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Examining the Relationships between Empathy, Mood, and Facial Mimicry

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ABSTRACT  Facial mimicry is an automatic process that may occur as we see facial expression and respond congruently with a similar expression (van Baaren, Fockenberg, Holland, Janssen, & van Knippenberg, 2006). Empathy is the capacity to take on and understand another’s emotions (Hojat et al., 2002). While positive relationships between mimicry and empathy have been previously established, less is known regarding the interrelations among state affect, empathy, and facial mimicry. The present study examined these relationships in a single sample. While positive relationships were found between empathy and state affect, empathy and state affect did not have an effect on facial mimicry.

INTRODUCTION  Facial mimicry has been defined as an automatic process that may occur as we see a facial expression and respond congruently with a similar facial expression (Chartrand & Bargh, 1999). For example, Dimberg, Andréasson, and Thunberg (2011) found that observing facial expressions resulted in corresponding facial expressions in the viewer. Several perspectives propose that mimicking expressions allows individuals to recognize and, in turn, understand the feelings of those they are observing (Niedenthal, 2007). Given that facial expressions commonly serve a communicative function of signaling to others of how an individual is feeling, mood is a variable often investigated in relation to facial mimicry. If facial mimicry enables individuals to feel what the other person is feeling more effectively, then facial mimicry may potentially increase their empathy. Still, few studies have examined how mood affects empathic capacity. Moreover, no previous study has examined the relations between empathy, non-induced mood states, and facial mimicry with all being the primary variables of interest and in the same sample. Thus, the overarching goal of this study is to attempt to replicate and advance the previous findings regarding the relations among mood, mimicry, and empathy.

EMG and Facial Mimicry  Facial mimicry is considered to be a rapid-acting, automatic process (Chartrand & Bargh, 1999). For instance, exposure to happy and
angry expressions for 30 milliseconds resulted in respective Zygomaticus major and Corrugator supercillii activity, even though participants did not recall having seen the expression (Dimberg, Thunberg, & Elmebed, 2000). Furthermore, the facial muscle movements involved in mimicry may be weak and result in little visible change in the appearance of the face. Thus the majority of research on mimicry uses electromyography (EMG). Two target muscles have been of primary interest; the Corrugator supercillii and Zygomaticus major (e.g., Dimberg, Andréasson, & Thunberg, 2011). The facial expressions of most negative emotions (e.g., anger, disgust, and fear) consist of Corrugator supercillii muscle activation, while the Zygomaticus major muscle’s activity corresponds to the smiling associated with the emotion of joy.

MOOD AND MIMICRY

Previous research has examined relations between mood and mimicry. Van Baaren and colleagues (2006) found that individuals in a negative mood were less likely to mimic observed expressions. Utilizing electromyography, Likowski et al. (2011) found that individuals in a sad mood had little to no facial reactions in response to happy, angry, and sad faces. In contrast, individuals induced to feel happiness had more intense and congruent facial expressions (demonstrating facial mimicry) in response to happy, sad, and angry faces. Specifically, an increase in Zygomaticus major activity and decrease in Corrugator supercillii activity was observed when the happy participants were viewing the happy faces. When viewing the angry or sad faces, happy participants showed an increase in Corrugator supercillii activity and decrease in Zygomaticus activity (Likowski, et al., 2011).

EMPATHY AND MIMICRY

Facial mimicry is attributed to facilitating our ability to empathize with others (Hatfield, Cacioppo, & Rapson, 1994). The relation between facial responses and empathy was first investigated by Lipps (1907), who proposed a “shared affect perspective” through a mimicry-feedback mechanism. He claimed that facial mimicry facilitates the recognition of the emotion (Lipps, 1907). According to Lipps’ perspective, this process takes place as individuals experience emotions after making facial expressions congruent with that emotion. Thus when one automatically mimics the expression of another person, they are better able to understand what the other person is feeling.

An empirical examination of the relation between mimicry and emotional contagion was conducted by Hess and Blairy (2001), yielding results that demonstrated that observers experienced the observed emotional expressions only when the target was sad or happy, and not when they were afraid, angry, or surprised. Interestingly, facial mimicry still occurred when participants were viewing expressions of all emotions.

THEORETICAL UNDERPINNINGS OF THE MOOD-MIMICRY RELATIONSHIP

There are two theories posed to explain why individuals in sad moods have lower levels of facial mimicry (for review, see Likowski et al., 2011). The affect as information theory posits that an upset mood is indicative of a threat in the environment, which makes the individual act more deliberately and, in turn, suppress automatic processes like facial mimicry (Schwarz & Clore, 1996). Attention focus theory instead argues that when a person is in a sad mood they are more internally focused because they are trying to discern the cause of their emotional state, therefore making them less receptive to external stimuli (for discussion, see: Likowski et al., 2011). Accordingly, Reinholdt-Dunne (2013) found that depression is associated with less attention control. Because a negative mood is in some ways similar to having a minor episode of depression, one would expect
to see similar attention deficits in a person who reports feeling more negative affect.

THE PRESENT STUDY

The present study seeks to build on Likowski, Weyers, Pauli, and Seibt (2011) and corroborate the relationships between mood and empathy, empathy and facial mimicry, and mood and facial mimicry. The first hypothesis predicts that individuals who report higher levels of negative affect will have lower empathy scores and will mimic the happy, angry, and fearful facial expressions less. This prediction is based on the research of Likowski, Weyers, and colleagues (2011), which demonstrated that an induced negative affective state moderately diminished the capacity to empathize with others, which in turn was believed to reduce the automatic mimicry response to facial expressions. The second hypothesis states that higher positive moods will predict higher rates of empathy, thus associating with increased mimicry. This study could provide support for attention focus theory if individuals in a negative mood report lower empathy, and/or show reduced levels of mimicry, therefore demonstrating that they are potentially more internally focused.

METHODS

PARTICIPANTS

The sample included 19 students from a private university who are required to participate in research studies for their classes.

MEASURES

Toronto Empathy Questionnaire (TEQ). To measure empathic capacities, participants completed the 16-item Toronto Empathy Questionnaire (Spreng, McKinnon, Mar, & Levine, 2009). The questionnaire required participants to rate their responses to items on a scale of 0 (never) to 4 (always). Sample items include “When someone else is feeling excited, I tend to get excited too” and “I am not really interested in how other people feel.” The Toronto Empathy Questionnaire has shown an internal consistency of $\alpha = 0.87$ and high test-retest reliability ($r = 0.81, p < .001$) in a previous study (Spreng, McKinnon, Mar, & Levine, 2009). An average empathy score will be calculated for each participant.

Positive and Negative Affect Schedule (PANAS). The 20-item PANAS was used to measure participants’ current mood both before and after the study. The PANAS was chosen to measure affect to maintain consistency with Likowski et al. (2011). Participants rated the extent to which they were feeling emotions attributed to positive affect (i.e. alert, excited, and inspired) and negative affect (i.e. upset or nervous) on a scale of 1 (very slightly or not at all) to 5 (extremely) (Watson & Clark, 1994).

Picture mimicry task. To examine facial mimicry, participants completed a computerized picture identification task that was generated using E-Prime software. The pictures task was an adapted go-no-go task that contained a total of 18 blocks. In each block, participants viewed four faces for 800ms with a 1000ms crosshair (to serve as a proximal baseline) in between each face. In the first six blocks, participants were instructed to press the spacebar every time they saw a happy face. For the second set of six blocks, participants were told to press the spacebar when they saw the specified gender, being either a man or woman. These blocks consisted of four pictures again, except this time the models would show a single facial expression per block (i.e. all angry) and the blocks would either consist of three females and one male or three males and one female. In the last six blocks, participants were told to view the faces shown to them on the screen without pressing the spacebar. These blocks also consisted of three affective faces of one neutral face.

Facial affect stimuli. In the picture identification task, participants were shown pictures of faces that were retrieved from the FACES database (Ebner, Riediger, & Lindenberger, 2010). Twenty-four total photos
were used from eight different models (four men and four women), each making a happy, neutral, fearful, and angry facial expression.

Electromyography (EMG). EMG equipment was attached to participants in accordance with Fridlund and Cacioppo (1986). The first score indicated Zygomaticus major activity while viewing happy faces, the second indicated Corrugator supercillii activity while viewing fearful faces, and the third indicated Corrugator supercillii activity when viewing angry faces.

PROCEDURE

Upon arrival, participants signed a consent form notifying them of the study’s procedure. The EMG sensors were then attached and calibrated. Participants filled out the first PANAS and then completed the three mimicry tasks. Lastly, participants completed the second PANAS, the TEQ, and demographics form. The researchers then removed the EMG sensors.

RESULTS

Correlations were conducted to examine the relationships between mood and empathy. Significant positive relationships were found between empathy and the negative affect as measured by the first PANAS ($r = .49, p < .05$). Furthermore, empathy was positively related to the average of positive affect scores on the first PANAS ($r = .75, p < 0.01$).

To examine group differences in facial mimicry, a median split was carried out to distinguish high from low levels of empathy in our sample. An empathy score of 3.0 or lower characterized low empathy ($n = 9$) and a score of 3.1 and above was indicative of high empathy ($n = 10$). An independent samples test was run again with high and low empathy being the independent variables of interest. No significant differences were found for the Zygomaticus major activity in response to happy expressions between participants with low ($M = .37, SD = .95$) and high empathy ($M = .93, SD = 1.63$), $t(18) = 0.39, p = .39$. Similarly, no significant differences were found between participants with low ($M = .17, SD = .63$) and high empathy ($M = .89, SD = 1.83$) for Corrugator supercillii activity in response to the fearful expressions, $t(18) = 0.28, p = .28$. Lastly, no significant differences were found between participants with low ($M = .26, SD = .50$) and high empathy ($M = .95, SD = 1.90$) for Corrugator supercillii activity in response to angry expressions, $t(18) = 0.30, p = .30$.

Further t-tests were conducted to determine if facial mimicry depended on the mood of the participants. Unfortunately, there was not enough variance in the participants’ negative affect averages as scores only ranged from 1.0 to 1.9, so a median split was conducted on the positive affect average instead. An average of 2.9 or less indicated a less positive mood ($n = 9$) while those in a greater positive mood ($n = 10$) had a score of 3.0 and above. No significant differences were found for the Zygomaticus major activity in response to happy expressions between participants with low ($M = 0.86, SD = 1.28$) and high positive affect ($M = 0.49, SD = 1.45$), $t(18) = 0.63, p = .57$. Similarly no significant differences were found between participants with low ($M = 1.10, SD = 1.77$) and high positive affect ($M = 0.05, SD = 0.78$) for Corrugator supercillii activity in response to the fearful expressions $t(18) = 0.11, p = .11$. Lastly, no significant differences were found between participants with low ($M = 1.13, SD = 1.75$) and high positive affect ($M = 0.17, SD = 0.93$) for Corrugator supercillii activity in response to angry expressions, $t(18) = 0.57, p = .15$.

DISCUSSION

This study examined relationships among empathy, mood, and facial mimicry. Overall, some relationships were found between empathy and mood, but there were no significant relations between empathy and mimicry or mood and mimicry.

Before the median split was conducted, the positive correlation between negative affect and empathy indicated that the more negative an individual’s mood, the more empathic they became. This result fails to support our first hypothesis and thus the attention focus theory, which proposed that people in a negative mood are more internally focused on the source of their mood, making them less empathetic (for review see: Likowski et al., 2011). The hypothesis that higher positive affect predicts
higher levels of empathy was supported and remained consistent with past findings of a moderately significant relationship between positive affect and empathy (Likowski et al., 2011). The results did not support the hypotheses regarding the predicted relations between mood and mimicry and empathy and mimicry. The present lack of significant findings can potentially be attributed to the small sample size, as past studies have reported significant relationships between mood and mimicry as well as empathy and mimicry. Technical issues with the electromyography equipment prevented analysis of data for a significant number of participants, resulting in a small sample size.

Future examinations of mood, empathy, and mimicry should strive to utilize dynamic facial stimuli rather than static images, which may elicit higher rates of mimicry and add to the real-world applicability of the findings. Furthermore, the lack of variability in participants’ negative affect suggests that future examinations of the relations among mood, mimicry, and empathy may benefit from the use of mood inductions. Overall, this study furthered previous knowledge regarding the relations among empathy and mood, in that both positive and negative affect was associated with high rates of empathy.

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