Emotion regulation and emotional information processing: The moderating effect of emotional awareness

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ABSTRACT

The aim of this study was to examine the moderating role of emotional awareness in the relationship between emotion regulation strategies and emotional information processing. A total of 120 female students regulated emotions while watching an unpleasant film. Before and after emotion induction, participants completed a set of tasks that required matching facial expressions. The results demonstrated that participants who were high in emotional awareness showed a significantly smaller increase in error responses (i.e., incorrect matches) than participants who were low in emotional awareness. However, this effect was observed only in suppression (i.e., inhibition of an emotionally expressive behavior), masking (i.e., emotion experienced with a happy expression) and control (i.e., no regulation) conditions. Among reappraisers, who were instructed to adopt a neutral attitude toward the film, regardless of whether they were high or low in emotional awareness, there was not a significant increase in error responses. This study shows that the potentially damaging impact of negative emotions on the processing of emotional information can be prevented by a high emotional awareness or with the implementation of reappraisal as an emotion regulation strategy.

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1. Introduction

Emotion regulation (ER) refers to the process by which we influence what emotions we experience, when we experience them, and how we express them (Gross, 1998). In his model, Gross (1998) distinguishes two major classes of ER strategies that occur in the emotion-generating processes. Antecedent-focused ER acts early in the emotion generation process (i.e., before the emotion response tendencies become fully activated and have changed behavioral and peripheral physiological responding). Response-focused ER refers to regulatory processes that occur after an emotion has been generated and involves emotion modification once an emotion has been elicited and once response tendencies have been fully activated. Two ER strategies have been widely studied in recent years: Expressive suppression and cognitive reappraisal (Gross, 2002). Reappraisal is a cognitive ER strategy that involves changing the way one thinks about a potential emotion-eliciting situation to reduce its emotional impact. Suppression is a behavioral ER strategy that aims to inhibit ongoing emotionally expressive behaviors. These strategies have different consequences. Reappraisal leads to a decrease in both expressive behavior and the experience of negative emotion whereas suppression leads to a decrease in behavioral responses, yet it fails to decrease the emotional experience. There is also evidence that suppression increases physiological responding and that it impairs cognitive functioning whereas reappraisal does not have such an effect (Gross, 2002).

With previous research concentrated mainly on the consequences of using ER strategies, there has been relatively little investigation into the role of individual differences that may influence ER outcomes. The concept of emotional awareness (EA), introduced by Lane and Schwartz (1987), provides a promising outline of this idea.

Lane and Schwartz (1987) define EA as the ability to identify and describe one's own emotions and other people's emotions. According to their model regarding the cognitive-developmental levels of EA, EA is a cognitive skill that undergoes a process, which is structurally parallel to Piaget's stages of cognitive development. The five levels of EA are hierarchically arranged in the following manner: bodily sensations, action tendencies, single emotions, blends of emotions, and combinations of blends of emotional experiences (see Lane & Schwartz, 1987, for a comprehensive description). According to Lane and Schwartz, the degree of differentiation and integration within the structural organization of EA is reflected through verbal descriptions of emotional experiences. Lane, Quinlan, Schwartz, Walker, and Zeitlin (1990) developed the Levels of Emotional Awareness Scale (LEAS) to measure individual differences in the differentiation in the use of emotional words while describing one's own emotional experiences and the emotional experience of others. This instrument is scored from an analysis of an individual's verbal descriptions of emotions, which are provided in response to short scenarios depicting emotion-eliciting situations.

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High scores on the LEAS, which indicate greater EA, have been associated with greater self-reported impulse control (Lane & Pollermann, 2002). Lane and colleagues (1998) observed a positive relationship between LEAS scores and increased activity in the dorsal anterior cingulate cortex (dACC) during emotional stimuli processing. Dorsal ACC is recognized as crucial for the cognitive control of emotion (Medford & Critchley, 2010). These results suggest that individuals higher in EA recruit more dACC activity during emotional stimuli processing, which possibly optimizes their behavior in response to emotional stimuli.

The aim of the present study was to examine whether EA moderates the effects of ER processes. We designed an experiment in which a film that activated intense aversive emotion (i.e., disgust) was presented to participants who were allocated to one of four groups differing in ER strategy: reappraisal, suppression, masking (i.e., expressing positive emotions regardless of real feelings), and control (i.e., no regulation). We included the masking condition in an attempt to broaden the knowledge about the consequences of response-focused regulation. Thus far research has focused mainly on suppression, however, many a time people want to not only suppress an emotion but also cover felt negative emotions with a happy expression (Ekman & Friesen, 2003). To measure emotional information processing (EIP), a set of 12 tasks, which involved matching the facial expressions of emotions, was created (i.e., the Facial Expressions Matching Test, FEMT). The level of performance on these tasks (i.e., the number of errors) was measured before emotion induction (i.e., six tasks, FEMT1) and after emotion induction (i.e., six tasks, FEMT2).

On the basis of previous results showing that negative affective states impair the ability to decode facial expressions of emotion (Chepenik, Cornew, & Farah, 2007; Schröder, 1995), we assumed that emotion induction would lead to poorer EIP. Prior to the experiment, we conducted a pilot study. A total of 24 female students (mean age = 24.17 years): completed the FEMT1, viewed a film inducing disgust while instructed to allow their emotions to arise, and they completed the FEMT2. The percentage of error responses in the FEMT2 was higher than in the FEMT1 ($M = 41.25$, $SD = 18.09$, $M = 29.17$, $SD = 18.01$, respectively), $t(40) = 3.24$, $p < .001$, Cohen's $d = .53$. There was not a significant difference between mean times needed to perform the task [FEMT1 = 5.71 s. (2.51), FEMT2 = 5.55 s. (2.29), $t < 1$]. These results confirmed our assumption that intense emotion leads to poorer EIP. To rule out other explanations of performance deterioration (e.g., boredom or tiredness) we conducted a follow-up study in which we asked 32 female students (mean age = 23.12 years) to complete the FEMT1, view a neutral film and complete the FEMT2. There was no significant deterioration in the performance (FEMT1: $M = 26.37$, $SD = 14.58$; FEMT2: $M = 29.31$, $SD = 16.25$; $t < 1$). The results of the pilot study are consistent with previous research showing that intense negative affective states reduce available attentional resources for performing prospective tasks (Eysenck & Derakshan, 2011). The next question is: Can ER prevent this unfavorable impact of negative emotions on emotional processing? Previous research shows that reappraisal increases activation in the dACC (Miller & Cohen, 2001) and diminishes self-reported negative affect (Gross, 1998), physiological responding to emotion-triggering events (Gross, 2002), and amygdala activity (Gross, 2002), which plays a crucial role in encoding emotional stimuli. Accordingly, one can assume that negative emotion is lessened by reappraisal and presumably interferes less with the attentional resources needed for performing incoming tasks (Baumeister, Heatherton, & Tice, 1994). Therefore, we hypothesize that reappraisers would demonstrate a smaller increase in error responses than participants in the other three conditions (*Hypothesis* 1).

The ability to represent emotion in a differentiated and complex way has been cited as pivotal for effective and adaptive coping with emotions and is a necessary prerequisite for executing

regulatory processes (Lindquist & Barrett, 2008). Thus, we assume that EA provides compensatory resources that prevent the deterioration of emotional processing that is caused by negative affect. We predict that individuals high in EA will show a smaller increase in FEMT error responses, as measured by a difference score calculated from the error responses in the FEMT2 and FEMT1, than individuals low in EA. However, we expect an interaction effect, in that the beneficial effects of EA will be observed particularly in the control, suppression, and masking conditions (*Hypothesis* 2). Because of gender differences in EA (Ciarrochi, Caputi, & Mayer, 2003) only women were recruited for this study.

2. Method

2.1. Participants

A total of 120 female students participated in this study, 30 in each condition (mean age = 19.75 years).

2.2. Materials

2.2.1. Emotion induction

To induce emotion, we selected a disgust-eliciting film [i.e., *Amputation* (1' 02")] from a set of standardized film stimuli (Rottenberg, Ray, & Gross, 2007). This stimulus has been used in previous ER research (Gross, 1998).

2.2.2. The FEMT

The FEMT is a computer-based test that consists of 12 tasks. In each task, four facial expressions each portrayed by a different individual (i.e., four different individuals), depicting negative emotions were presented simultaneously on a computer screen: one at the top and three at the bottom of the screen. The faces at the bottom of the screen expressed three different emotions while the face at the top of the screen expressed the same emotion as one of the three faces presented below. The task involved matching the facial expression displayed at the top with the one at the bottom that displayed the same emotion. Participants indicated their choice by pressing one of three buttons. The stimuli for the FEMT (i.e., expressions of anger, sadness, disgust, and fear) were selected from the Ekman and Friesen (1976) series[1]. The presentation of the next task was triggered by a participant's response to the previous task, so there was no time pressure. The FEMT tasks were divided into two 6-task-sets (i.e., FEMT1/FEMT2), which allowed us to have a pre/post emotion induction design. To design the FEMT we asked 74 undergraduates (88% were female, mean age = 20.10 years) to perform an initial set of 24 tasks. We averaged participants' correct responses to each task in order to examine the level of task difficulty. For the pilot and the main study we selected a set of 12 tasks with a difficulty level of 38–73%, $\alpha = .63$. Both in the pilot and the main study the selection of 12 tasks in each FEMT was randomized and counterbalanced for each participant – this controlled the measurement error (see Novick, 1966).

2.2.3. The LEAS

The LEAS consists of 20 emotionally suggestive scenarios, each involving two people. Each scenario is followed by the following two questions: "How would you feel?" and "How would the other person feel?" Participants were asked to write their responses to both questions. Responses were scored using criteria that were based on the cognitive-developmental levels of the EA model (Lane & Schwartz, 1987), with higher scores related to higher developmental levels (for a comprehensive description of the scoring

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[1] Ekman's codes of faces used in this experiment are available from the first author on request.