Ben-Gurion University of the Negev
Faculty of Humanities and Social Sciences
Department of psychology

Emotion Regulation and Affect Labeling

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF ARTS DEGREE (M.A)

Submitted by: Kami Taler
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August 2020

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THE FACULTY OF HUMANITIES AND SOCIAL SCIENCES
DEPARTMENT OF PSYCHOLOGY

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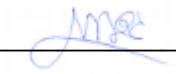
Signature of supervisor:  Date: 12/8/2020

Signature of chairperson of the M.A. committee: _____ Date: _____

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אוניברסיטת בן גוריון בנגב

הפקולטה למדעי הרוח והחברה

המחלקה לפסיכולוגיה

ויסות רגשי ושיום רגשות

חיבור זה מהווה חלק מהדרישות לקבלת התואר "מוסמך למדעי הרוח והחברה" (MA)

מאת: קמי טלר

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בהנחיית: ד"ר גדעון אנהולט

אוגוסט 2020

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Abstract

Emotion regulation refers to the way people control their emotions: how they identify which emotions they experience and the way they experience and express these emotions.

Emotion regulation is essential for mental health, and difficulties in using adaptive forms of emotion regulation are related to various mental disorders. Importantly, various strategies of emotion regulation are implemented in different stages of the emotional process.

The current work aimed at investigating the relationship between emotion recognition processes and reappraisal and examining whether consequent to forced affect labeling (AL), participants will show a higher tendency to use reappraisal over distraction in response to high valenced stimuli. Furthermore, we aimed at testing whether the effectiveness of reappraisal conducted subsequent to AL will be superior. Finally, we wanted to assess whether alexithymia, which involves difficulty in AL will mediate effects.

106 undergraduate students from Ben-Gurion University of the Negev participated in the study for a small monetary compensation. They were randomly assigned to one of two groups – forced AL and control. In both groups, the participants were trained in performing distraction and reappraisal. In the experimental group, subjects were asked to label the emotion that arose in them when looking at images of varying emotions and emotional intensity, before choosing to use one of the two emotion regulation strategies in which they were trained.

In accordance with our central hypothesis, consequent to forced AL, participants showed a higher tendency to use reappraisal over distraction in response to high valenced stimuli.

However, paradoxically, effectiveness of reappraisal conducted subsequent to AL was reduced. AL increased the subjective rating of the stimulus intensity, perhaps due to increased emotional engagement with the presented stimuli.

Also, the level of alexithymia was a moderating factor for the proportion of choice, but did not affect the degree of effectiveness of the manipulation.

Finally, results replicated earlier findings concerning an increase in the choice of distraction in response to stimuli evoking greater emotional intensity in both groups.

In conclusion, our results support the suggestion that there is a relationship between emotion recognition and reappraisal. This conclusion has significant implications in both the clinical and research domains.

תקציר

ויסות רגשי הוא מונח המתייחס לדרך בה אנשים שולטים ברגשות שלהם: כיצד הם מזהים איזה רגש הם חווים וכיצד הם חווים ומביעים את רגשותיהם.

ויסות רגשי הוא חיוני לבריאות נפשית וקשיים בשימוש אדפטיבי בטכניקות לויסות רגשי קשורים למגוון הפרעות נפשיות. חשוב מכך, אסטרטגיות שונות של ויסות רגשות מיושמות בשלבים שונים של התהליך הרגשי.

העבודה הנוכחית נועדה לבחון את הקשר בין תהליכי זיהוי רגשי לבין הערכה מחדש. בעיקר רצינו לבחון האם כתוצאה משיום כפוי, המשתתפים יראו נטייה גבוהה יותר להערכה מחדש לעומת הסחת דעת בתגובה לגירויים המעוררים עוצמה רגשית גבוהה. יתר על כן, כיוונו לבדוק האם היעילות של הערכה מחדש שנערכה בעקבות שיום תהיה גבוהה יותר. לבסוף, רצינו להעריך האם אלקסיתימיה, הכרוכה בקושי בשיום רגשות, תתווך את האפקטים שתוארו לעיל.

106 סטודנטים לתואר ראשון מאוניברסיטת בן גוריון בנגב השתתפו במחקר תמורת סכום כספי סמלי. הם הוקצו רנדומלית לאחת משתי קבוצות הניסוי – שיום כפוי וביקורת. בשתי הקבוצות, המשתתפים אומנו בביצוע הסחת דעת והערכה מחדש. בקבוצת הניסוי, הנבדקים התבקשו לשיים את הרגש שעלה בהם כשהסתכלו על תמונות המיועדות לעורר רגשות שונים בעוצמות שונות, טרם בחירת אחת משתי אסטרטגיות הויסות הרגשי בהן אומנו.

בהתאם להשערת המחקר המרכזית שלנו, בעקבות שיום כפוי, משתתפים הראו נטייה גדולה יותר להשתמש בהערכה מחדש ופחות בהסחת דעת, בתגובה לגירויים המעוררים עוצמה רגשית גבוהה.

יחד עם זאת, באופן פרדוקסלי, היעילות של הערכה מחדש שבוצעה לאחר שיום כפוי הייתה נמוכה יותר. השיום העלה את הדירוג הסובייקטיבי של עוצמת הגירוי, אולי כתוצאה מעלייה במעורבות הרגשית של המשתתפים אל מול אותם גירויים שהוצגו לפניהם.

כמו כן, רמת האלקסיתימיה היוותה גורם ממתן עבור פרופורציית הבחירה של הנבדקים בהערכה מחדש לעומת הסחת דעת, אך לא השפיעה על רמת האפקטיביות של המניפולציה.

לבסוף, התוצאות שחזרו ממצאי מחקרים קודמים והראו כי אל מול גירויים בעוצמה רגשית גבוהה, נבדקים נטו יותר לבחור בהסחת דעת על פני הערכה מחדש, בשתי הקבוצות.

לסיכום, תוצאות המחקר תומכות בהשערה שישנו קשר בין זיהוי רגשי להערכה מחדש. מסקנה זו הינה בעלת השלכות משמעותיות על השדה הטיפולי, כמו גם על השדה המחקרי.

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תוכן עניינים

Introduction

Emotions are important and basic in human experience, and are comprised of different components, such as subjective feelings, cognitive appraisal, physiological response and action tendencies (Kleinginna & Kleinginna, 1981). Emotions become dysfunctional when they interfere with one's ability to behave adaptively, and therefore successful emotion regulation (ER), when necessary, is crucial for psychological health. ER refers to the ability to determine when we feel certain emotions, which emotions we feel, and in what manner we experience and express them (Gross, 1998). In this process, individuals can manipulate the quality, duration, or intensity of an emotion (Gross, 2015). Previous studies showed that differential use of ER strategies has wide ranging consequences for psychological health (Gross, 2015; Mennin & Fresco, 2015). For instance, difficulties with ER are associated with psychopathologies, including major depressive disorder (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), generalized anxiety disorder (GAD; McLaughlin, Mennin, & Farach, 2007), and social anxiety disorder (SAD; Werner, Goldin, Ball, Heimberg, & Gross, 2011). While ER is commonly considered to be a conscious and intentional process, there is growing evidence that some processes involved in ER function at implicit levels (Berkman & Lieberman, 2009; Koole & Rothermund, 2011).

A well-known model that describes the process of ER was suggested by Gross (1998). The model describes five processes of ER that occur at different time points in the course of emotional processing and regulation. In the current study have we focused on two ER strategies included in the process model of Gross—distraction and reappraisal—and also on affect labeling (AL), an ER strategy that is not part of the process model. Reappraisal, distraction and AL are considered cognitive strategies used to regulate emotions (for a review on the reciprocal relationship between emotion and cognition see Dolcos et al., 2011).

Distraction is an antecedent-focused strategy of ER (i.e., it is implemented before the generation of the emotion). Distraction constitutes the deployment of attention away from a negative aspect of a situation, to a neutral or positive aspect (Gross, 1998). Attention can be deployed externally (e.g., focus on the shape of a certain stimulus) or internally (e.g., focus on neutral or positive thoughts). Distraction was found to be an effective ER strategy in various studies (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Sheppes et al. (2011) demonstrated, for example, that participants tend to choose distraction when emotional stimuli are highly intense. Furthermore, distraction use was found to reduce negative affect in depressed patients (Nolen-Hoeksema et al., 2008). Finally, one of the

interventions in cognitive behavioral therapy (CBT), concerns teaching patients to distract themselves from negative situations that might cause dysphoria (Beck, 2011, p. 213). These findings are in line with data on brain activation during distraction that show increased activation in the ventro-medial prefrontal cortex (PFC) and decreased activation in the amygdala (McRae et al., 2009; Kanske et al., 2010).

Reappraisal is also an antecedent-focused strategy, but it is implemented later than distraction during the time course of ER (Gross, 1998). Reappraisal constitutes a cognitive change of the meaning of an emotion-eliciting situation, in order to reduce negative feelings (Gross, 1998). Reappraisal was found to be highly adaptive and people who tend to use this strategy show greater well-being and fewer symptoms of depression compared with people who do not tend to use reappraisal (Gross & John, 2003). In addition, different studies demonstrated that when participants are explicitly asked to use reappraisal, they report less negative affect compared with a control group (e.g., Ochsner et al., 2004; Sheppes & Meiran, 2007). This is in line with studies that examined the neural basis of reappraisal and found increased activity in the medial, dorsolateral and ventrolateral PFC that was correlated with decreased activity in the amygdala while using reappraisal (Goldin et al., 2008; McRae et al., 2009). McRae et al. (2009) found that although distraction caused a greater decrease in amygdala activation compared with reappraisal, reappraisal was more effective in down-regulating the emotional experience as measured by self-reports.

Affect labeling (AL) is the verbalization of a current emotional experience, a process which involves identifying and naming the emotions that arise in certain situations (Lieberman et al., 2007). Different studies showed that AL, much like reappraisal and distraction, results in decreased activity in the amygdala and increased activity in prefrontal areas and Broca's area (Hariri, Bookheimer, & Mazziotta, 2000; Lieberman et al., 2007; Torrisi, Lieberman, Bookheimer, & Altshuler, 2013; Tupak et al., 2014). Hariri et al. (2000) showed that AL of facial emotions involved increased activation in the right ventral PFC and decreased activation in the amygdala compared with a control condition requiring matching facial stimuli with respect to emotional expressions. This finding suggests that AL has a unique contribution to this pattern of brain activation since processing different characteristics of emotional stimuli (e.g., by matching a facial expression) is insufficient to regulate amygdala activation. Similarly, Taylor, Phan, Decker and Liberzon (2003) found that when participants rated their emotional experience while watching negative pictures there was decreased activation in the amygdala and increased activation in the dorsal medial PFC and the anterior cingulate sulcus.

These findings regarding the pattern of activation in the brain during AL were replicated in different studies (e.g., Nakamura et al., 1999; Narumoto et al., 2000; Gorno-Tempini et al., 2001) and suggest that linguistic processing of emotions (but not other, non-emotional properties of stimuli) regulates the activation in the amygdala. AL was also found to decrease skin conductance following exposure to anxious provoking situations (Tabibnia et al., 2008).

It is important to distinguish between appraisal and AL. AL is different from appraisal in the sense that appraisal is an automatic and general processing of various aspects of a situation (e.g., novelty, relevance; for reviews see Ellsworth & Scherer, 2003; Brosch & Sander, 2013), and it includes a basic evaluation of emotional aspects in order to execute an adaptive emotional response (e.g., action tendencies; Brosch, 2013). AL, on the other hand, relates specifically to the emotional aspect of the situation and involves an explicit verbal process of identifying and naming the emotion (Lieberman et al., 2007). In recent years, research of implicit forms of emotional regulation has focused on AL. AL does not involve the intentional goal of changing felt emotions, and therefore constitutes a form of incidental emotion regulation (Berkman & Lieberman, 2009; Burklund, Creswell, Irwin, & Lieberman, 2014).

Alexithymia concerns a difficulty to identify emotions and describe them (Aleman, 2005). Participants with alexithymia show a reduced tendency to use reappraisal compared with participants who do not suffer from alexithymia (Swart et al., 2009). Hence, the difficulty to use AL is an integral part of alexithymia and it is likely AL ability is negatively correlated with alexithymia.

Recently, emotion recognition was suggested to be an essential part of effective reappraisal (Moyal, Henik & Anholt, 2014). It was maintained that in order to reappraise a situation, one has to recognize one's emotions first. Effective reappraisal may be dependent upon good emotion recognition since the reappraisal process is directed at changing specific emotions. For example, when someone experiences unpleasant arousal, identifying the emotion as anxiety is key to successful ER. Only after recognizing (explicitly or implicitly) the emotion that the situation evokes, can one interpret the situation in a less negative way.

Consequently, an updated process model was suggested (Gross, 1998; Moyal, Hanik & Anholt, 2014), whereby emotion recognition serves as an additional stage of ER (e.g., AL). AL itself is an ER strategy that helps to decrease emotional reactivity (Hariri et al., 2000; Lieberman et al., 2007; Tabibnia et al., 2008; Kircanski et al., 2012). It might be that similar to distraction, AL enables dealing with highly intense emotional situations (e.g., exposure to

phobic stimuli; Tabibnia et al., 2008; Kircanski et al., 2012), but unlike distraction, it also enables learning, since the individual attends to the emotional stimulus. Successful reappraisal includes an underlying process of emotion recognition (that is part of the appraisal process). It was suggested that healthy individuals succeed in reappraisal because they are able to recognize their emotions. This assertion was further supported by findings with subjects with alexithymia who show a reduced tendency to use reappraisal compared with participants who do not suffer from alexithymia (Swart et al., 2009).

In the current study we aimed at exploring the relationship between AL (explicit emotion recognition) and the probability and effectiveness of choosing reappraisal over distraction in response to low vs. high valenced negative stimuli. We hypothesized that the choice of AL preceding ER will increase likelihood of choosing reappraisal for high intensity stimuli and improve its effectiveness. Furthermore, we hypothesized that alexithymia will moderate this effect. Finally, since we used pictorial stimuli for which the main emotion evoked is specific (Moyal, Henik, & Anholt, 2018), we exploratively tested whether AL exerts similar effects in response to various emotions.

Methods

Design

After receiving ethical approval from BGU's IRB, participants were recruited for the study and were randomly assigned to the experimental forced labeling and control groups.

In the experimental group, Participants were asked to choose the primary emotion that was evoked from a list of seven emotions and then to choose one of the emotional regulation methods learned earlier (distraction or reappraisal) and execute the emotion regulation chosen (following Sheppes et al., 2011).

In the control group, participants were asked to choose the dominant color in the image presented, from a list of seven colors (as an unemotional processing control condition) and then choose one of the emotional regulation methods learned earlier (distraction or reappraisal) and execute the emotion regulation choice.

Participants

106 undergraduate students from Ben-Gurion University of the Negev participated in the study for a small monetary compensation. Participants were randomly assigned to one of the two groups. An a priori power analysis was conducted using G∗Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), indicating this number of 106 participants will provide sufficient power (> 0.9) to account for medium size effects (f2 = .15), with Type 1 error ($\alpha <$ 0.05).

Materials

The emotion regulation task (Sheppes et al., 2011) was modified to include an AL vs. neutral color identification condition preceding emotional regulation choice. The duration of the task was about an hour.

Picture stimuli:

44 negative pictures from the CAP-D (Categorized Affective Pictures Database; Moyal, Henik, & Anholt, 2018) were used in the experiment. Choice of pictures was based on their ratings as evoking primarily specific emotions- sadness, fear, disgust and compassion; Moyal et al., 2018).

Measures:

Toronto alexithymia scale (TAS-20; Bagby, Taylor, & Parker, 1994). The TAS-20 is a 20-item self-report questionnaire designed to assess difficulties in identifying and expressing emotions. There are 3 subscales in the questionnaire: difficulty describing feelings, difficulty identifying feelings and externally oriented thinking.

Procedure

After signing a consent form, participants were seated in a quiet room in front of a computer and instructions were presented on the screen, in addition to vocal instructions that were read by the experimenter from the study protocol. Participants were informed that unpleasant pictures might appear, and in case they felt distressed, they could stop participation in the study at any time.

Subsequently, participants were instructed to look at pictures that appeared in the middle of the screen, and to concentrate on the emotions the pictures evoked in them. Following the picture presentation in the experimental group a screen with seven names of different emotions (i.e., disgust, sadness, anger, fear, compassion, neutral emotion and positive emotion) appeared and participants were asked to choose what is the emotion they felt while looking at the picture. Participants were specifically asked to pay attention to what they felt, and not to what they thought they should feel or what the characters in the pictures might have felt. In the control group, following the picture presentation, participants were asked to choose the most dominant color in the picture they viewed from a list of seven colors (i.e., red, black, blue, white, yellow, green and gray).

Each trial began with the presentation of a fixation cross for 100ms, followed by a picture that was presented for 500 ms. Subsequently, a screen with the instruction, “please choose the emotion that is closest to your feelings about the picture”, in the experimental group or: “please choose what is the most dominant color in the picture you saw”, in the control group, until the participant’s response. Following the response screen, participants were asked to choose one of the emotional regulation ER techniques previously learned. The image was then shown again for a longer period (5 seconds), during which participants were required to use the ER strategy they chose. Finally, participants were required to quantify the intensity of the feeling they eventually felt toward the picture.

Data analyses and expected results

We expected that in the experimental group, participants will show a higher tendency to use reappraisal over distraction in high valenced stimuli.

Furthermore, we aimed at testing whether the effectiveness of reappraisal conducted subsequent to AL will be superior.

Finally, we wanted to assess whether alexithymia, which involves difficulty in AL will mediate effects.

Towards this goal, we first analyzed the differences in proportion of reappraisal selection. A 3x2x2 ANCOVA was conducted with the proportion of selection in reappraisal as the dependent variable and group (forced labeling / control), stimuli intensity (low / medium / high) and alexithymia scores (low / high) as independent variables.

To examine the effectiveness of our manipulation, we conducted a three-way ANCOVA analysis using the subjects' stimuli intensity ratings as the dependent variable. As in our previous analysis, age and gender were used as covariates, and controlled for subject as a random effect. Group, stimuli intensity and the selected strategy (reappraisal/distraction), were used as independent variables.

Results

Analysis of selection proportion

To examine our hypothesis, we first analyzed the differences in proportion of reappraisal selection. A 3x2x2 ANCOVA was conducted with the proportion of selection in reappraisal as the dependent variable and group (Forced labeling / control), stimuli intensity (low / medium / high) and alexithymia scores (low / high) as independent variables. Age and gender were used as covariates and subject were controlled for as a random variable (see Table 1 for a summary of the results).

Table 1. ANCOVA analysis results.

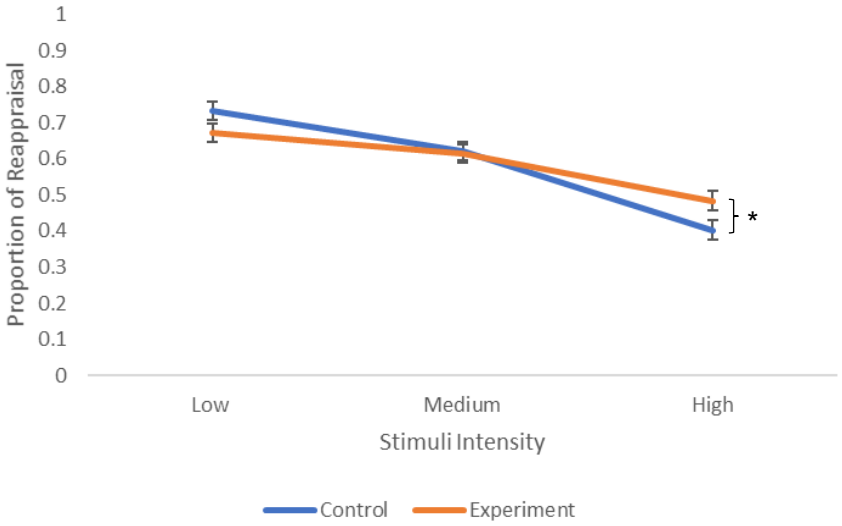
Variable	F	p-value	ηp2
Group	0.36	0.55	0.004
Stimuli intensity***	199.06	<0.0001	0.06
Alexithymia	0.55	0.46	0.006
Gender	1.43	0.23	0.015
Age	1.36	0.25	0.014
Group x Stimuli intensity***	16.84	<0.0001	0.005
Group x Alexithymia	1.07	0.3	0.011
Stimuli intensity x Alexithymia	1.62	0.2	0.0005
Group x Alexithymia x Stimuli intensity*	4.94	0.007	0.0015

* $p < 0.05$, ** $p < 0.005$, *** $p < 0.0005$

As displayed in Table 1, Neither gender nor age differences were found to be associated with proportion of reappraisal selection ($F(1,96) = 1.43$, $p = 0.23$, $\eta p2 = 0.015$; $F(1,96) = 1.36$, $p = 0.25$, $\eta p2 = 0.014$, respectively).

In accordance with our main hypothesis a two-way interaction was found between group and stimuli intensity ($F(2,6418) = 16.84$, $p < 0.0001$, $\eta_p^2 = 0.005$, see Figure 1).

Figure 1. A two-way interaction between group, and stimuli intensity.

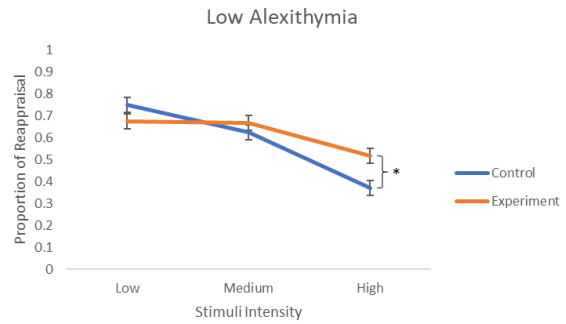


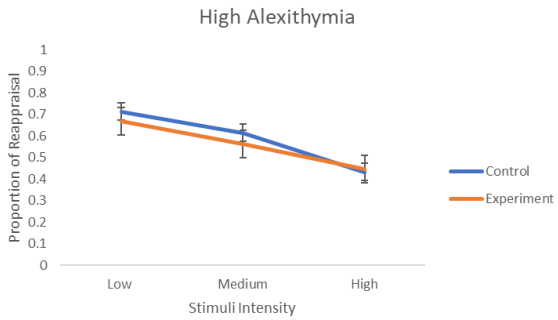
* p < 0.05

To better understand the origin of this interaction, further analyses were conducted contrasting the proportion of reappraisal selection between experiment and control groups in each stimuli intensity. A significant simple effect for group revealed that for high stimuli intensity, individuals in the experiment group showed higher proportion of reappraisal than in the control group (t = 2.23, p = 0.028, η_p^2 = 0.05). No significant differences between experiment and control groups were found when stimuli intensities were medium (t = -0.16, p = 0.88, η_p^2 = 0.0002) nor low (t = -1.66, p = 0.1, η_p^2 = 0.03).

We next turned to explore the relevance of alexithymia to the proportion of reappraisal and distraction selection. As detailed in Table 1, no main effect for alexithymia was found (F(1,96) = 0.55, p = 0.46, η_p^2 = 0.005). However, a significant three-way interaction between group, alexithymia, and stimuli intensity was found (F(1,96) = , p = 0.007, η_p^2 = 0.0015, see Figure 2).

Figure 2. A three-way interaction between group, alexithymia, and stimuli intensity.





* $p < 0.05$

As shown in Figure 1, a further analysis was conducted to better understand the origin of the three-way interaction. For the low alexithymia group, a significant simple two-way interaction effect was found between stimuli intensity and group ($F(2,6418) = 20.17$, $p < 0.0001$, $\eta_p^2 = 0.006$).

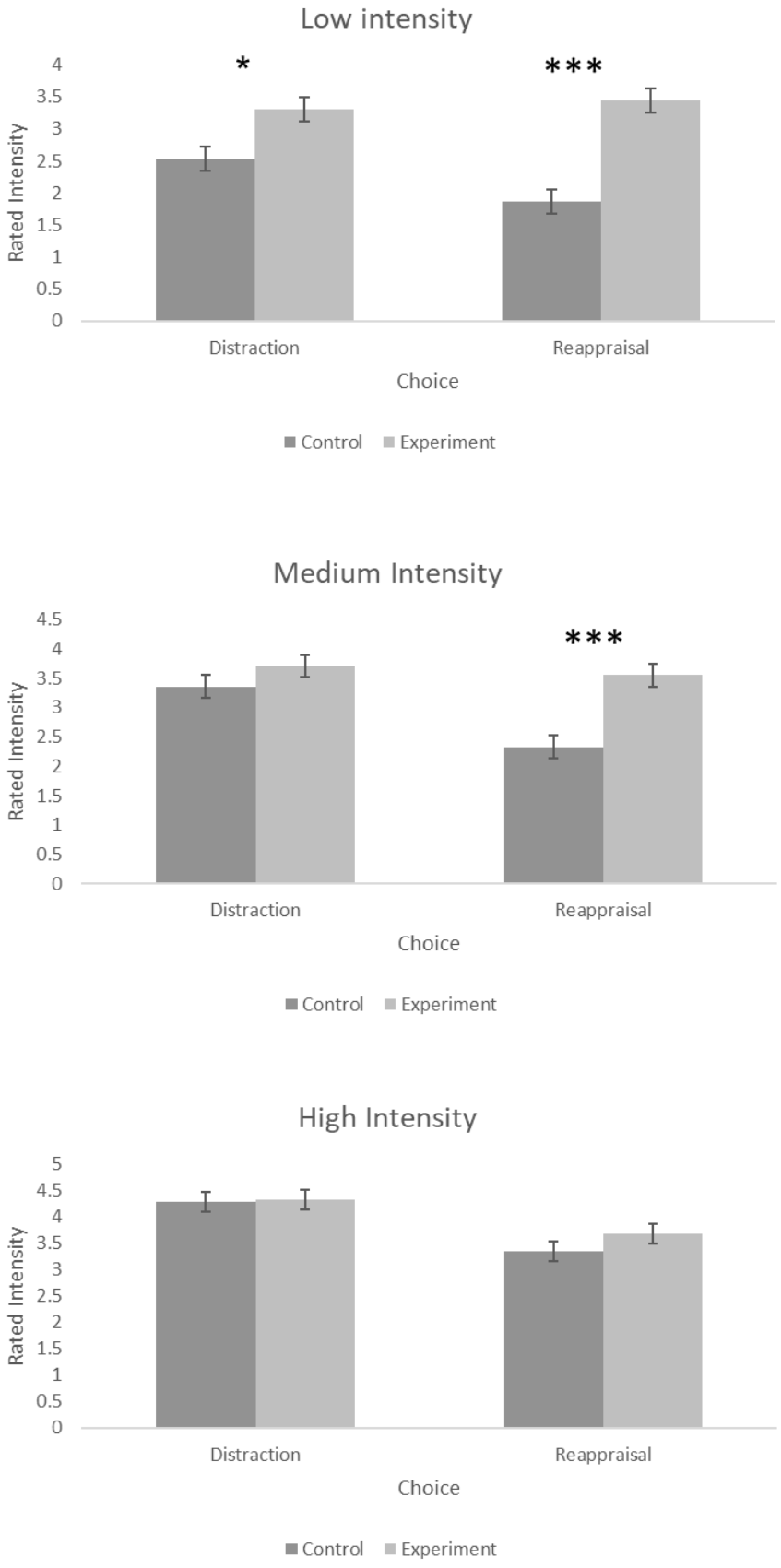
This simple two-way interaction consisted of a significant simple-simple main effect for group (control / experiment) in the high stimuli intensity condition showing the experimental group chose higher proportion of reappraisal than the control group ($t = 3.12$, $p = 0.028$, $\eta_p^2 = 0.09$). No simple-simple main effects for group were found in the low or medium stimuli intensities ($t = 1.57$, $p = 0.62$, $\eta_p^2 = 0.025$; $t = 0.84$, $p = 0.96$, $\eta_p^2 = 0.007$, respectively). For the high alexithymia group, no significant simple two-way interaction between stimuli intensity and group was found ($t = 1.61$, $p = 0.2$, $\eta_p^2 = 0.03$).

Additionally, we conducted two exploratory ANCOVA analyses to examine whether alexithymia would affect selection proportion differently across different emotions. For each analysis, proportion of selection was used as the dependent variable. Like our previous analyses, we controlled for gender and age, and used the subject number to control for random effects. Proportion of reappraisal choices did not differ between individuals with high and low alexithymia across the different emotions ($F(4, 6418) = 2.11$, $p = 0.08$, $\eta_p^2 = 0.001$). Examining the three way interaction between group, alexithymia, and emotion type, the previous insignificant interaction did not differ between the groups ($F(4, 6418) = 1.56$, $p = 0.18$, $\eta_p^2 = 0.001$).

Analysis of effectiveness

To examine the effectiveness of our manipulation, we conducted a three-way ANCOVA analysis using the subjects' stimuli intensity ratings as the dependent variable. As in our previous analysis, age and gender were used as covariates, and we controlled for subject as a random effect. Group, stimuli intensity and the selected strategy (reappraisal/distraction), were used as independent variables revealing a significant three-way interaction ($F(2, 6416) = 5.52$, $p = 0.004$, $\eta_p^2 = 0.0017$). This interaction is depicted in Figure 3.

Figure 3. Effectiveness analysis.



Three-way interaction between stimuli intensity, group, and strategy choice was conducted. The stimuli intensity rated by participants is depicted on the y axis. top, middle, and bottom plots represent low, middle, and high intensity of the stimuli (respectively). * $p < 0.05$, ** $p < 0.005$, *** $p < 0.0005$.

Further analyses revealed three significant simple two-way interactions between group and selected strategy in the low ($F(1, 6416) = 29.47$, $p < 0.0001$, $\eta_p^2 = 0.0045$), medium ($F(1, 6416) = 32.931$, $p < 0.0001$, $\eta_p^2 = 0.005$), and high ($F(1, 6416) = 4.62$, $p = 0.03$, $\eta_p^2 = 0.0007$) stimuli intensities. In the low stimuli intensity, individuals in the experiment group rated the intensity as higher compared to the control group both when choosing distraction ($F(1, 98) = 7.62$, $p = 0.007$, $\eta_p^2 = 0.07$) and even higher (as the simple two-way interaction is significant) when choosing reappraisal ($F(1, 98) = 35.81$, $p < 0.0001$, $\eta_p^2 = 0.27$). When stimuli intensity was medium, no differences in stimuli ratings where found between the control and experimental groups when using distraction ($F(1, 98) = 1.49$, $p = 0.22$, $\eta_p^2 = 0.015$). However, when choosing to use reappraisal, individuals in the experimental group rated the stimuli as more intense than the control group ($F(1, 98) = 20.82$, $p < 0.0001$, $\eta_p^2 = 0.175$). No simple simple main effects were found when stimuli intensity was high when choosing distraction ($F(1, 98) = 0.04$, $p = 0.84$, $\eta_p^2 = 0.0004$) or reappraisal ($F(1, 98) = 1.59$, $p = 0.21$, $\eta_p^2 = 0.016$).

We also examined whether the manipulation affected individuals with different alexithymia levels differentially. A two-way ANCOVA analysis was conducted examining the differences in ranked stimuli intensity between alexithymia level (low / high) and group (control / experiment). This interaction was found to be insignificant ($F(1, 96) = 1.13$, $p = 0.29$, $\eta_p^2 = 0.01$).

Discussion

The current work aimed at investigating the relationship between emotion recognition processes and reappraisal, and examining whether consequent to forced AL, participants will show a higher tendency to use reappraisal over distraction in high valanced stimuli. Furthermore, we aimed at testing whether the effectiveness of reappraisal conducted subsequent to AL will be superior. Finally, we wanted to assess whether alexithymia, which involves difficulty in AL will mediate effects.

The examination of the relationship between AL and reappraisal in the study yielded several interesting findings. First, our main research hypothesis was confirmed: after forced AL, participants showed a higher tendency to use reappraisal over distraction in the face of high intensity stimuli. In the experimental group, subjects were more likely than in the control group to choose reappraisal over distraction, for high intensity stimuli. Facing low-intensity stimuli, no between group differences were observed.

Given that the difficulty in performing reappraisal is most apparent in the face of high-intensity stimuli, it is possible that, according to the research hypotheses, AL advanced participants in the cognitive processing of the stimulus, making it easier for them to take another step toward a complete cognitive assessment of the stimulus – reappraisal: when one recognizes his/her emotions, reappraisal is more accessible and beneficial, since it targets the specific emotion that is evoked.

These findings have clinical implications for psychological treatment. When the emotion that is evoked is clear, there are more opportunities for a semantic re-interpretation of the situation, even in high intensity emotions, making emotion regulation via reappraisal more accessible. These findings highlight the potential benefits of AL in psychological treatment as they facilitate reappraisal of high intensity emotions.

When it comes to AL effectiveness, the results obtained were surprising. It seems that contrary to our hypothesis that AL will increase the effectiveness of reappraisal, it actually elevated the subjective rating of stimulus intensity, so that subsequent to forced AL, participants rated the stimuli as more evocative.

A potential explanation is that AL increased subjects' emotional activation and deepened their emotional involvement in the stimulus, so that the final rating they chose was higher, even though the use of reappraisal might have been effective.

Possibly, participants who were not required to use AL paid less attention to the stimuli and particularly to their emotional details. Importantly, this difference was not evident in high valenced stimuli, suggesting that it does not affect the recommendation of using AL in clinical practice in order to promote reappraisal opportunities.

Regarding the effect of alexithymia as a moderator, results were mixed. The level of participants' alexithymia did not appear to have any effect on the effectiveness of AL. However, it did appear to influence the proportion of selection of ER strategy. Among people with low levels of alexithymia, forced AL does indeed appear to increase the proportion of reappraisal selection, relative to the control group, particularly in high valanced stimuli. However, among participants with high level of alexithymia, forced AL did not appear to have any effect on the proportion of reappraisal selection, relative to the control group. It is possible that for individuals with high alexithymia, semantic reinterpretation is not accessible since it is harder for them to recognize the emotion that is evoked. Perhaps this difficulty in the recognition of emotions makes it harder for them to choose to use reappraisal, since it is not clear to them what they should reappraise.

This may explain why forced AL did not lead them to prefer reappraisal: they may have been unsuccessful in recognizing the exact felt, and consequently failed to proceed to deeper cognitive processing of the stimulus. Therefore, in future studies, it would be interesting to examine the AL accuracy performed by participants with high vs. low levels of alexithymia.

Finally, we have also been able to replicate the findings of previous studies demonstrating that in the face of a high intensity emotions, participants show an increased tendency to use distraction over reappraisal. It seems that when people experience a very high level of negative emotion, they find it difficult to deepen their emotional processing of the stimulus and prefer to distract from it. It is also possible that when participants encounter high-intensity stimuli, they find it difficult to find compelling alternative cognitive explanations that will be effective in reducing emotional intensity.

Regarding demographic research variables, no age effects were found in the present study. Similarly, no gender effect was found. As alexithymia is much more common in men than in women (Levant, 1998) we have expected that gender will affect the chosen ER strategy choice.

Several limitations must be addressed. First, as noted earlier, the sample was very homogeneous with little variation in some of the study characteristics, such as gender and

age. Almost all participants were between the ages of 22 and 25, so the variance in this variable was low. Also, another reason for the lack of effect of the gender variable may be considered. Participants were all psychology undergraduates. It is possible that men who choose to study psychology, are men with unique characteristics. Therefore, male participants in the study may be unrepresentative of the male population at large since they may exhibit high ER capabilities. Finally, the power analysis was conducted to ascertain power for detecting group differences, whereas the sample may have been underpowered for the moderation analyses.

To conclude, the current study set out to examine the relationship between AL and reappraisal. The findings of the current study strengthen our previous hypothesis regarding the relationship between emotion recognition and reappraisal (Moyal et al., 2014) and provide evidence for the role of ER in reappraisal. The implications of this study are relevant for both ER research as well as for psychological treatment. The role of emotion recognition in reappraisal should be taken into consideration when studying reappraisal, and also in psychotherapy as it forms the basis for interventions aimed at increasing the use of reappraisal in therapy and in daily life. The findings of the current work provide the basis for future research on psychological interventions for people with difficulties in ER (such as people suffering from alexithymia).

It might be that people who tend to choose other strategies than reappraisal, choose them because the emotion that is evoked in them is unclear, especially at high levels of emotion that create confusion and emotional flooding. Hence, training in accurate and efficient emotion recognition might help them feel that reappraisal is more beneficial in some situations and increase their ability for ER strategies.

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Appendix