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## The effects of irrational, rational, and acceptance beliefs about emotions on the emotional response and perceived control of emotions

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## ABSTRACT

The current study aimed at investigating the effect of endorsing different beliefs about emotions (BAEs) on the emotional response and perceived control of emotions. Two hundred and fourteen individuals were randomly assigned to one of four groups. One group was instructed to endorse irrational BAEs, one rational BAEs, one to approach emotions with acceptance, and a control group received no specific instructions. Participants further watched an emotion-provoking film and applied the instructions assigned to their group while their negative emotions, skin conductance, respiratory rate, heart rate, negative meta-emotions, and perceived emotional control were assessed. Results showed that after the film clip, individuals endorsing irrational and rational BAEs showed significant decreases in negative emotions compared to the control group. However, individuals endorsing irrational BAEs reported more negative meta-emotions and poorer perceived emotional control. Further, after a recovery period, only individuals endorsing rational BAEs and those endorsing an acceptance-based approach showed significant decreases in negative emotions. No between-groups differences were observed on physiological measures. Thus, current results show that how individuals evaluate their emotions has important consequences for emotional functioning and instructing them to endorse rational BAEs might be beneficial when encountering emotional situations.

### 1. Introduction

It is very common for individuals to experience negative emotions in stressful situations, but it is also clear that these individuals differ on how they evaluate their emotional responses that arise in these contexts (Ford & Gross, 2018). Recently, an increased interest has been observed in investigating individuals' evaluations of emotions or beliefs about emotions (BAEs) (Kneeland, Dovidio, Joormann & Clark, 2016). Across the literature, BAEs are defined as the personal-specific beliefs individuals endorse about their emotions (Edwards & Wupperman, 2019). To date, a number of BAEs were investigated, such as beliefs that emotions are fixed/uncontrollable (vs. malleable) (Kneeland et al., 2016), beliefs that emotions are unacceptable (vs. acceptable) (Ford, Lam, John & Mauss, 2018), anxiety sensitivity (beliefs that anxiety experiences are dangerous) (Naragon-Gainey, 2010), emotional schemas (e.g., beliefs that emotions are not comprehensible) (Leahy, 2002) and other BAEs (Manser, Cooper & Trefusis, 2012).

Recent research has suggested that these BAEs influence (1) how individuals control their emotions (their ability to effectively regulate emotions in a given context), as well as (2) the emotional response per se (both at the subjective and physiological level) (Ford & Gross, 2018). In addition, researchers revealed that these BAEs are significantly associated with various psychological conditions (Edwards & Wupperman, 2019).

In this regard, cross-sectional studies showed significant relationships between various BAEs and depression (Castella et al., 2013), anxiety (Rimes & Chalder, 2010), borderline personality (Westphal, Leahy, Pala & Wupperman, 2016), dispositional mindfulness (Silberstein, Tirch, Leahy & McGinn, 2012), and other emotion regulatory processes, such as reappraisal (Castella et al., 2013). Also, experimental studies provided preliminary evidence for the causal role of BAEs showing that individuals who were induced to believe that emotions are uncontrollable/fixed were less likely to regulate their emotions by using reappraisal in an emotional situation

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(Kneeland, Nolen-Hoeksema, Dovidio & Gruber, 2016). Another experimental study pointed out that an evaluative emotional processing contributed to a less efficient cardiovascular functioning than approaching emotions with acceptance in a stressful situation (Low, Stanton & Bower, 2008). At the same time, a laboratory study revealed that individuals who believed that emotions are uncontrollable/fixed experienced greater negative affect when responding to a negative film clip (Kappes & Schikowski, 2013). Altogether, this growing literature suggests that how individuals evaluate their emotions has consequences for emotional functioning, emotion regulation, and mental health in general, and the nature of these consequences (helpful or harmful) depend of the nature of the evaluations/BAEs endorsed.

Consistent with these data, classic cognitive behavioral therapies, and in particular, rational-emotive behavior therapy (REBT) (David & Cristea, 2018; Ellis, 1991) suggests that endorsing irrational BAEs might be detrimental for individuals' emotional functioning. According to REBT, once negative emotions are generated, these emotions can be irrationally evaluated by (1) rigidly demanding not to feel such emotions ("I shouldn't feel negative emotions"), (2) catastrophizing and (3) evaluating them as unbearable ("It's awful and unbearable to experience negative emotions"), as well as (4) globally evaluating one's self for having negative states ("I'm weak if I have negative emotions"). These four irrational BAEs are hypothesized to further contribute to intense negative meta-emotions (feeling ashamed about feeling negative emotions) and to a maladaptive emotional control, and eventually to an overall escalation of the emotional response (David, Matu, Podina & Predatu, 2019). This absolutistic, dogmatic, extreme thinking (represented by these four BAEs) is considered irrational/dysfunctional because it often leads to poor emotional and behavioral outcomes – and thereby tends to be detrimental for well-being and adaptation (David, Lynn & Ellis, 2010). Consistent with this, both cross-sectional and experimental studies have supported the association between irrational beliefs and distress in different samples (Višlā, Flückiger, Holtforth & David, 2016).

Similarly, more recent "third wave" approaches, such as Acceptance and Commitment Therapy (ACT) suggest that the persistence of negative emotions results mainly from evaluative judgments that some emotions are unacceptable ("Feeling negative emotions is unacceptable") (Hayes, Strosahl & Wilson, 1999). According to ACT, when individuals experience negative emotions they tend to judge them negatively, further being unwilling to remain in contact with these experiences and trying to suppress or avoid them (generally termed *experiential avoidance*). It has been hypothesized that this approach has a short-term effect of reducing negative emotions, but it might come at an immediate meta-emotional and/or behavioral cost, which in the long-term could determine the amplification of the initial emotional response (Hayes, Steven, Luoma, Bond, Masuda & Lillis, 2006). Indeed, research has pointed out that experiential avoidance is associated with maladaptive outcomes, such as increased negative affect, substance use, and psychopathology (Chawla & Ostafin, 2007). However, research is needed to directly test the above-mentioned assumptions.

To sum up, both REBT and ACT point towards the detrimental effects of endorsing irrational BAEs for emotional functioning and regulation. However, despite this similarity, they differ in their conceptualization of how is best to approach emotions when they arise in distressing situations. On the one hand, ACT argues that a non-evaluative, accepting stance is the most adaptive reaction towards emotions with beneficial effects on the emotional response, especially for an efficient recovery from distressing situations (Campbell-Sills, Barlow, Brown & Hofmann, 2006b). Accordingly, individuals are encouraged to be aware about their emotions, accept non-judgmentally, and remain in contact with uncomfortable emotions while letting them run their natural course (vs. trying to control/avoid them) (Hayes et al., 1999). This stance is considered to contribute to lower levels of negative emotions and to a decreased probability to experience meta-emotions

and engage in maladaptive strategies (Troy, Shallcross, Brunner, Friedman & Jones, 2018).

On the other hand, REBT suggests that endorsing rational BAEs, in terms of (1) flexibly preferring not to feel negative emotions ("I prefer not to feel negative emotions, but I accept it if this does happen"), (2) considering them unpleasant but not awful/terrible and (3) tolerating negative emotions ("It's unpleasant but not awful to feel negative emotions and I can stand it"), as well as (4) unconditionally accepting one's self for having negative states ("I'm valuable even if I experience negative emotions") might also be beneficial for emotional functioning (Ellis, 1991). It has been suggested that the goal of endorsing these four rational BAEs is to achieve a more functional meta-emotional response, as well as a more effective emotional control (David et al., 2019), and eventually a less intense emotional response. This flexible, non-dogmatic, balanced thinking (represented by these four BAEs) is considered rational/functional because it often leads to adaptive emotional and behavioral outcomes – and thereby tends to increase well-being and adaptation (David et al., 2010). Consistent with this, studies have revealed that higher levels of rational beliefs are associated with lower levels of distress, as well as with higher levels of happiness and optimism (Oltean, Hyland, Vallières & David, 2019).

Thus, the REBT framework (unlike ACT) considers that approaching emotions with negative evaluations/judgements ("It's bad to feel negative emotions") is adaptive, as long as these evaluations are formulated rationally ("This is bad but not terrible and I can stand it"). Also, in this conceptualization individuals are encouraged to effectively control their emotions. Hence, from a general perspective, the main theoretical differences between these two approaches are related to two main components: (1) the approach towards emotions (evaluative in REBT vs. non-evaluative in ACT), and (2) the effect of each approach with respect to emotional control (active control in REBT vs. no control in ACT).

However, despite the recognized importance of various BAEs, few studies investigated their impact on (1) the emotional response, as well as on (2) the emotional control. To date, research was mainly focused on the acceptance-based approach (Kohl, Rief & Glombiewski, 2012), with studies showing that individuals who were instructed to accept emotions reported a decrease in negative emotions, physiological reactions, and maladaptive emotion regulation processes (Campbell-Sills et al., 2006b). Nevertheless, other studies failed to show its benefits in decreasing negative emotions, especially during acute emotional situations (Dan-Glauser & Gross, 2013). Thus, it has been suggested that acceptance may be especially effective for emotional recovery by diffusing the intense negative emotions after an emotional situation (Troy et al., 2018). These inconsistencies clearly highlight the need to clarify the effects of acceptance, both during emotional induction and recovery.

Further, to our knowledge no studies to date investigated the effects of irrational BAEs on the emotional response and regulation. Indirect evidence comes from studies investigating individuals high in experiential avoidance and anxiety sensitivity (thus at risk to endorse non-acceptability/irrational BAEs), which showed that these individuals reported an increase in negative emotions during emotional situations compared to those low in these traits (Sloan, 2004; Telch, Silverman & Schmidt, 1996). Also, a few studies showed that endorsing non-acceptability BAEs was further related to engaging in strategies considered to be maladaptive, such as emotional suppression (Campbell-Sills, Barlow, Brown & Hofmann, 2006a). Lastly, a plethora of cross-sectional studies showed robust associations between experiential avoidance/anxiety sensitivity and negative affect and psychopathology (Aldao, Nolen-Hoeksema & Schweizer, 2010; Naragon-Gainey, 2010). However, more research is needed to directly test the effects of irrational BAEs on the emotional response and regulation.

Finally, none of the previous studies investigated the effects of rational BAEs on the emotional response and regulation. Preliminary data revealed that rationally evaluating an emotional situation was effective

in fostering reductions in negative emotions (Cristea, Szentagotai Tatar, Nagy & David, 2012). Thus, it may be the case that rationally evaluating emotions may also have beneficial effects.

In this context, the goal of the current study was to investigate the effects of endorsing different BAEs (irrational, rational, acceptance) on the emotional response and perceived emotional control in individuals exposed to a negative film clip. Based on REBT we expected that (1) endorsing rational BAEs would decrease negative emotions during the emotion induction relative to a control group, as this approach was conceptualized as an adaptive approach. With respect to individuals endorsing irrational BAEs we predicted that (2) they will experience significantly more negative meta-emotions and poorer perceived emotional control during the emotion induction relative to the other groups (as both ACT and REBT suggest). However, (3) in terms of decreases in negative emotions our investigation was exploratory, as REBT does not clearly specify the effects of this irrational approach during an emotional situation (would rather point towards increases in negative emotions), while ACT suggests that (4) this approach is associated with reductions in negative emotions.

Further, we expected that after a recovery period, (5) only individuals endorsing rational and acceptance BAEs to show significant decreases in negative emotions in comparison with the control group. We did not expect (6) significant differences to emerge between the rational and acceptance-based approaches, as both are conceptualized as adaptive, however (7) we expected acceptance to be particularly important in the recovery period. Finally, after the recovery we expected that (8) individuals endorsing irrational BAEs to show significant increases in negative emotions (as REBT and ACT suggested) in comparison with the other groups. Although we were primarily interested in the subjective emotional response, we also conducted exploratory analyses to investigate the effects of BAEs at the psychophysiological level, and to provide a multidimensional evaluation of the individual emotional reactivity. Indeed, emotional reactions are ubiquitously associated with changes in the autonomic nervous system. Moreover, impairments in emotion regulatory processes have been often linked to autonomic imbalance. Since previous studies largely neglected the investigation of the physiological component of the emotional response, this study aimed at exploring potential links between the endorsement of BAEs and the physiological reactivity arising from emotional induction.

## 2. Methods

### 2.1. Participants

Two hundred and fourteen undergraduate students (186 females, 28 males) participated in this study. The mean age was 19.9 years (range = 18–25;  $SD = 1.42$ ). All participants were Romanian, White Caucasians. The sample size was estimated to detect a moderate-to-large effect size (Cohen's  $d = 0.60$ ) of different BAEs (compared to control), with a type I error probability of  $\alpha = 0.05$ , and a power of 0.80. The estimated sample size is of 45 participants per group. Thus, our sample was in the expected range. Participants were recruited through online postings on University's groups and rewarded with credit course. Written consent was obtained and data protection was ensured. The study was approved by the Institutional Review Board.

### 2.2. Procedure

The experimental procedure took approximately 1 h. First, participants were asked to give their consent and to complete two self-report measures to assess their depressive symptoms and their habitual tendency to avoid internal experiences. Further, participants in the experimental groups (irrational/rational/acceptance) took part in a 15-min training to familiarize with the BAEs they had to endorse in the experimental session (as assigned to their group). These beliefs were practiced

using four scenarios (imagine the scenario, identify your feelings, and adopt the BAEs): (1) failing to build relationships with coworkers, (2) failing to perform well in a project, (3) failing to deliver a public speech, and (4) finding out that a close friend considered them boring. After this training, participants had a ten-minutes break, followed by the experimental session. The control group did not receive any training, they started directly with the experiment. In the experimental session, participants were invited to sit in front of a computer where devices to measure physiological activity were attached. The experiment began with a 3-min baseline in which participants sat quietly, followed by an assessment of their negative emotions. After the baseline period, participants were asked to watch a 171-sec film clip depicting a boy grieving his father's death (extracted from the movie "The Champ"). Participants were instructed to adopt specific BAEs while watching the film. In the Irrational BAEs group, participants were asked to endorse BAEs represented by (1) rigidly demanding not to feel negative emotions, (2) catastrophizing and (3) evaluating them as unbearable, as well as (4) globally evaluating one's self for having negative states. In the Rational BAEs group, participants were asked to endorse BAEs represented by (1) flexibly preferring not to feel negative emotions, (2) considering them unpleasant but not awful, and (3) tolerating negative emotions, as well as (4) unconditionally accepting one's self for having negative states. The instructions for irrational and rational BAEs were developed according to a REBT guide (DiGiuseppe, Leaf, Exner & Robin, 1988) (*Supplementary Material 1*). In the Acceptance-focused BAEs group, participants were asked to endorse BAEs represented by a non-evaluative and accepting stance towards emotions in the present moment. Acceptance instructions were developed according to protocols described by Hayes et al. (1999) (*Supplementary Material 1*). Participants in the control group were instructed to watch the film carefully with no further instructions. Immediately after the film, participants were asked to complete measures of negative emotions, negative meta-emotions and perceived emotional control experienced during the emotional task. Finally, participants were asked to rest for 3-min as a recovery period, and at the end to rate their negative emotions, as well as to complete a series of manipulation check questions.

### 2.3. Measures

*The Beck Depression Inventory* (BDI-II) (Beck, Steer, Ball & Ranieri, 1996) is a 21-item self-report scale that measures depressive symptoms. Participants were asked to rate on scale ranging from 0 to 3 the severity of their symptoms of depression over the previous 2 weeks. For this study, the BDI-II had good internal consistency ( $\alpha = 0.90$ ).

*The Acceptance and Action Questionnaire – II* (AAQ-II) (Bond et al., 2011) is a 7-item self-report scale that measures the tendency to avoid unwanted internal experiences. Participants were asked to rate on a 4-point Likert scale (1 = not at all true, 7 = completely true) the extent to which they habitually tend to avoid internal experiences. For this study, the AAQ-II had good internal consistency ( $\alpha = 0.88$ ).

*The Positive and Negative Affect Schedule* (PANAS) (Watson, Clark & Tellegen, 1988) is a 20-item self-report scale that measures negative and positive emotions. For this study, we used the negative affect subscale to assess negative emotions (10 items). Participants were asked to rate on a 5-point Likert scale (1 = not at all, 5 = very much) the extent to which they had negative emotions through the experiment. In this study, the scale has acceptable/good internal consistency ( $\alpha$  between 0.71 and 0.82).

*The State Difficulties in Emotion Regulation Scale* (S-DERS) (Lavender, Tull, DiLillo, Messman-Moore & Gratz, 2017) is a 21-item self-report scale that measures emotion dysregulation as a state. For this study, two subscales were used, (1) the Non-Acceptance subscale to measure negative meta-emotions ("I am embarrassed for feeling negative emotions"), and (2) the Modulation subscale to measure perceived emotional control ("My emotions feel out of control"). Participants were asked to rate on a 5-point Likert scale (1 = not at all,

**Table 1**  
Descriptive Statistics for Study Variables.

Measure	Acceptance ( <i>n</i> = 53) <i>M</i> ( <i>SD</i> )	Rational ( <i>n</i> = 53) <i>M</i> ( <i>SD</i> )	Control ( <i>n</i> = 55) <i>M</i> ( <i>SD</i> )	Irrational ( <i>n</i> = 53) <i>M</i> ( <i>SD</i> )
PANAS-N				
Baseline	14.30 (4.68)	14.92 (5.78)	15.70 (5.87)	14.77 (4.40)
Film	18.37 (5.41)	16.43 (4.84)	20.81 (5.82)	17.90 (5.38)
Recovery	13.22 (3.60)	12.35 (3.17)	15.65 (5.98)	15.09 (5.08)
SCL				
Baseline	6.17 (2.43)	5.70 (2.04)	6.17 (2.09)	5.19 (1.91)
Film	6.93 (2.96)	6.43 (2.41)	7.17 (2.64)	6.13 (2.18)
Recovery	6.94 (2.89)	6.40 (2.45)	6.96 (2.64)	6.12 (2.20)
RSP				
Baseline	14.74 (4.12)	14.64 (3.24)	14.36 (3.46)	14.91 (3.11)
Film	15.31 (3.63)	15.48 (3.04)	15.57 (2.99)	16.23 (3.92)
Recovery	14.99 (3.74)	14.19 (3.12)	13.85 (3.34)	14.74 (3.27)
HR				
Baseline	82.76 (12.72)	81.87 (10.73)	88.09 (13.66)	83.04 (11.21)
Film	83.18 (12.07)	82.87 (11.17)	89.04 (14.55)	84.50 (11.05)
Recovery	81.57 (11.53)	81.37 (9.31)	85.51 (11.23)	81.85 (9.99)
NON-ACCEPTANCE	7.60 (1.19)	8.15 (2.06)	9.27 (4.39)	12.64 (5.43)
MODULATE	11.64 (4.33)	10.58 (3.56)	12.89 (5.46)	13.94 (5.13)

Note. PANAS-N = Negative Affect subscale from PANAS; SCL = Skin Conductance Level; RSP = Respiration Rate; HR = Heart Rate; NON-ACCEPTANCE = subscale assessing negative meta-emotions; MODULATE = subscale assessing perceived emotional control.

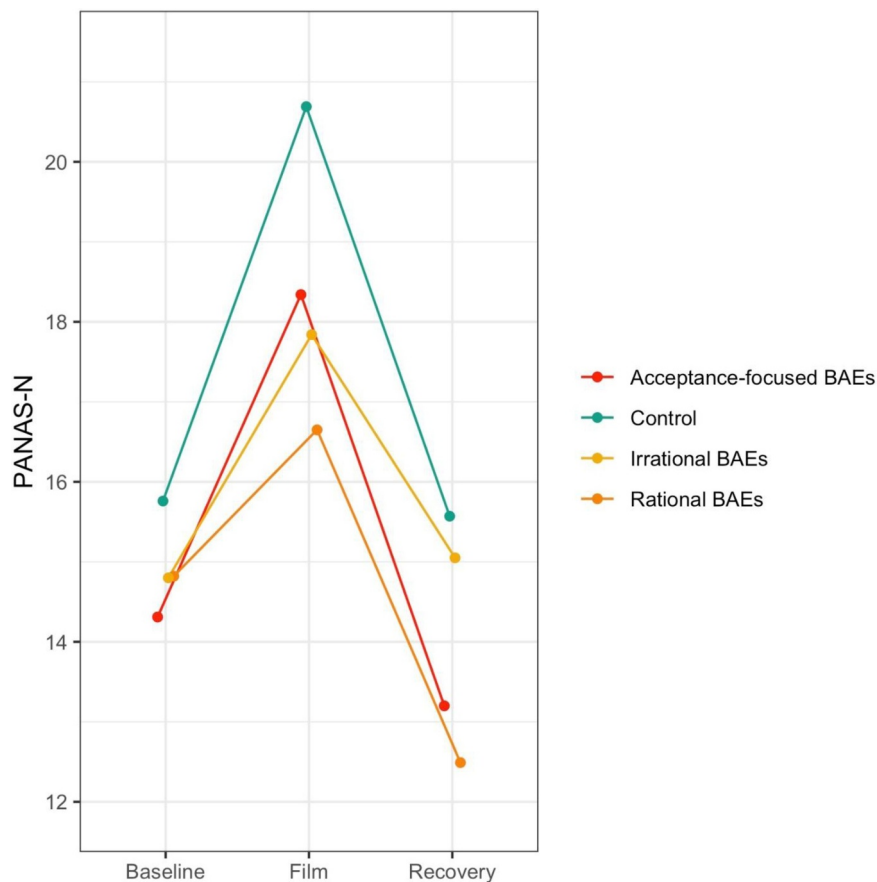


Fig.. 1. The effects of BAEs on negative emotions.

5 = completely) the extent to which they experienced difficulties in these domains during the film. In this study, data indicate good reliability for both subscales ( $\alpha = 0.92$ ).

### 2.3.1. Manipulation checks questions

To check if participants followed the instructions, we developed a 10-item measure assessing the extent to which participants (a)

irrationally evaluated emotions (2 items), (b) rationally evaluated emotions (2 items), and (c) accepted emotions (2 items). Also, we examined the participants' ability to (d) watch the film carefully (3 items) and (e) follow the experimental instructions (1 item) (*Supplementary Material 2*). Participants were asked to rate on a 7-point Likert scale (1 = to a small extent, 7 = to a great extent) the extent to which each item applied to them.

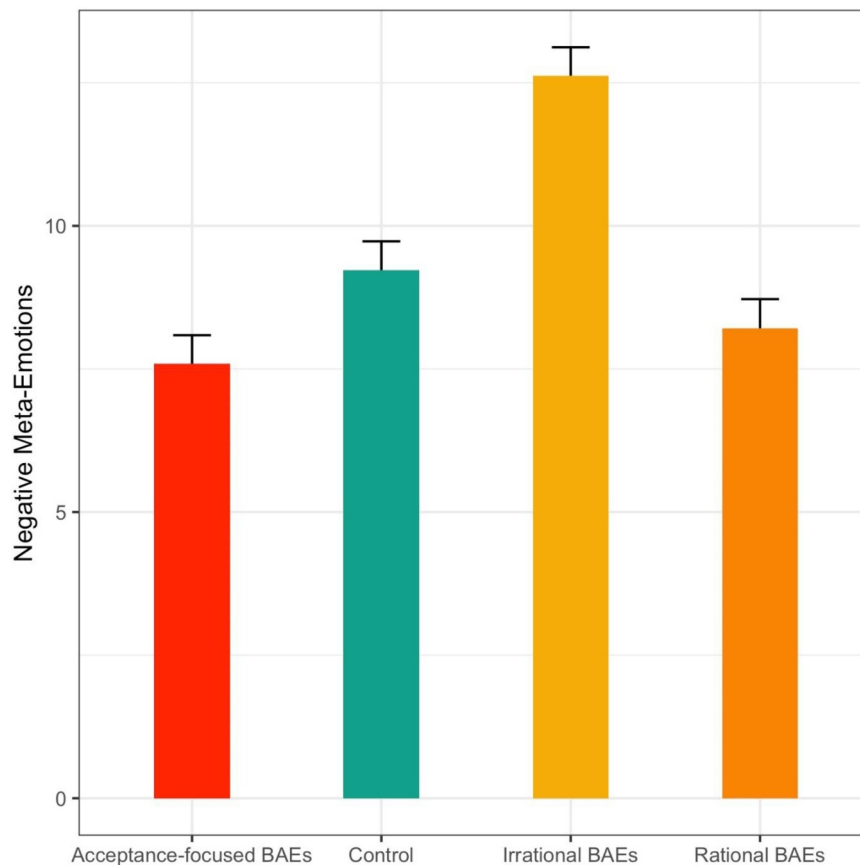


Fig.. 2. The effects of BAEs on negative meta-emotions.

### 2.3.2. Psychological measures

Psychophysiological signals were collected using a BIOPAC amplifier (MP150:Biopac Systems Inc., USA, sampling rate = 1000 Hz) using disposable electrodes placed on the chest (ECG) and second and middle finger of non-dominant hand (SCL), and using a resistive belt placed on participants' chest (RSP).

Raw ECG signals were analyzed using standard preprocessing with the software Kubios, v2.0 (Tarvainen, Niskanen, Lipponen, Ranta-aho & Karjalainen, 2014). Due to equipment errors, ECG data for 10 participants were discarded. R-waves were detected applying a digital trigger in order to derive inter-beat intervals (IBIs). After visual inspection, rare artifacts were corrected by spline interpolation. Then, heart rate (HR) was computed (in beats per minute, bpm) for each time interval considered (Baseline, Film, Recovery).

Raw skin conductance and respiration signals were analyzed using custom MATLAB (v. 2015b) scripts. Due to equipment errors, data from 13 participants were discarded for skin conductance and from 5 participants for respiration. For the remaining participants, raw skin conductance signals were downsampled to 100 Hz and filtered with a 2nd order zero-phase low-pass Butterworth filter (cut frequency = 1 Hz). After visual inspection to identify and discard rare artifacts, the mean skin conductance level (SCL) was computed (in microsiemens,  $\mu$ S) for each time interval considered (Baseline, Film, Recovery).

Raw respiration signals were downsampled to 100 Hz and filtered with a 4th order zero-phase band-pass Butterworth filter with cut frequencies of 0.05 and 1 Hz. After visual inspection in order to identify and discard rare artifacts, peaks corresponding to breathing were identified and the respiratory rate (RSP) was computed (in breath per minute, bpm) for each time interval considered (Baseline, Film, Recovery).

### 2.4. Data analysis

Changes in negative emotions (PANAS-N) and physiological indexes (SCL, RSP, HR) through the experiment, were analyzed with a series of repeated measures analysis of variance (rmANOVA), including Time (Baseline, Film, Recovery) as a within-subjects factor, and Group (Irrational, Rational, Acceptance, Control) as a between-subjects factor. Second, to investigate group differences in negative meta-emotions and perceived emotional control experienced during the film, a series of ANOVAs were conducted with these variables examined as dependent variables.

## 3. Results

### 3.1. Preliminary analysis

No significant differences between-groups were found for age [ $F(3,210) = 1.722, p = .16$ ], depressive symptoms [ $F(3,210) = 0.303, p = .82$ ], and experiential avoidance [ $F(3,210) = 0.162, p = .92$ ], but significant differences emerged with respect to gender [ $\chi^2(3, N = 214) = 11.864, p = .008$ ]. Thus, gender was used as a covariate in all statistical analyses. Means and standard deviations for all study variables are presented in Table 1.

### 3.2. Manipulation check questions

The manipulation checks revealed a significant effect of Group on the extent to which participants irrationally evaluated their emotions [ $F(3,206) = 159.13, p < .001, \eta^2p = 0.69$ ], rationally evaluated their emotions [ $F(3,206) = 14.52, p < .001, \eta^2p = 0.17$ ], and accepted their



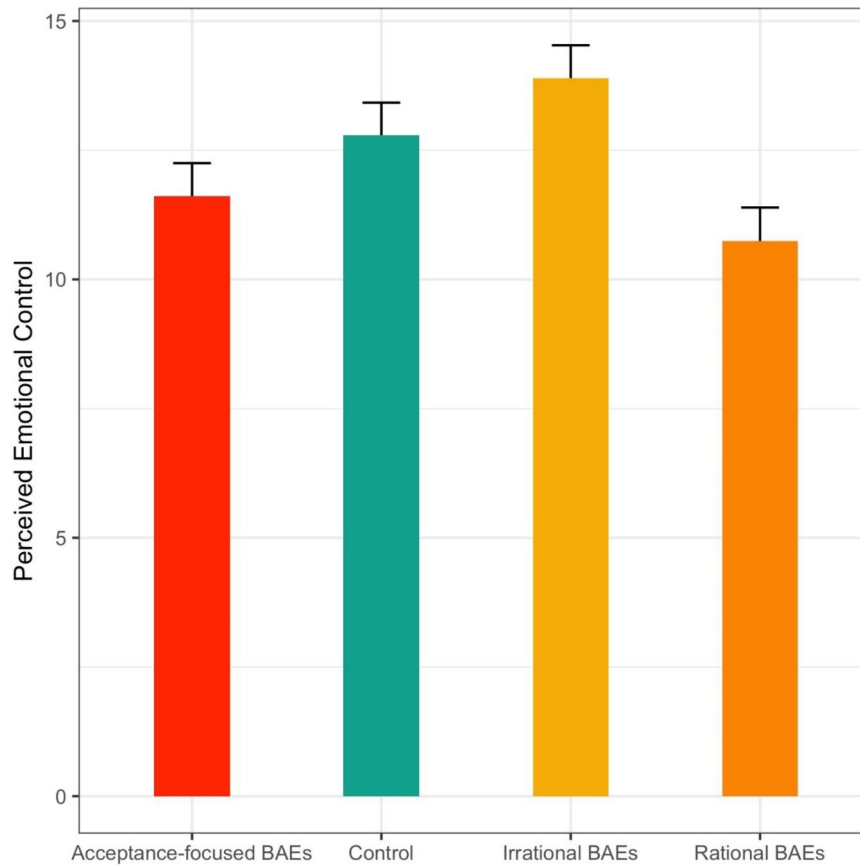


Fig. 3. The effects of BAEs on perceived emotional control.

emotions [ $F(3,206) = 36.81, p < .001, \eta^2p = 0.34$ ]. Post-hoc test confirmed the efficacy of the manipulation showing that the Irrational BAEs group engaged more in an irrational evaluation, the Rational BAEs group more in a rational evaluation, and the Acceptance-focused BAEs group more in acceptance compared to other groups ( $ps < 0.05$ ). Finally, no between-groups differences were found with respect to participants' ability to watch the film carefully or to follow the experimental instructions ( $ps > 0.05$ ).

### 3.3. The effects of BAEs on negative emotions and physiological indexes

For PANAS-N, results (Greenhouse-Geisser corrected) showed a significant effect of Time [ $F(1.815,379.276) = 7.34, p < .001, \eta^2p = 0.03$ ], Group [ $F(3,209) = 4.05, p < .05, \eta^2p = 0.05$ ], and Time by Group interaction [ $F(5.444,379.276) = 2.78, p < .05, \eta^2p = 0.03$ ].

For SCL (Huynh-Feldt corrected), we found a significant Time effect [ $F(1.428,279.876) = 9.69, p < .001, \eta^2p = 0.04$ ], but a non-significant Group and Time by Group interaction effect ( $ps > 0.05$ ). Similarly, a significant Time effect was found for RSP (Greenhouse-Geisser corrected) [ $F(1.827,372.609) = 6.40, p < .05, \eta^2p = 0.03$ ], but a non-significant Group and Time by Group interaction effect ( $ps > 0.05$ ). For HR, no significant effects were found ( $ps > 0.05$ ).

#### 3.3.1. Pairwise comparisons on negative emotions

Pairwise comparisons (Sidak corrected) performed on the main effect of Time revealed a significant increase in negative emotions from baseline to film ( $mean\ difference = -3.45, SE = 0.40, p < .001, 95\%CI = [-4.43; -2.48]$ ), and a significant decrease from film to recovery ( $mean\ difference = 4.30, SE = 0.32, p < .001, 95\%CI = [3.51; 5.09]$ ) when collapsing across conditions (thus, our emotional manipulation proved to be effective). Also, pairwise

comparisons (Sidak corrected) performed on the main effect of Group revealed that the Rational BAEs group reported less negative emotions than the Control group ( $mean\ difference = -2.68, SE = 0.81, p < .05, 95\%CI = [-4.84; -0.52]$ ). No other Group differences were found.

Time by Group pairwise comparisons (Sidak corrected) revealed that after the film, the Rational BAEs group ( $mean\ difference = -4.04, SE = 1.06, p < .001, 95\%CI = [-6.85; -1.22]$ ) and the Irrational BAEs group ( $mean\ difference = -2.84, SE = 1.03, p < .05, 95\%CI = [-5.59; -0.10]$ ) reported significantly less negative emotions compared to the Control group. However, after the recovery, only the Rational BAEs group ( $mean\ difference = -3.07, SE = 0.91, p < .05, 95\%CI = [-5.49; -0.66]$ ) and the Acceptance-focused BAEs group ( $mean\ difference = -2.36, SE = 0.89, p < .05, 95\%CI = [-4.73; -0.01]$ ) reported significantly less negative emotions compared to the Control group (Fig. 1). Moreover, after the recovery, the Rational BAEs group reported significantly less negative emotions compared to the Irrational BAEs group ( $mean\ difference = -2.56, SE = 0.91, p < .05, 95\%CI = [-4.97; -0.14]$ ). No other significant differences were found.

#### 3.3.2. Pairwise comparisons on physiological indexes

Pairwise comparison (Sidak corrected) revealed a significant increase in SCL from baseline to film ( $mean\ difference = -0.85, SE = 0.07, p < .001, 95\%CI = [-1.04; -0.67]$ ), but a non-significant decrease from film to recovery when collapsing across conditions ( $ps > 0.05$ ). For RSP, pairwise comparison (Sidak corrected) revealed an overall significant increase from baseline to film ( $mean\ difference = -0.98, SE = 0.24, p < .001, 95\%CI = [-1.56; -0.40]$ ), and a significant decrease from film to recovery ( $mean\ difference = 1.20, SE = 0.22, p < .001, 95\%CI = [0.65; 1.75]$ ).

### 3.4. The effects of BAEs on negative meta-emotions and perceived emotional control

ANOVAs confirmed the effect of BAEs on negative meta-emotions [ $F(3,209) = 19.27, p < .001, \eta^2p = 0.21$ ] and on perceived emotional control [ $F(3,209) = 4.41, p < .05, \eta^2p = 0.06$ ].

#### 3.4.1. Pairwise comparisons on negative meta-emotions and perceived emotional control

Pairwise comparisons (Sidak corrected) revealed that the Irrational BAEs group reported significantly more negative meta-emotions compared to the Rational BAEs group (*mean difference* = 4.41, *SE* = 0.73,  $p < .001$ , 95%CI = [2.46;6.35]), Acceptance-focused BAEs group (*mean difference* = 5.02, *SE* = 0.72,  $p < .001$ , 95%CI = [3.11;6.94]), and Control group (*mean difference* = 3.38, *SE* = 0.71,  $p < .001$ , 95%CI = [1.49;5.28]). Further, with respect to perceived emotional control, pairwise comparisons (Sidak corrected) revealed that the Rational BAEs group reported significantly less problems in perceived emotional control than the Irrational BAEs group (*mean difference* = -3.14, *SE* = 0.92,  $p < .05$ , 95%CI = [-5.60; -0.69]), but no other significant differences were found.

## 4. Discussion

The purpose of the current study was to investigate the effects of BAEs on emotional response and perceived emotional control. Previous therapeutic conceptualizations and empirical research suggested that how individuals evaluate their emotions has consequences, and the nature of these consequences depend of the nature of BAEs endorsed (irrational, rational).

Current results revealed that individuals endorsing irrational BAEs during an emotional film, as well as those endorsing rational BAEs showed significant decreases in negative emotions compared to the control group. However, the former reported significantly more negative meta-emotions compared to the other groups and poorer perceived emotional control compared to those endorsing rational BAEs. Thus, even though both approaches were effective in decreasing negative emotions, endorsing irrational BAEs comes with a meta-emotional cost and with a poorer perceived emotional control. Further, after a recovery period it seems that only individuals endorsing rational BAEs and those endorsing an acceptance-based approach showed significant decreases in negative emotions. Importantly, endorsing an acceptance-based approach during the film was beneficial only in the recovery period, while endorsing rational BAEs were effective in reducing negative emotions both during and after the film. Indeed, this result is in line with recent suggestions that acceptance might be especially important in recovering from distressing situations (Troy et al., 2018).

Finally, no significant differences emerged between groups on the physiological indexes. For what concerns this lack of effect of BAEs on the autonomic activity, it is important to consider that autonomic modulation primarily reflects physiological changes that support coping with the environment (Kreibig, 2010), rather than simply mirror the subjective affective state. In other words, they index the typical psychophysiological response pattern of the individual. In this experiment, participants were asked to adopt a specific set of cognitive rules to face the stressor, even though these rules might not represent their typical response style. Thus, the manipulation used might not be sufficient to highlight changes in the physiological component, which is resilient to changes without specific tools (biofeedback). Thus, future studies should investigate how autonomic activity change as a consequence of a long-term training in using specific BAEs.

However, current findings take an important step in establishing the effects of various BAEs underlying different therapeutic conceptualizations on the emotional response and perceived emotional control experienced by individuals in an emotional situation. Specifically, results point towards the detrimental effects of irrational

BAEs by contributing to more negative meta-emotions and to poorer perceived emotional control during an emotional film. Also, this study highlights the adaptive role of endorsing rational BAEs in decreasing negative emotions, as well as of an acceptance-based approach, especially in the recovery period. Thus, at a general level, these findings support recent empirical research suggesting that endorsing various BAEs entails important consequences influencing the perceived emotional control, as well as the subjective emotional response (Ford & Gross, 2018).

Also, our findings provide one of the first experimental support for the therapeutic conceptualizations which suggest that irrational evaluations of emotions are detrimental for emotional functioning (David et al., 2019). In addition, our study extends recent research on adaptive ways to approach emotions that arise in distressing situations. First, in line with ACT, our results point out the beneficial effects of the non-evaluative, accepting stance towards emotions on emotional recovery (Hayes, Steven et al., 2006). Second, contrary to ACT which states that an evaluative approach towards emotions is detrimental, our results highlight that a negative evaluative approach (albeit rational) might also be beneficial. We suggest that endorsing rational BAEs could contribute to a more efficient emotional functioning in distressing contexts, in terms of reducing negative emotions and preventing the escalation of negative emotional responses, which is often the case. Thus, an evaluative approach towards emotions might not always be harmful, but the consequences might depend on the nature of these evaluations (rational/irrational). Altogether, these findings suggest that assessing the content of BAEs in individuals and helping them develop more rational BAEs might improve their emotional functioning when facing emotional situations.

The current study has also several limitations. First, our sample was a convenience sample composed of undergraduate students. Future research should investigate the effects of BAEs in a more heterogeneous sample of individuals. Also, future studies should employ vulnerable/clinical populations that are at-risk to endorse irrational BAEs and investigate the effects of adopting more adaptive BAEs on the emotional functioning. Second, as an emotional task we used only a negative film clip, thus the generalizability is limited. Even though films are widely used as an emotion induction procedure and proved to be effective (Gross & Levenson, 1995; Maffei, Vencato & Angrilli, 2015), future studies should test whether current results could be replicated in more ecological situations. Third, we examined the effects of these beliefs in relation to overall negative emotions, and not in relation to more discrete/specific emotions, such as anxiety or sadness. Even though this approach provides more ecological validity, as in real-life situations individuals experience numerous negative emotions, it might be reasoned that particular/discrete emotions relate in different ways with different BAEs. Thus, future studies should account for this potential specificity. Finally, a related limitation is that as a measure of negative affect we used the PANAS scale. While this scale is a well-established measure of negative affect, it does not include items addressing low arousal negative affect, such as sadness. This is important given that in this study we used a sad film clip as an emotion induction task. Thus, it would have been more appropriate to use a scale that includes items assessing sadness and further investigate the effects of different beliefs about sadness.

Despite these limitations, current findings provide novel information about the effects of various BAEs underlying different therapeutic conceptualizations on the emotional response and perceived emotional control. Specifically, we pointed out the detrimental effects of endorsing irrational BAEs, as well as the beneficial effects of approaching emotions with acceptance or in a rational way (albeit still negative evaluative).

In conclusion, this study highlights that how individuals evaluate their emotions has important consequences for emotional functioning when navigating emotional situations. Thus, interventions that focus on instructing individuals to endorse adaptive ways in which to evaluate

their negative emotions might be effective in improving emotional functioning in these individuals.

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None.

### CRedit authorship contribution statement

**Răzvan Predatu:** Conceptualization, Investigation, Data curation, Formal analysis, Writing - original draft, Writing - review & editing, Project administration. **Daniel O. David:** Conceptualization, Writing - original draft, Writing - review & editing, Project administration, Supervision. **Antonio Maffei:** Data curation, Formal analysis, Writing - original draft, Writing - review & editing.

### Declarations of Competing Interest

All authors declare that they have no competing or potential conflicts of interest in relation to this work.

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### Supplementary materials

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