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DOCTORAL THESIS

THE COST OF EMOTIONAL REGULATION ON QUALITY OF LIFE

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Contents

Keywords: reappraisal, emotional self-regulation, cognitive strategies, emotional flattening.

I. CHAPTER I. THEORETICAL FRAMEWORK

1.1. Models and Characteristics of Emotional Regulation Strategies

Emotional self-regulation is defined in the literature as a set of automatic or consciously and voluntarily controlled processes that are involved in initiating, maintaining, or modifying the occurrence, intensity, or duration of emotional/affective states (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Gross & Thompson, 2007; Webb et al., 2012).

The way these processes unfold, the mechanisms involved, and the categories of emotional self-regulation strategies manifested in aversive everyday life situations have been synthesized in multiple conceptual models (Bonanno & Burton, 2013; Gross, 1998; Koole, 2009; Larsen, 2000; Parkinson & Totterdell, 1999; Thayer, Newman, & McClain, 1994).

One of the best-studied models and one that has become a standard for reporting and evaluating emotional self-regulation strategies is the process model of emotional self- regulation developed by Gross (1998, 2015). This model provides a solid foundation in understanding the distinction between emotional self-regulation strategies such as distraction, concentration, cognitive reappraisal, and suppression of emotions, thoughts, and emotional expression (Webb et al., 2012). Bonanno and Burton's (2013) model of emotional self- regulation flexibility (Bonanno and Burton, 2013) provides an important complement by including contextual sensitivity, self-regulation repertoire, and continuous outcome- dependent adjustment as important

factors in understanding inter-individual differences in the heterogeneity of outcomes related to the effectiveness of different reappraisal strategies. Table 1 shows a comparison between t h e ways of categorizing and defining cognitive reappraisal strategies in the literature.

Studies	Similarities			Differences	
	Normality	Decrease negative evaluation	Humor, linguistics and negation	Problem solving	*Various general definitions*
McRae et al., (2012)	Acceptance	Change current circumstances. Change future circumstances, Explicite positivity	Reality challenging, distancing	Tehnical-Analytical-Problem Solving	Agency is a reappraisal strategy focused on external help
Papousek et al., (2019)	A different world experience		Metonymy, metaphor, polysemy, word play, fantasy and fiction, change to narrative point of view		
Nook et al., (2020)			Third person pronoun		
Gross și Thompson (2007), Webb, et al., (2012)	Reappraisal of the emotional response, Perspective taking	Reappraisal of emotional stimuli			Mixed reappraisal
Lennarz et al., (2018)	Acceptance	Reaapraisal	Distraction, Avoidance and Distancing	Reappraisal, acceptance and problem solving are viewed as different self-regulation strategies	Social support
Bonanno & Burton, 2013					Frequency, repertoire, context and feedback
Sheppes et al., 2014					Automatic and controled reappraisal
Zeier et al., 2019					Fluency of assessment and flexibility of reappraisal
Ford et al., 2017; Ford & Troy, 2019					Reappraisal attempt and reappraisal succes

The cells include the names of the reassessment categories described by different authors

The analysis of the current state of the literature allows us to synthesize some conclusions and identify some important research directions. More precisely we can conclude:

1. A primary factor responsible for the significant differences in the effectiveness of emotional self-regulation strategies lies precisely in experimental research designs - studies conducted in the laboratory with affective stimuli (pictures, videos or vignettes) versus studies with a higher degree of ecological (studies using the daily diary method or Experience Sampling Method - ESM) (Boemo and solab. 2022)
2. Reappraisal strategies have proven to be among the most effective ways of self-evaluation. Emotional regulation in the sense of changing positive and negative emotions in the desired direction and at the desired level (Deplancke et al. 2022; Hofmann et al., 2009; Koval et al. 2014; Newman & Nezlek, 2021; Troy et al., 2018; Webb et al., 2012; Wenzel et al., 2023).
3. Reappraisal strategies can sometimes be used consciously and voluntarily, but they can also be activated automatically and without conscious effort (Ma et al., 2019; Vlasenko et al., 2024).

4. Automatically triggered reappraisal strategies come with lower cognitive effort, suggesting on the one hand a higher likelihood of their use, but studies show conflicting results in this regard (Ma et al., 2019; Vlasenko et al., 2024; Milyavsky et al., 2019).
5. Degree of habituation of reappraisal strategies, repertoire of reappraisal strategies, cultural environment, awareness (Troy et al., 2018; Sheppes et al., 2014; Sheppes et al., 2014; Ortner et al., 2016; Sheppes & Meiran, 2008; Suri et al. 2015; Brans et al., 2013), belief in the controllability of emotions, perceptions of the usefulness and

justifiability of emotions (Deplancke et al. 2022; Gutentag et al., 2016; Petrova et al., 2023), can significantly influence the appeal of reappraisal strategies and their effectiveness.

6. Habituating reappraisal strategies can extend the effect of reappraising an immediate aversive situation, producing prospective effects on subsequent events (Boemo et al. 2022).
7. Reappraisal strategies based on categorization criteria can be divided into many types of categories, an important distinction is between strategies focused on reinterpreting the reality/situation versus strategies focused on self/emotions (Ma et al. 2019; Petrova et al. 2023; Tamir 2019).
8. Different authors have highlighted different specific reappraisal strategies, drawing on relatively heterogeneous definitions and operationalizations, but they have served to highlight the importance of defining reappraisal strategies at the specific level in order to understand inter-individual differences and to be able to develop effective intervention programs (Gross & Thompson, 2007; Fink et al., 2017; McRae et al., 2012; Papousek et al., 2019; Webb, et al., 2012).
9. The results regarding the effect of reappraisal strategies on the increase or decrease in positive emotions (life savoring) is unclear and contradictory (Ma et al., 2018; Tamir et al., 2007, 2008; Tamir & Ford, 2009, 2012). Could habituation or the prospective effect of reappraisal produce emotional flattening in both negative and positive emotions?

Defining the concepts related to reappraisal strategies and summarizing the current state of the research has highlighted important elements in understanding the effects of reappraisal strategies on well-being or quality of life from the perspective of the degree to

which life is savored by the intensity of positive emotions.

1.2. Research Relevance

The complexity of the cognitive processes and factors involved in moderating self- regulation in general and reappraisal strategies in particular, lead to significant heterogeneity in the effectiveness outcomes. Second, they lead to possible uncertainty in the selection of contexts and intervention modalities to increase the quality of life of both healthy individuals and those suffering from psychopathology. Multiple meta-analysis studies (Alarcón-Espinoza et al., 2022; Aldao et al., 2010; Boem et al., 2022; Eadeh et al., 2021; Kämpf et al, 2023; Schütz & Koglin, 2023) revealed significant differences in the reviewed studies in terms of operationalization modalities and results obtained, leading to difficulties in drawing firm conclusions about (a) differences in the effectiveness of different reassessment strategies (Alarcón- Espinoza et al. 2022; Kämpf et al., 2023), (b) the effectiveness of intervention programs (Eadeh et al, 2021), (c) about the effect of reappraisal strategies on increases or decreases in positive emotions (Aldao et al., 2010; Kämpf et al., 2023, Eadeh et al, 2021), respectively (d) the relationship between reappraisal strategies and specific behaviors (Schütz & Koglin, 2023). Based on the findings of these studies, we can consider the possibility that these differences are due to (a) the fact that multiple studies did not account for the distinction between emotion-focused versus reality-focused reappraisal strategies (Ma and et al., 2019; Vlasenko et al., 2024) and the possibility that they might produce different emotional outcomes, respectively (b) some reappraisal strategies might induce a emotional flattening versus others that might generate intensification of

positive emotions (Boem et al., 2022; Hoffmann et al., 2009; McRae et al., 2012; Mueller et al., 2024; Vlasenko et al., 2024). It is important that future studies include the possible differentiating elements highlighted above, i.e., investigate the possibility of a possible cost of an increased level of use of reappraisal strategies. A cost that could consist of a decrease in quality of life defined as the degree to which life is savored by experiencing intense positive emotions.

II CHAPTER II. RESEARCH OBJECTIVES AND METHODOLOGY

2.1. General Objectives of the Thesis

Reappraisal strategies are presented in multiple studies as the most important and effective category among emotional self-regulation strategies. The importance of reappraisal strategies is also evidenced by the significant increase in the volume of studies over the last 20 years (Alarcón-Espinoza et al., 2022) investigating its characteristics. The optimal use of reappraisal strategies in particular, and emotional self-regulation strategies in general, could be defined as the means by which a person maintains an emotional balance.

The literature suggests to be guided by a unitary implicit underlying assumption, specifically the idea that habituation and increased use of reappraisal strategies leads to an optimal and adaptive emotional level (Troy et al., 2018; Sheppes et al., 2014; Ortner et al., 2016; Sheppes & Meiran, 2008; Suri et al, 2015; Brans et al., 2013). Thus the question emerges to what extent there might be a curved relationship or in other words an optimal level of reappraisal beyond which an excess of reappraisal strategies might have the effect of flattening emotional valence and arousal (Hoffmann et al., 2009; Mueller et al., 2024).

The overall objective of this thesis is to investigate the extent to which an increased level of emotional balance in the use of reappraisal strategies may have a cost on quality of life due to the possibility of decreased life savoring through emotional flattening of all emotions. In order to achieve this general research objective, we divided the dimensions under study into sub-objectives from which the

three studies of the present thesis emerged.

The first study has two objectives (a) to identify potential subsidiary mechanisms to the reappraisal process, and (b) to identify and clearly define specific intervention strategies at the level of intervention technique.

Based on the reappraisal strategies identified in the first study, namely, five reality- focused reappraisal strategies, three emotion-focused reappraisal strategies, and two categories of cognitive mechanisms that influence the effectiveness and use of reappraisal strategies, the objectives for the next two studies were derived.

For the second study the major objective was to determine the relationship between different strategies of cognitive reappraisal and the level of emotional flattening, assessing the predictive power of reality-focsed versus emotion-focused reappraisal. More specifically, our aim is to reveal the level of emotional flattening for subjects with high use of reality-fcused reappraisal strategies.

Given that not only the type but also the repertoire of reappraisal strategies can significantly contribute to differences in the effectiveness of emotional response modulation (Bonanno & Burton, 2013), the objective of the third study was to identify (a) the characteristics of the repertoire of emotional regulation strategies, respectively (b) the relationship between the repertoire of emotional self-regulation strategies (including avoidance and distraction as emotional regulation strategies) and positive and negative emotions.

2.2. Research methodology

Given the complexity of the field under study, the orientation towards research projects aiming at an ecological approach (Boem et al., 2022; Brans et al., 2013; Buhle et al., 2014; Gunaydin et al., 2016; Mueller et al., 2024) was our methodological desideratum, more precisely the idea was to use experience sampling methods (ESM). Unfortunately due to resource and time limitations the research methods we had to resort to in the three studies to be presented below was at best a mixed (quantitative-qualitative) approach.

In the first study a mixed research approach was applied, drawing on audio-video recording of subjects' responses regarding reappraisal strategies used in various exposed life situations. On the transcription of the cognitive content, an inductive content analysis was performed and the code meaning method described by Hennink and Kaiser (2022) was used. Quantitatively, the collection (using likert scales) of emotional response measured by discrete and non-discrete methods was used.

In the second and third studies, the gorilla app was used for data collection with respect to standard images from the standardized Nencki Affective Picture System (NAPS) (Marchewka et al., 2014; Michałowski et al., 2015; Riegel et al., 2016; Wierzba et al., 2015). The research design being a predominantly quantitative research design using a version of research design similar to experimental laboratory studies, as standardized affective stimuli were used to determine the activation and use of reappraisal strategies. Both positive and negative affective stimuli were used, taking into account the necessary characteristics of these stimuli to activate reappraisal and not appeal to suppression, we refer to stimulus intensity studies (Suri et al., 2015).

III CHAPTER III. ORIGINAL RESEARCH CONTRIBUTIONS

3.1. STUDY 1

3.1.1. Introduction

Cognitive reappraisal is a method of emotional self-regulation that results in perceiving aversive aversive events from a different perspective and/or reinterpreting their meaning to change their emotional impact (Fink et al., 2017; Ford & Troy, 2019; Ford & Troy, 2019; Lazarus & Alfert, 1964; Lazarus & Folkman, 1984; Newman & Nezlek, 2021; Perchtold et al., 2019).

As research by Perchtold et al, (2019) suggests, not all reappraisal strategies show the same level of effectiveness in changing dysfunctional emotional responses into an adaptive emotional response. Furthermore, the authors hypothesized that not all forms of cognitive reappraisal are beneficial. In this regard, McRae et al, (2012) state that in order to identify differences in the emotional outcome efficacy of reappraisal strategies used by subjects, it is necessary to consider the following three criteria: a) the primary purpose of the reappraisal strategies (increasing positive emotions versus decreasing negative emotions); b) the reappraisal tactics used to challenge/ combat reality; and c) the extent to which the effect on emotion regulation depends on changes in the first two criteria.

These results do not provide a clear insight into the underlying cognitive mechanisms. Ford & Troy (2019) formulated a conceptual framework that identified some shortcomings in current research and recommended directions for future research, two of which focused on identifying the mechanisms responsible for inter-

individual differences and designing interventions that best help individuals in stressful situations.

According to Brans and Verduyn (2014), in order to have a better understanding of emotional experience in specific situations, it is necessary to determine both the nature of an emotion and its intensity and duration (Verduyn et al., 2009; Verduyn et al., 2012). Verduyn et al. (2012). Thus the authors suggest that this approach could be useful even in cases of self-evaluation. More specifically, using discrete emotional categories (such as anger, fear, etc.) as well as non-discrete emotional dimensions (such as valence and physiological arousal) (Betella & Verschure, 2015; Marchewka et al., 2013; Riegl et al., 2015) could help to understand differences in emotional response to different reappraisal strategies across different studies.

In our study, first, we aim to identify whether there are cognitive dimensions or mechanisms that have been omitted by previous studies. Second, we try to identify the reappraisal strategies used by the participants, and third, to verify the level of effectiveness of the reappraisal strategies used by the participants in changing a dysfunctional emotional response into an adaptive response.

3.1.1.1. Aim of this study

The questions that our study aimed to answer were: a) are specific reappraisal strategies sufficiently well defined in the scientific literature to allow their use in training/intervention programs; and b) what cognitive processes are activated during the reappraisal process that may influence emotional outcomes.

Based on our previous findings and our research objectives, we used a mixed research design, namely: a) inductive content analysis with the aim of identifying possible previously omitted cognitive mechanisms underlying the reappraisal; and (b) measuring pre- vs. post-intervention emotional responses (non-discrete and discrete measures of emotional response) to test the effectiveness of the reappraisal strategies that were identified and utilized. We expect discrete and non-discrete negative emotion levels to be significantly lower at the post-reappraisal stage (Bonanno & Burton, 2013; Deplancke et al., 2022; Fink et al., 2017; Ford et al, 2017; Lazarus & Alfert, 1964; Lazarus & Folkman, 1984; Newman & Nezlek, 2021; Perchtold et al., 2019; Sai et al., 2015; Scult et al., 2016; Sheppes & Gross, 2010; Sheppes et al., 2012).

3.1.2. Method

Participants

Our sample consisted of 24 subjects from Romania, from various professional backgrounds (executive directors, managers, medical assistant, make-up artist, teacher, freelancer, student, salesman, accountant, housewife, cook, factory worker and cashier), with a mean age of 33.0 years (19-56 years, *SD* = 10.3, 79.2% female). The subjects were of nationality Romanian, Hungarian and German. 37.5% were married, 4.2% were engaged, 16.7% were divorced or widowed and 41.7% were neither married, engaged, divorced or widowed. The educational level of the participants was as follows: 62.5 % had completed high school; 8.3% had a bachelor's degree; and 29.2% had a master's degree. We tested the saturation of the sample size using the coded significance method (Hennink & Kaiser, 2022), and the sample reached

saturation at 12 subjects. Participants volunteered for the study and no incentives were offered for participation. Data were collected between November 2020 and March 2021. An information sheet and consent form were included at the beginning of the study. Participants were informed that they could choose not to answer the questions and could withdraw at any time. Participants were informed about the confidentiality of the information collected, i.e. that it was to be used exclusively for the present study. Project approval was obtained from the appropriate review committees within the authors' institution. The group was selected to include members of the general population with no history of mental health problems.

Instruments

Emotional response. The self-report method described by Riegl et al. (2015), (Betella & Verschure, 2015; Marchewka et al., 2013). Discrete emotional categories (joy, anger, fear, disgust, pity, sadness, and surprise) were measured using a 5-step Likert scale (1- absent to 5- high). The non-discrete emotional dimensions (valence, arousal, approach) were measured using a 5-step Likert scale (where 3 was the neutral value between the two extremes, e.g., between negative and positive for valence).

Re-evaluation strategies. The RIT is a measure of reappraisal strategies using four anger- provoking vignettes (Weber et al., 2013) and four anxiety-provoking vignettes (de Assuncao et al., 2015; Perchtold et al., 2019), which present subjects with types of everyday situations that elicit an emotional response. The vignettes were adapted, first by improving the original description of each situation by including sensory cues (Andrade et al., 2012; Schifferstein, 2009) to facilitate the process of identifying and imagining the negative situation. Second, we substituted some locations or details to make them easier to identify for a wider population.

Procedure

Data were collected online. In order to undertake an inductive content analysis, the content of the recordings was transcribed. Demographic information was collected from participants who consented to the use of their data in accordance with the specific legal regulations of the research.

Inductive content analysis was performed by the authors. In the first instance, we used McRae et al. (2012). We analyzed the similarities and differences between the reappreisal categories used in our study and those used by McRae et al. (2012). We aimed to identify categories that were not included in the benchmark categories or had limitations that could be translated into specific intervention techniques. Second, we aimed to identify cognitive processes that could possibly be present that could impact the use of reappraisal strategies (Brockman et al., 2023; Cohen Ben Simon et al., 2022; Wang & Yin, 2023). To validate the possible reappraisal strategies we identified, we measured changes in emotional responses. We used the code-meaning method described by Hennink and Kaiser (2022) and inductive content analysis. The fact that, after 12 subjects, the authors found no new reappraisal strategies suggested that the saturation point of possible reappraisal strategies had been reached.

For each vignette/emotion-evoking situation, data were collected in three steps, as follows: a) subjects were instructed to read the vignette aloud and imagine the situation happening to them. They were then asked to rate their emotional response by selecting fields on the form provided; (b) subjects were then asked to try to rethink the unwanted situation and describe aloud as many ways as possible to reappraise the specific situation in ways that would lessen their negative emotions; and (c) subjects were asked to re-evaluate their emotional response to the situation, and the contents of the

vignette were displayed again so that they could be read again (Perchtold et al, 2019; Weber et al., 2013). A Google Form was used during the video call to record the pre- and post-reevaluation of the emotional response related to each situation.

Statistical analysis

Descriptive analyses were performed with JAMOVI. To determine and test the relationship between the variables, we used the following statistical calculations and tests (at 95% confidence interval): (a) descriptive statistics; and (b) Wilcoxon paired-samples test for the pre vs. post re-evaluation comparison test. The Wilcoxon test was selected as the optimal test for highlighting possible significant differences due to the non-parametric characteristics of our results.

3.1.3. Results

3.1.3.1. Non-discreet emotional response

Comparing the emotional responses operationalized by non-discrete measures obtained between the first and the third stage of our study, before and after the reappraisal task, we obtained statistically significant differences in the levels of valence pre versus post, arousal and approach for both anger and anxiety vignettes.

3.1.3.2. Discrete emotional response

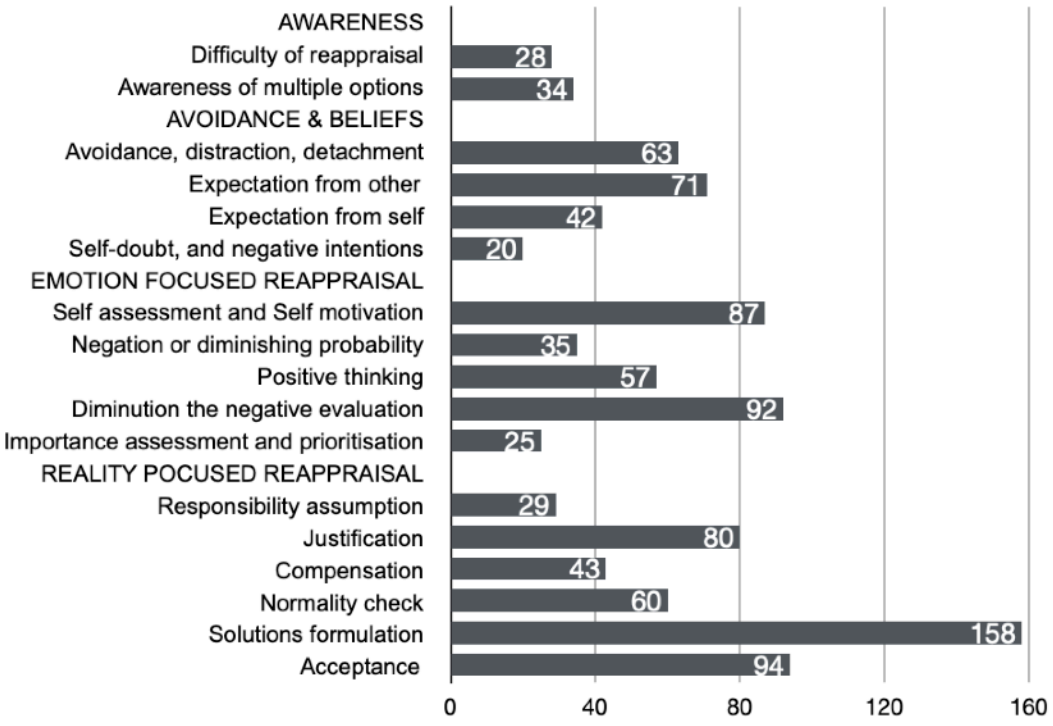
For anger-stimulating situations, the pre/post-intervention comparison showed no statistically significant differences for pity and the smallest effect size for fear. For anxiety- stimulating situations, the pre/post-intervention comparison showed no statistically significant differences for disgust.

3.1.3.3. Cognitive and re-appraisal strategies

Based on the inductive content analysis, we identified 17 cognitive and reappraisal strategies used by the subjects in our sample to change their emotional responses to the situations presented in the vignettes (see Figure 1).

Figure 1.

Frequency of reappraisal strategies and additional cognitive content



Note. as a point of reference for assessing the frequency of each reappraisal strategy, there are 192 total situations (value that is calculated multiplying the 8 emotion eliciting situation with N= 24 subjects)

The cognitive and reappraisal strategies identified could be divided into at least two categories: (a) 11 effective reappraisal strategies focused on reappraising the emotional response and reality reappraisal strategies, respectively (b) 6 additional cognitive processes that were used alongside self-regulation processes, such as awareness, beliefs and emotional avoidance/ detachment as alternatives to reappraisal.

3.1.4. Discuss

In our attempt to find possible subsidiary mechanisms to understand the variation in the effectiveness of reappraisal strategies for regulating unwanted emotions (Deplancke et al., 2022; Ford et al., 2017; Ford & Troy 2019; Newman & Nezlek, 2021), we identified (a) awareness as a possible mediator, (b) eleven reappraisal strategies and (c) two cognitive processes that may play a role in the efficacy of reappraisal as an emotional self-regulation strategy (Brockman et al., 2023; Cohen Ben Simon et al., 2022; Wang & Yin, 2023).

3.1.4.1. Changes in emotional response to stressful situations

Based on our results, the reappraisal strategies were effective in changing participants' emotional response. This can be seen as a first level of validation of our prospective analysis of the identified reappraisal strategies.

3.1.4.2. Awareness and reappraisal strategies

In the process of identifying multiple reappraisal strategies, we identified three levels of awareness: (a) subjects who could not find a different perspective on the situations presented and who verbalized the difficulty of reappraisal imagined negative situations; (b) subjects who could easily find reappraisal strategies but who were limited to one version of the imagined situation; and (c) subjects who could imagine variations of the situation and found different reappraisal strategies depending on the context, in other words, subjects who were aware of multiple possibilities.

The results are consistent with the findings of Füstös et al. (2013) that interoceptive awareness facilitates emotional regulation in the sense of decreasing emotions, a phenomenon that has also been identified by measurements at the physiological level (Brockman et al., 2023; Cohen Ben Simon et al., 2022; Wang & Yin, 2023).

3.1.4.3. Two categories of additional reappraisal strategies

The reappraisal strategies identified include strategies described by McRae et al. (2012) but are not limited to these. Acceptance is a reappraisal strategy that normalises the negative event and can include a wide variety of perspectives on the negative things experienced (McRae et al., 2012). Thus, we have identified four reappraisal strategies that could be included in this category of reappraisal labeled acceptance, i.e., the delineation of which I consider beneficial when undertaking future interventions and training. Based on our results acceptance includes (a) justification, (b) responsibility assumption, (c) verifying normality, and (d) acceptance, each of which will be treated and studied separately. Compensating for negative events emerged in the content analysis as an additional reappraisal strategy, focusing on finding something useful, though not necessarily something positive, in situations that cause anger or anxiety.

3.1.4.4. Reappraisal beliefs and strategies

The participants' focus on verbalizing their expectations about themselves and others led to subsections' de-focusing on the search for reappraisal strategies. This observation suggests that activating beliefs about expected behavior or outcomes in a

given stressful situation might interfere with the process of finding and effectively applying reappraisal strategies as emotional self-regulation.

Previous studies have emphasized the importance of beliefs on the efficacy of the emotional self-regulation process, (Akyunus et al., 2021; Buffie & Nangle, 2022; Deplancke et al., 2022; Ford et al., 2018, Petrova et al., 2023). These studies support our finding that the importance of beliefs and expectations about how a situation could or should be can interfere with the process of finding and applying reappraisal strategies in an effective way.

3.1.4.5. Limitations and future directions

The limitations of our study are due to the characteristics of the mixed exploratory design. First, the instructions given to participants to verbalize the identification of reappraisal strategies could have influenced the thought process and captured only declarative items. Second, the relatively short time between pre- and post-evaluation of emotional responding with respect to the presented situations suggests the possibility that participants' responses may have been influenced by the idea of an expected response. Third, the specific situations might have influenced what kind of reappraisal strategies were more likely to be activated or utilized. These three limitations lead us to be cautious about the conclusions of our study, and highlight the need to undertake future studies to test these observations. The fourth limitation might support our findings that some of the subjects stated in the post-experiment debriefing that, in some cases, during the first time reading the emotion-evoking vignettes, before being given the task of reassessing the situation, i.e., before evaluating their initial emotional response, they had already considered alternative interpretations of the event.

Conclusions

Our paper is a contribution to the existing literature in two respects. First, it identifies specific cognitive techniques by clearly defining four acceptance-focused reappraisal strategies. Second, it emphasizes the role of awareness and activation of specific beliefs on influencing the self-regulation process.

We believe that our results suggest two main directions for future research. One direction would be to study the possible mediating role of awareness and expectations in the effectiveness of reappraisal strategies. A second direction would be oriented towards testing the effectiveness of training and intervention based on the eleven identified reappraisal strategies.

We believe that our study has highlighted important factors involved in the variation in the effectiveness of reappraisal as an emotional self-regulation strategy, as presented in the existing scientific literature.

3.2. STUDY 2

3.2.1. Introduction

Positive and negative emotions play important roles in our lives, from increasing the motivation needed to achieve our goals, to maintaining meaningful relationships and enhancing cognitive flexibility (Gruber, 2011a, 2011b; Li et al. 2020; Newman & Nezlek, 2022). Consequently, optimal emotion regulation is vital for our well-being and adaptability to our environment. In this regard, studies on the increase or decrease of positive and negative emotions through reappraisal strategies need to lead to understanding and guiding effective interventions to enhance and maintain well-being (Farmer & Kashdan, 2012; Kanske et al., 2010; Li et al., 2020; Newman & Nezlek, 2022; Shafir et al., 2018).

Multiple studies in the scientific literature investigating the efficacy and mechanisms of reappraisal strategies and other modalities of emotional self-regulation often use specific instructions to increase or decrease positive and negative emotions in their experimental designs. Kanske et al. (2010) achieved a significant decrease in the intensity of negative as well as positive emotions in the reappraisal condition in response to images eliciting negative, neutral, and positive emotions using a research procedure that asks participants to decrease the intensity of their emotional response. The authors also revealed changes in neural network responses. Gunaydin et al. (2016) showed, in their study using the experience sampling method (ESM), that reappraisal as a trait (in other words, a high use of reappraisal strategies) could be responsible for both lower negative emotions and for lower overall emotional range, including positive emotions in our daily lives.

In contrast, Brans et al. (2013) through two studies using the experiential sampling method (ESM), aimed to investigate the use of six emotional regulation strategies encountered in the complexity of everyday life. In one of the studies the authors identified a positive relationship between reappraisal and increased intensity of positive emotions. Unfortunately, they only measured reappraisal by the frequency of use of this emotional regulation strategy, without differentiating between emotion-focused and reality-focused strategies. Second, positive emotions were operationalized using only two categories (happiness and relaxation). Typically, positive emotions with a high level of physiological arousal would be the main target of emotional self-regulation, more specifically emotions such as enthusiasm, happiness, pride or joy. Newman and Nezlek, (2022) make a clear distinction between activated and deactivated positive affect. Differences in emotional response operationalization might also be an important factor in understanding the source of the increase versus decrease in positive emotions as a result of the reappraisal strategies employed. We find that assessing emotion via valence and arousal, as operationalized in several studies on reappraisal strategies (Lalot et al., 2014; Lin et al., 2022; Lin et al., 2022; Neta et al., 2022; Vlasenko et al., 2024), might be an optimal way to identify possible emotional flattening.

The reappraisal strategies that have been found to be used more frequently by previous studies (Ruan et al., 2024; Vlasenko et al., 2024) could be considered reality-focused reappraisal strategies. Gross and Thompson (2007) describe specific reappraisal strategies according to the reappraisal object. Webb et al. (2012), classify reappraisal strategies into four main categories (a) emotional stimuli, (b) emotional response, (c) perspective taking, respectively (d) mixed approach, therefore we could

talk about two major categories (a) reality-focused reappraisal strategies, respectively (b) emotion-focused reappraisal strategies (Blanke et al., 2022).

If the findings of these studies are correct (Buhle et al., 2014; Gunaydin et al.,2016; Lalot et al., 2014; Li et al., 2020; Shafir et al., 2018; Kanske et al, 2010), this could mean that the use of a high level of reality-focused reappraisal strategies could decrease the intensity of all emotions, therefore suggesting the possibility of reducing our ability to savor or fully enjoy our lives (Neta et al., 2022; Yuan et al., 2014).

3.2.1.1 Aim of the present study

The main objective of our study is to determine the relationship between different emotional regulation strategies and the level of emotional flattening, in particular assessing the predictive power of reality-focused versus emotion-focused-reappraisal. More specifically, our aim is to highlight the level of emotional flattening for subjects with a high use of reappraisal strategies in general and reality-focuesd reappraisal in particular.

In line with our objective, we hypothesized two hypotheses. We expect that the frequency of use of emotional regulation strategies, from the category of reality-focused reappraisal, predicts the degree of emotional flattening. Second, we expected that the frequency of use of emotional regulation strategies, in the category of emotion-focused reappraisal, does not predict the degree of emotional flattening.

3.2.2. Methods

3.2.2.1. Participants

Our experimental sample consists of 108 subjects. Subjects ranged in age from 19-67 (mean age = 42, SD = 9.6; 85.7% female and 14.3% male participants; family status 66% married, 17% unmarried, 12.3% divorced, 4.7% other) with a significant variety of professional occupations. Participants were recruited by snowball sampling methods. An invitation to participate in the study including the access link in the gorilla app was distributed on social media, for this sample was offered the opportunity to participate in an online webinar as a reward for participation in the study. Subjects were presented with how the study was conducted and a consent form. Participants could choose to withdraw at any time and were informed that the data collected are confidential and will be used solely for the purpose of this study. Project approval was obtained from the appropriate review committees at the authors' institution. The group of participants was selected to include members of the general population.

3.2.2.2. Measures

Emotional flattening. In our study, we consider emotional flattening as a dependent variable. To measure emotional flattening, we ask participants to rate both their emotional valence and physiological arousal (Betella & Verschure, 2015; Kanske et al. 2010; Marchewka et al., 2013; Neta et al., 2022; Riegl et al., 2015). For both emotional valence and physiological arousability, participants will rate their emotions on a scale where the midpoint represents a neutral emotional state. The scale ranges from -5, indicating maximal negative valence, to +5, indicating maximal positive

valence. For arousal, from -5, indicating an increased level of calmness, to +5, indicating maximum arousal/agitation. To calculate the emotional flattening index for each trial, we compute z- scores for both emotional valence (Zv) and arousal (arousal - Za). The average of these z- scores for all trials will represent the emotional response of each participant. a higher average z-score indicates less emotional flattening, meaning that participants experience a wider range of emotions. In contrast, a mean score approaching 0 suggests greater emotional flattening, indicating a narrower range of emotional experiences.

Reality-focused reappraisal strategies. Reality-focused reappraisal is an independent variable in our study and comprises the following sub-strategies: acceptance, justification, normality checking, taking responsibility, and formulating solutions. These focused reappraisal strategies were identified in a previous study (Gross, 2015; McRae et al. 2012; Vlasenko et al. 2024; Wild et al. in press). In our study design, reality-focused reappraisal will be calculated as the sum total of the frequencies in which participants indicate the use of the specific sub-strategies that comprise it.

Emotion-focused reappraisal strategies. Emotion-focused reappraisal is an independent variable in our study and includes the following sub-strategies: humor, positive thinking, compensation (Gross, 2015; McRae et al. 2012; Vlasenko et al. 2024; Wild et al. in press). Similar to how we proceeded with the re-evaluation Reality-centered, emotion-centered reappraisal will be calculated as the sum total of the frequencies in which participants indicate the use of the specific sub-strategies that comprise it.

3.2.2.3. Procedure

We used 16 pictures selected from the standardized Nencki Affective Picture System (NAPS) (Marchewka et al., 2014; Michałowski et al., 2015; Riegel et al., 2016; Wierzba et al., 2015) as positive emotional stimuli and Neg, displayed in random order for each subject.

The mean valence for the selected negative images was m=3.24; SD=1.44, and m=7.42; SD=1.26 for the selected positive images. The valence values for the entire NAPS image database ranged from m=1.33-8.54. Each image will be presented for 15 seconds, followed by the evaluation of reappraisal strategies (spontaneous reappraisal) and emotional response scales (valence and excitability). The experiment was implemented using the gorilla experiment builder app.

3.2.2.4. Statistical analysis

We performed the statistical analysis with JAMOVI. In order to determine and test the relationship between the variables, we used the following calculations and statistical tests (at a confidence interval of 95%): (a) descriptive statistics, including a test of normality of the distribution; (b) for our hypotheses we used linear regression with two dimensions of the dependent variable (1) valence, (2) excitation.

3.2.3. Results

Analyzing the nature of the relationship between reality-focused reappraisal strategies and emotional response as measured by valence and arousal, we identified an important difference between the influence of reappraisal strategies on stimuli eliciting positive versus negative emotions.

Mainly, in the case of positive stimuli, justification as a reappraisal strategy influenced the emotional response measured by both valence and arousal. On the other hand, acceptance as a reappraisal strategy mainly showed an effect on physiological excitability as an emotional response. The emotional response being standardized in Z-values, the meaning in relation shows us that, (a) justification may influence an emotional flattening in terms of valence of emotions, but it amplifies the physiological arousel of the emotional response, whereas (b) acceptance may lead to an emotional flattening of the physiological excitability of the emotional response to positive emotions.

In cases of stimuli eliciting negative emotions, only acceptance as a reality-focused reappraisal strategy shows an effect on negative emotions. Acceptance seems to help to increase the valence of emotions and decrease arousal.

In line with our second hypothesis, emotion-focused reappraisal strategies did not show any significant influence on negative emotions in terms of both valence and physiological excitability. However, an interesting relationship was identified between humor and positive thinking as emotion-focused reappraisal strategies and positive emotions. Namely, humor as a reappraisal strategy exhibits a negative relationship

with positive emotions, suggesting a flattening effect on positive emotions, whereas thinking positive seems to have a positive relationship with emotional response, influencing the evaluation of the positive valence of emotions.

3.2.3. Conclusions

Our research started from the question to what extent effective reappraisal strategies might not only diminish negative emotions, but also lead to a general flattening of all emotional experiences, including positive emotions. This would lead to a cost of the extensive application of reappraisal by decreasing the level of savoring of our lives. Specifically, we hypothesized that this effect might differ between reality-focused versus emotion-focused reappraisal strategies (Blanke et al., 2022).

3.2.3.1. Reappraisal and negative emotions

The identified effect of reality-focused and emotion-focused reappraisal strategies on negative emotions was consistent with our hypotheses. Similar to the results of Ruan et al. (2024) and Vlasenko et al. (2024), which show that some reappraisal strategies are not only more utilized than others but also more effective, such as (a) situational modification and savoring (Ruan et al., 2024) and (b) reality challenge and changing current circumstances (Vlasenko et al., 2024), respectively, we obtained significant results only for acceptance. This suggests that acceptance as a reality-focused reappraisal strategy might be the most effective in decreasing unhealthy and undesirable negative emotions.

Based on our results, one question that emerges is the need to understand why

other reappraisal strategies were chosen and utilized, given that they appear to exhibit either a limited effect or no effect at all on emotional response. It would be useful for future studies to investigate the possibility of direct and indirect roles of different reappraisal strategies through structural equation modeling (SEM) studies.

3.2.3.2. Reappraisal and positive emotions

The effect of reappraisal strategies identified in positive emotion cases seems more complex than expected. We identified justification as a reality-focused reappraisal strategy and humor as emotion-focused reappraisal strategies respectively as having a statistically significant negative effect on the valence appraisal of positive emotions, implying that high use of these reappraisal strategies may lead to emotional flattening of positive emotions. These results suggesting a high cost to the quality of life by lowering the subjective intensity of positive emotions, leads us to the need to identify what is the level of optimal or moderate use of this type of reappraisal to minimize these presumed costs.

In contrast to justification and humor, positive thinking is an emotion-focused reappraisal that exhibits a positive relationship to positive emotions, which implies a valence-enhancing effect of positive emotions. These results may seem confusing at first glance, but positive thinking as a reappraisal strategy is perhaps the only one that focuses on changing the valence appraisal of an emotion, as defined in the literature by

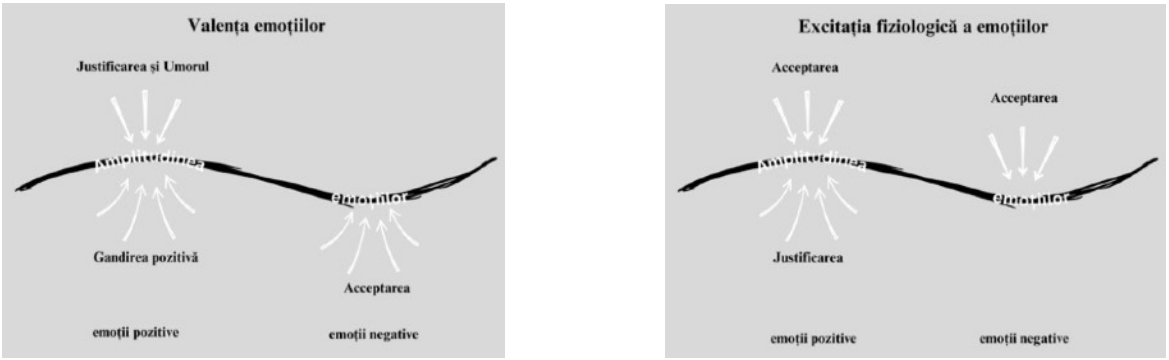
McRae et al. (2012), and Vlasenko et al. (2024). The question that arises from these results is to what extent the heterogeneous results on the effectiveness of reappraisal strategies in the scientific literature is due to the fact that different reappraisal strategies modulate the emotional response differently, some producing emotional flattening while others do not, only future studies could provide us with enlightening answers in this regard.

3.2.3.3. Reappraisal and arousel of positive emotions

Similar as with humor and positive thinking, which showed an opposite effect on emotional valence, acceptance and justification as reality-focused reappraisal strategies show an opposite effect on the degree of physiological arousal of positive emotion. Our results are also supported by Hofmann et al. (2009) who showed that acceptance had no effect on subjective ratings of anxiety, suggesting that acceptance is effective in reducing the physiological affect of positive emotions. Even though, at first glance, a calmer state could be considered a positive state, a flattened physiological arousal could equally lead to a cost through a decrease in activated positive emotion, such as enthusiasm, happiness, or pride. (Newman & Nezlek, 2022). Apparently in contrast to our results, Mueller et al. (2024) measuring positive emotions using a discrete way of operationalizing positive emotions (happy, proud, interested), show an effect of acceptance on the enhancement of positive emotions. The fact that the authors used discrete emotions that also include deactivated positive emotions, such as interested, could partially explain the differences in the results.

Figure 1.

Graphical representation of the results of the relationship between reappraisal strategies and emotional flattening.



3.2.3.4. Study limitations

The design of our experimental study has a number of limitations that may make it difficult to generalize the results obtained, and hence the need for future studies to retest our findings. The first limitations consist in the size of our sample, which restricted us in performing structural equation modeling (SEM) analysis to identify the answer to our question regarding reappraisal strategies with different roles in the emotional regulation process. The second limitation was that affective stimuli used to test the spontaneous use of reappraisal strategies (Neta et al., 2022; Vlasenko et al., 2024) might have significantly influenced the emotional response or the degree of use of reappraisal strategies. Within ecological studies using experiential sampling methods (ESM) or studies using other momentary reappraisal methods (Newman & Nezlek, 2022) results could have looked significantly different. A third limitation could emerge from the fact that participants were instructed to recognize the type of reappraisal strategies that they used, which could have led to a prospective effect due

to an earlier activation of reappraisal strategies, as presented by Boemo et al. (2022), increasing the manifestation of reappraisal strategies compared to the spontaneous use of reappraisal strategies in real life.

To summarize, our first hypothesis that the frequency of use of reality-focused reappraisal strategies could predict the degree of emotional flattening was partially confirmed. Justification contributed to the flattening of the valence of positive emotions, whereas acceptance exhibited an intensifying effect on the excitability of positive emotions. In the case of the second hypothesis we expected that the frequency of use of emotion-focused reappraisal strategies would not predict the degree of emotional flattening, it was confirmed for negative emotions, but not for the valence of positive emotions. Humor as emotion-focused reappraisal strategies also seems to contribute to emotional flattening of positive emotions (see Figure 1).

3.3. STUDY 3

3.3.1. Introduction

The heterogeneity of the results on the degree of effectiveness of different types of emotional regulation strategies have led to explanatory attempts, in this sense the model of the flexibility of emotional self-regulation developed by Bonanno and Burton (2013) emerges. The authors formulated three key components that have the potential to explain inter-individual differences and varied outcomes in the effectiveness of emotional regulation strategies, namely (a) context adaptation, (b) repertoire of emotional regulation strategies, and (c) the ability to adjust for self-regulation outcomes. Multiple studies investigating the extent of emotional regulation repertoire using the instrument developed by DeFrance and Hollenstein (2017), the Regulation of Emotion Systems Survey (RESS) questionnaire (RESS) which comprises six emotional regulation strategies (a) distraction, (b) rumination, (c) reappraisal, (d) suppression, (e) engagement, (f) control of excitability (DeFrance & Hollenstein, 2017). The limitation of the times of which tool is due to the fact that it is difficult to highlight the complexity of emotional regulation strategies, especially if we refer to reappraisal strategies and the multiple factors that contribute to their activation, such as habituation, belief in the controllability of emotions, awareness, etc.(Gutentag et al, 2016; Deplancke et al., 2022; Petrova et al., 2023) or their inhibition, such as: perceived cost, stimulus intensity, etc.(Brans et al., 2013; Suri et al. 2015). A second limitation of the scale developed by DeFrance and Hollenstein (2017) is the omission of avoidance as an emotional self-regulation strategy. Thus possibly useful on the one

hand for advancing knowledge, it remains limited in providing an exhaustive picture of the repertoire of emotional regulation strategies.

Chen and Bonanno (2021) investigated the importance of each of the components of the flexibility model of emotional self-regulation (Bonanno & Burton, 2013) and to what extent a high level of development of each of these components leads to more appropriate psychological adjustment to aversive life events. Chen and Bonanno (2021) describing these dimensions at the individual level as equal to a skill, identified five categories of regulators,

(a) individuals with the three skills highly developed, (b) individuals with poorly developed skills, (c) individuals with low context sensitivity, (d) individuals with a limited repertoire of emotional regulation strategies, and (e) individuals who show limited adjustment based on the results (feedback). By the fact that all participants in the last three categories showed increased symptoms of depression and anxiety, the importance of these skills in general, and of a broad repertoire of emotional regulation strategies in particular, is evident.

In contrast, Meneghini et al. (2024) conducted a study investigating the particularities of nurses' repertoire of emotional regulation strategies. Investigating the degree of utilization of six types of emotional regulation strategies, they revealed that nurses predominantly used (a) suppression of emotional expression and (c) task-involvement commitment, respectively.

Suggesting a selective and preferential use of some strategies from the available repertoire of strategies and this according to the requirements of the context in which a person finds themselves. The findings of Meneghini et al. (2024) indicate that the

availability of an increased repertoire is not necessarily activated and manifested in any context or life event (DeFrance & Hollenstein, 2017). Another hypothesis emerging from the study by Meneghini et al. (2024) is the possibility that in the case of initial activation of emotional regulation strategies with a high degree of habituation contextual and increased efficiency, could lead to inhibition of the activation of other emotional regulation strategies available in a person's repertoire.

Results obtained in study two of the present thesis revealed the question and the need to understand the motivation of participants to resort to reappraisal strategies which, based on our data, were found to be ineffective in modifying emotional response. We ask the question, to what extent is the existence of an increased repertoire of emotional regulation strategies by itself sufficient to modulate emotional response, and to what extent is it absolutely necessary that the repertoire consist of emotional regulation strategies with increased levels of effectiveness?

3.3.1.1. Aim of this study

The main objective of our study is to determine the relationship between the repertoire of emotional regulation strategies (including eight reappraisal strategies, distraction and avoidance strategies) and emotional level.

In line with the above formulated objective, two hypotheses emerged. We expect that in the case of positive stimuli the frequency of manifestation of the different strategies in the repertoire will be diminished compared to the frequency of manifestation in the situations of negative stimuli. Second. We expect the repertoire of

emotional regulation strategies to predict emotional level for both valence and emotional excitability.

3.3.2. Methods

3.3.2.1. Participants

Our experimental sample consists of 108 subjects. Subjects ranged in age from 19-67 (mean age = 42, SD = 9.6; 85.7% female and 14.3% male participants; family status 66% married, 17% unmarried, 12.3% divorced, 4.7% other) with a significant variety of professional occupations. Participants were recruited by snowball sampling methods. An invitation to participate in the study including the access link in the gorilla app was distributed on social media, for this sample was offered the opportunity to participate in an online webinar as a reward for participation in the study. Subjects were presented with how the study was conducted and a consent form. Participants could choose to withdraw at any time and were informed that the data collected are confidential and will be used solely for the purpose of this study. Project approval was obtained from the appropriate review committees within the authors' institution. The group of participants was selected to include members of the general population.

3.3.2.2. Measures

Emotional response. In our study, we consider emotional response as a dependent variable. To measure emotional level, we ask participants to rate both their emotional valence and physiological arousal (Betella & Verschure, 2015; Kanske et al., 2010; Marchewka et al., 2013; Neta et al., 2022; Riegl et al., 2015). For both emotional valence and physiological arousability, participants will rate their emotions on a scale

in which the midpoint represents a neutral emotional state. The scale ranges from -5, indicating maximum negative valence, to +5, indicating maximum positive valence. For arousal, the scale ranges from -5 to +5, indicating increased calmness, to -5, indicating maximum arousal/agitation, to +5.

Repertoire of emotional self-regulation strategies. The repertoire of emotional self-regulation strategies (Bonanno & Burton, 2013) is an independent variable in our study and comprises the following sub-strategies: acceptance, solution formulation, justification, normality checking, taking responsibility, humor, positive thinking, compensation, distraction, and avoidance. These emotional self-regulation strategies have been identified in previous research (Gross, 2015; McRae et al., 2012; Vlasenko et al., 2024; Wild et al., forthcoming). The repertoire of emotional self-regulation strategies will be calculated by summing the situations and participants in which each of the emotional regulation strategies is used.

3.3.2.3. Procedure

We used 16 pictures selected from the standardized Nencki Affective Picture System (NAPS) (Marchewka et al., 2014; Michałowski et al., 2015; Riegel et al., 2016; Wierzba et al., 2015) as positive and negative emotional stimuli [vi2] , displayed in random order for each subject (see Appendix A.). Mean valence for selected negative images was m=3.24; SD=1.44, and m=7.42; SD=1.26 for selected positive images. The valence values for the entire NAPS image database ranged from m=1.33-8.54. Each image will be presented for 15 seconds, followed by assessment of reappraisal strategies (spontaneous reappraisal) and emotional response scales (valence and excitability). The experiment was implemented using the gorilla application

experiment builder app.

3.3.2.4. Statistical analysis

We performed the statistical analysis with JAMOVI. In order to determine and test the relationship between the variables, we used the following calculations and statistical tests (at a confidence interval of 95%): (a) descriptive statistics, including a test of normality of the distribution; (b) for our hypotheses we used linear regression with two dimensions of the dependent variable (1) valence,

(2) excitation.

3.3.3. Results

Our study focused on identifying the repertoire of emotional self-regulation strategies in relation to positive and negative emotions. To this end, we first turned to investigating the descriptive characteristics of the emotional regulation strategies used. Based on the investigation of the instances in which each emotional regulation strategy was activated, calculating their manifestation in the case of the 8 images positive and negative stimuli, respectively. In the case of negative stimuli acceptance, solution formulation and normality show percentages between 17.7% - 27.9% at the level of 6-8 instances out of 8 existing.

Analyzing the nature of the relationship between the portfolio of emotional regulation strategies and the emotional response measured by valence and arousal, we found only partial confirmation of the hypothesis. Specifically, the repertoire of emotional regulation strategies shows a direct relationship with the level of

physiological arousel only in the case of stimuli eliciting negative emotions.

3.3.4. Conclusions

On the basis of our results we revealed a significant difference between the repertoire manifested in negative versus positive situations, suggesting multiple possible conclusions. First, the prospective effect of the strategies activated in negative situations did not transfer to positive situations, as we might have expected according to some studies in the literature (Boemo et al., 2022; Neta et al., 2022).

Second, according to the flexibility model of emotional regulation, individuals are expected to exhibit context sensitivity (Bonanno & Burton, 2013; Chen & Bonanno, 2021) and to use strategies according to the emotional demand of stimuli. Thus in the case of positive stimuli to resort less to reappraisal strategies.

Third, according to these data the complete and accurate estimation of the actual repertoire of emotional regulation strategies available to a person is limited and significantly influenced by the context of the assessment. What we would probably expect is that we can highlight the repertoire of habituated strategies (Meneghini et al., 2024; Suri et al., 2015). Similar to this idea, Southward et al. (2018) have highlighted the role of persistence in the use of some strategies to maximize their effect on decreasing negative depressive emotions, suggesting the possibility that in some situations a more limited but persistent repertoire may produce greater efficacy than an increased repertoire but with low persistence (Aldao & Nolen- Hoeksema, 2013; Meneghini et al., 2024)

Acceptance and positive thinking being the most persistent emotional

regulation strategies in the repertoire of the participants in our study, may suggest according to studies in domain (Aldao & Nolen-Hoeksema, 2013; Meneghini et al., 2024; Southward et al., 2018) an unequally activated repertoire or with different degrees of habituation. Summarizing our findings, we consider that individuals can sometimes adopt an experimental, trial-failure approach to emotional self-regulation. Specifically, in low-risk or possibly novel situations, we consider that individuals may initially test different available strategies, which may prove ineffective. Possibly, in these situations, individuals may select the persistence of some strategies only after observing the effect of the first round of using emotional regulation strategies (Aldao & Nolen-Hoeksema, 2013; Meneghini et al., 2024).

The second hypothesis of our study was predominantly unconfirmed, the only significant relationship evidenced of the repertoire of regulation strategies to emotional response was in the case of physiological excitability for negative situations. In study two, for negative situations the only strategy that predicted emotional flattening was acceptance as a reappraisal strategy.

A question that emerges from this finding is whether, an increased frequency of use and reuse of some strategies can increase the effectiveness of a strategy or is absolutely necessary for some strategies to show a significant effect (Aldao & Nolen-Hoeksema, 2013; Boemo et al., 2022; Chen & Bonanno, 2021; Southward et al., 2018).

3.3.4.1. Limitations of the study

The design of our experimental study has a number of limitations that may make it difficult to generalize the results obtained, and thus the need for further studies future to retest our findings. The first limitations consist of the characteristics of the affective stimuli used to test the use of reappraisal strategies, these by their intensity, familiarity to the participants could have influenced the degree of activation of the available emotional regulation strategies. The second limitation also emerges from the laboratory research design, more specifically in ecological situations the stakes of a regulation are likely to be higher, individuals might persist significantly longer in the use of some strategies (Aldao & Nolen- Hoeksema, 2013; Meneghini et al., 2024; Southward et al, 2018). A third limitation could emerge from the fact that participants were instructed to recognize the type of emotional regulation strategies used, which could have led to the possibility of omitting other emotional regulation strategies available to a person but not listed in those taken in the study.

To summarize, our first hypothesis, in which we expected that the frequency of manifestation of the different strategies in the repertoire would be diminished in the case of positive stimuli compared to the frequency of manifestation in the case of negative stimuli, was confirmed. The second hypothesis of our study, by which we expect the repertoire of emotional regulation strategies to predict emotional level for both emotional valence and emotional excitability, was predominantly invalidated. The results revealed a significant relationship only for negative situations and negative emotions operationalized by physiological arousal.

IV CHAPTER IV. CONCLUSIONS AND GENERAL DISCUSSION

4.1. Summative Conclusions and Contributions to Knowledge

The research endeavors in the present thesis were motivated by the general objective of investigating the extent to which an increased level of emotional balance may have a cost on quality of life. More specifically, to reveal whether clinical observations that people who make extensive use of emotional regulation strategies often manifest an emotional life predominantly on the neutral spectrum are supported by scientifically rigorous findings.

The conclusions related to each of the three studies included in this thesis have been extensively discussed in Chapter III, thus we consider it important to synthesize all the results obtained. It should also be mentioned that our research project followed an approach that started from specific to general. We started in study 1 with a detailed and in-depth analysis of cognitive reappraisal strategies, followed by the investigation of the extent to which the identified cognitive reappraisal strategies influenced emotional flattening in study 2. We concluded by investigating the relationship of the repertoire of emotional regulation strategies, and not only cognitive reappraisal, to the extent to which they can predict emotional responding, in Study 3.

4.1.1. Differentiated Frequency of Cognitive Reassessment

The frequency and persistence of cognitive reappraisal strategies may be defining factors in their effectiveness in modulating emotional response (Aldao &

Nolen- Hoeksema, 2013; Meneghini et al., 2024; Southward et al, 2018). Thus comparing the frequency of occurrence of the reappraisal strategies identified in study 1 versus study 3, acceptance and solution seeking are the most utilized cognitive reappraisal strategies followed by positive thinking and normality, in this comparison we only refer to negative emotions as in study 1 only this category was investigated. As expected we also revealed differences between the two studies in the frequency of the strategies in the later positions in the frequency hierarchy. Specifically, in Study 1 justification is a more frequently used reappraisal strategy than positive thinking and normality.

These results stimulated a number of questions. Specifically, to what extent the uneven activation of reappraisal strategies is due to (a) uneven habituation (Newman & Nezlek, 2022; Neta et al., 2022; Aldao, 2013; Kobylin´ska & Kusev, 2019; Yuan et al., 2014), (b) differential efficiency or responsiveness to outcome (feedback) (Bonanno & Burton, 2013; Deplanche et al., 2022; Hoffmann et al., 2009; Wenzel et al. 2023), (c) the higher cognitive cost of cognitive reappraisal strategies (Brans et al., 2013; Ortner et al., 2016; Sheppes et al., 2014; Sheppes & Meiran, 2008; Suri et al. 2015; Troy et al., 2018), respectively (d) stimulus characteristics (Suri et al., 2015).

4.1.2. Cognitive reappraisal and emotional flattening

In our research endeavors, we found in all three studies a significant effect of cognitive reappraisal on emotional responding in general and on emotional flattening in particular. Acceptance and justification (reality-focused cognitive reappraisals) among the most frequently used in study 1, were found to have the most significant effect on emotional flattening investigated in study 2, but also a bidirectional effect on

emotional flattening.

More specifically, in the case of positive emotions, justification showed a flattening effect of emotional valence, i.e. an intensification of the intensity of physiological arousal as opposed to acceptance which shows a flattening effect of physiological arousal. In the case of negative emotions, the only cognitive reappraisal strategy that showed predictive power was acceptance. This showed an effect of intensifying emotional valence, i.e., flattening the physiological arousal of negative emotions. These results are in line with the study by Hofmann et al. (2009) and Mueller et al. (2024) who similar to our results emphasized that acceptance predominantly shows an effect on physiological arousal.

Similar as in the case of reality-focused reappraisal, humor and positive thinking as emotion-focused emotion regulation strategies showed an opposite effect on the valence of positive emotions. The essential element is the evidence of an opposing effect of some reappraisal strategies, which could be responsible for the heterogeneity of results in the literature.

4.1.3. New Contributions and Perspectives

As the summarized analysis of the results shows, we consider that the three studies integral part of the present paper, have contributed to knowledge in the field of emotional self-regulation strategies in general and cognitive reappraisal in particular. Considering that the elements of novelty or nuance of the information in the literature are not limited to those highlighted in the synthetic analysis in the previous paragraphs, and we consider it important to point them out below.

4.1.3.1. Contributions that could guide future studies:

- Identifying a possible role of awareness in increasing the level of activation of re-evaluation strategies (study 1)
- Inductive content analysis revealed the simultaneous activation of reappraisal strategies and expectations of one's own or others' behavior, respectively self-motivation strategies to self-regulate (study 1)
- Highlighting that the repertoire of emotional regulation strategies suggests to be insufficient to predict emotional response change. Persistence in the use of effective emotional regulation strategies suggests to be more important than a large palette of strategies. (Study 3)
- Evidence of unequal levels of activation of different reappraisal strategies that might be due to the multiple characteristics of cognitive reappraisal (study 2).
- Highlighting the need to design future research using ecological methods, due to the characteristics of cognitive reappraisal and the multiple factors involved (study 1, 2).

4.1.3.2. Contributions to the development of intervention programs :

- Identifying eight cognitive reappraisal strategies, respectively defining them at the level of detail necessary to translate them into techniques that can be trained in development programs (study 1 - see Annex A.).
- Identification of two supporting processes (a) prioritization and (b) self-motivation. Cognitive processes that facilitate and maintain emotional self-regulation effort using

cognitive reappraisal (study 1).

- Highlighting a new cognitive reappraisal strategy, namely justification (study 1). Justification was found to be effective and showed a different effect than acceptance, the category in which this strategy has been integrated in the literature (Study 2).
- Formulation of four new reappraisal strategies at the technical level (a) assumption of responsibility, (b) normality check, (c) compensation, and (d) justification (study 1).
- Highlighting a possible emotionally flattening effect of cognitive reappraisal, but also the opposite effect.

4.1.3.3. Contributions related to the overall objective of this thesis :

Through the general aim of the present thesis we aimed to investigate the extent to which an increased level of emotional balance (from the perspective of using reappraisal strategies) could determine a cost on our quality of life thought an emotional flattening. The results of our three studies converged with our main research objective.

Study 1 identified specific reappraisal strategies that provide a specific study modality to identify the effect of reappraisal strategies, with the contributions of Study 1 being to provide the basis for studying cognitive reappraisal and how best to operationalize emotional flattening. In study two, we effectively investigated the possible cost of emotional regulation, the results suggesting the possibility that, depending on factors not yet elucidated by this paper, cognitive reappraisal may produce an emotional flattening effect and indirectly a decrease in the intensity of

savoring life to the fullest. In Study 3, we contributed to the overall goal by emphasizing that a large number of reappraisal strategies is not absolutely necessary for the manifestation of the emotional flattening effect.

4.1.4. Integration into Scientific Literature

After reviewing the literature, we often find it one of the most difficult tasks to try to integrate the results of different studies into a unified and coherent overview. Thus relating the highlighted results to the models and characteristics discussed in Chapter I we consider that it could be beneficial for the integration of new knowledge in the field.

4.1.4.1. Outcomes and Process Model of Emotional Self-Regulation

The qualitative analysis conducted in the first study revealed that in some cases participants exhibited a spontaneously activated cognitive reappraisal that occurred almost simultaneously with the occurrence of the event and obviously with the initial appraisal of the event (Wild et al., in press). These findings may suggest that cognitive reappraisal need not necessarily occur in the sequentiality of the initial pattern (Gross, 1998, 2014; Webb et al., 2012) subsequent to the change in the situation, i.e., attention management.

4.1.4.2. Outcomes and Flexibility Model of Emotional Self-Regulation

Based on our results, we also concluded (Aldao & Nolen-Hoeksema, 2013; Meneghini et al., 2024; Southward et al., 2018) the possibility that persistence in the use of a specific emotional regulation strategy might better predict emotional response modulation, relative to an activated extended repertoire.

4.1.4.3. Results and Characteristics of Cognitive Reassessment

Ecological studies using experimental methods such as experience sampling (ESM) can be divided into two categories (a) those that have shown an emotion flattening effect (on positive emotions) of cognitive reappraisal (Buhle et al, 2014; Gunaydin et al., 2016; Mueller et al., 2024), versus (b) studies that have shown a positive emotion heightening effect of reappraisal strategies (Boem et al., 2022; Brans et al., 2013; Wenzel et al., 2023). Results of studies in this paper shows that these apparent contradictions could be explained by charachteristics of cognitive reappraisal revealed by our data.

From the approach of integrating the results and conclusions obtained from the studies carried out in this doctoral thesis, it can be concluded, not only that our results are adequately integrated into the literature, but also that they offer (a) a significant contribution to knowledge in the field of cognitive reappraisal, and (b) a potential explanatory mechanism for the apparent contradictions in the literature.

4.1.4. Limits and Future Directions

The limitations of the studies in this thesis are due to the characteristics of the experimental research designs. Specifically, in the first study the instructions given to the subjects to verbalize cognitive reappraisal appealed only to the conscious component of the emotional self-regulation process. In the second and third study the affective stimuli used could have determined the selection and mode of use of reappraisal strategies. Beyond attempting to utilize both studies that appeal to conscious/intentional as well as spontaneous/automatic reappraisal, the limitations given by the pre-selected stimuli and events limit the degree of generality to ecological means of the results obtained.

Second, our sample size for study 2 and 3, although exceeding the initially calculated sample size, was not large enough to have the possibility of more advanced statistical processing such as structural equation modeling (SEM) to highlight possible reasons why subjects resorted to strategies that later proved to be inefficient. Bayesian statistics could also have elucidated which effects are anecdotal versus certain.

Thirdly, the experimental research designs for study two and three clearly defined the variables under study, and disentangled the essential elements from between the emotional regulation process. In contrast to a qualitative or ecological approach, it is possible that factors such as (a) expectations/beliefs, or (b) supportive strategies or motivational factors, may have made an important contribution to the results obtained, without accounting for their moderating effect.

These three limitations lead us to be cautious about the conclusions of our study, and

highlight the need to undertake future studies to test these observations.

In conclusion, in order to elucidate the seemingly contradictory results regarding the effect of cognitive reappraisal strategies, future studies would need to (a) draw on research projects investigating the effect of specific reappraisal strategies, i.e. their seemingly opposite effects on different emotional dimensions, (b) emotional flattening would need to be investigated through ecological studies, i.e. drawing on multiple ways of operationalizing emotions to better understand how emotional flattening occurs.

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