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Ph.D. THESIS

DYSFUNCTIONAL AND FUNCTIONAL BELIEFS IN EMOTIONAL REGULATION: REAPPRAISAL AND ACCEPTANCE BASED APPROACHES

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(1) This is to certify by Cristea Ioana-Alina that:

(a) The thesis includes the original research work of Cristea Ioana-Alina (author) towards the Ph.D.;

(b) Parts of the thesis have been accepted for publication or presented as conference papers; appropriate citations for these publications were included in the thesis. Other co-authors have been included in the publications, if they contributed to the exposition of the published text, data interpretation etc. (their contribution was clearly explained in the footnotes of the thesis);

(c) The thesis was written according to the academic writing standards. All the text of the thesis and its summary was written by Cristea Ioana-Alina who assumes the all responsibility for the academic writing.

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1.1. Theoretical models of emotion regulation

1.1.1. The appraisal theory of emotions

One of the most influential theories on emotion formation and change is the *appraisal theory of emotions*. According to this theory (Lazarus, 1991; Smith & Lazarus, 1993), emotion is born in an encounter with an environmental stimulus situation as the result of a *transaction* between the person and the environment. The resulting emotion depends on how this transaction is evaluated or appraised by the individual, whether it is appraised as harmful, beneficial, threatening or challenging.

The transaction is formed involving both the goals of the individual, as well as the cognitive representation of the encounter. *Appraisals* or evaluations ("hot cognitions") denote the way in which representations of the encounter with the stimulus situation are processed in terms of their relevance for the person's goals and well-being.

In the model, primary and secondary appraisal serve to generate emotions, after which the appraisal and the emotion it brought on influence coping mechanisms, which in their turn act on the person-environment encounter. This altered person-environment transaction is then reappraised, and the process goes on in cascades of appraisal-emotion sequences.

1.1.2. The process model of emotion regulation

As a construct, emotional regulation refers to methods of influence, relating to the experience and expression of emotions, as well as the times in which emotions occur (Rottenberg & Gross, 2003). In one of the most prominent models used in research paradigms on the topic- the emotional regulation paradigm- James Gross and colleagues (Gross & John, 2003) tried to organize these strategies, focusing on how specific strategies can be evidenced along the timeline of an unfolding emotional response. The fundamental assumption of this model is that the essential factor on which regulation strategies differ is *the moment* in which they have their primary impact on in the process of emotion generation and unfolding.

Antecedent focused emotional regulation occurs early on in the emotion generation process, before the emotion has been fully generated and allow for alteration of the emotional trajectory, influencing both the experience and subsequent expression of the emotion (the prototypical example being cognitive reappraisal). Response focused regulation occurs later in the emotion generation process, and thereby allow fewer opportunities for intervention. As the emotion is fully generated, response-focused strategies tend to focus on alteration of the expressional component of the emotion, rather than the experiential and physiological components (the prototypical example being suppression).

1.2. Emotion regulation- a view from psychopathology and psychotherapy

Emotions have the potential of being harmful. More specifically, the unsuccessful or inefficient chronic management of emotions can, on the longer run, lead to the genesis and symptomatology of many psychiatric disorders (Davidson, 2000; Phillips, Drevets, Rauch, & Lane, 2003). The **relevance** of studying emotional regulation stems primarily from its relevance to the understanding of psychopathology on one hand, and to the field of cognitive behavioral therapy on the other. Regarding the former, a review of the Diagnostic and Statistical Manual of Mental Disorders, 4th edition ([DSM-IV]) reveals that over 50% of Axis I disorders and 100% of Axis II disorders implicate emotion regulation deficiencies (Gross & Levenson, 1997).

Hoffman and Asmundson (2008) argue that emotional disorders, such as anxiety disorders and depression, are, by definition, characterized by ineffective attempts to regulate emotions. The DSM criteria for most anxiety disorders list avoidance as a prevalent symptom and avoidance is considered a harmful regulation strategy. Many psychological treatments for emotional disorders are, in fact, focused on promoting beneficial regulation strategies and discouraging detrimental strategies.

Cognitive behavioral therapy (CBT) has become the elect psychotherapeutic approach for a wide range of disorders, from anxiety disorders and mood disorders to more serious, disabling conditions such as psychotic and personality disorders (Butler, Chapman, Forman, & Beck, 2006).

1.2.1 A psychotherapeutic model of functional and dysfunctional emotions

The dysfunctional beliefs, called *irrational* in the in the first version of CBT-Rational Emotive Behavioral Therapy (REBT; Ellis, 1994)-, are characterized by not being logical, not having factual support in reality and hindering the person from achieving his/hers goals. The functional beliefs (referred to as *rational* in REBT) are the total opposite, being logical, concordant with reality and helping the person achieve his/hers goals.

According to the general CBT model of psychopathology is it precisely these maladaptive beliefs that sustain emotional problems by directly causing dysfunctional emotions, while adaptive beliefs sustain functional emotions (Ellis, 1994). An important distinction has to be made here: the functional-dysfunctional axis does not overlap with the positive-negative axis in categorizing emotions. While the valence of functional and dysfunctional emotions can be the same (e.g. both are negative when the event is the person finding out they have a serious illness), the differences lie in intensity and their impact upon behavior. Functional emotions are of a lesser intensity and most importantly they do not significantly interfere with the person's normal functioning (work, interpersonal relationships) and do not block the person to still pursue relevant goals and activities.

However, currently, a self entitled "new wave" in CBT suggests that cognitive restructuring is not the only way to correct emotional problems and fosters instead a new approach based on *acceptance* (Hayes, Strohsahl, & Wilson, 1999).

1.3. Regulation strategies informed by cognitive behavioral therapies: reappraisal and acceptance

Two regulation strategies, cognitive reappraisal and acceptance, have both been associated with wide-spread, major therapeutic approaches. Reappraisal is recognized as one of the main active ingredients of traditional cognitive-behavioral therapy (Hofmann & Asmundson, 2008), while acceptance is considered central in more recent therapeutic approaches, also called "new wave" or "third wave" CBTs, such as acceptance and commitment therapy (ACT; Hayes et al., 1999), dialectical behavioral therapy (DBT; Linehan, 1993) or mindfulness based therapies (MBCT; Segal, Williams, & Teasdale, 2002).

Reappraisal has been defined as "a form of cognitive change that involves construing a potentially emotion-eliciting situation in a way that changes its emotional impact" (Lazarus, 1991). Its homologue in classical CBT would be cognitive restructuring, which involves the change of dysfunctional cognitions that sustain psychological distress, a process considered to central in this form of therapy and a mediator of treatment outcome (Clark, 1999).

On the other hand, acceptance is defined as an approach that promotes fully experiencing emotions, thoughts and bodily sensations, even when they are harmful, without trying to change, control or avoid them, thus implying an openness to unpleasant internal experiences and a willingness to remain in contact with them

(Hayes et al., 1999). In third wave therapies, most notably ACT, this process is used to counteract experiential avoidance,

Nonetheless, Aldao, Nolen-Hoeksema, and Schweizer (2010), in a meta-analysis regarding emotional regulation strategies across psychopathology, indicated that acceptance and reappraisal, two of the most preeminent approaches in treatment models, also displayed the weakest associations with psychopathology, thus questioning the status of these strategies as protective.

1.3.1. Cognitive reappraisal

It should be reemphasized reappraisal was the object of research long before the emotion regulation paradigms. Classical studies conducted by Lazarus in the stress-coping paradigm have also focused on this process (Lazarus & Folkman, 1984).

The recent, more basic research oriented paradigms, (i.e., the emotion regulation paradigm) mainly focuses on a form of detached reappraising. In behavioral studies conducted in this paradigm, participants in the reappraisal group were instructed to "think about what you are seeing in such a way that you don't feel anything at all" (Gross, 1998, p. 227), "to view the slides with the detached interest of medical professional" (Richards & Gross, 2000, p. 416) or "to think about your situation in such a way that you remain calm and dispassionate" (Butler et. al., 2003, p. 52). These studies have shown benefits (i.e,. decreased negative emotion and expression, with reduced physiological costs, as well as no cognitive costs in terms of memory impairment) of employing this type of reappraisal, in comparison to other strategies, most frequently suppression.

Except for this type of detached reappraisal, which has been the focus of most studies on the topic, a few others have dealt with positive reappraisal. In this form, the individual attends to the negative event, while also recognizing its positive aspects (Folkman & Moskowitz, 2000). This is a more ecological form of reappraisal, but it is still hinged on by the fact that in some more dramatic situations, with which people are often confronted, finding positive aspects proves very difficult, if not close to impossible. A series of studies conducted by Rusting and DeHart (2000) showed that positive reappraisal, initiated after the negative emotion was generated, leads to the reduction of negative mood and the increase of positive mood.

On the other hand, in the clinical tradition (i.e., the stress-coping paradigm of Richard Lazarus and cognitive behavioral therapy), reappraisal (i.e., negative functional reappraisal) is by no means employed with the purpose of shifting from an emotional to an unemotional way of thinking. Rather, the purpose of reappraisal is to shift from a dysfunctional emotional mode (e.g., depression), which is self-defeating and prevents the individual from attempting to pursue his or her goals, to a more functional one (e.g., sadness), which would still allow the person to engage in goal-directed behavior, albeit experiencing psychological discomfort (see David, Szentagotai, Kallay, & Macavei, 2005, for a review).

1.3.2. Acceptance

Most studies focusing on acceptance have also compared it to suppression. For panic symptoms using a carbon dioxide (CO_2) challenge task, studies have shown that while suppression is not only inefficient in reducing panic symptoms, but is also associated with paradoxical increases in anxiety and distress, acceptance was associated with less subjective anxiety and avoidance behaviors (Levitt, Brown, Orsillo, & Barlow, 2004). In another study in the same paradigm, Eifert and Heffner (2003) showed that acceptance participants reported fewer and less intense fear symptoms, but also cognitive ones, including catastrophic thinking during CO_2 inhalation.

Several studies have compared the effects of experimentally induced mindfulness or acceptance with those of rumination and/or distraction after negative mood induction (Broderick, 2005; Singer & Dobson, 2007; Kuehner, Huffziger, & Liebsch, 2009). Some of the studies identified mood improvements after the induced mindful self-focus that were comparable (Singer & Dobson, 2007) or even higher (Broderick, 2005) than for induced distraction. However, Kuehner et al. (2009) failed to detect a clear advantage of mindful self-focus over rumination on both negative and positive mood following the regulation instruction.

It is worth noting that many of the experimental studies using acceptance as regulation strategy fail to find differences in physiological parameters with other, non-adaptive strategies (such as supression or rumination), but do find differences on measures of subjective distress (Eifert & Heffner, 2003). According to Wolgast, Lund, and Viborg (2011) this would indicate that as emotion regulation strategy, acceptance has more to do with how physiological responses are experienced and evaluated, which would support the idea that acceptance fits in Gross' model of emotion regulation as a response-focused strategy. While this may be so, we believe it is also interesting to note this may also suggest that although acceptance does not directly attempt to modify evaluations individuals make about specific situation, this may well constitute an unplanned side-effect. The degree in which this hypothesized change in maladaptive cognitions is the mechanism through which acceptance strategies of regulation carry their effect on emotions remains an open empirical question.

1.3.3. Reappraisal versus acceptance: empirical data

Hoffman, Heering, Sawyer, and Asnaani (2009) contrasted the emotion regulation strategies of cognitive reappraisal, acceptance and suppression in an anxiety inducing task in which subjects were giving an impromptu speech in front of a camera. Suppression resulted in greater heart rate increases than acceptance and reappraisal. Also suppression led to greater gains in self-reported anxiety as compared to reappraisal, but not to acceptance. Yet direct comparisons between acceptance and reappraisal revealed no significant differences in heart rate or anxiety.

In another study, focused on induced anger, Szasz, Szentagotai, and Hoffman (2010) showed reappraisal to be more effective at reducing anger than attempts to suppress or accept it. Furthermore, participants in the reappraisal condition persisted significantly longer in a frustrating task than those who were instructed to suppress or accept their negative feelings.

A third study compared reappraisal and acceptance with a control condition in terms of their efficiency in reducing subjective distress, associated physiological reactions and behavioral avoidance (Wolgast et al., 2011). Both acceptance and reappraisal led to significant reductions in these variables, thus suggesting both of them to be adaptive regulation strategies. There were few significant differences between the two strategies of these outcomes, however the authors showed that there was a different pattern of correlation between avoidance and aversive negative emotions in the reappraisal and acceptance groups. While the correlation was positive and significant in the reappraisal group, this didn't happen in the acceptance group.

2. Problems identified: the gap between the research and the practice of emotion regulation

2.1. Variants of cognitive reappraisal

First of all, as we have exemplified in the section discussing cognitive reappraisal, studies have used a narrow definition of reappraisal, which is not very informative for the way this process functions in real-life emotion eliciting situation. As Wager, Davidson, Hughes, Lindquist, and Ochsner (2008) specified, research has conducted reappraisal in three general categories. The first and the most common

involved switching from an emotional mode to an unemotional mode of interpreting the stimulus-situation (e.g."try to remain calm and dispassionate"). We have referred to this strategy as detached reappraisal. Its problems lie particularly in the fact that, even if proven efficient, this strategy is hardly accessible. Even if one can successfully practice this strategy while viewing pictures or video clips, it is highly unlikely that one would be able to resort to it in real-life negative events, such as the illness of a family member, a break-up, the loss of a job. We also believe it is highly debatable whether it would be truly useful to chronically resort to such an approach to negative emotions, since it more or less implies one the individual should try as much as possible to not experience negative emotions at all. But negative emotions play an important role in sustaining adaptive behavior and attempting not to experience them at all would probably have long-term deleterious consequences.

The second type of reappraisal used in a lot of studies involved finding a positive, beneficial interpretation of the events- positive reappraisal. While this is certainly more ecological than instructing subjects to try to not feel anything at all, it is still hinged on by the fact that it is not always possible to find a favorable interpretation of the events that take place, or, better said, a lot of times the this kind of interpretation strikes as fake or lacking credibility. If a close one is ill or a significant relationship has been lost, resorting to seeing things in a positive light, albeit possible, might not be very convincing.

Finally a third alternative in which some studies have seen reappraisal and by far the most problematic has been the so-called blunting of the negativity of the stimulus. In this sense, subjects are instructed for instance to "view the situation as fake or unreal" (Johnstone et al., 2007) or to imagine for instance that a picture of a mutilated corpse comes from the scene of a movie and not an accident. It is here that we see most clearly the rift between the research on emotion-regulation and its use in real life. If for a set of pictures or other experimental stimuli you can easily imagine the situation is fake or that it represents something else than what it seems because you will never get to know the real outcome of the situation, this is not the case in life outside the laboratory.

We deem this rift between more basic and clinical research has to start being addressed in studies looking not solely at the comparative efficiency and consequences of the generic concept of reappraisal, but at the actual way in which it is carried out. We also believe basic research should start addressing more ecological, clinically grounded strategies of reappraisal. In real life emotion eliciting situations, people can rarely resort to a type of reappraisal that would entail moving toward an "unemotional" mode of thinking.

2.2. Focus on outcomes

With very few exceptions, most of the studies we listed regarding emotion regulation were exclusively focused on the outcome the strategy would achieve and not on its hypothesized mechanisms. Mechanisms by which these strategies might be efficient, such as their impact on constructs causally linked to psychopathology like maladaptive beliefs, have been scarcely investigated. Also absent are studies looking at trait factors related to psychopathology (such as neuroticism, trait anxiety) that might determine the differential efficiency of emotion regulation strategies, that is, not solely if a strategy *per se* is more or less efficient pending on these trait factors, but whether they might influence the differential efficiency of two approaches proved to be both efficient, like cognitive reappraisal and acceptance.

2.3. Methodological issues

A serious methodological caveat that affects most of the empirical research on emotion regulation strategies has to do with demand characteristics. In almost all of

these studies, participants were also told, when given the strategy, that they were to try not to feel negative or to try to feel less negative about the situation. While some exceptions do exist (Hoffman et al., 2009; Wolgast et al., 2011), we need to acknowledge this as a serious limit, raising important questions about the validity of the results. If subjects are well aware of what is expected of them (to increase or decrease their emotion), this creates a social context than can influence their responses (e.g. they report decreased negative emotions because they *know* that is expected of them). Moreover if the results of the studies are affected by demand characteristics, this also impairs our possibility to study the mechanisms by which an emotion regulation strategy works.

3. The relevance of the topic

The relevance of the research topic is articulated from three different directions.

A **first** one comes from psychopathology research that identifies inefficient or unsuccessful emotion regulation at the root and in the symptomatology of most psychiatric disorders (Davidson, 2000; Phillips et al., 2003). It therefore becomes extremely important to identify useful and detrimental mechanisms of regulating emotions, and especially the particular their mechanisms of action and the specific contexts in which they are efficient. We therefore turned to therapy research and chose to look at two strategies that have the potential of being adaptive mechanisms of regulating emotions. This leads us to the **second** direction which sustains the relevance of this research: cognitive behavior therapy research and its controversies.

The CBT field has been dominated by the ideas that cognitive change is central to treating psychological disorders, that "all therapies work by altering dysfunctional cognitions, either directly or indirectly" (Clark, 1995, p. 158). But in a now classic review, Longmore and Worrell (2007) questioned if this "challenge" of dysfunctional thoughts is really essential. This debate on the status of cognitive change as essential process of CBT has fostered the rise of a "third wave" within CBT-acceptance/mindfulness based approaches. Proponents of these stress the emphasis is not on changing the contents of thoughts, but the individual's awareness of these thoughts and the relationship to them (Segal et al., 2002).

It would be therefore justified to conclude that at least at a conceptual level, cognitive reappraisal and acceptance fundamentally differ in their outlook on dysfunctional cognitions. While the former tackles maladaptive thoughts directly and often times explicitly, attempting to restructure their content, the latter is meant to leave the content unmodified, while changing the function of the thoughts or their link to aversive emotions. However, empirical arguments for this distinction are sparse. As we have shown very few studies have contrasted cognitive reappraisal and acceptance and even in the cases in which they have, the investigation of their hypothesized mechanisms of change has been minimal. Moreover, even at a conceptual level, the picture could prove to be much more complex. It is possible that acceptance strategies, even if the do not directly target the content of maladaptive thoughts, could nonetheless indirectly lead to changes in these cognitions.

Finally a **third** direction that supports the relevance of this research project is based on the break we have identified between the way these strategies, and in particular cognitive reappraisal, are conceptualized in empirical research and the way in which they are understood and used in CBT models and protocols. We have argued that due to this break, the results obtained in empirical research are limited in regards to the degree in which they can be used to make inform clinical protocols or models of psychopathology.

CHAPTER II.
RESEARCH OBJECTIVES AND OVERALL METODOLOGY

We aimed to redefine emotion regulation strategies, in particular cognitive reappraisal stripping them of the artificiality with which they are implemented in current research paradigms and rendering them more similar to what actually happens during therapy and in general every day interactions where aversive emotions are bound to arise. To reach this goal, we focused on a key construct in emotion research: dysfunctional beliefs, seen as causal precursors of emotional problems and psychopathology and representing the process being targeted by cognitive-behavioral therapies, the most efficient form of treatment across most kinds of psychopathology.

As emotion regulation strategies, we looked at two strategies that have been associated with major, wide-spread cognitive behavioral approaches: cognitive reappraisal and acceptance.

The **first** major objective of our research was to investigate whether dysfunctional beliefs (conceptualized as evaluations or "hot" cognitions) play a determining role in the comparative efficiency and mechanisms of these strategies, implemented in a way that is tightly informed by how they are used in their corresponding therapies. By contrasting them on outcomes that have to do both with the symptoms of psychopathology (problematic emotions), as well the hypothesized causes (dysfunctional thinking patterns), we can look at the way this construct can serve emotion regulation. This objective aimed at **conceptual and theoretical** innovations.

A **second** major objective is to study emotion regulation strategies across the normality-pathology continuum, following healthy individuals, as well as at risk, sub-clinical and clinical cases. This approach is all the more relevant since meta-analyses (Aldao et al., 2010) signal the lack of research pertaining to emotion regulation for individuals vulnerable for various types of disorders or already affected by these. As part of this objective, we also intend to look to how trait variables relating to psychopathology or vulnerability to psychopathology influence the differential efficiency of these strategies.

A **third** objective is to study emotion regulation strategies involving in as much as possible all four levels of analysis which can be employed in studying the cognitive system- subjective, cognitive, behavioral, biological- , with the purpose of shedding some light onto the present status of dysfunctional beliefs in the service of cognitive regulation. Objectives two and three implied more **methodological** developments in the study of emotion regulation.

The **structure** of the Ph.D. project is closely molded on these objectives, and the majority of the studies conducted respond both to the conceptual and theoretical terms, as well as to the methodological ones. In the first part, we aim to provide some conceptual clarifications. We analysed the key constructs that these approaches claim to modify and which are believed to act as change mechanisms. We wanted to see whether they truly represent distinct constructs and to assess the degree of overlap among them, as well as possible mutual influences in determining emotional outcomes (Study 1). We further on continued with a meta-analytic investigation looking at the comparative efficiency and mechanisms of change of two of the most preeminent therapeutic approaches based on reappraisal and acceptance techniques respectively (Study 2).

In the second phase of the project (Studies 3, 4 and 5) we conducted a series of experimental studies using healthy volunteers to compare reappraisal and acceptance strategies, with each other and with control conditions, for modifying emotional outcomes. We investigated the role of dysfunctional beliefs in this process by

constructing a type of reappraisal that was informed by cognitive-behavioral models of psychopathology. We called it "negative functional reappraisal", defining it as a modification in the interpretation of a situation that maintains the negative character, but reformulates it in a way that does not hinder the individual from continuing to pursue his own goals. We also looked at possible moderating effects of trait social anxiety, looking at whether results look different for individuals more close to psychopathology. In the third phase of the project (Study 6), we moved on to studying a clinical sample to see if how the strategies would act in this case. Finally the fourth part of the project (Study 7) looked on neurobiological mechanisms of dysfunctional beliefs and how these might sustain cognitive reappraisal.

CHAPTER III ORIGINAL RESEARCH
PART I. EMPIRICAL ANALYSIS OF CONCEPTS AND THERAPIES

Study 1: Key cognitive constructs in reappraisal- and acceptance-based therapeutic approaches[1]

The field of cognitive-behavioral psychotherapy (CBT) is one of the fastest developing fields in psychotherapy. Sometimes described as "the third wave", new forms of CBT have emerged from the basic paradigm . Major exponents are considered to be: Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), Dialectical Behavior Therapy (DBT; Linehan, 1993), and Mindfulness Based Therapy (MBCT; Segal et al., 2002). Their shift regards changing the way we look at the very basis of CBT, namely the status of cognitive change.

Clark (1995), in common with other leading cognitive therapists, asserts that a fundamental postulate of the cognitive model of psychopathology is that cognitive change is central to treating psychological disorders, stating that "all therapies work by altering dysfunctional cognitions, either directly or indirectly" (p. 158). While they still view cognitions as highly relevant to psychopathology, "third wave" CBTs deem cognitive change as non-essential in producing therapeutic change. Instead they choose to focus on different processes that employ a less didactic and a more experiential approach to the clients' beliefs. The processes include constructs like experiential avoidance/psychological flexibility, acceptance, defusion, and values.

In our studies we take into account key processes from three major forms of therapy, representing the directions described above. One of them is rational-emotive behavioral therapy (REBT) and the cognitive processes we consider are irrational beliefs and unconditional self-acceptance (as a special form of rational beliefs); we focus on these beliefs because they are the core cognitive processes in REBT and are the most investigated in previous studies (see David et al., 2005). Another one is cognitive therapy (CT) and the cognitive process considered refers to dysfunctional attitudes (cognitive distortions); we focus on them because they are at the heart of the cognitive therapy (Beck, 1995). The third one is acceptance and commitment therapy (ACT) and the key process considered is experiential avoidance/psychological flexibility; we focus on this component because it is at the heart of ACT and one of the most investigated ACT components (Hayes et al., 2004).

[1] This study is under review at *Journal of Clinical Psychology*.
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There are no studies so far that link these key constructs among each other. Therefore one of the objectives of the studies refers to the investigation of the relationships among key variables in three different forms of cognitive behavioral therapy (e.g., degree of association, overlap). The other objective, closely linked to the first, involves the exploration of the relative contributions of these constructs to psychological distress. It aims to test whether the relationship between some of these constructs and distress is more likely a direct one, or whether it is mediated by the other cognitive variables (i.e. an indirect effect).

General Method

Overview

We aimed to investigate these relations in two types of samples: a healthy sample nonetheless vulnerable to experiencing distress (Study 1) and a clinical sample (Study 2). Using these two samples, we increase the generalizability, relevance, and the robustness of the results. The cross-sectional design of the study, as well as the procedure and the instruments used were consistent across studies.

Measures

Clinical diagnosis. The Structured Clinical Interview for DSM-IV-TR (SCID-I/P; First, Spitzer, Gibbon, & Williams, 2002) was used to for assessing clinical diagnostic status.

Irrational and rational beliefs. The Attitudes and Beliefs Scale 2 (ABS 2; DiGiuseppe, Leaf, Exner, Robin, 1988) measures irrational and rational beliefs. It was devised as a valid measure of the central constructs in rational-emotive behavior therapy.

Unconditional self-acceptance. The Unconditional Self-Acceptance Questionnaire (USAQ; Chamberlain & Haaga, 2001) was developed based on Albert Ellis's theory on unconditional self acceptance, a central concept of REBT.

Dysfunctional attitudes. The Dysfunctional Attitudes Scale A (DAS-A; Weissman & Beck, 1978) offers information regarding the person's dysfunctional attitudes, which function as schemata through which the person builds his/her reality.

Experiential avoidance/psychological flexibility. The Acceptance and Action Questionnaire (AAQ-II; Bond & al., submitted) is a revised form of the AAQ (Hayes et al., 2004), which was originally developed to provide an internally consistent model of the ACT treatment model and behavioral effectiveness.

Emotional distress. The Profile of Affective Distress (PAD; Opris & Macavei, 2005) is an instrument designed to evaluate emotional distress. It consists of 39 items that are adjectives describing emotions, both negative and positive. The global negative emotions score was used in the current studies.

Study 1

Research demonstrates that both the beginning of semester (Pennebaker, 1997) and the period before an exam (Malouff et al., 1992) are often stressful periods, which may negatively impact emotional health. In Study 1 we explored the relationships between the constructs considered on a non-clinical sample in one of these periods, before moving to a clinical sample in Study 2.

Method

A large sample of a hundred and fifty two student participants (mean age of 21.71 years, SD= 1.33) took part in the study. The gender distribution was 22.4% males and 77.6% females. None of the subjects had had any prior experience with any of the forms of therapy taken into account.

Results and discussions

The mean score for distress, reported on the PDA, is 61.93 (SD=22.73), which, according to comparisons with the Romanian norms would qualify the sample as having a high level of negative emotions.

Correlation analysis. The association between cognitive variables from each therapy approach considered (REBT, CT, ACT) and their associations with subjective-emotional distress are presented in Table 1

Table 1

Correlations between the cognitive and subjective/emotional variables in Study 1

Cognitive variables	*1*	*2*	*3*	*4*	*5*	*6*
1. USAQ Unconditional self-acceptance	—					
2. AAQ-II Psychological flexibility	.57*	—				
3. DAS-A Dysfunctional attitudes	-.61*	-.56*	—			
4. ABS 2 Global Irrationality	-.38*	-.44*	.60*	—		
5. ABS 2 Rationality	.19	.23	-.40*	-.88*	—	
Subjective-emotional variables						
6. PAD Distress	-.44*	-.58*	.35*	.32*	-.21	—

Note. *p<.003 Bonferroni corrected for multiple comparisons

The results from the correlational analysis show significant and high positive correlations between irrational beliefs and dysfunctional attitudes, as well as significant and high negative correlation between irrational beliefs and unconditional self acceptance. These results were expected from the underlying theories and models, as well as from previous studies (Ellis, 1994; Beck, 1995).

The fact that the correlation between rational beliefs and unconditional self-acceptance is small points to the fact that they may refer to distinct constructs. The REBT authors (Ellis, 1994) has advanced the idea that unconditional self-acceptance could be a different change process, aiming at more radical, philosophical changes.

Psychological flexibility (=lack of experiential avoidance) is highly and negatively associated with cognitive constructs central to the other forms of therapy (irrationality, unconditional self-acceptance, dysfunctional attitudes). The fact they share a high degree of variance could indicate they deal with very similar processes.

In regards to the relationships between these variables and distress, the associations obtained were fully consistent with the underlying theories. Irrationality appeared to have a medium positive correlation with distress (see also Dryden, 2003; David et al., 2009). Dysfunctional attitudes were also found to have medium positive correlations to distress, again in accordance to the theory that these attitudes can lead to distress (de Graaf, Roelofs & Huibers, 2009). As expected from the literature on ACT (e.g. Hayes & al., 2004), psychological flexibility (=lack of experiential avoidance) bears higher negative associations with distress.

Mediation analysis. We used bootstrapping tests with 5000 re-samples and reported a bias corrected and accelerated confidence interval (Preacher & Hayes, 2008). Mediation is considered to have taken place when the confidence interval for the estimation of the indirect effect does not contain 0.

The results indicated experiential avoidance/psychological flexibility to act as a mediator in the relationship between global irrationality and emotional distress, indirect effect =.14, *SE*=.03, 95% *CI* (bias corrected and accelerated) = .08 to .21. Experiential avoidance/psychological flexibility also mediated the relationship between unconditional self-acceptance and emotional distress, indirect effect = -.51, *SE*=.10, 95% *CI* (bias corrected and accelerated) = - .75 to -.32, as well as between

dysfunctional attitudes and emotional distress, indirect effect =.26, *SE*=.05, 95% *CI* (bias corrected and accelerated) = .17 to .37. For each of the alternative models, the confidence intervals of the indirect effect contained zero, indicating the absence of mediation.

Our results seem to point out to the fact that the changing irrationality may lead to modifying experiential avoidance which may further on bring about changing distress (negative emotions). In the same framework, the effects of unconditional self-acceptance on distress may be carried out through influencing experiential avoidance, and those of dysfunctional attitudes on distress may also operate through impacting experiential avoidance.

It is worth noticing that irrational beliefs and dysfunctional cognitions are conceptualized as core beliefs, coded as underlying schemata (Ellis, 1994; Beck, 1995); thus, they are more general and not easily experienced directly. Moreover, by interaction with specific activating events, they generate automatic thoughts that are experienced consciously and are associated to dysfunctional feelings and behaviors. According to the theory of ACT, experiential avoidance is defined as the lack of willingness to experience (i.e., not alter the form, frequency, or sensitivity of) these automatic thoughts (i.e. unwanted private events – in ACT terms) (Hayes & al., 1999). Thus, if these constructs are related to each other, the impact of irrational beliefs and dysfunctional cognitions on distress could be mediated on one hand by experiential avoidance, and on another hand by automatic thoughts. Regarding experiential avoidance, our study provides support for this prediction.

Consequentially, some interesting conjectures emerged following Study 1, regarding the relationship between experiential avoidance and automatic thoughts as mediators between more profound, schema type constructs and distress. One theoretical possibility would be that irrational beliefs and/or dysfunctional cognitions represent underlying cognitive vulnerability factors that in negative situations generate automatic thoughts that are then experientially avoided, generating distress. The other one would be that irrational beliefs and/or dysfunctional cognitions, as underlying cognitive vulnerability factors, prompt the response of experiential avoidance which in turn activates automatic thoughts by a mechanism similar to the paradoxical rebound effect of suppression (Wegner, Schneider, Carter, & White, 1987). We tried to address these questions in Study 2, along with corroborating the results of Study 1 on a clinical sample.

Study 2

In Study 2, we aimed to see whether the meditational models we showed in Study 1 were valid in the case of a clinical sample. We used the same measures of beliefs and distress so as to make the results comparable to the ones for the healthy sample. We also wanted to check which of the two theoretical predictions we set forth consequently to Study 1 would better describe the relationships between the constructs considered. To this purpose, we also included a measure of automatic thoughts as a potential mediator in the relationship between more profound cognitive structures (e.g., irrational beliefs), experiential avoidance and distress.

Method

Twenty eight participants (26 females, 2 males), diagnosed with generalized anxiety disorder (GAD) took part in this study. Ages ranged from 21 to 50 years, with a mean age of 26.67 (SD= 6.29). None of the subjects had had any prior experience with any of the forms of therapy taken into account. Subjects were recruited from an ongoing randomized clinical trial comparing various forms of cognitive-behavior therapy for generalized anxiety disorder. All participants were diagnosed with GAD

after having been evaluated with SCID-I/P module for anxiety disorders (First, Spitzer, Gibbon, & Williams, 2002). The procedure used was the same as in Study 1, with the addition of a measure of automatic thoughts.

Automatic thoughts were measured with the Automatic Thoughts Questionnaire (ATQ; Hollon & Beck, 1980). This instrument consists of 15 statements which represent dysfunctional thoughts the subject has to rate in terms of frequency of occurrence.

We employed the same data analysis procedure as in Study 1 (correlation and mediation analysis), but in addition we used a procedure for testing multiple step mediation. We employed the Hayes, Preacher, & Myers (2011) multiple step multiple mediation procedure in which mediators are allowed to influence each other, implemented in the MEDTHREE script for SPSS.

Results and discussions

Correlation analysis. The association between cognitive variables from each therapy approach considered (REBT, CT, ACT) and their associations with emotional distress are presented in Table 2.

Table 2

Correlations between the cognitive and subjective/emotional variables in Study 2

Cognitive variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. USAQ Unconditional self-acceptance	—						
2. AAQ-II Psychological flexibility	.61*	—					
3. DAS-A Dysfunctional attitudes	-.67*	-.49*	—				
4. ABS 2 Global Irrationality	-.77*	-.60*	.80*	—			
5. ABS 2 Rationality	.69*	.46	-.74*	-.95*	—		
6. ATQ Automatic thoughts	-.38	-69*	.57*	.58*	-56*	—	
Subjective-emotional variables							
7. PAD Distress	-.59*	-.74*	.58*	.75*	-.70*	.78*	—

Note. *p<.05 Bonferroni Holm corrected for multiple comparisons

The correlation pattern was similar to the one obtained in Study 1. However the correlations are higher than those for the sample high on distress in Study 1. Automatic thoughts were, as expected from the literature, highly correlated with distress. They displayed medium correlations with the more broad, core cognitive constructs (irrationality, dysfunctional attitudes), indicating they represent different, but related constructs.

Simple mediation analysis. Mediation was conducted following the same procedure as in Study 1. The results indicated experiential avoidance/psychological flexibility to act as a mediator in the relationship between global irrationality and emotional distress, indirect effect =.15, *SE*=.06, 95% *CI* (bias corrected and accelerated) = .04 to .29. Experiential avoidance/psychological flexibility also mediated the relationship between unconditional self-acceptance and emotional distress, indirect effect = -.61, *SE*=.21, 95% *CI* (bias corrected and accelerated) = -1.10 to -.26, as well as between dysfunctional attitudes and emotional distress,

indirect effect =.27, *SE*=.11, 95% *CI* (bias corrected and accelerated) = .09 to .51. The converse models were again non-significant.

The results are therefore consistent with those of Study 1, indicating that the effect of more general, schema-like cognitive variables (irrationality, unconditional self-acceptance, dysfunctional attitudes) on emotional distress is carried out through changes in experiential avoidance.

Multiple step multiple mediation analysis.

However, we also tested two alternative multiple mediation models, corresponding to the two possible paths we anticipated theoretically: with automatic thoughts as mediator 1 and experiential avoidance as mediator 2, and respectively with experiential avoidance as mediator 1 and automatic thoughts as mediator 2. As predictors we used each of the deeper level, schema like constructs consecutively, while as outcome we used distress.

Our results showed significant mediation in the cases in which experiential avoidance played the role of mediator 1 and automatic thoughts the role of mediator 2: with irrationality as the predictor, indirect effect =.07, *SE*=.04, 95% *CI* (bias corrected and accelerated) = .008 to .187; with unconditional acceptance as a predictor, indirect effect = -.35, *SE*=.21, 95% *CI* (bias corrected and accelerated) = - .925 to -.07; and with dysfunctional attitudes as the predictor, indirect effect 10, *SE*=.07, 95% *CI* (bias corrected and accelerated) = .006 to .289. For each of the alternative models (automatic thoughts as mediator 1 and experiential avoidance as mediator 2), the confidence intervals contained zero, indicating the absence of mediation.

Summary and concluding discussions

The first major conclusion of our research regards the fact that although these constructs, central for each of the therapies considered, are strongly associated, they do no entirely overlap. Their associations are medium to high which could mean they measure similar, related (but not identical) processes.

The second major conclusion refers to the fact that experiential avoidance/psychological flexibility mediated the relationship between the cognitive constructs (e.g. irrationality/unconditional self-acceptance, dysfunctional attitudes) and distress. This effect held both for a large, high on emotional distress sample used in Study 1, as well as for a smaller, clinical sample with GAD used in Study 2.

An interesting result, which emerged subsequently to Study 1, was that the effect of the more general constructs on distress was carried out through modifying experiential avoidance which in turn acted on automatic thoughts that were the most proximal to distress. Theoretically, these results seem to reinforce the notion that irrational beliefs and/or dysfunctional cognitions are underlying cognitive vulnerability factors that in negative situations generate activate experiential avoidance which in turn primes automatic thoughts presumably by a mechanism similar to Wegner et al. (1987) white bear effect (i.e. avoided thoughts return with more frequency). However, due to the limited sample we used, we recommend the testing of these multiple mediation models on other, greater samples.

This research has several limitations. The most important is the very nature of the study, which uses a cross-sectional design. The aim of the study was to compare the key cognitive constructs of these therapies, and not the efficiency or proposed mechanisms of change of the therapies themselves. Also, while we tested these relationships on a clinical sample, it was reduced in number. However, the fact we obtained the same results in both studies argues for the robustness of the findings.

Study 2: How do reappraisal-based approaches compare to acceptance-based ones: meta-analysis

The field of cognitive behavioral therapy (CBT) is allegedly undergoing major transformations. Over the past 20 years, it has witnessed the rise of a self-entitled "third wave". According to Hayes (2006), one of the main promoters of the concept, this wave has emerged from both within the cognitive and the behavioral tradition and includes a number of forms of therapy: Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), Dialectical Behavior Therapy (DBT; Linehan, 1993), Mindfulness Based Cognitive Therapy (MBCT; Segal et al., 2002).

As a general idea, third wave approaches have diminished the importance "traditional" CBT attaches to cognitive change. Clark (1995), in common with other leading cognitive therapists asserts that a fundamental postulate of the cognitive model of psychopathology is that cognitive change is central to treating psychological disorders, stating that "all therapies work by altering dysfunctional cognitions, either directly or indirectly" (p. 158). As a difference, third wave therapies choose to focus on different processes that employ a more experiential and less didactic approach to the clients' beliefs.

Third wave therapies have been enthusiastically championed by their proponents as new, empirically based approaches. But in a recent meta-analysis, Öst (2008) showed that the randomized control trials (RCTs) employed by third wave therapies lacked the methodological stringency of CBT studies published in the same years, in the same journals and went on to conclude that none of the third wave therapies fulfill the criteria for empirically validated treatments. The validity of the assertion that there is indeed a "third wave" has been put under question (Hofmann & Asmundson, 2008). It has been argued that these therapies are merely extensions of CBT and in their attempt to distance themselves from CBT they employ misperceptions about the its goals and techniques (Hofmann & Asmundson, 2008).

The efficiency of third wave studies has been summarized in two meta-analyses. The first one (Hayes, 2006) was conducted on ACT and it reviewed outcome studies, but also correlational studies regarding ACT processes, and componential experimental studies. Hayes also noted that a handful of studies have directly compared ACT and traditional CBT. Analyzing these four studies, he concluded that between condition effect sizes were 0.73 (range 0.49- 1.23) at post (N=96) and .83 (range .79-.92) at follow-up (N=39) in favor of ACT. However, Hayes acknowledged there might be some problems with the relevance and confidence that could be placed on these results, since they were based on a very small number of studies, with a limited number of participants. Moreover they were all conducted by ACT researchers, which may have biased the results.

At a careful analysis however, there are more serious problems with the Hayes (2006) meta-analysis. The most important one is the lack of clear selection criteria for the studies included in the meta-analysis. Inclusion and exclusion criteria were not made transparent, nor were the details of the procedure employed for retrieving the studies. Thus, apart from published studies, it also includes data from unpublished works such as posters presented at conferences, unpublished doctoral dissertations.

The other meta-analysis regarding the efficiency of third wave approaches was conducted by Lars-Göran Öst (2008) for randomized control trials from third wave therapies. The results indicated that the total effect size for third wave therapies, across all comparison conditions, was 0.56 ($p<.0001$), with a 95% CI of (0.33, 0.79).

Based on the analysis of these two meta-analyses, we noticed that a point that has not been properly analyzed regards the differential efficiency of third wave

therapies as compared to classical CBT, despite claims made on both sides regarding comparative efficiency and the idea of similar versus distinct mechanisms of change. So our idea was to summarize how the domain presents itself in this aspect, which has been one of the major contention points in the "new" wave versus "classical" wave of CBT debate.

Method

Literature search

Since ACT is a new development, going back to the mid 1980s, we decided for a less conservative approach than Öst (2008) and included all clinical trials regarding efficiency, mechanisms of change or both, whether or not these were randomized or not.

We conducted an extensive database search on MEDLINE, PsycINFO and the COCHRANE LIBRARY. Databases were searched from inception through August 2010. The following key words were used: "acceptance and commitment therapy" (all fields) and "comprehensive distancing". According to Hayes et al. (2010) comprehensive distancing was the term denoting an early form of ACT.

Inclusion criteria

In order to be included in the meta-analysis, a study had to satisfy the following conditions: (a) It had to be published or in press in a peer-reviewed journal in the English language; (b) It had to investigate a form of intervention; (c) ACT or a form of ACT had to be used; (d) CBT or a form of therapy assimilated to CBT had to be used as a comparison treatment

Meta-analysis

Since we were interesting in comparisons regarding both efficiency and mechanisms of change, all measures that regarded one of these aspects, involved the use of validated instruments were included in the meta-analysis. Subsequently they were grouped in measures related to efficiency (distress, quality of life) and measures related to mechanisms of change (ACT-specific mechanisms of change, CBT-specific mechanisms of change). The effect sizes (ES) were calculated for both post-treatment change and follow-up change, for the ACT and CBT groups. The mean change was used instead of the post-test mean, as not all studies employed proper randomization procedures.

The controlled ES was calculated post-treatment by dividing the difference between the ACT pre- to post- mean change and the CBT pre- to post- mean change with the pooled standard deviation of the two conditions (the standard deviations for the mean changes). The meta-analysis was performed using the comprehensive meta-analysis, version 2 software (Biostat, Inc., 2006), correcting for small samples by calculating Hedges' g.

Results

The search yielded 6 published articles comparing ACT (or a form assimilated to ACT) to CBT (or a form assimilated to CBT). These studies comprised of a total of 237 participants for pre-post change (considering only those in the ACT and CBT groups, which were the focus of our comparison) and 130 participants for pre-follow-up change (one of the 6 studies did not report follow-up). We subtracted the drop-outs from the initial number in the cases where the analysis were conducted on the subjects who completed all sessions and evaluations and considered the initial number of subjects (not subtracting the drop-out number) in the case where the analysis done were intention-to-treat type. We did this in order to be able to include all studies in the analysis and to do that in a way that closely follows the analysis conducted by the

authors. As with other aspects of this meta-analysis, we tried to be as inclusive as possible, while still adhering to scientific standards.

A synthetic summary of the studies is presented in Table 1.

Table 1
Characteristics of the ACT studies

Study	*Disorder*	*ACT*[a]	*CBT*[b]	*Therapist Expertise*[c]	*Manual*	*Administration*	*N at start*[d]	*Drop out*[e]	*Tx sess*[f]	*Tx h*[g]	*F-up m*[h]	*F-up no*[i]
Zettle, 1986	Depression	CD	CT	NI	NI	Individual	18	0	12	NI	2	18
Zettle, 1989	Depression	CD	CT	Expert	Manual	Group	27	6	12	18	2	21
Bond & Bunce, 2000	Stress	ACT	IPP	NI	Manual	Group	60	15	3	9.75	6-7	45
Zettle, 2003	Mathematics anxiety	ACT	SD	Expert	Manual	Individual	37	13	6	6	2	18
Forman et al., 2007	Clinically distressing symptoms	ACT	CT	Novice	Core skills	Individual	101	44	TD (≈15)	NI	NI	NI
Lappalainen et al., 2007	Outpatient therapy seekers	ACT	CBT	Novice	Core skills	Individual	28	0	10	10	6	28

[a]CD= cognitive distancing, ACT=acceptance and commitment therapy
[b]CBT= cognitive behavior therapy, CT= cognitive therapy, IPP= Innovation Promotion Program, SD= systematic desensitivization, SIT= Stress Innoculation Training
[c]NI= no information is given in the article
[d]The number of subjects reported is just for the ACT and CBT conditions taken into comparison, not taking in account other conditions that were used in the study (e.g. control)
[e] Drop out number before or at post-test. The Forman study only reports intention-to-treat, so the number of subjects considered for the meta-analysis was the initial one
[f]Number of sessions of therapy; TD= therapist's decision
[g]Number of sessions X session length (in hours)
[h]Follow-up period (in months)
[i]Number of subjects at follow-up

Meta-analysis

Pre-post change

Efficiency (outcome measures)

The results of the meta-analysis for the overall outcome measures showed an ES (Hedges' *g*) of 0.178 (*z*= 0.96, p>.05) and 95% CI (-0.184, 0.539).

We then divided the outcome variables in two categories: the ones that dealt with psychopathology/subjective distress (considered together as not all studies included clinically distressed participants) and the ones that dealt with quality of life.

For the outcome variables grouped in the category psychopathology/subjective distress, we obtained an ES (Hedges' *g*) of 0.148 (*z*= 0.82, p>.05) and 95% CI (-0.204, 0.500). For the outcome variables grouped in the category quality of life, we obtained an ES (Hedges' *g*) of 0.145 (*z*= 0.98, p>.05) and 95% CI (-0.143, 0.433).

Theory of change

We considered 2 categories of processes of change: ACT- related processes of change and CBT- related ones. For the ACT-related processes of change, 5 of the 6 studies reported measures in this category. We have found an ES (Hedges' *g*) of 0.244 (*z*= 1.36, p>.05) and 95% CI (-0.106, 0.594). For the CBT-related processes of change, 4 of the 6 studies reported measures. We have found an ES (Hedges' *g*) of -0.116 (*z*= -0.73, p>.05) and 95% CI (-0.427, 0.194).

Moderator analysis

Moderator analysis were not part of the initial objectives of the study, they were conducted as supplementary post-hoc analysis.

We thought 4 moderators might be of interest, given the fact we were dealing with therapeutic interventions and their efficiency: publication period, type of therapy, use of a manual and the therapist expertise. Each of these was constructed as categorical, dichotomous variables. The results of the moderator analysis on the overall outcome are presented in Table 2.

Table 2 Moderator analysis for overall outcome

Moderator	**Number of studies**	**E.S. (Hedges' *g*)**	***z* (p)**	**95% CI**
Publication period				
1980-2000	3	.367	1.67 (p>.05)	(-.062, .795)
2001-2009	3	.175	1.14 (p>.05)	(-.125, .475)
Type of therapy				
Individual	4	.125	.52 (p>.05)	(-.342, .592)
Group	2	.247	1.01 (p>.05)	(-.231, .724)
Use of manual				
Manualized intervention	3	.028	. 10 (p>.05)	(-.513, .569)
Core skills training	2	.099	.58 (p>.05)	(-.232, .430)
Therapist expertise				
Novice	2	.099	58 (p>.05)	(-.232, 430)
Expert	2	-.037	-.07 (p>.05)	(-1.058, .984)

Follow-up

Five of the six studies included reported follow-up data. We compared the pre- to follow-up change for the ACT and the CBT groups.

Efficiency (outcome measures)

The results of the meta-analysis for the overall outcome measures showed an ES (Hedges' *g*) of 0.380 (*z*= 2.14, p>.05) and 95% CI (-0.234, 0.950).

For the outcome variables grouped in the category psychopathology/subjective distress, all the 5 studies reported results on measures fitting here. We obtained an ES (Hedges' *g*) of 0.361 (*z*= 1.18, p>.05) and 95% CI (-0.234, 0.950). For the outcome variables grouped in the category quality of life, only two of the studies reported follow-up data from this category. We obtained an ES (Hedges' *g*) of 0.424 (*z*= 1.81, p>.05) and 95% CI (-0.033, 0.880).

Theory of change

For the ACT-related processes of change, 4 of the 5 studies reported measures in this category. We have found an ES (Hedges' *g*) of 0.187 (*z*= 0.55, p>.05) and 95% CI (-0.469, 0.844). For the CBT-related processes of change, 3 of the 5 studies reported measures. We have found an ES (Hedges' *g*) of -0.188 (*z*= -0.74, p>.05) and 95% CI (-0.684, 0.309).

Post-hoc moderator analysis were not reported on follow-up data, due to the fact there were only 5 studies, out of which some did not even include enough data to assess for some of the proposed moderators.

Discussion

The present meta-analysis started off from the goal of getting a summary of the "traditional CBT" versus "third wave" approaches dispute. As we pointed out in the introduction, ongoing debate between the two sides has focused on two major contention points: comparative efficiency and whether or not they operate by distinct mechanisms of change. Building up on previous meta-analytical work, we wanted to see how the field of presented itself in this respect. No previous meta-analytical review that we are aware of until now has approached these issues taking into account only the studies directly comparing third wave interventions with traditional CBT.

As a general observation, we note there was a reduced number of studies that involved comparisons between ACT (or an ACT consistent intervention) and CBT (or a CBT consistent intervention). Regarding efficiency the pre-post change results showed no significant differences between the ACT and the CBT groups, neither on global outcome, nor on the specific outcome subcategories considered (psychopathology/subjective distress and quality of life). Also, pre-follow-up results (on both global outcome and the specific outcome categories considered) showed greater, but still not significant effect sizes, ranging around 0.3-0.4.

Regarding mechanisms of change, we focused on separately analysing the ACT-related mechanisms of change and the CBT-related ones. For the ACT-related mechanisms of change, we found non-significant Hedges'*g* values (ranging around 0.2) for both pre-post change and pre-follow-up change. The same holds true for the CBT-related mechanisms of change.

Moderator analysis was only tentatively conducted post-hoc, due to the fact it was not anticipated by the study objectives. The only one which yielded interesting results, both for pre-post change in global outcome, but especially in pre-post change ACT-related mechanisms of change, was the publication period. Although statistical tests for comparisons between moderator categories could not be computed because of the small numbers of studies, the trend appears to be that older studies (published before 2000) report results more favorable to ACT than more recent studies (published after 2000).

In conclusion the status-quo seems to be one of little empirical work doing comparisons between the two approaches, both from the ACT and the CBT side. Even if we acquiesce with the claims of Hayes (2006) and consider ACT to be a relatively

young orientation, going back to the mid 1980s, 6 studies over a 20 years period comparing this intervention with traditional CBT is still very scarce.

Secondly, the results of the present meta-analysis do not support in any way the existence of differences in efficiency or in mechanisms of change for these two forms of therapy. Of course this could be explained by a number of factors, including small number of subjects, great variance across the studies and so on, but what we find more relevant is that these factors are also an intrinsic part of the status-quo. This is clearly more of an ACT problem, than it is a CBT problem. Empirically rigorous studies and meta-analyses have already established CBT as the gold standard for the majority of emotional disorders (e.g. Butler & Beck, 2000; Hollon et al., 2005). Evidence-based treatments according both to the APA Division 12 task force's list (Chambless, Baker, Baucom, Beutler, & Calhoun, 1998) and to the National Institute for Health and Clinical Excellence' guidelines (http://www.nice.org.uk/) are saturated in CBTs as the empirically validated and recommended interventions for most emotional disorders. The functionality of its mechanisms of change have been also empirically tested in many studies (e.g. Hofmann et al., 2007; Kendall & Treadwell, 2007). It is ACT which comes to make the claim it can achieve at least comparative efficiency by the means of distinct mechanisms of change. Therefore the burden of proof is inherently placed on the ACT shoulders, and this burden includes conducting rigorous studies to substantiate these claims.

PART II. DYSFUNCTIONAL BELIEFS IN EMOTIONAL REGULATION: HEALTHY INDIVIDUALS

Study 3: Differential effects of negative functional reappraisal on distress and dysfunctional beliefs[2]

One of the regulation strategies that has recently received extensive attention in the literature is reappraisal, which basically implies changing the meaning of the situation the person is confronted with in order to alter its emotional impact (Gross, 1998). It is recognized as one of the main active ingredients of cognitive-behavioral therapy/CBT (Hofmann & Asmundson, 2008), as cognitive change and the modification of irrational (i.e. dysfunctional) beliefs are considered among the main determinants of changes in outcomes (i.e., emotions, behavior) across most forms of psychopathology.

The recent, more basic research oriented paradigms, (i.e., the emotion regulation paradigm) mostly focus on a form of detached reappraising. In behavioral studies conducted in this paradigm, participants in the reappraisal group were instructed to "think about what you are seeing in such a way that you don't feel anything at all" (Gross, 1998, p. 227), "to view the slides with the detached interest of a medical professional" (Richards & Gross, 2000, p. 416) or "to think about your situation in such a way that you remain calm and dispassionate" (Butler et. al., 2003, p. 52). Except for detached reappraisal, which has been the focus of most studies on the topic, a few others have dealt with positive reappraisal. In this form, the individual attends to the negative event, while also recognizing its positive aspects (Folkman & Moskowitz, 2000).

[2] This study was accepted for publication in the journal *Motivation and Emotion.* Author contributions: I. Cristea contributed to the study design, data analysis, data interpretation and writing of the manuscript; D.Nagy contributed to the study design and data collection; A.Szentagotai and D.David contributed to the data interpretation and writing of the manuscript.

In the CBT literature, reappraisal is by no means employed with the purpose of shifting from an emotional to an unemotional way of thinking. Rather, the purpose of reappraisal is to shift from a dysfunctional emotional mode (e.g., depression), which is self-defeating and prevents the individual from attempting to pursue his or her goals, to a more functional one (e.g., sadness), which would still allow the person to engage in goal-directed behavior, albeit experiencing psychological discomfort.

Even if both detached and positive reappraisal have been proven to be efficient strategies for regulating emotions, their efficiency remains limited by the fact that they are not always accessible and feasible. Adopting a detached perspective or finding positive aspects is harder, if not impossible, in more tragic life situations with which individuals are often confronted. At the same time, it is precisely in such situations that regulation of negative emotions is needed.

We believe an alternative that has not been studied so far is that of negative functional reappraisal, inspired by cognitive-behavioral therapies, and in particular, rational-emotive behavior therapy (REBT) and empirical developments in this field (Ellis, 1994; David, Schnur, & Birk, 2002). In this framework, the reinterpretation of the situation maintains its negative character, reformulating it in more functional (i.e. rational) - albeit still negative - terms. The goal would be to achieve a less pervasive and intense emotional effect on the functioning of the individual (i.e., thinking that a situation is very bad, but not catastrophic; that it is hard to stand, but not unbearable).

The primary objective of the present study was to test more ecological strategies of reappraisal, informed from CBT strategies of cognitive change. Most studies have approached reappraisal monolithically and none so far has brought together and compared particular and distinct reappraisal strategies.We aimed to see if a reappraisal strategy that would point out the positive aspects of the emotion-provoking situation (positive reappraisal) would yield better results on negative and positive emotions, as well as dysfunctional and functional beliefs than a strategy focused on presenting the undesirable aspects in a more functional, less tragic, but still negative way (negative functional reappraisal).

Method

Participants

Ninety participants (16 men; 74 women; Mean age= 21.80, SD= 1.13) participated in the experiment. All of them were undergraduate students and of Romanian nationality. None of the participants had had any previous experience with cognitive-behavioral therapy, nor taken courses regarding it.

Film Stimulus

All participants were shown a video clip (165s) depicting the story of a young woman, named Jacqueline Saburido, who was involved in a car accident that left her with very serious physical injuries and burns covering most of her body. The film clip was tested beforehand on a different sample of participants, with regards to its capacity of reliably inducing negative emotions.

Measures

The Profile of Affective Distress (PAD; Opris & Macavei, 2005) consists of a list of 39 adjectives describing positive and negative emotions. The participant is asked to rate the suitability of each item in assessing how he/she feels at the present moment, on a 5-point Likert scale.

The Attitudes and Beliefs Scale 2 – ABS 2 (DiGiuseppe, Leaf, Exner, & Robin, 1988; Macavei, 2002) is a self-report measure of irrational and rational beliefs, uncontamined by the inclusion of emotional items (DiGiuseppe et al., 1988).

It consists of 72 items, representing assertions that the subject is asked to rate in terms of agreement/ disagreement using a 5-point Likert scale.

Procedure

The procedure was administered individually. After signing the informed consent, participants watched the movie clip. Subsequently they completed the mood and cognitions measures.

Participants that had been previously randomized in one of the three groups were each given the correspondent instruction. The control group instruction involved an non-evaluative description of the story presented in the film stimulus. The positive and the negative functional reappraisal scripts were each presented in the form of an interview with Jacqueline, the main character of the film. The first one focused on the positive aspects of the situation, underlining that there are good aspects to be found even in this tragic context. The second acknowledged the negative aspects of the situation, without trying to strip them of their negative valence, but reformulated them in more functional terms (e.g., *It is bad that this happened, but it is not the end of the world; I really wish this would have not happened, but I know things don't necessarily have to work according to my wishes*). This negative functional reappraisal instruction was developed following the prescriptions of rational-emotive and cognitive-behavioral therapy literature (David et al., 2005). After having read the instructions, participants once again completed the mood and cognitions evaluations and were subsequently debriefed.

Results

Negative emotions (distress) - Primary outcome

There was a main effect of the emotional regulation strategy on negative emotions, when pre-intervention level of negative emotions was controlled for, $F(2, 86)= 111.41$, $p<.001$. Sidak post-hoc tests indicated the control group displayed a higher level of negative emotions post-intervention than the positive reappraisal (mean difference=14.98; SE=1.26, p=.001, Cohen's d= 0.96) and negative functional reappraisal ones (mean difference=16.41; SE=1.118, p<.001, Cohen's d= 1.96).

Positive emotion generation

The emotion regulation strategy also had a significant effect on post-intervention positive emotion, when the pre-intervention level of positive emotions was controlled for, $F(2, 86)= 686.61$, $p<.001$. Sidak post-hoc tests showed that positive reappraisal resulted in significantly more positive emotions than the others: control (mean difference=40.4 SE=1.21, p<.001, Cohen's d= 7.18) and negative functional reappraisal (mean difference= 37.04, SE= 1.20, p<.001, Cohen's d= 6.34). The negative functional reappraisal instruction also resulted in more positive emotions than the control one (mean difference= 3.36, SE= 1.21, p=.02, Cohen's d= .76).

Cognitive mechanisms: Irrational and rational beliefs

The results of the ANCOVA indicated a significant effect of Instruction type on the level of irrational beliefs post-intervention, $F (2, 86)= 67.36$, $p<.001$. Sidak post-hoc tests showed the control group displayed greater levels of irrational beliefs than the positive reappraisal (mean difference=9.82; SE=2.23, p<.001, Cohen's d= 0.90) and negative functional reappraisal groups (mean difference=26.29; SE=2.23, p<.001, Cohen's d=1.81). Positive reappraisal led to higher increases in irrationality than negative functional reappraisal (mean difference=16.46, SE= 2.24, p<.001, Cohen's d=1.02).

The ANCOVA showed a significant effect of the emotional regulation strategy on the level of rational beliefs, ($F(2, 86)= 85.92$, $p<.001$). Post-hoc tests (Sidak) indicated that positive reappraisal conducted to higher increases in rationality than

control (mean difference= 17.24; SE=2.10, p<.001, Cohen's d= 1.19), while negative functional reappraisal led to higher increases in rationality than both the control (mean difference= 27.22; SE= 2.09, p<.001, Cohen's d= 1.93) and positive reappraisal instructions (mean difference=9.97; SE=2.09, p<.001, Cohen's d= .81).

Mediation analysis

Since the manipulation had a significant effect on both the primary outcome measure and the purported mechanisms of change (irrational and rational beliefs), we wanted to see whether changes in dysfunctional beliefs would mediate the impact of instruction type on negative emotions, as one would expect from the CBT theories of change.

Mediation analysis was done using the bootstrapping approach for assessing indirect effects (Preacher & Hayes, 2008).We coded the independent variable as two dummy variables (one for positive reappraisal and one for negative functional reappraisal), using the control condition as a reference category. As a mediator, we used changes in irrational beliefs from post- to pre-instruction. The outcome measure was the level of negative emotions as posttest. We used the pre-manipulation level of negative emotions as a covariate. Mediation is considered to have taken place when the confidence interval for the estimation of the indirect effect does not contain 0.

We used bootstrapping tests with 5000 re-samples and reported a bias corrected confidence interval (Preacher & Hayes, 2008). Results showed that in the case of dummy variable one, which contrasted positive reappraisal to the other two conditions, there was no mediating effect of the changes in dysfunctional beliefs on the outcome measure (indirect effect =1.62, *SE*=.98, 95% *CI* (bias corrected)=-.13 to 3.75.). For dummy variable two, contrasting negative functional reappraisal with the others, bootstrapping tests with 5000 re-samples estimated the indirect effect for changes in irrational beliefs to -2.51, *SE*=1.34, 95% *CI* (bias corrected)=-5.78 to -0.37, thus providing evidence of mediation.

Discussion

The rationale of the study came from the need of assessing reappraisal in a more ecological way. We identified a rift between two lines of study on this topic: a more basic research approach and a more clinical approach. We speculated that one of the possible causes of this gap is the fact that research has approached reappraisal in a monolithic way, which was insensitive to the differences that are bound to exist between different ways of reappraising. We aimed to bring together two types of reappraisal strategies (positive reappraisal and negative functional reappraisal) and compare them which each other and with a control condition. While the former has been approached in studies regarding emotional regulation (Rusting & DeHart, 2000), the latter is informed by clinical work in cognitive behavioral psychotherapy (David et al., 2005; Ellis, 1994) and has not been evaluated until now in empirical studies.

Our results show that both regulatory strategies were more efficient than control and this held across all outcome measures considered (negative emotions, positive emotions, rational and irrational beliefs). An important result regarded functional negative reappraisal, a strategy that has not been approached in emotion regulation studies before. This reticence might be at least in part due to the common sense belief that in order to make oneself feel better about a situation, one has to find a way to challenge the negative character of the situation. Nonetheless, our results come in clear contradiction with this assumption, as negative functional reappraisal appears to be as efficient in reducing negative emotions as positive reappraisal.

More interestingly though, the negative functional reappraisal group displayed greater reductions in irrational beliefs and higher increases in rational beliefs than

both the control and the positive reappraisal group. Mediation analysis indicated that the changes in irrational beliefs mediated the impact of the instruction on the outcome measure of distress and this happened for negative functional reappraisal group, but not for the positive reappraisal group. This result is consistent with the theoretical underpinning of negative functional reappraisal, stemming from cognitive behavioral therapies, which posits that its effect is carried out through the modification of irrational beliefs (Beck, 1995; David & Szentagotai, 2006; Ellis, 1994).

Negative functional reappraisal could be one of the most robust reappraisal strategies, which one might employ even when confronted with more challenging emotion provoking situations, even after the negative emotion has had time to unfold, and possibly even by individuals with psychological vulnerabilities. The last is an empirical question that needs to be addressed by future studies.

Interestingly enough, the only aspect in which negative functional reappraisal does not outperform positive reappraisal, is positive emotion generation. While our results confirm that positively reinterpreting a situation may lead to increases in positive emotions, this is probably as far as the strategy goes. Compared to functional negative reappraisal, it led to greater levels in irrational beliefs and lower levels of rational beliefs. Moreover, finding good aspects in a situation is not always possible and even if it were, these are often peripheral or not credible.

The study has certain limits. We only used self-report measures so the results could also reflect an influence of demand characteristics. However the participants were not told that the written text they got was aimed at changing their emotions or thoughts regarding the film in any way. Moreover the functional negative reappraisal instruction is somewhat counterintuitive for people not familiar with cognitive behavioral interventions.

Study 4: Positive thinking is a quick fix: A reply to Wood, Perunovic, and Lee. (2009)[3]

The expansion of positive self-statements has been sustained from two different directions. One direction comes from the self-help industry which advocates intensely for the so-called "power of positive thinking". Another direction comes from cognitive behavioral therapies which employ self-statements as part of their protocols (e.g., as homework assignments) for a wide range of disorders (e.g., the manual of treating panic of Barlow and Cerny (1988)). In fact, constructing and using self-statements is a widespread homework assignment in cognitive behavioral therapy protocols (Scheel, Seaman, Roach, Mullin, & Mahoney, 1999). In a recent study, Wood, Perunovic and Lee (2009) argued that the real effectiveness of these statements remains unknown, as they have not been studied independently of treatment protocols. In a couple of experiments, using the self-statement "I am a lovable person", the authors showed that the efficiency of positive self-statements on measures of mood and state self-esteem is moderated by participants' trait self-esteem. In this sense, people high on self-esteem may have some benefits from repeating positive self-

[3] Parts of this study were presented at the EABCT Congress, Reykjavik, 2011
Cristea, I., Szentagotai Tatar, A., & David, D. (2011, September).Positive thinking is a quick fix: Beyond Wood, Perunovic, & Lee (2009). Oral presentation at the European Association for Behavioural and Cognitive Therapy (EABCT) Congress, Reykjavik, Iceland.
Author contributions: I.Cristea: study design, data analyses, interpretation of the results, making of the presentation; A. Szentagotai: interpretation of the results; D. David.: study design and interpretation of the results

statements, while people low in self esteem not only do not display these benefits, but subsequently worsen on these measures.

We must note that self-statements denote beliefs and therefore are not simply classifiable along a positive/negative continuum. On one hand, when positive or negative self-statements are considered, one must not forget that, as beliefs, they can be functional (rational) or dysfunctional (irrational). The dysfunctional/irrational ones are not logically coherent, don't have factual support in reality, and hinder the person from achieving his/her goals. The rational evaluations are the opposite, being logically coherent, concordant with reality, and helping or at least not preventing the person from achieving his/her goals (see David & Szentagotai, 2006 for a review).

On the other hand, one can have self-statements that are neither entirely positive, neither entirely negative. Such is the case of unconditional acceptance statements- "the individual fully and unconditionally accepts himself whether or not he behaves intelligently, correctly, or competently and whether or not other people approve, respect, or love him" (Ellis, 1977, p. 101)- considered to be at the core of some cognitive behavioral therapies, such as Rational-Emotive Behavioral Therapy.

Moreover, if one remains in this paradigm of self-statements as denoting beliefs (as cognitive behavioral therapies consider), one can also notice the self-statement used in the study of Wood and colleagues is not just any one. The authors argue it deals with concerns which may lie at the heart of self-esteem. Regardless, it is also a statement that denotes one of the core cognitions in cognitive-behavioral theories of psychopathology. In its negative form - *I am an unlovable person* - it is considered one of the main dysfunctional core schemas underlying psychopathology (Beck, 1995). In its positive form, depending of its formulation, it can be either functional or dysfunctional. A statement like *I am a lovable person (I am a person that is worth being loved as any other human being)* would be a functional cognition, while a statement like *I am very lovable, entertaining and interesting* would be a compensatory dysfunctional belief, typical but not exclusive of a narcissistic personality (Beck, Freeman, & Davis, 2004).

Positive self-statements consequently cannot simply be treated like a unitary concept and should be classified along the dysfunctional-functional (i.e. irrational-rational) axis. Unfortunately there are few studies using this classification with the goal of trying to distinguish if there are differences in the efficiency of various types of self-statements. Furthermore, the study of Wood and collaborators measured the efficiency of a positive self-statement in the absence of an emotion-provoking or another type of situation requiring adaptation from the individual. But people often resort to these affirmations when faced with a problematic, threatening or challenging situation (e.g., an important exam, a break-up, a failure). The efficiency of these self-statements should also be measured if they were employed in a problematic situation, in other words if they functioned as emotional regulation strategies.

Study objectives

Based on the cognitive behavioral literature, we wanted to compare several types of positive self-statements in terms of their efficiency on self-esteem and mood. We used the statement employed by Wood et al. (2009) - *I am a lovable person* - as a rational positive statement. Cognitive behavioral therapies see it like this, because it deals with the basic human prerogative of being essentially worthy of love, without having to do anything for it, by our very human nature. We introduced an irrational positive statement (*I am a very good, intelligent and valuable person*), similar to the ones identified in pathologies that involve inflated self-esteem, such as the narcissistic personality disorder (Beck et al., 2004). Apart from the positive self-statements, we introduced two other categories: a negative, dysfunctional self-statement (*I am an*

unlovable person) and a functional, acceptance (not positive, not negative) statement - *I unconditionally accept myself as a person, with qualities and flaws.* We selected these statements because they are all informed by cognitive behavioral theories of psychopathology and because, among themselves, they cover both the valence axis (positive versus negative) as well as the functionality axis (irrational versus rational).

Method

Participants

Ninety undergraduate students (77 females, 13 males; mean age= 22.48, SD=5.38) took part in the study for extra credit.

Measures

Self-esteem. Rosenberg's Self Esteem Scale (Rosenberg, 1965) was used to evaluate trait self-esteem. The scale consists of 10 affirmations regarding the global evaluation of oneself. Subjects are asked to rate their agreement with these statements on a 4-point Likert scale. State self-esteem was assessed using McGuire and McGuire's (1996) scale. Participants were asked to respond how they saw themselves right then.

Mood. We used both explicit and implicit measures of mood. Explicit measures of mood used were the State Trait Anxiety Scale (form STAI X1-State; Spielberger, Gorsuch, & Lushene, 1970) and the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971). The POMS consists of a list of 47 adjectives describing emotions, which the subjects are asked to rate in terms of their intensity. We used the negative (α=.96) and positive emotions (α=.87) scales.

For implicit measures of mood, one instrument was Mayer and Hanson's (1995) Association and Reasoning Scale (ARS), which assumes is that judgments tend to be congruent with mood and that optimistic answers suggest happy moods. The other measure was Clark and Teasdale's (1985) 'incentive ratings'; participants rated their desire to engage in a list of eight pleasant activities, the idea being that positive moods would led to increases in the desire ratings.

Procedure

All measures were applied at baseline. Participants were then asked to write a letter addressed to the administration of the university asking that scholarships for socially disadvantaged students be terminated. After this, participants were asked to write down any thoughts and feelings they had. During this period, they were instructed to repeat to themselves the self-statement corresponding to their condition (i.e., positive rational - *I am a lovable person*; positive irrational: *I am a very good, intelligent and valuable person*; negative: *I am an unlovable person*; acceptance: *I unconditionally accept myself as a person, with qualities and flaws*) every time they heard a doorbell-sound. This task lasted 4 minutes, with the sound being played every 15s (i.e., 16 repetitions), similar to the study of Wood and colleagues (2009). After completing the task, participants were given the measures again and were then debriefed.

Results

Between groups comparisons

In order to control for differences in baseline scores, we computed change scores (post-baseline) for each of the dependent variables. There was a significant effect of statement type on state self-esteem ($F(3, 86) = 7.78$, $p<.001$) and on 2 out of 3 explicit mood measures (state anxiety: $F(3, 85) = 6.77$, $p<.001$; negative emotions: $F(3, 80) = 8.60$, $p<.001$) and on one implicit measure of mood (incentive ratings: $F(3, 81) = 3.63$, $p=.016$), but not on positive emotions ($F(3,82)=0.97$, $p=.41$) and the other implicit mood measure (ARS: $F(3, 82)=.39$, $p=.76$). Post-hoc comparisons

(Games Howell) revealed that for *state self-esteem*, the positive rational statement group presented higher increases than the negative statement group (mean difference = 7.04, SE = 1.79, p=.002, d=1.18), and that the same held true for the positive irrational statement group (mean difference = 6.71, SE = 1.89, p=.006, d=1.06). For *state anxiety*, the positive rational statement group report larger decreases than the negative statement group (mean difference = -10.36, SE = 2.83, p=.004, d=1.10) and the acceptance statement group (mean difference = -7.23, SE = 2.39, p=.021, d=0.91), while the positive irrational statement group reported larger decreases than the negative statement group (mean difference = -7.20, SE = 2.56, p=.038, d=0.84). For *negative emotions*, a similar pattern of results emerged, with the positive rational statement group presenting larger decreases than the negative statement group (mean difference = -21.59, SE = 5.30, p=.002, d=1.15) and the acceptance statement group (mean difference = -16.06, SE = 5.11, p=.025, d=1), as well as the positive irrational statement group displaying larger decreases than both the negative statement group (mean difference = -20.24, SE = 5.12, p<.001, d=1.16) and the acceptance statement group (mean difference = -14.71, SE = 4.93, p=.022, d=1). For *incentive ratings*, the rational positive statement produced greater increases than the acceptance statement (mean difference = 8.05, SE = 2.71, p=.024, d=0.75).

Moderation analysis

We conducted moderation analysis, using trait self esteem as a moderator and focusing only on the outcome variables for which ANOVA showed significant effects of instruction type. We followed the procedure recommended by Hayes (2005), according to which a moderation effect reveals itself statistically as an interaction between the independent variable and the moderator in a model of the outcome variable. In our case the independent variable was multi-categorical and coded as a dummy variable for the analysis, while the moderator was kept as a continuous variable. We used the positive irrational self-statement as the reference category.

We found evidence of moderation for changes in state self-esteem (F(3, 80)= 3.58, p=.017) and negative emotions (F(3, 74)= 3.92, p=.012), but not for state anxiety (F(3, 79)= 1.77, p=.159) or incentive ratings (F(3, 75)= 2.15, p=.101). Significant moderation effects were probed using the *pick a point* approach (probing at values of the moderator). For state self-esteem (SSE), at low values of self-esteem (LSE), there was no differential efficiency of the positive rational and irrational self-statements ($b_{rat\text{-}irrat}$ = -.18, p=.818), but differential efficiency emerged for the acceptance and positive irrational ($b_{accept\text{-}irrat}$ =-1.84, p=.006), as well as negative and positive irrational self-statements ($b_{neg\text{-}irrat}$ =-2.49, p=.002). For mean values of self-esteem (MSE), the same pattern emerged, but of a smaller magnitude ($b_{rat\text{-}irrat}$=.026, p=.822; $b_{accept\text{-}irrat}$= -0.26, p=.024; $b_{neg\text{-}irrat}$= -.48, p<.001), while at high levels of self-esteem (HSE) there was no differential efficiency of these strategies (all bs n.s.at p<.05). For negative emotions, the pattern was similar at LSE ($b_{rat\text{-}irrat}$ = -1.07, p=.181; $b_{accept\text{-}irrat}$ =1.14, p=.094; $b_{neg\text{-}irrat}$ =2.05, p=.012), at MSE ($b_{rat\text{-}irrat}$ = -0.13, p=.905; $b_{accept\text{-}irrat}$ =.35, p=.002; $b_{neg\text{-}irrat}$ =.50, p<.001), and at HSE (all bs n.s.at p<.05).

Discussion

Our objective in this study was to expand the research line opened by the study of Wood et al. (2009), by taking a more nuanced look at the specific types of self-statements one can resort do and their potential contextual use. We noted that self-statements denote beliefs and, therefore, are not simply classifiable along a positive-negative continuum. The dysfunctional-functional axis on which these beliefs situate themselves is an essential factor to be taken into account if we want to get a comprehensive and accurate image of what truly underlies their efficiency. A second

argument we made regards the fact that self-statements, which are in fact schematic formulations of beliefs, become more poignant and are employed particularly when the individual is confronted with a problematic or threatening situation.

Our results lead to intriguing conclusions. It seems that, at least on the short run, thinking positive trumps thinking rationally. The positive rational self-statement and the positive irrational self-statement were no different from each other in their efficiency to boost momentary self-esteem and dampen anxiety and negative emotions, following a self-esteem threatening or in other way stressful situation (i.e., an act of unfounded lack of compassion participants were requested to carry out). In what positive thinking is concerned, at least on short run, thinking rationally or thinking in a way mimicking that of a narcissist doesn't appear to make much of a difference. Even more interestingly, the neither negative, nor positive, acceptance statement, did not differ from the negative statement in its efficiency on transitory self-esteem and mood (anxiety, distress).

We found a more complex picture of the moderating effect of self-esteem on the comparative efficiency of the self-statements than the one reported by Wood et al. (2009). Resorting to an acceptance, or a negative rather than a positive irrational self-statement, resulted in decreases in state self-esteem for people with low and medium self-esteem, but not for people with high self-esteem. A similar pattern was found for changes in negative emotions. Interestingly, there seems to be no moderation by trait self-esteem on the differential efficiency of the positive rational and irrational statements. Together with the findings about the lack of a differential efficiency between the two, this result points to the robustness of these self-statements in being a "quick fix" in response to situations where self-esteem is challenged or one is beginning to experience distress. It is interesting to notice that at high levels of self-esteem, the differential effect of the self-statements seems to fade out, people high on self-esteem remaining relatively insensitive to the differences (and possibly even the practice) of these beliefs.

Study 5: Differential effects of reappraisal and acceptance-based strategies in response to emotion inducing scenarios[4]

Aldao et al. (2010) in their recent meta-analysis about strategies of emotion regulation and their links to psychopathology brought into focus the idea of strategies believed to be intrinsically adaptive or maladaptive across a variety of contexts. On the maladaptive end, one such approach would be rumination, defined as a person's repetitive focus on the experience of the emotion and its causes and consequences.

However, whether rumination is maladaptive *per se* or whether it could also be considered an adaptive coping mechanism, part of a problem solving process, has been a subject of debate. Joorman, Dkane, and Gotlib (2006) consider this issue can be resolved by clarifying whether rumination is truly an unitary process. Recent factorial analysis on one of the most used measures of rumination- Ruminative Responses Scale (RRS; Nolen-Hoeksema, Larson, & Grayson, 1999)- have revealed two subcomponents of ruminative thinking (Treynor, Gonzales, & Nolen-Hoeksema, 2003). The first one, called "reflective pondering", was described as the adaptive part of rumination, "a purposeful turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms" (Treynor et al., 2003, p.256).

[4] This study is under review at *Anxiety, Stress and Coping*
Author contributions: I. Cristea contributed to the academic writing of the manuscript and data interpretation, S.Matu to the design and study implementation, A.Szentagotai Tatar and D. David to the design of the study and the data interpretation.

As an alternative that also involves focusing on one's emotions, acceptance/mindful self-focus is defined as the non-elaborative, non-judgmental present-centered awareness in which thoughts, feelings, and sensations are taken as they are (Segal et al., 2002). While both rumination and acceptance involve a focus on one's emotions, a different approach, referred to as cognitive reappraisal, entails changing the meaning of the situation the person is confronted with in order to alter its emotional impact (Gross, 1998).

The main objective of our study was to explore whether the adaptive component of rumination – *reflective pondering* – could function as an emotion regulation strategy and to compare it with two other strategies – reappraisal and acceptance – which have separately been proven as efficient in regulating emotions (Hoffman et al., 2009; Wolgast et al., 2011).

We included a form of reappraisal (i.e. negative functional reappraisal) informed by cognitive-behavioral therapies. In this framework, the reinterpretation of the situation maintains its negative character, reformulating it in more functional - albeit still negative - terms. The goal is to achieve a less pervasive and intense emotional effect on the functioning of the individual, but in a more realistic way than reinterpreting the situation as neutral or positive (i.e., thinking that a situation is very bad, but not catastrophic; that it is hard to stand, but not unbearable). Finally, we wanted to explore whether the impact of these strategies would be differentially affected by a trait variable related to psychopathology – social anxiety. Since we used social scenarios to induce anxiety, we expected the participants' level of social anxiety to have an impact on the way they use of the emotion regulation strategies.

Method

Participants

One hundred and three undergraduate students (86 females, 17 males) with a mean age of 20.93, SD= 2.61, participated in the experiment for extra credit.

Measures

Trait social anxiety. We used the sub-scale assessing anxiety in the social evaluation domain from the Endler Multidimensional Anxiety Scales-Trait (EMAS-T; Endler, Edwards & Vitelli, 1991). EMAS-T was adapted on the Romanian population (Miclea, Ciuca & Albu, 2009).

State anxiety. We used the Endler Multidimensional Anxiety Scales-State (EMAS-S) (Endler et al., 1991), comprising 20 items grouped in two subscales, measuring emotional-autonomic responses and worry-cognitive responses.

Negative Mood. We used the Basic Negative Emotions Scales (i.e. fear, hostility, guilt and sadness) from the Positive and Negative Affect Schedule - Expanded Form (PANAS-X; Watson & Clark, 1999).

Mood induction vignettes

For the induction of negative mood we used a procedure that implied guided imagery based on social vignettes. We first developed 15 short (2 to 4 phrases) second-person narrations of negative socially-evaluative situations or interactions. Based on a prior pilot study we selected 10 of them that were evaluated as the most anxiety inducing.

Procedure

Participants were randomly assigned to one of the three groups corresponding to the emotion regulation strategies. After completing the informed consent and the trait anxiety measure, they underwent a 20 minutes training in the use of the emotion regulation strategy. The instruction for the reappraisal (i.e. functional negative reappraisal) group was derived from CBT studies and clinical protocols and it targeted

replacing maladaptive/ irrational appraisals of the situation with more adaptive/rational ones. It did not, however, attempt to modify the negative character of the situation. The instruction for the acceptance condition was derived from ACT (Hayes et al., 1999). As such, participants in this condition were asked to take a non-judgmental, accepting perspective over their own feelings and thoughts. Finally, the instruction for reflective pondering was constructed consistent with studies discussing this construct (Treynor et al., 2003). We asked participants to focus on their thoughts, emotions and behavior, and think about the consequences and significance of these responses for themselves and others, but in a neutral way. The experimental task consisted of two phases. In the first one, participants watched one of the two slide-shows comprising of 5 vignettes with the instructions to read each scenario carefully and try to imagine it as vividly as possible, as if it was happening to them. They were told to react to the situations as they normally would do. In the second phase, participants watched the second slide-show with instruction to use the strategy they had been taught before. We measured mood at the beginning and at the end of each of the two phases.

Results

Manipulation check

The social vignettes reliably determined mood changes across groups in the mood induction alone phase for negative emotions, $t(102)= -9.18$, $p<.001$, anxiety (worry cognitive: $t(102)= -5.18$, $p<.001$, and emotional-autonomic:, $t(102)= -4.46$, $p<.001$). ANCOVA analysis controlling for baseline values revealed there was no effect of Group on negative emotions and anxiety (all ps >.05).

Effects of task and the emotion regulation instruction

In order to assess the effect of the emotion regulation strategy, we conducted an ANCOVA (controlling for pre-task scores) for the outcomes in the mood induction plus emotion regulation phase. Results showed an effect of the emotion regulation strategy on negative mood, $F(2, 99)= 3.40$, $p=.014$, and the emotional-autonomic component of anxiety, $F(2, 99)= 4.45$, $p=.037$, but not on the worry-cognitive component, $F(2, 99)= 2.19$, $p=.117$. Post-hoc tests (Sidak) indicated the reflective pondering group presented a higher level of negative emotions than the acceptance group (mean difference= 2.18, SE=.83, $p=.032$). Participants using reflective pondering displayed higher levels of autonomic-emotional anxiety than those using reappraisal (mean difference= 3.14, SE=1.15, $p=.023$) or acceptance (mean difference= 2.83, SE=1.14, $p=.045$)

We computed change scores for both phases and conducted a Task-related change (mood induction, after combined mood induction and emotion regulation) by Group (acceptance, reappraisal, reflective pondering) repeated measures MANOVA. There was a significant main effect of Task, indicating that after the mood induction alone, participants displayed overall higher increases in negative emotions, $F(1,100)= 8.20$ (Wilks' Lambda), $p=.005$, partial $\eta^2=.08$, and the worry-cognitive component of anxiety, $F(1,100)= 6.09$ (Wilks' Lambda), $p=.015$, partial $\eta^2=.06$, but not the emotional-autonomic one, $F(1,100)= 3.05$ (Wilks' Lambda), $p=.084$. The main effect of Group, as well as the interaction effect were not significant (all ps >.05).

Moderation analysis

In order to see if social anxiety (SA) would influence the comparative efficiency of these strategies, we conducted moderation analysis using pre to post change scores in the combined task as outcomes, and social anxiety as a moderator. We followed the procedure recommended by Hayes (2005), according to which a moderation effect reveals itself statistically as an interaction between the independent variable and the moderator in a model of the outcome variable. We used reflective

pondering as the reference strategy, against which we contrasted the other two.We found evidence of moderation for negative emotions, F(2, 95)= 4.79, p=.01, and the emotional component of anxiety, F(2, 95)= 4, p=.021, but not for the cognitive one, F(2, 95)= 1.74, p=.181. Significant moderation effects (Table 1) were probed using the *pick a point* approach (probing at values of the moderator).

Table 1.
Values represent standardized beta coefficients for the comparative efficiency of acceptance and respectively reappraisal versus reflective pondering, at different values of social anxiety.

Social anxiety level/ Outcome	**21 (min)**	**43 (2st quartile)**	**50.44 (mean)**	**52 (3nd quartile)**	**58 (4rd quartile)**	**72 (max)**
Emotional autonomic						
Acceptance - pondering	.614	-.007	-.216*	-.260*	-.429*	-.824*
Reappraisal-pondering	.465	-.071	-.253*	-.291*	-.437*	-.779*
Negative emotions						
Acceptance - pondering	.414	-.093	-.264*	-.300*	-.438*	-.760*
Reappraisal-pondering	.852*	.116	-.133	-.185	-.386*	-.854*

*Note.**p<.05

Discussion

This is the first study to consider reflective pondering, the adaptive component of rumination, as a potential strategy for regulating negative emotions. Across groups, participants displayed greater increases in anxiety and negative emotions after mood induction task alone as compared to the combined mood induction and emotion regulation and these results were not affected by the type of strategy used, showing that all three strategies were efficient in impacting negative mood and anxiety.

We were interested in the comparative efficiency of these regulatory strategies. All three strategies are equally efficient for the cognitive component of anxiety. However, both acceptance and reappraisal decreased the impact of the emotion induction task on the autonomic-emotional component of anxiety more than reflective pondering. Acceptance also led to a lower impact on negative emotions than reflective pondering, while reappraisal did not. While both reflective pondering and acceptance involve a focus on one's thoughts and emotions, the latter also includes a non-judgmental, actively accepting stance, which could be the ingredient responsible for these additional benefits.

Further on we investigated the possible moderating role of social anxiety on the efficiency of these emotion regulation strategies. These results seem to indicate that while low socially anxious individual make equal use of reflective pondering and reappraisal or acceptance in influencing their mood (and in some instances the adaptive component of rumination is more useful), subjects high on social anxiety make a decisively better use of reappraisal and acceptance as compared to reflective pondering.

This result is consistent with previous studies showing their efficiency as emotion regulation strategies and comes as further indirect evidence to their consideration as active ingredients in wide-spread therapeutic approaches such as

CBT and ACT. To our knowledge, this is one of the first studies to provide evidence for the idea that the efficiency of emotion regulation strategies could vary as a function of where the subjects place themselves on the normality-pathology continuum. While for subjects low on social anxiety, strategies like reappraisal and acceptance might have the downside of evidencing the possible negative consequences of the situations (which they might have ignored or viewed in a neutral or positive light), for subjects high on social anxiety these strategies might represent more accessible and relevant alternatives one could try to make use of when confronted with a negative situation or the ensuing emotion.

PART III. DYSFUNCTIONAL BELIEFS IN EMOTIONAL REGULATION: PATHOLOGY

Study 6: Reappraisal and acceptance-based emotion regulation strategies in socially anxious subjects[5]

Social anxiety has been closely linked to difficulties in emotional regulation (Mennin, McLaughlin, & Flanagan, 2009). However, studies looking at the efficiency of emotion regulation strategies *per se* (i.e. not as integrated parts of therapy protocols) for socially anxious subjects have been scarce. In one study, Goldin et al. (2009a) indicated that regulation during social threat resulted in reduced activation of cognitive control–related brain regions (dorsomedial and dorsolateral prefrontal cortex) in patients compared to healthy controls. In another study, Goldin et al. (2009b) re-confirmed that socially anxious patients reported more negative emotion when reacting to negative beliefs about the self, but also when reappraising them. At a neurobiological level, patients had later and fewer brain responses in brain regions considered key for reappraisal (dorsolateral prefrontal cortex, anterior cingulate) in comparison to healthy controls, which might point to specific difficulties associated with this process in socially anxious individuals. Greater social anxiety symptom severity was linked with reduced regulation of negative emotion in patients.

Furthermore these brain regions found to display reduced or deficient activity during emotion regulation in socially anxious patients as compared to healthy controls are also hypothesized to be involved in autonomic control (Ahs et al. 2009). Neuroimaging studies in healthy subjects have provided evidence that the activity of the prefrontal cortex is associated to the vagal function (Lane et al. 2009). Reviewing neuroimaging and pharmacological evidence, Thayer and Lane (2009) emphasize the role of the prefrontal cortex in the modulation of subcortical cardioacceleratory circuits via an inhibitory pathway that is associated with vagal function and that can be indexed by high frequency heart rate variability (HF-HRV).

It is our contention that if HF-HRV represents an index of prefrontal inhibitory processes via the vagal function, it may be distinctly affected by different emotion regulation strategies, especially for subjects affected by psychopathology. An interesting recent study provides preliminary evidence in this direction. Di Simplicio et al. (2011) showed that HF-HRV might be impacted quite differently by the same regulatory strategy in subjects at risk for psychopathology than in normal ones. In

[5] Parts of this study have been presented at the EABCT Congress, Milano, 2010.
Cristea I., Lucacel R., Apopi, D., Visla, A., Szentagotai, A., David, D. (2010, October). Differential impact of reappraisal and acceptance as emotional regulation strategies for socially anxious subjects. Oral presentation at the European Association for Behavioural and Cognitive Therapy (EABCT) Congress, Milano, Italy.
Author contributions: I. Cristea contributed to the design of the study, data analyses, interpretation of the results and making of the presentation; R.Lucacel, D.Apopi, & A. Visla to the data collection; A. Szentagotai and D.David to the design of the study and interpretation of the results.

their study, subjects low on neuroticism displayed increases in HF-HRV subsequently to employing cognitive reappraisal as compared to passive exposure to negative stimuli, while subjects high on neuroticism presented an opposite pattern, of decreases in HF-HRV during reappraisal.

Therefore the main aim of our study was to evaluate the comparative efficiency of emotion regulation strategies for socially anxious subjects in impacting self-reported emotion and autonomic flexibility (HF-HRV). More specifically, we also wanted to see if the severity of social anxiety would modify the way in which distinct strategies impact HF-HRV. As adaptive emotion regulation strategies, we focused on cognitive reappraisal and acceptance/mindfulness, which have both been associated with wide-spread, major therapeutic approaches.

Method

Participants

Ninety nine participants (7 men; 92 women; Mean age= 20.19, SD= 2.25) participated in the experiment. Out of the 191 respondents to the invitation to take part in the study, we selected those scoring over 30 on the Liebowitz Social Anxiety Scale. All of them were undergraduate students.

Self-Report Measures

Liebowitz Social Anxiety Scale- Self-Report (LSAS- SR; Liebowitz, 1987; Fresco et al., 2001) is an instrument designed to measure social anxiety by assessing the fear and avoidance individuals might experience in social interaction and performance situations. A cut-off point of 30 was shown to be indicative of a diagnosis of social phobia, while a cut-off point of around 50 or 60 for the generalized sub-type of social phobia (Mennin et al., 2002).

The short form of the State version of the State-Trait-Anxiety-Inventory (STAI, Spielberger et al., 1970; Marteau & Bekker, 1992) consists of 6 items selected from the original STAI.

Physiological measures

Cardiac data was acquired using the ECG100C Electrocardiogram Amplifier (MP150: Biopac Systems Inc., US), at a sampling rate of 1 kHz, which recorded the D2 lead ECG signal (bandwidth: 0.05-35 Hz) connected with pre-gelled Ag/AgCl electrodes placed following the Einthoven triangle configuration. ECG signal was used to extract the heart rate variability (HRV). The Matlab package was used for data analysis. In order to ensure reliable results, we rejected an HRV signal which presented more than 20% of samples out of the range mean +/- 2σ, where σ is the standard deviation of the HRV, thus excluding 9 HRV signals. The Power Spectral Density (PSD) of the HRV was estimated by means of an Auto-Regressive (AR) model. The HF power was calculated by integrating the spectral power across the bandwidth 0.15–0.4 Hz (Task force 1996).

Procedure

Participants underwent four stages within a single experimental session. In the *baseline* phase (T0), subjects had their level of current anxiety measured. Baseline physiological data were also recorded for 5 minutes after a short habituation period. In the *anticipation-instruction* phase (T1), subjects were told they had to give a speech in front of a virtual audience on a topic that would be announced to them just before the actual speech. In the meanwhile they were given a written instruction corresponding to their experimental condition and were told to read it carefully and practice it in expectation of the giving the speech. They were left to practice the instruction for 3 minutes. At the end of this phase, and the head-mounted display was installed and

subjects were immersed in the virtual reality environment. The VR environment (Virtual Classroom; Grapp, 2004) consisted of a virtual audience arranged in a medium sized classroom, in which the participant took the position of the speaker at the podium, in front of the audience. They were announced a topic and were asked to speak on it for 3 minutes (*speech* phase/T2). Afterwards, subjects were let to rest for 2 minutes (*recovery* phase/T3).Self-reported anxiety was measured at the beginning of each phase, while physiological data were recorded continuously.

Each of the emotion regulation instructions consisted of beliefs about the public speaking situation. In the Dysfunctional group, participants were given a set of irrational beliefs, which mimicked the ones a socially anxious person could hold in a socially evaluative situation, such as the one awaiting. In the Reappraisal group, they received a set of rational beliefs as to how to evaluate the situation, which were similar to the ones a socially anxious client would be presented with during therapy, to replace the dysfunctional negative thoughts about the situation. In the Acceptance/Mindfulness group, they received an acceptance-based rationale, stressing on the idea of accepting to remain in the present moment experiencing the thoughts and fears, without trying to modify them.

Results

We conducted a 3 (Group: Dysfunctional, Reappraisal, Acceptance) by 3 (Time: T1, T2, T3) repeated measures ANOVA with anxiety scores as the outcome measure. The results showed a significant effect of Time, $F(2, 95)= 3.55$ (Wilks' Lambda), $p= 0.033$, partial $\eta^2=.07$, and a non-significant effect of Group, $F(2, 96)= .74$, $p=.323$. The Time by Group interaction effect was non-significant, $F(2, 96)= 2.03$ (Wilks' Lambda), $p= .137$. Post-hoc tests (Bonferroni corrected) following up on this effect indicated there was a significant increase in state anxiety from T1 to T3 (mean difference= -.97, SE=.36, p=.028).

We conducted a 3 (Group: Dysfunctional, Reappraisal, Acceptance) by 3 (Time: T1, T2, T3) repeated measures ANOVA using HF-HRV as dependent variable. Baseline HF-HRV scores were entered as covariates. Multivariate tests (Wilks' Lambda) indicated a significant effect of Time, $F(2,85)= 5.76$, $p<.001$, partial $\eta^2=.12$ and a non-significant effect of the Time by Instruction interaction, $F(4, 170)= .70$, $p=.59$.The main effect of Instruction was non-significant, $F(2, 86)= 1.12$, $p=.331$. Post-hoc tests (Bonferroni corrected) evidenced a significant increase in HF-HRV from T1 to T2 (mean difference= -134.84, SE= 33.71, $p<.001$) and a significant decrease from T2 to T3 (mean difference= 146.07, SE= 46.79, $p<.001$).

No significant correlation was found between changes in self-reported anxiety and HF-HRV (all p*s* >.05).

Moderation Analysis

Results only indicated evidence of moderation for the HF-HRV component, but not for self-reported anxiety. For *dummy 1* (the contrast between the Reappraisal and Dysfunctional), we found evidence of moderation by the level of social anxiety in the recovery phase, $F_{interac}(5,84)= 6.23$, $p=.014$, but not in the speech and anticipation phases (all interaction F*s* non-significant). For dummy 2 (the contrast between the Acceptance and Dysfunctional), we found evidence of moderation in all three phases considered: anticipation-instruction ($F_{interac}(5,84)= 6.81$, $p=.01$), speech ($F_{interac}(5,84)= 12.91$, $p<.001$) and recovery ($F_{interac}(5,84)= 13.17$, $p<.001$).

Significant moderation was further probed using the Johnson Neyman technique (Johnson & Fay, 1950) to identify regions of significance across values of the moderator. For dummy 1, we found that for subjects scoring from 30 to 51.73 on the LSAS, there was no difference between the Reappraisal and Dysfunctional

instruction on HF-HRV in the recovery phase. For subjects scoring above this value, the Reappraisal instruction led to significantly smaller HF-HRV than the Dysfunctional instruction. For dummy 2, in the anticipation-instruction phase, for subjects scoring under 55.56, there was no difference between the Acceptance and the Dysfunctional instruction, while for subjects over this value, acceptance led to higher HF-HRV. The same pattern repeated for the speech phase, with the threshold value of 51.91. In the recovery phase, a more complex pattern emerged with 2 inflexion points for defining significance regions. For subjects' means on the LSAS going from 30 to 40.36, Acceptance led to lower HF-HRV than the Dysfunctional instruction; from 40.36 to 60.62 there was no significant difference between the two; whereas from subjects' means over 60.62 Acceptance led to higher HF-HRV.

Discussion

While a number of studies have looked at self-reported emotions and autonomic responses in socially anxious individuals during a public speaking task, few studies have addressed the use of emotion regulation strategies in this context. Our results show that self-reported anxiety *across* the groups did not differ from baseline to the moment before the speech. However all three groups reported more anxiety after the speech than at baseline, pointing to a possible rebound effect of the social performance.

Conversely, *all* strategies had an effect on increasing autonomic flexibility *after* they were practiced. Butler et al. (2006) also showed increases in autonomic control both subsequent to a strategy considered adaptive (reappraisal), as well as to one considered maladaptive (suppression), suggesting a general mechanism to attend to and attempt to modify emotional responses might sustain this increase. However HF-HRV decreased from the speech to the recovery phase. This might point out to the same rebound effect of social performance, perhaps due to the engagement in post-event processing, a common phenomenon in social phobics (Clark & Wells, 1995).

For subjects with more severe social anxiety, the reappraisal instruction used led to *lower* HF-HRV compared to one that mimicked their dysfunctional thinking in social performance situations. Di Simplicio et al. (2011) also showed that for individuals high on neuroticism (a category vulnerable to developing anxiety disorders) reappraisal was associated to decreases in HF-HRV, conjecturing on a reduced flexibility of the autonomic system during cognitive reappraisal.

We would speculate that the particular type of reappraisal subjects were instructed to use was a challenging one, in brazen contradiction to their own way of thinking. One was not instructed to isolate or detach from the irrational thoughts, nor to minimize them or contest their validity, but instead to challenge the way they were evaluated in terms of well-being (e.g. the situation would be bad, but it would not be so terrible). This kind of reinterpretation involves a profound philosophical change, usually carried out during the stages of CBT, and it might have been too demanding for subjects to use or fully understand. As such it might have triggered a "freeze" like reaction (seen in the reduced autonomic flexibility) as compared to the familiar, albeit dysfunctional, interpretation mode.

On the other hand, the results of the moderation analysis for the contrast between the acceptance/mindfulness and the dysfunctional instruction revealed an opposite configuration. On the whole, the former produced *higher* increases in autonomic control than the latter across those subjects with more severe and generalized social anxiety across *all* phases of the experiment.

The overall result seems to fit with the purpose this process is given in therapies such as ACT and MBCT, which is to increase psychological flexibility. We

speculate this result might reflect an effect of acceptance/mindfulness training in fostering inhibition, reflected in increased autonomic flexibility. Corroborating evidence for this hypothesis comes from studies showing that mindfulness meditation practice improves response inhibition (Sahdra et al., 2011) and as well as cognitive flexibility (Heeren et al., 2008).

Thayer et al. (in press) conclude HRV is linked to appraisals of threat and safety, via shared brain regions, and that it represents an index of top-down flexible control of the brain over autonomic responses. Our results show that for individuals suffering from more generalized and severe forms of social anxiety, reappraisal and acceptance/mindfulness rely on different mechanisms in impacting this index as compared to the patients' habitual way of thinking.

PART IV. DYSFUNCTIONAL BELIEFS IN EMOTIONAL REGULATION : BIOLOGICAL APPLICATIONS

Study 7: Neurobiological basis of dysfunctional beliefs

Cognitive reappraisal, the cornerstone of cognitive behavioral therapies (CBT), has been shown to be an efficient way to modify negative emotions, by turning irrational (dysfunctional) beliefs which are at the core of psychopathology into rational (functional) ones (Beck, 1995). Despite its key-role in CBT, little is known on the brain correlates of cognitive reappraisal as a tool for modifying dysfunctional thinking about stimuli or situations.

A series of neuroimaging studies have investigated the correlates of cognitive reappraisal. In one of the first studies on this topic using fMRI, Ochsner, Bunge, Gross, and Gabrieli (2002) showed reappraisal was associated with increased activation of the lateral and medial prefrontal cortex and decreased activation of the amygdala and orbito-frontal cortex. The particular lateral and medial prefrontal structures identified are regions that had been associated with working memory, maintaining information in awareness and withstanding interference (Courtney, Petit, Maisog, Ungerleider, & Haxby, 1998; Smith & Jonides, 1999), which led the authors speculate that an overlapping network of prefrontal regions sustains the regulation of both emotions and thoughts. In another study, that focused both on the up-regulation (increase) and down-regulation (decrease) of negative emotion, Ochsner et al. (2004) showed that both types of regulation recruited left lateral prefrontal regions involved in working memory and cognitive control (Smith & Jonides, 1999), as well as dorsal anterior cingulate regions involved in on-line monitoring of the performance (Botvinick, Braver, Barch, Carter, & Cohen, 2001). The activity of the amygdala was selectively decreased or increased, in accordance with the goal of regulation. Phan et al. (2005) also reported that reduction of negative affect by means of cognitive reappraisal was associated with activation of the dorsal anterior cingulate (dACC), dorsal medial prefrontal (DMPFC), lateral prefrontal (dorsal-DLPFC and ventral-VLPFC) and orbitofrontal cortices (OFC), as well as with decreases of activation within limbic regions (nucleus accumbens/extended amygdala).

We noted that some important inconsistencies mark the cognitive reappraisal literature. First of all, one thing we noted has to do with the extremely diverse ways in which reappraisal was actually conducted. Wager at al. (2008) identified three kinds of reappraisal approaches that have been used. One kind emphasizes positive potential interpretations of the stimulus situation (e.g. seeing a picture of a person that is hospitalized and thinking they will get well soon or they are not really sick, but they had a baby). A second kind is considered to be the blunting of the negativity of the

stimulus (e.g. seeing a picture of a mutilated body and imagining it in fact comes from a movie set instead of the scene of an accident). Finally a third kind of reappraisal refers to distancing or detaching from the emotional situation (e.g. seeing a picture of a person in pain and imagine it has nothing to do with you or anyone close to you). Most neurobiological studies on cognitive reappraisal have used one or more of these kinds of reappraisal: positive interpretation-generation and negative-blunting appraisals (Johnstone et al., 2007; Ochsner et al., 2002 ; Ochsner et al., 2004; Phan et al., 2005) or distancing and detachment (Eippert et al., 2007; Kalisch et al., 2005).

However we have argued there are serious inherent problems with these three ways of reappraising. We believe they add up to a narrow, artificial definition of reappraisal, which is not very informative for the way this process functions in real-life emotion eliciting situation.

To bridge this gap, we wished to study the neurobiological correlates of cognitive reappraisal, implemented in the way that closely resembles CBT practice. Specifically, we wanted to distinguish the neurobiological underpinnings of irrational and rational thinking. We used fMRI in combination with a novel experimental design, comprising imaginative scripts to induce negative emotions. To avoid contamination with demand characteristics, we did not give an instruction to participants explicitly telling them how to modify their emotions.

Methods

Experimental paradigm

Twenty-five healthy volunteers (10 females; mean age 26 ± 3 yrs) were enrolled. During fMRI, participants were presented with emotional scenarios in which they were asked to imagine themselves as vividly as possible. They were then instructed to practice irrational or rational beliefs about the situation, trying to imagine that those were their own thoughts. Each scenario was presented for a maximum of 30 seconds while each instruction was presented for a maximum of 45 seconds. After each scenario and each instruction participants rated their emotional distress on a 1 (no distress) to 10 (highly distressed) Likert-type scale.

Scenarios were designed to represent emotionally distressing situations that may be encountered by young adults, and were either unequivocally negative (the situation portrayed was undoubtedly negative) or ambiguously negative (the situation portrayed was negative but there were still some chances of a not so negative outcome). Scenarios had been validated in terms of the degree to be easily imagined and to induce negative emotions in a distinct sample of subjects. The instructions were tailored for each scenario and were constructed using the principles of CBT. A total of 24 scenarios and instructions were presented to each subject. fMRI acquisitions were performed using a 1.5 T GE MRI scanner (TR 3000; 64*64 matrix; 23 axial slices).

Data analysis

The AFNI package was used for data analysis. After space and time registration, normalization and smoothing (FWHM 6 mm) a multiple regression was performed with regressors modeling each single event.

After Talairach Transformation we used paired-test to evaluate the contrasts of interest. We considered significant a p-value < 0.01 cluster-size corrected for multiple comparisons at a p-value level < 0.05.

Results

Rational Instructions VS Irrational Instructions after Ambiguous Scenarios

Rational instructions higher activate the precuneus (BA 47), while irrational instructions higher activate the right posterior Superior Temporal Sulcus STS (BA

39), Occipital cortex (BA 18), bilateral Dorsolateral Prefrontal Cortex (DLPFC) (BA 9/BA 46)

Rational Instructions VS Irrational Instructions after Negative Scenarios

Rational Instructions higher activate the precuneus (BA 47), the ACC (BA 24), and left STS (BA 13/21)

Rational Instructions after Negative Scenarios VS Rational Instructions after Ambiguous Scenarios

Rational Instructions after negative scenarios higher activate Medial Prefrontal Cortex (MPFC) (BA 9/10), Right Posterior STS (BA 39), ACC (BA 24), Right MFG (BA 9), bilateral OFC (BA 32/47)

Irrational Instructions after Negative Scenarios VS Irrational Instructions after Ambiguous Scenarios

Irrational Instructions after ambiguous scenarios higher activate the right STS (BA 37). Irrational instructions after negative scenarios higher activate precuneus (BA 47)

Discussion

Our study introduced two innovations in the study of cognitive reappraisal. First of all, reappraisal was approached in an ecological way, informed by cognitive-behavioral therapy and it entailed the direct change of irrational beliefs into rational ones. A second innovation had to do with the fact we used two types of negative emotional stimuli, to see if this would be a moderator of the brain response to the irrational and rational thinking processes.

Our results showed that after scenarios that were ambiguously negative, irrational thinking more strongly activated areas involved in theory of mind (STS), visual areas (occipital cortex) and cognitive control areas (bilateral DLPFC). While the irrational instruction was a type of thought that was meant to maintain or increase negative emotion, the activation of cognitive control areas (DLPFC) is consistent with other studies showing it becomes active in up-regulating negative emotion (Ochsner et al., 2004). On the other hand, rational instructions were associated with an increased activation in the precuneus, an area of the brain associated to self-mentalizing and shown to be affected in certain disorders, such as social anxiety (Gentili et al., 2009).

The pattern of brain changes modifies after negative scenarios. Rational instructions are associated, as before, with higher activation in the precuneus, but also in theory of mind areas (STS) and in the ACC, an area that has been associated with cognitive reappraisal success in other studies (Phan et al., 2005; Wager et al, 2008).

We speculate these results point to the increased cognitive and perspective taking effort that our healthy participants had to employ in order to think in an irrational way about a situation that is not clearly negative (ambiguous scenarios). Things essentially change after an unequivocally negative scenario, when thinking rationally seems to require the increased perspective taking effort from the brain. Moreover, the usefulness of the rational instruction, as reflected by increased activation in an area of the brain shown to be relating to the regulation of emotion (ACC), becomes more evident after the clearly negative emotional stimuli.

We also looked at how each specific thinking process (rational and irrational thinking) worked comparatively in the two types of stimuli-situations: ambiguously negative and unequivocally negative scenarios. For rational or functional thinking, in the case of clearly negative scenarios, there was a higher activation in areas associated with the cognitive regulation of emotion such as the medial prefrontal cortex, the anterior cingulate and the orbito-frontal cortex (Ochsner et al., 2002; Phan et al., 2005; Wager et al., 2008). We believe this might point out to an increased efficiency of the rational thinking instruction following this kind of situations.

CHAPTER IV
CONCLUSIONS AND IMPLICATIONS

The present project tries to take a closer look at emotional regulation and specifically at the role played by dysfunctional beliefs. In this project, we aimed to redefine emotion regulation strategies, in particular cognitive reappraisal, stripping them of the artificiality with which they are implemented in current research paradigms and rendering them more similar to what actually happens during therapy and in general every day interactions where aversive emotions are bound to arise.

IV.1. Theoretical and conceptual advances

The **first** major objective of our research was to investigate whether dysfunctional beliefs (conceptualized as evaluations or "hot" cognitions) play a determining role in the comparative efficiency and mechanisms of these strategies, implemented in a way that is tightly informed by how they are used in their corresponding therapies. This objective was directed at theoretical and conceptual innovations.

On the conceptual level, we thought that a necessary initial step for this objective was analyzing the constructs that are thought to be the core processes impacted by reappraisal and acceptance. In Study 1 we found that, while there was an amount of shared variance, these constructs were distinguishable from each other. Before assessing empirically the differential efficiency of reappraisal and acceptance strategies of regulating emotions, we attempted to clarify and synthesize the status of their adjacent therapeutic interventions. Study 2, a meta-analysis focused on the comparison between reappraisal-based (cognitive behavioral therapies) and acceptance based (acceptance and commitment therapy) approaches revealed little differences between the two in their impact on outcomes regarding distress and psychopathology.

As the central part of our research, we introduced and tested a particular form or emotional regulation: "functional negative reappraisal". This based on conceptual considerations (David & Szentagotai, 2006) and inspired by cognitive-behavioral therapies, and in particular, rational-emotive behavior therapy (REBT) and empirical developments in this framework (Ellis, 1994; David, Schnur, & Birk, 2002). In this framework, the reinterpretation of the situation maintains its negative character, reformulating it in more functional - albeit still negative - terms. The goal would be to achieve a less pervasive and intense effect on the functioning of the individual. In our first study on this topic (Study 3), we compared this form of reappraisal to another established one- positive reappraisal (i.e. trying to interpret the distressing situation by emphasizing its positive aspects) and showed it had superior efficiency on both emotional outcomes (reduction of negative emotions), as well as on hypothesized cognitive mechanisms of change (maladaptive and adaptive beliefs). Moreover, preliminary mediation analysis indicated that this mechanism works by the means of modifying dysfunctional beliefs (i.e. irrational evaluations) that are thought to lie at the core of psychopathology.

We also compared this form of cognitive reappraisal with acceptance and reflective pondering- an emotion regulation strategy we derived from studies that evidenced an adaptive component of rumination (Study 5). Both acceptance and reappraisal decreased the impact of the emotion induction task on the autonomic-emotional component of anxiety more than reflective pondering. However, moderation analysis showed the degree of social anxiety influenced the comparative efficiency of reappraisal and acceptance as contrasted to reflective pondering on measures on negative emotions and anxiety. In another study (Study 4), we used a

concise form of this type of reappraisal, expressed in coping self-statements. We introduced the idea that positive and negative self-statements should be classified not only based on their valence, but also on an irrational-rational axis. We also analysed the use of cognitive reappraisal and acceptance for a clinical sample of socially anxious individuals, during the preparation phase of a public speaking task (Study 6). While neither acceptance, nor the particular type of cognitive reappraisal we used (negative functional reappraisal) impacted self-reported anxiety after they were practiced, they both had an effect in increasing autonomic flexibility, as indexed by the high frequency component of heart rate variability. Finally, we found differential neurobiological basis for dysfunctional and functional beliefs. In a fMRI study looking at the way the process of negative functional reappraisal activated the brain, we found that a complex pattern of activation in areas of the brain associated with perspective-taking, self-mentalizing and cognitive regulation.

IV.2. Methodological innovations

One of the methodological advances of our research is the study of emotion regulation strategies across the normality-pathology continuum, following healthy individuals, as well as at risk, sub-clinical and clinical cases. As part of this objective, we also looked to how trait variables relating to psychopathology or vulnerability to psychopathology influence the differential efficiency of cognitive reappraisal and acceptance. From our knowledge of the literature, this is a procedural innovation that has been introduced for the first time by our studies.

Another methodological development was aimed at studying emotion regulation strategies involving in as much as possible all four levels of analysis which can be employed in studying the cognitive system- subjective, cognitive, behavioral, biological- with the purpose of shedding some light onto the present status of dysfunctional beliefs in the service of cognitive regulation. To serve this objective, we did not stop at examining the subjective emotional consequences of cognitive reappraisal and acceptance, but instead also follow associated behaviors, cognitions or biological correlates (Study 6 and 7).

IV.3. General conclusions

I. Cognitive reappraisal that is constructed to directly change dysfunctional beliefs (for instance by offering their functional alternatives)- "negative functional reappraisal"- is a viable alternative, both behaviorally and neurobiologically, to the way reappraisal is now done in the emotion regulation paradigms inspired mainly by the work of James Gross.

II. Negative functional reappraisal seems to be associated to particular changes at a biological level (both regarding peripheral physiological parameters and brain changes). Preliminary neurobiological data on this process seem to indicate that it might increase its regulatory potential in connection to highly negative situations, where others types of cognitive reappraisal are most likely powerless.

III. Our research is one of the first to provide evidence for the idea that the comparative efficiency of emotion regulation strategies could vary as a function of where the subjects place themselves on the normality-pathology continuum.

IV. The emotion regulation paradigm as promoted by James Gross has clear limits when it comes to being applied on clinical samples. For individuals affected by psychopathology direct instruction into using a regulation strategy without significant prior preparation might prove insufficient.

IV.4. Limitations and future directions

One general limitation of our studies is that the emotion regulation instructions used were also not generated by the participants. It is possible that more personally relevant instructions, following the same principles of construction but individualized for private contents, would give a clearer picture as to how these reappraisal alternatives compare to each other.

An additional limitation has to do with potential gender effects. Our samples had unequal gender distribution, which might have obscured some of these possible effects. Future studies could take a closer look at the potential effects of gender, using equal matched gender samples or non-mixed samples.

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