The Journal of Mind and Behavior
Winter 2025, Volume 46, Number 1
Pages 367–377
ISSN 0271–0137

The Role of Emotion Regulation in Emotion Recognition Biases

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This investigation examines the association between difficulties in emotion regulation (ER) and biases in emotion recognition within a non-clinical cohort comprising 37 individuals. Employing the Difficulties in Emotion Regulation Scale (DERS) alongside the Karolinska Directed Emotional Faces (KDEF) test, the study evaluates the extent to which distinct ER impairments correspond with interpretative biases in recognising facial expressions. The analysis identified significant correlations: elevated disgust bias was associated with increased challenges in emotional control, while a pronounced neutral bias was markedly related to weaker overall ER abilities. In contrast, anger bias demonstrated a negative correlation with emotional awareness, indicating that individuals possessing heightened emotional insight tend to exhibit reduced recognition biases. These outcomes imply that ER difficulties influence both perceptual and cognitive mechanisms underpinning emotion recognition, even among non-clinical populations.

Keywords: Emotion Regulation; Mentalisation; Emotion Recognition; Recognition Biases

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Introduction

Mentalisation and Social Interaction

Mentalization denotes the capacity to comprehend and interpret one's own and others' mental states, including beliefs, desires, and emotions (Baron-Cohen et al., 1985; Luyten et al., 2020). This ability is fundamental to social functioning, as it allows individuals to anticipate and appropriately respond to others' behaviours (Jara-Ettinger, 2019). As a complex cognitive process, mentalization integrates several mental faculties such as empathy, social cognition, and executive functioning (Frith & Frith, 2005; Premack & Woodruff, 1978; Schurz et al., 2021). Deficits in mentalization have been linked to impairments in empathy, executive processes, and the quality of interpersonal relationships (Decety & Jackson, 2004; Perner & Lang, 2000; Premack & Premack, 1995; Repacholi & Slaughter, 2004). The present study investigates mentalization through the lens of first-order inferences, concentrating on the immediate judgments individuals form regarding others' mental states based on observable indicators (Hudson et al., 2018; Sabbagh, 2004). Emotion recognition, measured via the KDEF test, serves as a practical and quantifiable proxy for mentalization proficiency. By requiring participants to label facial expressions, the study assesses both the accuracy of emotion recognition and any inherent biases affecting task performance. The standardised nature of the KDEF ensures uniformity across responses, facilitating the detection of systematic trends and deviations in emotion recognition.

Emotion Regulation and Mentalisation

ER involves the dynamic, context-dependent modulation of emotional experiences, including the monitoring, evaluation, and adjustment of emotional responses (Cole et al., 1994; Thompson, 1991). Effective ER is vital for adaptive psychological functioning, whereas difficulties in ER have been associated with numerous forms of psychopathology, including depression, anxiety, post-traumatic stress disorder (PTSD), and substance use disorders (Aldao et al., 2010; Berking et al., 2011; Cisler et al., 2010). A growing body of literature highlights a strong interrelation between mentalization and ER, with both clinical (Vahidi et al., 2021) and non-clinical (Schwarzer et al., 2021) research demonstrating clear associations between ER and various mentalization capacities. This study utilises the DERS to assess multiple dimensions of emotion dysregulation, including reduced emotional awareness, impaired impulse control, and challenges in implementing effective regulation strategies. These facets offer valuable insight into how specific ER difficulties may influence the perception and recognition of emotional expressions. The research specifically explores

the relationship between emotion recognition biases and particular ER challenges, aiming to detect patterns that could inform psychological evaluation and therapeutic approaches. By analysing the associations between ER difficulties and emotion recognition biases, this study seeks to enhance understanding of the cognitive and perceptual processes that underpin the interplay between emotional perception and regulation. The findings may inform the refinement of interventions aimed at improving both mentalization and ER, potentially benefitting clinical and non-clinical populations alike.

Materials and Methods

Procedure

Data were obtained from two distinct experimental sessions, comprising a combined total of 37 participants (31 female), all recruited via digital media platforms. The majority of participants were university students, with ages ranging from 19 to 43 years (Mean = 23.37, SD = 4.71). Prior to participation, individuals received comprehensive information regarding the study and provided written informed consent. The research protocol complied with Argentina's Personal Data Protection Law Nº 25.326 and conformed to the ethical principles set forth in the Declaration of Helsinki (2004), the Universal Declaration on Bioethics and Human Rights (Unesco., 2005), and the International Guidelines for Biomedical Research Involving Human Subjects (Sciences, 2002). Following consent, participants completed a sociodemographic questionnaire and the DERS. They were then instructed to perform an emotion recognition task using the KDEF in a controlled setting. Participant responses were recorded for subsequent analysis.

Test Description DERS

The DERS (Gratz & Roemer, 2004) was used to assess emotion regulation deficits. The Spanish version by (Hervás & Jódar, 2008) includes 28 items rated on a 5-point Likert scale (1 = almost never, 5 = almost always), with higher scores indicating greater difficulties in emotion regulation. It consists of five subscales: Emotional Awareness, Emotional Control, Emotional Clarity, Non-Acceptance of Negative Emotions, and Inability to Engage in Goal-Directed Behaviour When Distressed.

Task Description KDEF

The KDEF (Lundqvist et al., 1998) was employed as the emotion recognition test. The original KDEF database comprises 490 JPEG images (72 x 72 dots per inch) depicting 70 individuals (35 female and 35 male),

each displaying seven distinct emotional expressions: fear, anger, disgust, happiness, neutrality, sadness, and surprise. For the purposes of this study, a subset of 28 images was selected, evenly divided between female (14) and male (14) faces. These images covered all primary emotional categories: disgust (4 images), fear (5 images), joy (4 images), sadness (4 images), anger (3 images), surprise (4 images), and neutral (4 images). The selected images were randomly ordered a single time to create the Google Forms questionnaire administered during the experiment.

Results

Emotion Recognition Biases

Two chi-square goodness-of-fit tests were conducted to evaluate potential biases in the selection of facial emotional expressions. The first analysis compared the observed frequencies against the expected distribution across specific emotional categories—namely, disgust, fear, joy, sadness, anger, surprise, and neutral. The results indicated significant deviations from the expected proportions, $\chi^2(6) = 137$, $p < .001$, thereby suggesting systematic biases in the selection of certain emotions. Specifically, the emotions of fear and sadness were notably underrepresented, whereas surprise and disgust appeared more frequently than anticipated (refer to Table 1).

Table 1

Proportions of Specific Emotions

Proportions - Emotion			
Level		Count	Proportion
Neutral	Observed	164	0.1583
	Expected	148	0.143
Disgust	Observed	182	0.1757
	Expected	185	0.179
Fear	Observed	78	0.0753
	Expected	148	0.143
Happiness	Observed	145	0.1400
	Expected	148	0.143
Sadness	Observed	102	0.0985
	Expected	111	0.107
Anger	Observed	134	0.1293

	Expected	148	0.143
Surprise	Observed	231	0.2230
	Expected	148	0.143

The second test assessed selection patterns at the level of broader emotional groupings, comprising negative, positive, and neutral emotions. This analysis similarly revealed significant discrepancies, $\chi^2(2) = 38.9$, $p < .001$, indicating the presence of selection biases across these broader categories. Negative emotions were chosen less often than expected, while both positive and neutral emotions were overrepresented (refer to Table 2).

Table 2

Proportions of Broader Emotion Categories

Proportions - Emotion Type			
Level		Count	Proportion
Negative	Observed	496	0.479
	Expected	592	0.571
Positive	Observed	376	0.363
	Expected	296	0.286
Neutral	Observed	164	0.158
	Expected	148	0.143

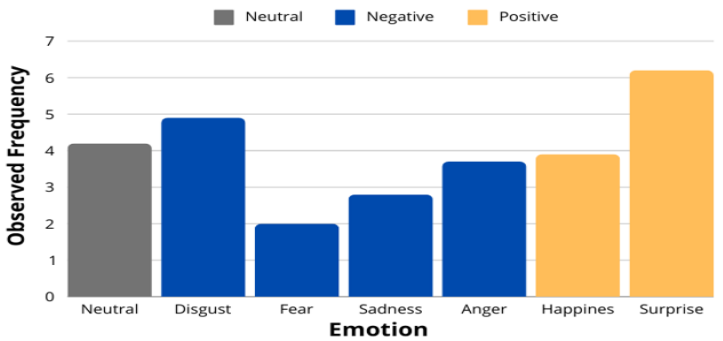

Figure 1: Observed Frequency of Every Emotion

Distribution of Emotional Biases

To examine emotional biases, the analysis focused on the distribution of misclassified emotional expressions and the corresponding percentage

of correct identifications. The results indicated that sadness, anger, surprise, and neutral expressions were most frequently misperceived as fear. In contrast, fear and disgust were commonly mistaken for sadness, while happiness was often confused with neutrality. These patterns of misclassification corresponded with varying levels of recognition accuracy. Specifically, happiness and neutral expressions yielded the highest accuracy rates at 99% and 84%, respectively. Conversely, emotions such as disgust, fear, surprise, sadness, and anger exhibited lower recognition accuracy, with correct response rates ranging between 75% and 64%.

Correlation Between Biases and DERS Measures

An initial analysis of the total scores on the DERS was conducted for the 37 participants. The sample yielded a mean score of M = 57.2 (SD = 19.8). Notably, both the mean and standard deviation were lower than the normative values reported by (Villarrubia et al., 2024), indicating that the sample represents a non-pathological population. Spearman's rank-order correlation tests were conducted to explore the relationship between emotion regulation difficulties and specific emotional biases, examining associations between emotional biases and both the DERS total scores and its subscale scores. A significant positive correlation emerged between the disgust bias and the overall DERS score ($r = 0.335$, $p = 0.043$), suggesting that increased bias towards disgust is associated with heightened difficulties in emotion regulation. Furthermore, disgust bias exhibited a significant positive correlation with the Emotional Control subscale ($r = 0.407$, $p = 0.012$), indicating that individuals with a pronounced disgust bias may face greater challenges in emotional self-regulation.

Similarly, neutral bias showed a strong positive correlation with the Emotional Control subscale ($r = 0.475$, $p = 0.003$), highlighting that a tendency to misclassify emotions as neutral is linked to more severe impairments in emotional regulation. Conversely, the happiness bias was negatively correlated with the Emotional Clarity subscale ($r = -0.276$, $p = 0.099$), implying that a stronger bias towards happiness may correspond with diminished emotional clarity, although this association did not reach conventional levels of statistical significance. Lastly, anger bias demonstrated a significant negative correlation with the Emotional Awareness subscale ($r = -0.353$, $p = 0.032$), indicating that individuals exhibiting a stronger anger bias tend to experience fewer difficulties in recognising and understanding their own emotional states.

Discussion

The findings indicate that participants across both experimental conditions performed comparably on the KDEF task, with no significant

differences observed in terms of accuracy or other performance metrics. This consistency implies that performance outcomes were not influenced by the contextual factors of the preceding tasks, thereby suggesting that alternative variables may have shaped the observed results. This study examined the association between emotion recognition biases and difficulties in emotion regulation, with a particular focus on how impairments in emotion regulation, as measured by the DERS, may account for systematic biases in interpreting facial expressions. The results support the hypothesis that emotion regulation difficulties significantly influence patterns of emotion recognition and associated perceptual biases. These findings align with prior research establishing a link between emotional dysregulation and altered emotional processing mechanisms (In-Albon et al., 2013; Megreya & Latzman, 2020).

Overall, participants displayed a lower accuracy rate in identifying negative emotions relative to positive and neutral ones. This may reflect an underlying bias favouring less threatening interpretations of emotional stimuli. Happiness emerged as the most accurately identified emotion, whereas fear was the most frequently misclassified, consistent with findings from previous literature (Calder et al., 2003; Smith & Schyns, 2009; Tracy & Robins, 2008). The confusion between fear and surprise may be explained by the perceptual-attentional limitation hypothesis (Camras, 1980; Ekman, 1993; Gosselin & Simard, 1999; Roy-Charland et al., 2014; Roy-Charland et al., 2015), which posits that certain facial expressions are more difficult to differentiate due to shared visual features. This overlap is particularly relevant in the context of Action Units (AUs), which are distinct facial muscle movements associated with specific emotions (Ekman & Friesen, 1978; Ekman et al., 1976).

The correlation analyses uncovered intricate relationships between specific emotion recognition biases and the subscales of the DERS. Notably, biases towards disgust and neutral expressions were positively associated with challenges in emotional control, suggesting that individuals with poorer emotional regulation abilities may be prone to misinterpreting ambiguous facial cues as emotionally neutral or less intense. In contrast, a negative correlation was found between anger bias and emotional awareness, indicating that individuals who are more attuned to their emotions tend to show less bias when recognising anger. It is important to note that these findings were obtained from a non-clinical sample characterised by relatively low levels of emotional regulation difficulties. This nuance implies that even within general populations, subtle connections between emotional regulation abilities and emotion recognition biases can still be detected. These results are consistent with research on psychopathological conditions, such as depression (Anderson et al., 2011), anorexia nervosa (Harrison et al.,

2009; Harrison et al., 2010), and borderline personality disorder (Domes et al., 2009), where altered emotional processing and biases in facial emotion recognition are similarly influenced by emotional states.

The ability to accurately interpret facial expressions is essential for effective social interaction and could help explain some of the challenges faced by individuals with the disorders mentioned above. This finding is particularly significant as it underscores the potential of future research to investigate whether emotional regulation therapies can induce meaningful improvements in emotion recognition processes. By identifying shared features across these conditions, such as the pivotal role of emotional regulation, we can gain a deeper understanding of the underlying mechanisms driving difficulties in emotion recognition. Early interventions in emotional regulation and emotion recognition training could benefit the general population, particularly in settings like schools or kindergartens. Developing these skills from a young age may improve social competencies and emotional perception, helping children navigate complex emotions in social contexts. Future research could be enhanced by expanding the sample size and ensuring gender balance to increase generalisability. Simplifying stimulus presentation by removing background elements and focusing on facial expressions (Montagne et al., 2005; Yang et al., 2022) would better isolate biases in recognition accuracy. Time constraints on responses might also reveal how biases affect quick versus deliberate judgments. In conclusion, these findings offer valuable insights into the relationship between emotional regulation difficulties and emotion recognition biases. They highlight how even subtle regulation challenges in non-clinical populations influence perceptual and cognitive biases.

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