higher accuracy in recognizing microexpressions, both in a standardized task and when presented with natural, spontaneous microexpression, and that they are distinct both from individuals who display low accuracy in recognizing microexpressions and those who exhibit good accuracy in a standardized task, but not when presented with natural, spontaneous stimuli.

Discussion

The present study showed that individual differences in empathy and emotion dysregulation among nonclinical populations are associated with differences in the recognition of microexpressions of emotion. Emotion dysregulation in particular was associated with enhanced ability to recognize emotion microexpressions, and particularly anger, supporting H3 and H4. More importantly, the present study was able to show that the sensitivity to subtle affective cues that accompany emotion dysregulation typically studied in clinical populations (Domes et al. 2008) may also apply to nonclinical populations. When comparing the standardized test and natural microexpression set recognition, the recognition advantage was only seen for standardized expressions, supporting both H5 and previous research findings (Roepke et al. 2012).

Finding that individual differences in emotion dysregulation are associated with increased recognition of brief emotion expression, and in particular anger microexpressions allows us to also see a potential pathway for how emotion dysregulation develops into interpersonal difficulties. For example the enhanced tendency to see even the smallest threat expressions in others (e.g. anger microexpressions) may be one pathway through which the individual experiences disproportionate emotional reactions that compromise the stability of their everyday relationships and interactions.

The association between empathy and microexpression recognition was much weaker, both for the standardized METT and the natural microexpression set. Empathy, and in particular affective empathy, was, however, associated with accuracy in recognizing natural anger microexpressions. This finding is consistent with previous research that shows affective empathy to play a greater role in the recognition of brief emotion expression presentations (Besel and Yuille 2010). The results of the present study suggest that when it comes to natural microexpression recognition, the ability to 'feel with' an individual may be a more important ability than 'knowing that' an individual feels a certain way. At the same time these findings must be interpreted with caution given that only one, self-report measure of empathy was used. Although self-report is the

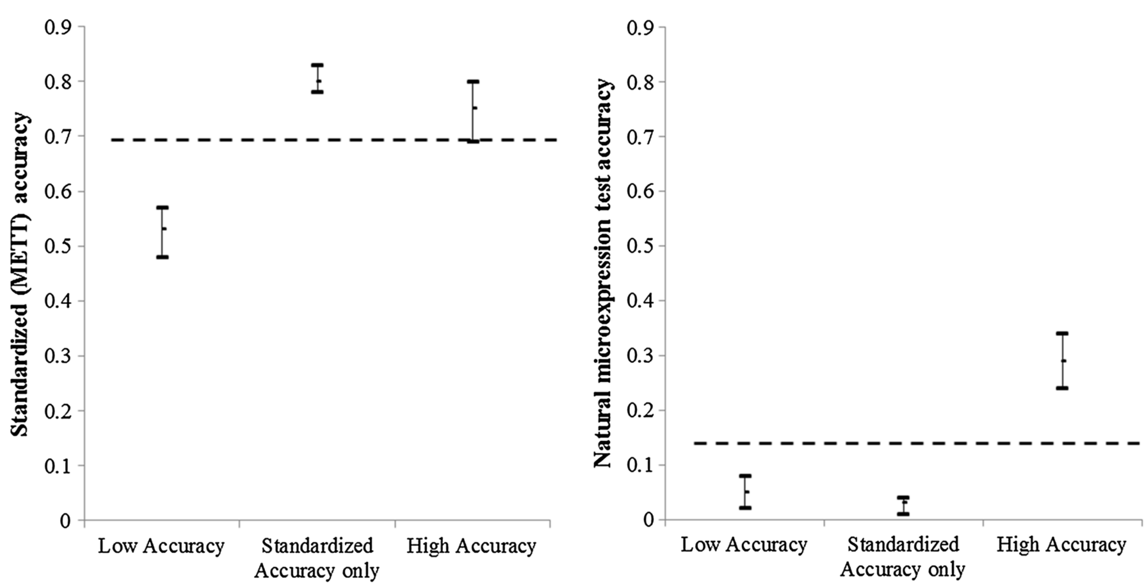


Fig. 3 Standardized (METT; *left*) and natural (*right*) microexpression recognition accuracy across the three identified groups. *Horizontal bars* represent 95 % CI of the mean. *Dashed lines* represent the average accuracy across the entire sample

standard approach to all trait measures of empathy (e.g. the David Interpersonal Reactivity Index 1983), it may not always be the case that individuals can provide an accurate and well calibrated indication of their actual empathic ability, and individuals may be particularly miscalibrated when understanding the extent to which they know how an individual feels. This in turn could underestimate the extent to which empathy is linked to microexpression recognition. Future research will be able to capitalize on the development not only of objective empathy tasks, but experimental interventions such as oxytocin administration (Bartz et al. 2010) that will better reveal any causal influence.

Similarly, the study design was such that the 'harder' task—the natural set of microexpressions—was given prior to self-report empathy as well as the easier task—the METT. Though no performance feedback was given, the subtlety in the natural microexpression task may have led participants to downscale their self-reported empathy. Though there is no a priori reason to suspect that this effect would influence the basic relationships observed, future research may observe how self-reported empathy is modulated by whether participant first complete a 'hard' or 'easy' emotion recognition task.

The study did not show an association between METT accuracy and recognition accuracy in the natural microexpression set. This may be because the natural microexpression set lacks validity, or the METT lacks ecological validity. While there is existing evidence that accuracy achievements in the METT may result in improvements in related but distinct tasks (such as deception detection) there is no evidence as yet that accuracy in the METT is related to recognition accuracy of natural emotion microexpressions. Indeed, existing research suggests that emotion microexpressions that occur in spontaneous communication are very subtle, never feature both the upper and lower parts of the face (Porter and ten Brinke 2008), and are thus quite distinct from the brief, high intensity and high consistency microexpressions represented by the METT. The large disparity in recognition accuracy found in the present study between the METT test and the natural microexpression set further supports this idea. Moreover, the METT is part of a microexpression recognition training system, such that training may modulate and enhance any association between METT accuracy and accuracy in recognizing natural microexpressions.

Similarly, in using a natural set of microexpressions it was not possible to exert perfect experimental control of the footage, including the timing, intensity and extraneous factors present during a spontaneous microexpression, such as the physical characteristics of the individual expresser (ethnicity, age etc.). This limitation adds noise to the experiment and makes underlying relationships more difficult to observe, although it does not invalidate the present findings.

Microexpression recognition and deception

Understanding the factors that result in enhanced microexpression recognition is of significant interest to deception researchers. Existing research suggests that, as indicators of concealed or suppressed affect, microexpressions are more common when individuals are lying, particularly in high stakes contexts where they must manage feelings of fear and distress during the lie (Ekman 2007; Porter and ten Brinke 2008). Existing research also suggests that there are individuals who are particularly adept at detecting deception, the so-called 'wizards' of deception detection (O'Sullivan and Ekman 2004). Though some hypotheses have been put forward as to the individual characteristics of these 'wizards' that underlie their enhanced deception detection ability (e.g. professional experience, or attention to nonverbal cues; O'Sullivan and Ekman 2004), there is no empirical research that examines specific and relevant psychological characteristics or traits.

However, rather that examining simple relationships between individual traits and deception detection ability, the present study adopts the approach that deception detection itself is not a unitary construct but likely to be composed of a number of related but distinct abilities and acuities. Accurate recognition of emotion microexpressions may be one important component to lie detection accuracy (Ekman and O'Sullivan 1991; Frank and Ekman 1997; Ekman et al. 1999), and the present study suggests that traits related to both the intrapersonal and interpersonal experience of emotion are related to ability to recognize and detect others' emotion microexpressions. The present study also shows that there are individuals who are more accurate at recognizing emotion microexpressions in both standardized presentations, but also when presented with natural, spontaneously produced microexpressions.

Future research will also be able to extend and replicate current research by establishing whether traits such as emotion dysregulation *indirectly* influence an individual's deception detection ability, especially when examining the subset of individuals that show higher recognition accuracy in both standardized and natural modalities. For example research suggests that individuals who have experienced childhood sexual abuse tend to also show a deception detection advantage, at present attributed to their ability to recognize concealed malice in seemingly benign verbal communications (Bugental et al. 2001). Given that individuals with BPD also tend to be overrepresented in samples of childhood abuse victims (Zanarini et al. 1997), these empirical findings allows us to formulate possible theoretical links between environmental experiences, their effects on emotion regulation and the perception of concealed, brief emotion, and any subsequent enhanced ability to detect the deceit of others.

Conclusion

In sum, the findings of the current study develop our understanding of the individual factors that may contribute to recognition of emotion microexpressions instances of concealed affect. The present research replicates and extends existing findings on traits that are associated with enhanced emotion expression recognition by providing evidence that affective empathy and emotion dysregulation are both related, in different ways, to enhanced recognition of emotion microexpressions, as observed with both spontaneous and standardized microexpression tasks. The findings will inform not only existing research in individual differences in emotion perception and social cognition, clinical research on how emotion dysregulation may manifest itself in every communication exchanges, but also provide the initial steps for understanding the skills that underlie enhanced deception detection ability, particularly in the nonverbal realm.

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