Cristea Ioana-Alina

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

Presa Universitară Clujeană

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Referenţi ştiinţifici:

Prof. univ. dr. Daniel David

Prof. univ. dr. Aurora Szentágotai-Tătar

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Universitatea Babeş-Bolyai
Presa Universitară Clujeană
Director: Codruţa Săcelean
Str. Hasdeu nr. 51
400371 Cluj-Napoca, România
Tel./fax: (+40)-264-597.401
E-mail: editura@editura.ubbcluj.ro
http://www.editura.ubbcluj.ro

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1. Introduction and research topic

1.1. Emotions and emotional regulation

The scientific study of emotions goes back to Darwin's *Expression of Emotion in Man and Animals* and has can be considered the backbone of research into the human psyche. A general capacity to ascribe value to events in a world seems to be the result on an evolutionary selection process and is present across phylogeny (Friston, Tononi, Reeke, Sporns, & Edelman, 1994). The concept of value would refer, in this framework, to the capacity of a living organism to interpret events in its environment as more or less desirable. Starting from this very basic capacity, emotions represent complex psychological and physiological states that closely follow the occurrences of value (Dolan, 2002). A corollary of this idea involves the fact that the range of emotions an organism can go through reflect the "complexity of its adaptive niche" (Dolan, 2002, p. 1). In humans, this translates into a wide range of demands, expressing physical, interpersonal and socio-cultural contexts.

Given these very general considerations, it is not at all surprising at all that we find emotions to be constant companions of almost all things happening to us in everyday life. It is also no surprise that emotions permeate our whole mental life, as well as most of our behaviours, from the memories we hold about things past to the decisions we invest in for the future. Emotions fuel the motivations we use to engage in certain actions and are the main cement of our interpersonal relations. On the other side of this construct, the loss of emotional balance underlies most of human unhappiness and is a common factor across the entire psychopathological spectrum.

It is precisely here that one confronts the paradox of emotions and hence the importance of their study. On one hand, emotions are extremely useful, relevant processes: they signal there is something important at stake. There is

the potential of imminent danger and fear is automatically triggered (LeDoux, 2000). On the other hand, emotions are harmful, as when they push us into chronic unhappiness or psychological problems. In the conception of Young (1943), emotions are irrational forces that give rise to destructive thoughts and impulses. In the eloquent words of Richard Lazarus, emotions represent the "wisdom of the ages", guiding us through life's challenges (Lazarus, 1991, p. 820).

Some of the essential characteristics of emotions might help shed some light over their apparent ambivalence. Firstly, emotions involve a coordinated set of physiological, behavioural, cognitive and experiential tendencies that together determine out response to the challenges sent into our direction. Secondly, they are flexible response sequences elicited by internal or external events appraised as relevant to an organism's well-being (Gross, 1998b). As other researchers have pointed out, what furthermore defines emotions is their malleability to change (Gross, 2002). This last characteristic seems to be ascribed to the useful-harmful ambivalence of human emotions.

1.2. Theoretical models of emotion regulation

1.2.1. 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 (Folkman & Lazarus, 1988; 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 this sense, appraisal has been analysed at two levels: a molecular one, referring to the specific questions evaluated, and a molar one, referring to core relational themes (Smith, Haynes, Lazarus, & Pope, 1993).

At the molecular level, two types of appraisal phases are described. The first type is primary appraisal, which assesses the encounter in terms of *motivational relevance* and *motivational congruence* (Smith et al., 1993) The former refers to the extent to which the situation is relevant to one's personal goals (i.e. the importance), while the latter to the degree in which it is consistent or inconsistent to these goals (i.e. desirability). The next stage of appraisal is secondary appraisal, which includes *accountability* (who or what deserves credit or blame for the transaction), *problem-focused coping potential* (evaluations of one's ability to act directly on the situation so as to make it consistent with one's goals), *emotion-coping focused potential* (perceived prospects of adjusting psychologically to the encounter) and *future expectancy* (the possibility of change occurring in the actual situation or its psychological consequences that would change its desirability).

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.

At a molar level, the *core relational themes* represent the pattern of answers to appraisal components, grouped into the central meanings underlying different emotions. Each theme (e.g. *danger-threat* for anxiety) is born out of a particular constellation of appraisal components (e.g. for the danger-threat theme: motivationally relevant, motivationally incongruent, low or uncertain emotion-focused coping potential).

1.2.2. The process model of emotion regulation

If emotions are malleable, it naturally follows they can change contextually, in response to different situations in the environment. This also implies that at least in general emotions are not useful or harmful *per se* and it is their pliability to a certain contexts that places them in one category of another. It additionally follows that people can find ways to deliberately change their emotions and that these ways themselves can influence the situation on the useful-harmful continuum.

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). Following up on our argument before, it has been suggested that what defines the usefulness/harmfulness of human emotions is the way in which they can be successfully regulated.

From this point on, a number of strategies that can be employed to regulate emotions have been proposed and empirically studied. In one of the most prominent models used in research paradigms on the topic – the emotional regulation paradigm – James Gross and colleagues (Gross, 1998a, 1998b; 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.

According to the model, there are five key points during the unfolding of an emotion in which its course or consequences can be altered: 1. Situation selection; 2. Situation modification; 3. Attentional deployment; 4. Change of cognitions; 5. Modification of experiential, behavioral and physiological responses. More broadly, these key points can be grouped into two major approaches: antecedent-focused and response-focused regulation strategies. 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).

1.3. Emotion regulation – a view from psychopathology and psychotherapy

Emotions have, as we have repeatedly mentioned before, 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. In what regards the former, a review of the Diagnostic and Statistical Manual of Mental Disorders, fourth edition ([DSM-IV]) reveals that over 50% of Axis I disorders and 100% of Axis II disorders implicate emotion regulation decencies (Gross & Levenson, 1997).

Hofmann 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.

When emotions become damaging, a common consequence is that individuals turn to psychotherapy to aid them in restoring the emotional equilibrium and their control over the emotions gone astray. It therefore logically follows that emotions are in the center of interest of most forms of psychotherapy and a main point of focus in psychotherapy research and practice. Different psychotherapeutic approaches proposed different theoretical models through which emotional problems or psychopathology are generated. While many of these models might provide interesting theoretical speculations, we will focus this brief section on one model that has received extensive empirical support: the cognitive-behavioral model.

Cognitive behavioral therapy has become the elect psychotherapeutic approach for a wide range of disorders, from anxiety disorders and mood disorders to psychotic and more serious, disabling conditions such as psychotic and personality disorders (Butler, Chapman, Forman, & Beck, 2006; Hofmann & Smits, 2008 for reviews).

1.3.1. A psychotherapeutic model of functional and dysfunctional emotions

Clark (1995), in common with other leading cognitive therapists including Aaron T. Beck (Beck, 1970; DeRubeis, Tang, & Beck, 2001), asserts that a fundamental postulate of the cognitive model of psychopathology is that cogni-

tive change is central to treating psychological disorder, stating that "all therapies work by altering dysfunctional cognitions, either directly or indirectly" (p. 158). Hence, modification of maladaptive cognition is both the process by which cognitive therapy is effective, as well as the mechanism of change in psychotherapy more generally (Longmore & Worrell, 2007). In line with this fundamental postulate, the authors of treatment manuals for cognitive behavior therapy (CBT) invariably describe techniques for modifying the meaning of thoughts (e.g., Beck, Rush, Shaw, & Emery 1979; Beck, 1995).

The dysfunctional beliefs, called *irrational* in the first version of this therapy – Rational Emotive Behavioral Therapy (REBT; Ellis, 1962), are characterized by the fact that they are not are not logical, don't have factual support in reality and hinder 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; David, 2006). An important distinction has to be made here: the functional-dysfunctional axis does not overlap with the positive-negative axis in categorizing emotions (David, 2006). 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. To exemplify, we are referring to the difference between somebody who is depressive and in this state does not fulfill any of his/her regular activities (e.g. going to work, socializing with friends, family activities) and somebody who is sad but continues to fulfill these activities while experiencing the sadness.

While this might seem self-evident, it is essential we reemphasize that in conclusion the objective of therapy is not to transform negative emotions into neutrality or positive emotions. Instead it is to change maladaptive thinking patterns, thus allowing the individual to experience functional emotions instead of dysfunctional ones.

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 et al., 1999). Approaches such as acceptance and commitment therapy (ACT; Hayes et al., 1999), dialectical behavioral therapy (DBT; Linehan, 1993a) or mindfulness based therapies (MBCT; Segal et al., 2002) take acceptance as their essential construct.

1.3.2. "Cold" and "Hot" maladaptive beliefs

A classic distinction introduced by Abelson and Rosenberg (1958) marks the diffence between knowledge (cold) and appraisals (hot). *Cold cognitions* refer to the way people develop representations about relevant circumstances. *Hot cognitions* refer to the way people further evaluate cold cognitions in terms of their relevance to their well being (Lazarus & Smith, 1988; Lazarus, 1991). According to Lazarus (1991) and to the appraisal theory of emotion, only hot cognitions can directly cause emotions. While cold cognitions also seem to contribute to appraisal (Schachter & Singer, 1962; Weiner, 1985), as long as they remain unevaluated, they are not sufficient enough to generate emotions (Smith et al., 1993). This would indicate that the effect of cold cognitions is carried out through the mediation of hot cognitions (David & Szentagotai, 2006).

This particular distinction has implications for emotion regulation strategies that attempt to modify the cognitions that are behind a particular emotion in a certain context. In this framework, the modification of an emotion does not really take place if evaluations have not changed as well. By modifying cold cognitions one can have an impact on changing emotions, but it will not be directly causal, but a more indirect, distal one that leaves the individual with the vulnerability of developing dysfunctional emotions in other contexts, with other types of cold cognitions.

1.4. Conscious cognitions as necessary or sufficient causes of emotions

Starting from Lazarus's appraisal theory, cognitive theories of emotion and cognitive behavioral therapies for emotional disorders are based on the idea

that people can have different emotions in response to the same situation, depending on how they interpret or evaluate it. It is therefore the appraisal of the situation, not the situation *per se,* that sustains the quality and the intensity of an emotional response.

More specifically however, it has been noted that there are two possible and not necessarily mutually exclusive versions of this basic claim (Siemer, Mauss, & Gross, 2007). The first version, also known as the *sufficiency* hypothesis, assumes that different appraisal constellations are sufficient conditions to determine different emotional responses to the same situation. In other words, having different appraisals is enough to induce different emotions, even if all other circumstances remain unchanged. The second version, referred to as *the necessity* hypothesis, sustains that different appraisal combinations are necessary conditions to determine different emotional responses to the same situations. The corollary of this theory is the prediction that if the same situation has led to different emotions, it implies that the situation was appraised differently.

Siemer et al. (2007) have noted that research attempting to parse these two hypotheses has been contaminated by the simultaneous use of both varied situations and appraisals, making the delimitation of the contribution of each difficult and confusing. In their study, they had participants respond to a standardized, yet ambiguous laboratory condition with a diversity of emotions. Appraisals predicted emotional responses across all subjects, lending support to the sufficiency hypothesis. However, the authors also found evidence upholding the necessity hypothesis, by identifying that subgroups of participants with similar emotional reactions made analogous appraisals.

1.5. 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/CBT (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, Strohsahl, & Wilson, 1999), dialectical behavioral therapy

(DBT; Linehan, 1993a, 1993b) 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 & Alfert, 1964). 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 (Beck et al., 1979; Clark, 1999) 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,

Attempts have been made to overlap these two regulation strategies (i.e. cognitive reappraisal and acceptance) and more precisely the therapeutic approaches centered around them (traditional CBT and third wave approaches such as ACT) in the process model of emotion regulation proposed by Gross and colleagues (1998a). Hofmann & Asmundson (2008) have argued that reappraisal strategies and its representative form of therapy (classical CBT) are *antecedent-focused,* by attempting to modify what goes on *before* the aversive emotion has been fully generated. In contrast, acceptance strategies and their representative therapy approaches, such as ACT, are response focused, by concentrating on what goes on *after* the aversive emotion has been generated and trying to counteract other maladaptive strategies which the individual might resort to in this phase (such as suppression or 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 measures of psychopathology. Effect sizes for general psychopathology (collapsed across symptom types), as well as for specific types of psychopathology, were small to medium for reappraisal and acceptance (non-significant for the

latter), thus questioning the status of these strategies as protective factors against psychopathology.

1.5.1. Cognitive reappraisal

It should be reemphasized that reappraisal has been 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, 1966; Lazarus & Folkman, 1984). Moreover, reappraisal is recognized as one of the main active ingredients of cognitive-behavioral therapy/CBT (Hofmann & Asmundson, 2008), as cognitive change and the modification of dysfunctional (i.e., irrational) beliefs are considered among the main determinants of changes in outcomes (i.e., emotions, behavior) in most forms of psychopathology. Recently, behavioral and neurobiological studies in the emotion regulation paradigm (Gross, 1998b; John & Gross, 2004) have also moved their focus on studying reappraisal.

Yet what seems to set apart these two approaches to reappraisal (a more basic research one, stemming from the emotion regulation paradigm of James Gross and colleagues, and a more clinical one, emerging from the work of Richard Lazarus and cognitive-behavioral psychotherapy) is the very way the concept is defined and, most importantly, used in studies.

A number of definitions of reappraisal have been laid forward as basis for empirical research conducted around this process. Reappraisal was defined as "a form of cognitive change that involves construing a potentially emotion-eliciting situation in a way that changes its emotional impact" (Lazarus & Alfert, 1964), as "reinterpreting the meaning of a stimulus or situation in order to change one's emotional response to it" (Gross, 1998b, p. 284), or as "changing the way an individual thinks about a potentially emotion-eliciting situation in order to modify its emotional impact" (John & Gross, 2004, p. 1302). Even if these definitions make no claim as to how (i.e., by what mechanisms) reappraisal works, it is exactly at this juncture where the two approaches split.

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, 1998a, 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.

Furthermore, another claim of Gross' emotion regulation paradigm is that reappraisal is an antecedent-focused strategy (i.e., carried out before emotion response tendencies have been fully activated and have changed behavior and peripheral physiological reactions). This characteristic would in fact account for at least part of the increased efficiency of reappraisal in impacting subjective emotional experience and physiological arousal (Gross, 1998a; John & Gross, 2004). But some studies conducted by Sheppes and Meiran (2007), as well as Sheppes, Catran and Meiran (2008) have shown that, when initiated late in the emotional situation (i.e., after the emotion has had time to develop), reappraisal is less efficient than distraction and comes with a higher physiological cost (i.e., increased skin conductance). It should be noted however that both studies used a working definition of reappraisal which involved adopting a detached, objective view of the situation, which was evident in the way the reappraisal instruction was constructed. In this sense, the results could be due more to this particular, rather difficult way of reappraising than to the process itself, and more ecological reappraising modalities might lead to different consequences.

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. Interestingly enough, positive reappraisal favors mood-incongruent memory, a process which the authors consider consistent with the notion of the activation of positive thoughts that counteract negative ones.

The neurobiological studies are similarly focus on mainly on these types of reappraisal. Wager, Davidson, Hughes, Lindquist, and Ochsner (2008) list three kinds of reappraisal strategies. 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). This overlaps with what we have referred to as positive reappraisal. 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 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, van Reekum, Urry, Kalin, & Davidson, 2007l., 2007; Ochsner, Bunge, Gross, & Gabrielli, 2002; Ochsner et al., 2004; Phan et al., 2005; Urry et al., 2006) or distancing and detachment (Eippert et al., 2007; Kalisch et al., 2005).

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. This would hardly be a feasible objective, especially for individuals affected by vulnerabilities and dealing with real-life, often challenging or dramatic, situations. 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). The efficiency of cognitive reappraisal,

understood in this sense and employed as part of integrated cognitive behavioral therapy protocols has been shown in studies providing evidence that therapeutically relevant treatment gains were mediated by changes in dysfunctional beliefs pre- to post-treatment (Foa, Franklin, Perry, & Herbert, 1996; McManus, Clark, & Hackmann, 2000; Hofmann, 2004). However, therapeutic packages generally involve a blend of various techniques. Component studies, looking at particular strategies of change and their efficiency, are a necessary continuation to break apart the relative contribution and usefulness of each strategy.

1.5.2. 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.

Campbell-Sills, Barlow, Brown and Hofmann (2006) showed that participants who were given an acceptance instruction displayed less negative affect in the recovery period after viewing an emotion-eliciting film than those who were give a suppression instruction. Also, the acceptance group reacted with decreased heart rate during the emotional stimuli, while the suppression group responded with increased heart rate.

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. Regarding dysfunctional attitudes (a belief variable

taken into account), they reported higher significant increases in the rumination condition, and non-significant decreases in the mindful self-focus and distraction conditions. In another study, Low, Stanton, and Bower (2008) had participants write about stressful situations to them with one of the instructions of acceptance, evaluative emotional processing (seen as a rumination subcomponent – see Rude, Maestas & Neff, 2007; Watkins, 2004) or attending to the objective details of the situation (control). Results suggested that evaluating one's emotional response impairs heart rate (HR) recovery, relative to both the acceptance and the control group. Acceptance-oriented processing produced HR responses that did not differ from the control condition which involved focusing on the objective details of the stressor. In spite of this, the observed group differences in HR responses were not accompanied by differences in self-reported positive or negative emotion reactivity. The authors conclude that their results speak more to the damaging effects of evaluative emotional processing, than to the beneficial nature of acceptance.

It is worth noting that many of the experimental studies using acceptance as an emotion 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; Feldner, Zvolensky, Eifert, & Spira, 2003; Low et al., 2008). 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 emotional responses remains an open empirical question.

1.5.3. Reappraisal versus acceptance: empirical data

We have been able to identify three studies directly comparing cognitive reappraisal and acceptance. Their main results are detailed below.

In one study, Hofmann, 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 Hofmann (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 subjective distress, physiological parameters associated with negative emotions and behavioral avoidance, 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. The authors speculate that in the reappraisal group, individuals that managed to successfully use reappraisal did not turn to avoidant behaviors, while those who were unsuccessful resorted to this type of behavior. On the other hand, in the acceptance group, this did not happen, suggesting that participants developed a higher tolerance of aversive events and were thus less likely to turn to reappraisal.

In conclusion, research directly comparing reappraisal and acceptance has been scarce. While studies concur in showing that both are efficient strategies in reducing at least some types of aversive emotions or general distress, results are mixed with regards to their comparative efficiency.

It is worth noting that all of these studies have compared cognitive reappraisal and acceptance using healthy individuals and have also not looked to how trait measures related to psychopathology (for instance trait level anxiety or neuroticism) impact the efficiency of these strategies. Moreover, Aldao et al. (2010) showed in their meta-analysis that the relationship between regulation strategies and psychopathology is moderated by the nature of the sample (non-clinical versus clinical). If the associations of these strategies with psychopathology may differ as a function of the clinical/non-clinical status of the sample taken into account, it is reasonable to assume that their efficiency might vary with this as well.

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

2.1. Variants of cognitive reappraisal

Based on the theoretical and empirical knowledge we reviewed, we identified a number of problems in the way research in emotion regulation, and in particular regarding reappraisal, has been carried out. We will analyze them more thoroughly in what follows.

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 et al. (2008) have listed 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 (the predilect stimuli in emotion regulation studies), 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 stimuls (Wager et al., 2008). 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 that 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. It is unreasonable to assume that one can go about imagining bad things only look bad and are in reality something else because this completely ignores the fact that in most situations people are confronted with, even as observers, the outcome and consequences are evident and cannot be eluded. One might even argue that fostering this type of strategy encourages a sort of delusional escape from the objective, blatant situations an individual might encounter. The use of such an approach is proof of the artificiality that many times infiltrates research.

Consequently by using this kind of understanding of reappraisal in the construction of their experimental tasks, almost all the studies reviewed: (i) cover a small part of what reappraisal represents and how it actually acts in real-life situations; (i) have reduced practical implications (e.g. optimization,

therapy).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. In most cases, even if they would, it would most likely be much less efficient than in laboratory studies due to the personal relevance and impact that real emotion-eliciting situations bring about. This holds even truer when dealing with individuals vulnerable to psychopathology, for whom it would prove even more difficult to shift to an unemotional approach of potentially threatening situations.

Thus what has remained yet not studied is the alternative of negative functional reappraisal, 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 (i.e., thinking that a situation is very bad, but not catastrophic; that it is hard to stand, but not unbearable; that we wish some things had not happened, but things don't always have to go the way we want them to go).

This approach fundamentally differs from all three listed before. Firstly, it doesn't encourage detachment from the negative emotions and it does not try to make the individual not feel anything. On the contrary, it assumes that he or she will experience a negative emotion, but of a functional nature. Secondly, it does not try to find positive aspects of the aversive event, as the focus is on how its harmful, aversive character is processed. And thirdly, it does not attempt to reconstruct the nature of the situation (i.e. to make it *seem* like something else), but assumes the negative property of the event as a given fact and attempts to change the way the individual *evaluates* this event.

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. Reported results made reference to the consequences of the strategy such as self-reported emotions, physiological parameters, behaviors or cognitive costs, such as memory impairment. However 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. Mediation studies looking if the changes in outcomes are brought about by changes in dysfunctional beliefs would be a necessary next step to the research conducted so far. 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 strategy, 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 (Hofmann 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 and the fact they might just be experimental artefacts. 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). Empirical evidence for this kind of demand bias comes from classical studies in social psychology, showing how the experimenter demand bias can affect results (Orne, 1962). In cognitive behavior research, Zettle and Hayes (1983) also showed social context influences the efficiency of coping statements.

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, as we don't have a way to distinguish how much of our outcomes is due to the real functioning of these strategies and how much is an artefact of wanting to satisfy the expectations of the experimenter.

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 disorder, 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. Across disorders, they showed that component studies found no difference in effectiveness between the cognitive and behavioral elements of CBT and that there was no evidence to substantiate the claim that cognitive interventions provide "added value" to behavioral interventions. This debate on the status of cognitive change as essential process of cognitive behavioral psychotherapy and, implicitly, of dysfunctional cognitions as core causal factors in determining psychopathology, has fostered and paralleled the rise of a "new wave" within CBT. The approaches included in this wave could be summarized as acceptance/mindfulness-based approaches (including therapies like ACT, MBCT, DBT) and their proponents argue that we do not need to challenge maladaptive thoughts at all

in order to achieve relevant therapeutic change. While they still view cognitions as highly relevant to psychopathology, third wave CBTs deem cognitive change as non-essential in producing therapeutic change and stress that we should surrender the explicit challenging of thoughts in favor of more indirect methods, which do not attempt to modify the content of these cognitions, but rather their function in determining psychological suffering, in other words, their relationship to emotional distress (Hayes, 2004). Proponents of one of these third wave CBTs 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, Teasdale, & Williams, 2004). These orientations choose to focus on different processes that employ a less didactic and a more experiential approach to the clients' beliefs. One of the most important of these processes is acceptance (see Hayes, 2004 for a detailed description of the others).

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 they do not directly target the content of maladaptive thoughts, could nonetheless indirectly lead to changes in these cognitions. Another unsolved issue has to do with the fact that despite these strategies are central in wide-spread, influential therapeutic approaches, a comprehensive meta-analysis of emotion regulation strategies has shown they bear small and in the case of acceptance even non-significant associations with psychopathology, measured both in a general, as well as in a specific way (Aldao et al., 2010). This seems to put under doubt their role as protective factors, implying that psychopathology could be more related to the presence of maladaptive emotion regulation strategies that to the absence of adaptive strategies.

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. Actually, going one step further, they are not even that informative in connection to how individuals can employ these strategies in real life situations, where aversive emotions are likely to abound. Therefore we believe research should move to studying more ecological versions of these strategies that could also be more accessible to healthy individuals, as well as to the ones vulnerable to or already affected by psychopathology.

4. Summary and concluding remarks

Psychopathology in the form of emotional problems is considered to be the result of *dysfunctional thinking patterns* about events (Ellis, 1962, 1994; Beck, 1979, 2005). These are defined as non-logical, non empirical and functionally detrimental to the client. Cognitive behavioral therapies are considered the gold standard for the treatment of most psychological disorders (Beck, 1979; Hofmann, 2008).

Cognitive reappraisal is one of the main mechanisms of change employed by cognitive behavioral psychotherapy. Thus, the way to *modify* the emotional problems is by modifying dysfunctional beliefs by means of *cognitive restructuring* (challenging them and teaching the client their functional counterparts). 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 et al., 1999). Approaches such as acceptance and commitment therapy (Hayes et al., 1999), dialectical behavioral therapy (Linehan, 1993a) or mindfulness based therapies (Segal et al., 2002) take acceptance as their essential construct.

Both cognitive reappraisal and acceptance have been viewed and studied as adaptive emotion regulation strategies. Yet Aldao et al. (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 measures of psychopathology, questioning their function as protective mechanisms from emotional disorders,. Effect sizes for general psychopathology (collapsed across symptom types), as well as for specific types of psychopathology, were small to medium for reappraisal and acceptance (non-significant for the latter).

Moreover the above mentioned meta-analysis revealed the scarcity of studies that use clinical samples when studying emotional regulation. Their meta-analysis focused on the relationship between different emotion regulation strategies and psychopathology. But a lot of empirical studies have analyzed the differential efficiency of various emotion regulation strategies, employing mostly normal, non-clinical samples. However, if the associations of these strategies with psychopathology are may differ as a function of the clinical/non-clinical status of the sample taken into account, it is reasonable to assume that their efficiency might vary with this as well. In a similar vein, in a review, focused on emotion regulation strategies in anxiety disorders, Amstadter (2008) concluded that "despite the inherent relationship between anxiety disorders and emotion deficits, there is a relative lack of studies examining emotion regulation within clinical samples of anxiety disorders" (p. 219).

The present project tries to take a closer look at emotional regulation and specifically at the role played by dysfunctional beliefs. Even though dysfunctional beliefs in the form of evaluations ("hot" cognitions) are acknowledged as the cornerstone of psychopathology and therapy in cognitive behavioral approaches, the situation has recently been challenged. The causal status of the cognitive mechanisms of change as related to CBT efficiency is being contested from a range of disorders (Jacobson, 1996, Longmore & Worrell, 2007). It is disputed which is the most feasible approach of these beliefs, as it is argued acceptance strategies could provide a more viable alternative to emotional regulation (Eifert & Heffner, 2003).

The present research is focused on the role of maladaptive beliefs in the comparison between two types of emotional regulation strategies: reappraisal and acceptance. Reappraisal involves changing the way an individual thinks about a potentially emotion-eliciting situation in order to modify its emotional impact (John & Gross, 2004). Acceptance involves the active and aware

embrace of those private events occasioned by one's history without unnecessary attempts to change their frequency or form, especially when doing so would cause psychological harm. (Hayes & al., 2006).

CHAPTER II
Research Objectives and Overall Metodology

Given the theoretical and empirical considerations outlined in Chapter I, the general goal of this research was to empirically approach emotion regulation from a more pragmatic, clinical stance. More specifically, 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 psychotherapy 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. More specifically, reappraisal and acceptance explicitly assume a different approach to dysfunctional evaluations. While the former directly attempts to challenge these evaluations and replace them with others that are rational and do no hinder the functioning of the individual, the latter does not address the content of evaluations, instead trying to modify the individual's mode of relating to this content. By contrasting them on outcomes that have to do both with the symptoms of psychopathology (problematic emotions), as well with 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 of this research is to study the emotion regulation strategies of cognitive reappraisal and acceptance across the normality-pathology continuum, following healthy individuals, as well as at risk, subclinical and clinical cases. This approach is all the more relevant since reviews and meta-analyses (Amstadter, 2008; Aldao et al., 2010) concur in signaling 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. We will therefore not just look at the subjective emotional consequences of these strategies, but instead also follow associated behaviors, cognitions or biological correlates.

Objectives two and three imply more **methodological** developments in the study of emotion regulation.

The **structure** of the research 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. In the first phase of the project, 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: cognitive behavioral therapy and acceptance/mindfulness based therapies (Study 2).

In the second phase of the project (Studies 3, 4 and 5) we conducted a series of experimental studies using healthy volunteers (i.e. without psychopathology) 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 therapies of psychopathology (rational emotive behavior therapy in particular). We entitled this form "negative functional reappraisal" and defined 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. This procedure closely follows what is carried out in CBT and especially REBT protocols. The basic idea is that it is ok to feel distress and to recognize that things are bad, as long as this is maintained at a level that does not hinder you from functioning (i.e. the difference between being sad and being depressed). In Study 3, we used a more comprehensive, extensive form of negative functional reappraisal and compared it to positive reappraisal, while in Study 4, we used a more concise form of this processes using coping self-statements. In Study 5, we moved on to comparing cognitive reappraisal in this version (negative functional) to the other strategy of interest – acceptance. Here we also looked at possible moderating effects of trait social anxiety, looking at whether results look different for individuals more close to psychopathology.

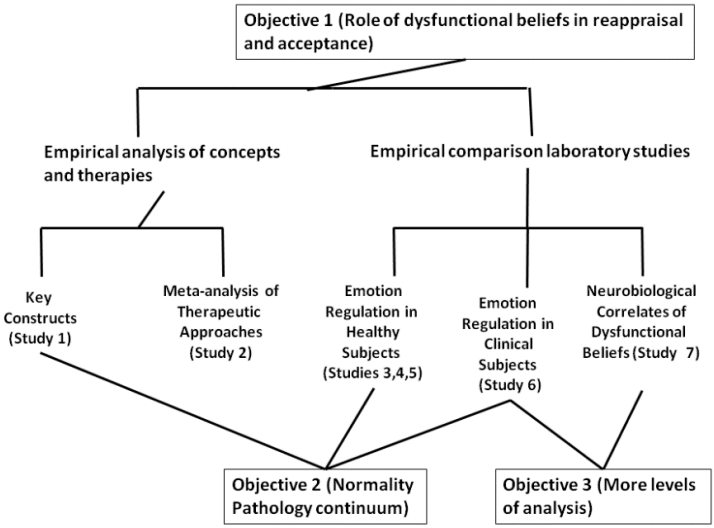

Figure 1. Schematic representation of the research program

In the third phase of the project (Study 6), we moved on to studying a clinical sample to see if the strategies would act differently in this case. In line with this conclusion, we decided to focus on social anxiety and investigated the efficiency of our version of reappraisal in contrast to acceptance strategies for this disorder. Finally the fourth and final part of the project (Study 7) looked on neurobiological mechanisms of dysfunctional beliefs and how these might sustain cognitive reappraisal. Preliminary results of a functional magnetic neuroimaging study are reported.

A graphical description of the objectives of the research and the studies included is presented in Figure 1.

CHAPTER III
Original Research

PART 1. 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.

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[1] This study was published (Cristea, Montgomery, Szamoskozi & David, 2013) in *Journal of Clinical Psychology, 69(6).* Author contributions: I. Cristea contributed to the design of the study, data collection and analysis, interpretation of the results and writing of the manuscript; D. David, G. Montgomery and S. Szamoskozi contributed to the interpretation of the results and writing of the manuscript.

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).

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 has shown 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	0.57*	–				
3. DAS-A Dysfunctional attitudes	−0.61*	−0.56*	–			
4. ABS 2 Global Irrationality	−0.38*	−0.44*	0.60*	–		
5. ABS 2 Rationality	0.19	0.23	−0.40*	−0.88*	–	
Subjective-emotional variables						
6. PAD Distress	−0.44*	−0.58*	0.35*	0.32*	−0.21	–

Note: *$p < 0.003$ 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 = 0.14, *SE* = 0.03, 95% *CI* (bias corrected and accelerated) = 0.08 to 0.21. Experiential avoidance/psychological flexibility also mediated the relationship between unconditional self-acceptance and emotional distress, indirect effect = −0.51, *SE* = 0.10, 95% *CI* (bias corrected and accelerated) = −0.75 to −0.32, as

well as between dysfunctional attitudes and emotional distress, indirect effect = 0.26, *SE* = 0.05, 95% *CI* (bias corrected and accelerated) = 0.17 to 0.37. For each of the alternative models, the confidence intervals of the indirect effect contained zero, indicating the absence of mediation.

Discussion

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	0.61*	–					
3. DAS-A Dysfunctional attitudes	−0.67*	−0.49*	–				
4. ABS 2 Global Irrationality	−0.77*	−0.60*	0.80*	–			
5. ABS 2 Rationality	0.69*	0.46	−0.74*	−0.95*	–		
6. ATQ Automatic thoughts	−0.38	−69*	0.57*	0.58*	−56*	–	
Subjective-emotional variables							
7. PAD Distress	−0.59*	−0.74*	0.58*	0.75*	−0.70*	0.78*	–

Note: *$p < 0.05$ 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 = 0.15, *SE* = 0.06, 95% *CI* (bias corrected and accelerated) = 0.04 to 0.29. Experiential avoidance/psychological flexibility also mediated the relationship between unconditional self-acceptance and emotional

distress, indirect effect = −0.61, *SE* = 0.21, 95% *CI* (bias corrected and accelerated) = −1.10 to −0.26, as well as between dysfunctional attitudes and emotional distress, indirect effect = 0.27, *SE* = 0.11, 95% *CI* (bias corrected and accelerated) = 0.09 to 0.51. 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 = 0.07, *SE* = 0.04, 95% *CI* (bias corrected and accelerated) = 0.008 to 0.187; with unconditional acceptance as a predictor, indirect effect = −0.35, *SE* = 0.21, 95% *CI* (bias corrected and accelerated) = −0.925 to −0.07; and with dysfunctional attitudes as the predictor, indirect effect 10, *SE* = 0.07, 95% *CI* (bias corrected and accelerated) = 0.006 to 0.289. 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

Introduction

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 (2004), 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: Dialectical Behavior Therapy (DBT; Linehan, 1993), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), Functional Analytic Psychotherapy (FAP;

Kohlenberg & Tsai, 1991), Integrative Behavioral Couples Therapy (IBCT; Jacobson & Christensen, 1996), Mindfulness Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2001).

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 including Aaron T. Beck (Beck, 1970; DeRubeis, Tang, & Beck, 2001), 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. These include constructs like mindfulness, acceptance, experiential avoidance, defusion, dialectics, values and others that are believed to be distinct processes of therapeutic change (Hayes, 2004).

Third wave therapies have been enthusiastically championed by their proponents as new, empirically based approaches. In Hayes' words (2004, italics not in original) *the breadth of current change and its deviation from core assumptions of earlier generations suggests that a new generation of behavioral and cognitive therapy has arrived.*

However it is exactly these two points that have been subject to the most controversy and critic. On one hand, third wave therapies (or at least a subset of them) have been accused of "getting ahead of their data" and making claims that are not empirically supported (Corrigan, 2001). Moreover 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.

On the other hand, 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 that in their attempt to distance themselves from CBT they employ misperceptions about the latter's goals and techniques (Hofmann & Asmundson, 2008). Some of these therapies have in fact started off by defining themselves as means of

extending CBT for specific problems or disorders (for example MBCT which was initially developed as an extension of CBT for preventing relapse for depression).

To all of these, the so-called third wave replied most chiefly through the voice of Steve Hayes and the responses are focused mainly on ACT. On the issue of empirical support, he refuted the claims about ACT getting ahead of its data by arguing that Corrigan's index (the ratio of empirical to non-empirical papers) for assessing whether an intervention is data supported is inappropriate and also by saying that the claim of ACT has always been one of preliminary empirical support (Hayes, 2002). In a more recent meta-analysis, which we will detail further on, Hayes, Luoma, Bond, Masuda, & Lilis (2006) moved on to say that there is a "growing base empirical support for the ACT model and the processes and components it specifies".

On the other problem of third wave therapies, or specifically ACT, not being distinct approaches from the CBT paradigm, Hayes (2008) argued that this seems to happen because traditional CBT refuses to be pinned down to specific processes and techniques (he refers to it as "a scientific bowl of Jell-O") and thus comparisons with any other approach encompassing specific models are not possible.

The existent database regarding the efficiency of third wave studies has been summarized and reviewed 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. With reference to the efficiency of ACT, the meta-analysis concluded that ACT produced between condition effect sizes (using Cohen's *d*) of 0.66 ($N = 704$) at post and 0.66 at follow-up ($N = 519$). When compared to active interventions, designed to solve the problem, effect sizes (Cohen's *d*) were 0.48 at post ($N = 456$) and 0.63 at follow-up ($N = 404$). When compared to Placebo, waitlist or general TAU, effect sizes (Cohen's *d*) were 0.99 at post ($N = 248$) and 0.63 at follow-up ($N = 404$).

Hayes also noted that a handful of studies have directly compared ACT and traditional cognitive therapy (CT) or cognitive behavioral therapy (CBT). Analyzing these four studies he identified, he concluded that between condition effect sizes on outcome were 0.73 (range 0.49–1.23) at post ($N = 96$) and 0.83 (range 0.79–0.92) 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. One of the most noticeable implications of this problem is that the meta-analysis is based on a mixture of studies of different levels of methodological stringency. Thus, apart from published studies, it also includes data from unpublished works such as posters presented at conferences, unpublished doctoral dissertations, or other types of unpublished studies. While the inclusion of both published and unpublished studies could be theoretically argument, no differential weight is placed on these two types in the analysis, nor is the published-unpublished distinction used further on as a moderator for secondary analysis. This would allow us to conclude that in the authors' viewpoint they are equivalent, a pernicious assumption which casts doubt over the results of the meta-analysis. To give just one example, out of the four studies used in the ACT versus CT/CBT comparison, two are published in peer reviewed journals, one is an unpublished doctoral dissertation and one is a paper presented at a conference. Another problem that we identified was the use of Cohen's *d* for effect sizes, as most studies taken into account involve a small number of participants and this index has been shown to show a slight upward bias for small samples (Lipsey & Wilson, 2001), which is why it would be indicated for it to be further transformed in Hedges' *g*

The other meta-analysis regarding the efficiency of third wave approaches was conducted by Lars-Göran Öst (2008). Öst conducted a review and meta-analysis for randomized control trials (RCTs) on third wave therapies with a threefold purpose: 1.to describe and review them methodologically; 2. to meta-analytically assess their efficiency; 3. to evaluate if they fulfill the criteria for empirically validated treatments. Although his literature search initially included a larger range of third wave therapies (Acceptance and Commitment

Therapy/ACT, Dialectical Behavior Therapy/DBT; Cognitive Behavioral Analysis System of Psychotherapy/CBASP; Functional Analytic Psychotherapy/FAP; Integrative Behavioral Couple Therapy/IBCT), he only used ACT and DBT for the subsequent analysis as for the others there were not enough studies for the analysis (for some, not even one published RCT).

The results indicated that the total effect size for third wave therapies, across all comparison conditions, was 0.56 ($p < 0.001$), with a 95% CI of (0.33, 0.79). The results for ACT indicated an overall effect size (Hedges' g) of 0.68 ($p < 0.001$), with the effect being a lot higher for passive control conditions (0.96 for waiting list control/WLC) and moderate for active conditions (0.79 for treatment as usual/TAU and 0.53 for active treatment). The results for DBT indicated an overall effect size (Hedges' g) of 0.58 ($p < 0.001$), with the effect being a lot higher for passive control conditions (1.30 for WLC) and moderate for active conditions (0.47 for TAU and 0.47 for active treatment).

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 CBT. This is despite claims made on both sides (the classical CBT side and the third wave side) 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.

The objectives of the current study refer to the review and summary of the literature domain for the purposes of assessing the differential efficiency of "third wave" therapies versus "traditional" and the differential impact of postulated mechanisms of change between "third wave" therapies and "traditional" CBT.

Methods

Literature search

Since ACT is a new development, going back to the mid 1980s, we decided for a less conservative approach than those of Öst (2008) and Powers et al. (2009) and included all clinical trials regarding efficiency, mechanisms of change or both, whether or not these were randomized or not (i.e. randomized clinical trials or not).

We conducted an extensive database search for studies on MEDLINE, PsycINFO and the COCHRANE LIBRARY. Databases were searched from inception through July 2009. We conducted this wide literature search especially to meet halfway the 2 quoted meta-analyses (a very lenient and a very rigorous one)

The following key words were used: "acceptance and commitment therapy" (all fields), "comprehensive distancing", "dialectical behavior therapy", "Mindfulness cognitive therapy". According to Hayes et al. (2010) comprehensive distancing was the term denoting an early form of ACT.

All abstracts were read, and when there was an indication of a group of patients receiving one of the particular treatments considered, the entire article was retrieved. The reference lists in the retrieved articles were then checked against the database search and any other articles that might fulfill the inclusion criteria were retrieved.

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) One of the target third wave therapies 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 and were presented in the studies 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 results reported involved the combination of measures, across the outcome categories considered (not assuming common variance).

The effect sizes (ES) were calculated for both post-treatment change and follow-up change, for the ACT and CBT groups. The mean changes between pre- and posttest were computed for both the ACT group and the CBT group,

so were the standard deviations for the mean changes in each group. 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).

As in the analysis, ACT was identified with the experimental group, and CBT with the control group, a positive effect size is one favoring ACT, while a negative effect size is one favoring CBT.

The uncontrolled ES (within-group) was calculated by dividing the mean change from pre to post with the pre-treatment SD, and the mean change from pre to follow-up with the pre-treatment SD (Feske & Chambless, 1995; Morris & DeShon, 2002).

The meta-analysis was performed using the comprehensive meta-analysis, version 2 software (Biostat, Inc., 2006), weighting the ESs by the reciprocal of the sampling variance (taking sample size into consideration) and correcting for small samples by calculating Hedges' g.

Results

ACT studies

The search yielded 6 published articles comparing ACT (or a form assimilated to ACT) to CBT (or a form assimilated to CBT). These studies included a comparison between an ACT intervention and a CBT intervention and 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. The studies were focused on a number of problems, both well defined clinical problems (depression, mathematics anxiety), as well as more general ones (clinically distressing symptoms, therapy seekers for clinical problems) or just matters of optimization (stress matters, therapy seekers for non-clinical problems). Two of the studies considered were effectiveness studies, which were conducted on outpatients seeking therapy (with a threshold level of clinical distress in one case), by novice therapists receiving core skills training in CBT and/or ACT. Regarding the ACT interventions, two of the studies used an earlier version of ACT referred to as cognitive distancing (Hayes, 2008). The CBT interventions included cognitive therapy, a problem solving intervention for stress management (IPP – Innovation Promotion Program) and cognitive behavioral therapy.

Table 1. Characteristics of the ACT versus CBT 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 Inoculation 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 results, so the number of subjects considered for the meta-analysis was the initial one (not considering drop-outs)
[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

Two studies included group interventions, while all the others involved individual interventions. The number of sessions ranged from 3 to around 15 (with a mean of 9.66), while the number of correspondent hours of therapy ranged from 6 to 18 (with a mean of 10.93) – though some of the studies did not provide data regarding the duration of each session. The publication period spanned a large interval from 1986 to 2007. Regarding the use of a manual, three studies reported using a manual-based intervention for both the ACT and CBT conditions, while the two others relied on core skills training in CBT and ACT of novice therapists (doctoral or masters students). Only four studies provided data about the therapists' expertise in conducting the interventions: in two of them these were conducted by an expert (which incidentally was in both cases the first author of the study), and in two others they were conducted by novice therapists.

DBT studies

The search yielded no articles comparing DBT with CBT

MBCT studies

The search yielded no articles comparing MBCT with CBT

Meta-analysis

Since we have not found studies comparing DBT or MBCT with ACT, the meta-analysis was conducted only on the ACT studies. Controlled effect sizes (ES) were calculated as Cohen's d, but since this suffers from a slight upward bias when based on small samples (Lipsey & Wilson, 2001) it was transformed to Hedges' g. Due to the fact that we had a small number of studies, with a reduced number of participants, we a-priori opted for the random effects model.

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 ($z = 0.96$, $p > 0.05$) 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. We did this in order to differentiate between the two relevant features that are a trademark of any clinically relevant problem: the experienced distress and the impairment of quality of life.

For the outcome variables grouped in the category psychopathology/subjective distress, we obtained an ES (Hedges' *g*) of 0.148 ($z = 0.82$, $p > 0.05$) 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 ($z = 0.98$, $p > 0.05$) 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 ($z = 1.36$, $p > 0.05$) 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 ($z = -0.73$, $p > 0.05$) 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	0.367	1.67 ($p > 0.05$)	(−0.062, 0.795)
2001–2009	3	0.175	1.14 ($p > 0.05$)	(−0.125, 0.475)
Type of therapy				
Individual	4	0.125	0.52 ($p > 0.05$)	(−0.342, 0.592)
Group	2	0.247	1.01 ($p > 0.05$)	(−0.231, 0.724)
Use of manual				
Manualized intervention	3	0.028	0.10 ($p > 0.05$)	(−0.513, 0.569)
Core skills training	2	0.099	0.58 ($p > 0.05$)	(−0.232, 0.430)
Therapist expertise				
Novice	2	0.099	58 ($p > 0.05$)	(−0.232, 430)
Expert	2	−0.037	−0.07 ($p > 0.05$)	(−1.058, 0.984)

With regard to processes of change, we focused on analyzing mediators only for ACT-related processes of change, as these were assessed in 5 of the studies, whereas CBT-related processes of change were assessed only in 4 of the studies.

Considering the same moderators as in the previous case, we only report the results for the mediator publication period (presented in table 3). The ones for the other mediators were either not computed because of the reduced number of studies in each category.

Table 3. Moderator analysis for ACT-related processes of change

Moderator	Number of studies	E.S. (Hedges' *g*)	*z (p)*	95% CI
Publication period				
1980–2000	2	0.684	2.65 ($p < 0.05$)	(0.180, 1.189)
2001–2009	3	0.029	0.18 ($p > 0.05$)	(−0.275, 0.333)

Follow-up

Five of the six studies included had a follow-up and 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 > 0.05) 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 related measures. We obtained an ES (Hedges' *g*) of 0.361 ($z = 1.18$, $p > 0.05$) and 95% CI (−0.234, 0.950).

For the outcome variables in the category quality of life, only two of the studies reported follow-up data. We obtained an ES (Hedges' *g*) of 0.424 ($z = 1.81$, $p > 0.05$) and 95% CI (−0.033, 0.880).

Theory of change

For the ACT-related processes of change, 4 of the 5 studies reported measures. We have found an ES (Hedges' *g*) of 0.187 ($z = 0.55$, $p > 0.05$) 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 ($z = -0.74$, $p > 0.05$) and 95% CI (−0.684, 0.309).

Post-hoc mediator analysis were not reported on follow-up data, due to the fact there were only 5 studies, some of which not even including enough data to assess for some of the proposed mediators.

Publication bias

Since effect sizes were not significant for both post-test and follow-up, we only computed a fail-safe N using Orwin's (1983) test to see the number of studies with an effect size of 0 that would be necessary to bring the mean ES under the threshold value of 0.2. This value was chosen because according to Cohen's (1988) classification a low effect size is considered starting from the value of 0.2, under this value an effect being considered very small or trivial. We therefore computed Orwin's test only for the effect sizes greater than 0.2.

For the pre-post test change, this included only the ACT-related processes of change, where the ES was 0.244. The fail-safe N computed with Orwin's formula was 2, therefore 2 studies would be necessary to bring this ES under the threshold value of 0.2.

For the pre-follow-up change, we used the overall outcome ES which was 0.38. The fail-safe N computed with Orwin's formula was 5, therefore 5 studies would be necessary to bring this ES under the threshold value of 0.2.

Discussion

The purpose of any meta-analysis is to integrate research findings thus offering a more complete and more accurate summary on a certain problem. The present meta-analysis started off from the goal of getting such 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. More generally, these points add up to the two lines of critique which have been brought against third wave approaches: that they are merely extensions of CBT, and that they are making claims lacking the necessary empirical support.

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.

We therefore focused on three of the most preeminent third wave approaches (ACT, DBT and MBCT) and searched for studies which directly compared any of these forms of therapy with a classical CBT form. In the inclusion criteria we decided to opt for an intermediary path from the two meta-analysis already conducted: a more rigorous approach than that of the Hayes' (2006) meta-analysis, which also included unpublished studies, but a less conservative approach than that of Öst' (2008), which only included RCTs. We did this precisely to accommodate claims from each side, the *classical* CBT experts' claim that third wave therapies do not reach the methodological stringency of similar CBT studies, by not conducting rigorously enough RCTs, and the *third wave* experts' claim that these approaches are too young and

have not yet time to develop and conduct their own large scale rigorous studies. Therefore we stuck to respecting criteria of scientific stringency (we considered only published studies), while at the same time not restricting the search to the *gold standard* studies- RCTs (we included all clinical trials).

The results bring out a number of points. First of all it should be noted, that, apart from ACT, none of the other therapies considered (DBT, MBCT) were directly compared to a form of classical CBT. The question which immediately comes to mind is of course why this would be the case, why don't the promoters of these forms of therapy consider it relevant to empirically confront them with CBT. The most reasonable would seem to sustain the idea that they are basically forms of CBT, building upon extensions of the basic paradigm through the use of new techniques, but they are not different, structurally new approaches. Their inclusion in a *third wave of CBT* appears therefore unwarranted, as well as their frequent citation as pillars of this new wave. It is more accurate to consider them as strains of the basic paradigm. In fact their own promoters have at least initially presented them as extensions of the CBT paradigm for specific clinical disorders (e.g. DBT was developed for borderline parasuicidal patients – Linehan, Armstrong, Suarez, Allmon, & Heard (1991); Linehan (1993); MBCT was developed for improving relapse prevention in depression – Segal & al. (2001)).

The meta-analysis was conducted only on the ACT studies, which was the only third wave approach that compared it directly with 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). We found 6 such studies with a total of 237 participants (for pre-post change), out of which 5 studies reported follow-up data (130 participants).

Since our objectives were two-fold (efficiency and mechanisms of change), we computed two separate effect sizes for each of these, using the indicator Hedges' *g*. 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). Still in the realm of efficiency, the pre-follow-up results (on both global outcome and the specific outcome categories considered) showed greater effect sizes, ranging around

0.3–0.4, therefore still in the confines of small effect size according to Cohen's (1998) classification. However these effect sizes still did not reach significance level, probably due to the high variance across the studies.

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. Moderators that would be possibly relevant for the efficiency of therapeutic interventions were considered. 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, what do these results tell us? A number of things have arisen. Firstly, as we pointed out before, a meta-analysis' aim is to integrate the main findings of the field. It is destined to give a snapshot of the status of the field, relating in this case to the ACT-CBT comparison. The status-quo seems to be one of little empirical work doing comparisons between the two, 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. The fact that a sparse number of studies with few subjects address the direct comparison of ACT and CBT is also a status-quo issue.

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 of empirically validated treatments (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, 2004; Hofmann et al., 2007; Kendall & Treadwell, 2007; Smits, Powers, Cho, & Telch, 2004; Smits, Rosenfield, Telch, & McDonald, 2006). 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.

Another point that we feel has to be acknowledged regards the divergence between our results and those reported by Hayes' (2006) meta-analysis. His meta-analysis is the only one, up until now, to have addressed the issue of studies directly comparing ACT and CBT. However his findings indicate much bigger effect sizes than ours both for outcome and mechanisms of change measures. We believe the difference resides mainly in the study selection, and, to a lesser extent, in the ES indicator considered. As pointed out in the introductory section, we reckon a major problem with Hayes' (2006) meta-analysis was the enmeshed inclusion of both published and unpublished studies, without attributing differential weights or following it up by moderator analysis. In fact, only two of the studies included by Hayes were also included in the present meta-analysis, the other two still not having been published. Another problem was the use of an effect size index that is known to suffer an upward bias for small sample sizes. We therefore hypothesize that these factors (along of course with other possible ones such as the publication of new studies) might have led to an artificially inflated effect size in the ACT-CBT comparison in Hayes' (2006) meta-analysis.

Concluding his meta-analysis, Öst (2008) asks himself for how long can a therapy still be considered "young and promising". And while it is clear that

such a therapy cannot be expected to have the database of empirical results that an established approach such as "traditional" CBT has, we believe that it is not unreasonable to expect it should limit itself to making claims that are entirely data-based. In other words, one cannot have it both ways: to be considered young as a reply to critiques regarding the scarcity and reduced methodological rigor of its data, but at the same time be considered old and established when it comes to the boldness, scope and breadth of the assertions it makes.

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).

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,

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[2] This study was published (Cristea, Szentagotai, Nagy, & David, 2011) in the journal *Motivation and Emotion, 36(4).* 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.

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, $F(2, 86) = 111.41$, $p < 0.001$. 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, $p = 0.001$, Cohen's $d = 0.96$) and negative functional reappraisal ones (mean difference = 16.41; SE = 1.118, $p < 0.001$, 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, $F(2, 86) = 686.61$, $p < 0.001$. 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, $p < 0.001$, Cohen's $d = 7.18$) and negative functional reappraisal (mean difference = 37.04, SE = 1.20, $p < 0.001$, 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, $p = 0.02$, Cohen's $d = 0.76$).

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, $F(2, 86) = 67.36$, $p < 0.001$. 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, $p < 0.001$, Cohen's $d = 0.90$) and negative functional reappraisal groups (mean

difference = 26.29; SE = 2.23, $p < 0.001$, Cohen's $d = 1.81$). Positive reappraisal led to higher increases in irrationality than negative functional reappraisal (mean difference = 16.46, SE = 2.24, $p < 0.001$, Cohen's $d = 1.02$).

The ANCOVA showed a significant effect of the emotional regulation strategy on the level of rational beliefs, ($F(2, 86) = 85.92$, $p < 0.001$). Post-hoc tests (Sidak) indicated that positive reappraisal conducted to higher increases in rationality than control (mean difference = 17.24; SE = 2.10, $p < 0.001$, 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, $p < 0.001$, Cohen's $d = 1.93$) and positive reappraisal instructions (mean difference = 9.97; SE = 2.09, $p < 0.001$, Cohen's $d = 0.81$).

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 post-test. 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, $SE = 0.98$, 95% CI (bias corrected) = −0.13 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 limitations. 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]

Introduction

Self-statements

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), the protocol of Beck, Wright, Newman and Liese (2001) for substance abuse), both for adults and for children (e.g. Kendall's (2000) Coping Cat program for anxiety problems in children). 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-statements, while people low in self esteem not only do not display these benefits, but subsequently worsen on these measures. The results of the study of Wood and collaborators (2009), albeit provoking and noteworthy, raise some interesting considerations.

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[3] This study was published (Cristea, Szentatogai Tatar, & Lucacel, 2014) in *Journal of Evidence-Based Psychotherapies, 14(1).* Author contributions: I. Cristea: study design, data analyses, interpretation of the results, writing of the manuscript; A. Szentagotai: interpretation of the results and writing of the manuscript; R. Lucacel, data collection

Extensions to previous studies

First, we must note that self-statements denote beliefs and therefore are not simply classifiable along a positive/negative continuum. This might be a distinction employed by common sense psychology and the self-help industry, but from a data driven point of view (i.e., in cognitive behavioral therapies) the classification of self-statements is more nuanced.

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. In the classification mentioned, this would be a functional/rational self-statement.

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. From the point of view of a clinical psychologist or a cognitive behavioral therapist, they 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. Thus, one question that we have asked ourselves is whether thinking positive and rationally helps us in the same way as thinking positive, but irrationally or as thinking rationally, but not necessarily in a positive way.

Furthermore, the study of Wood and collaborators measured the efficiency of a positive self-statement in the absence of an emotion-provoking or some other type of situation requiring adaptation on the part of the individual. But people often resort to these affirmations when faced with a problematic, threatening or in some other way challenging, situation (e.g., an important exam, a break-up, a failure). Telling yourself you are a lovable person after a break up or a quarrel with a friend serves as a coping mechanism. We claim that merely measuring the efficiency of these statements in the absence of a problematic situation soliciting some form of coping does not grasp the full picture. The efficiency of these self-statements should also be measured if they were employed in response to a in some way problematic situation, in other words if they would function as an emotional regulation strategy.

Finally, a problem we found with the study of Wood and collaborators (2009) has to do with the methodology involved. In order to study the differences between people with low and high self-esteem, the authors applied the so-called extreme groups approach (EGA), retaining only the subjects in the top and bottom third of the distribution on Fleming and Courtney's (1984) self-esteem scale. It was not clear whether subjects in the middle third of the distribution were not selected at all or excluded from further analysis. However, even assuming they were not selected at all, the EGA has been shown to be a highly problematic approach, which leads to artificial inflation of effect sizes (Preacher, Rucker, MacCallum, & Nicewander, 2005). In fact, in a critical review of the EGA, Preacher et al. (2005) decisively recommend it should not be used in designing research studies.

Study objectives

Our aim was to extend the study of Wood et al. (2009) by approaching the aspects we have identified as warranting further exploration. Firstly, we set out to investigate the efficiency of positive self-statements in response to a problematic, self-esteem challenging situation. We exposed the subjects to a situation in which they had to perform a gratuitous non-compassionate act, thus threatening to their self-esteem by challenging their self concept of good persons (Blanton, Cooper, Slkurnik, & Aronson, 1997).

Secondly, 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 view this as a rational, functional statement, 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 (dysfunctional/irrational versus functional/rational). Our objective was to compare different types of self-statements among each other, which is why we have not included a no statement condition. The comparison with a no-statement condition has already been done by the study of Wood et al. (2009) and we aimed to extend their findings by distinguishing between different types of self-statements.

Thirdly, in order to overcome the methodological problems of the extreme groups approach, we did not pre-select subjects based on their self-esteem scores. We employed a post-hoc data analysis procedure to check if participant's self-esteem plays a role in moderating the efficiency of the statements.

We maintained the continuous nature of the proposed moderator variable in order to make sure the differences we might see were not artificially inflated.

Method

Participants

Ninety undergraduate students (77 females, 13 males; mean age = 22.48, SD = 5.38; all participants were White Caucasian) took part in the study for extra credit. Participants were randomly assigned in one of the four groups corresponding to the four self-statements.

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 (1 = *I totally disagree* to 4 = *I totally agree*). The scale was adapted for the Romanian population (Cronbach's alpha = 0.79). State self-esteem, was assessed using McGuire and McGuire's (1996) scale. Participants were asked to respond how they saw themselves right then. Ratings were made for six pairs of opposite adjectives (pleasant, unpleasant; valuable, useless; nice, awful; high, low; good, bad; and successful, unsuccessful). The scale was translated into Romanian and Cronbach's alpha was computed, indicating excellent reliability ($\alpha = 0.93$).

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 STAI X1 asks participants to evaluate how they feel "right now", by rating twenty statements regarding mood in terms of their perceived intensity (*not at all, a little, pretty much, a lot*). The POMS consists of a list of 47 adjectives describing emotions, which the subjects are asked to rate in terms of their intensity (*not at all, very little, medium, a lot, very much*). While items can be grouped in more subscales, we used the negative emotions ($\alpha = 0.96$) and the positive emotions subscales ($\alpha = 0.87$). Both instruments have been previously translated and adapted on

the Romanian population. Cronbach's alpha for the STAI X1 was 0.95 (Pitariu & Peleasa, 2007).

For implicit measures of mood, we used the same ones as Wood et al. (2009), which we translated into Romanian. One was Mayer and Hanson's (1995) Association and Reasoning Scale (ARS), including questions such as 'What is the probability that a 30-year-old will be involved in a happy, loving romance?'. The underlying assumption 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 (e.g., go to a party) (α = 0.79), the idea being that positive moods would led to increases in the desire ratings.

Procedure

The procedure was adapted from the studies of Blanton et al. (1997) and Wood et al. (2009). 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 flaw*) every time they heard a sound (doorbell-sound). This task lasted 4 minutes, with the doorbell 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 mood measures again and were then debriefed.

Results

Mean scores for all the dependent variables (at baseline and after having practiced the statements) are presented in Table 1.

Participants' trait self-esteem (Rosenberg's self-esteem scale) ranged between 14 and 40, with a mean of 30.29 (SD = 4.94).

Table 1. Means and standard deviations (in parentheses) in each experimental condition

	Positive rational self-statement		Positive irrational self statement		Negative irrational self-statement		Acceptance rational self-statement	
Measures	Baseline	Post	Baseline	Post	Baseline	Post	Baseline	Post
State self-esteem	33.32 (7.29)	36.04 (6.16)	30.43 (7.46)	32.83 (5.75)	33.27 (5.70)	28.95 (9.80)	34 (5.11)	32.3 (8.80)
Explicit mood measures								
Anxiety (STAI X1)	38.5 (13)	33.77 (7.90)	41.04 (12.29)	39.48 (11.40)	35.90 (10)	41.54 (12.15)	32.54 (9.15)	34.83 (11.77)
Negative emotions (POMS)	37.09 (29.4)	25.25 (22.9)	41.65 (25.66)	30.30 (22.29)	30.58 (20.48)	38.90 (32.32)	22.45 (16.87)	25.82 (24.78)
Positive emotions (POMS)	19.48 (6.28)	17.8 (6.05)	18.13 (4.90)	18.20 (5.21)	19.30 (5.29)	16.80 (5.18)	20 (8.45)	17.54 (11.5)
Implicit mood measures								
Mood congruent judgment (ARS)	27.18 (6.90)	27 (7.09)	21.54 (6.07)	22.13 (6.40)	23 (5.36)	22.23 (8.02)	23.59 (7.79)	22.52 (8.20)
Incentive ratings	47.19 (9.01)	48.47 (12.09)	48.35 (13.57)	46.78 (14.70)	46.55 (12.40)	40.48 (14.95)	50.43 (10.35)	44.36 (12.15)

Note: STAI X1 – State Trait Anxiety Inventory; POMS-Profile of Mood States; ARS-Association and Reasoning Scale

Between groups comparisons

In order to control for differences in baseline scores, we computed change scores (post-baseline) for each of the dependent variables. Univariate Analysis of Variance (ANOVA) was performed with the type of self-statement as a between groups factor. We reported effect sizes (Cohen's d) for the significant mean differences, dividing the mean differences by the pooled standard deviation (Cohen, 1988).

There was a significant effect of statement type on state self-esteem ($F(3, 86) = 7.78$, $p < 0.001$) and on 2 out of 3 explicit mood measures (state anxiety: $F(3, 85) = 6.77$, $p < 0.001$; negative emotions: $F(3, 80) = 8.60$, $p < 0.001$) and on one implicit measure of mood (incentive ratings: $F(3, 81) = 3.63$, $p = 0.016$), but not on positive emotions ($F(3,82) = 0.97$, $p = 0.41$) and the other implicit mood measure (ARS: $F(3, 82) = 0.39$, $p = 0.76$). 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, $p = 0.002$, $d = 1.18$), and that the same held true for the positive irrational statement group (mean difference = 6.71, SE = 1.89, $p = 0.006$, $d = 1.06$). For *state anxiety,* the positive rational statement group report larger decreases than the negative statement group (mean difference = −10.36, SE = 2.83, $p = 0.004$, $d = 1.10$) and the acceptance statement group (mean difference = −7.23, SE = 2.39, $p = 0.021$, $d = 0.91$), while the positive irrational statement group reported larger decreases than the negative statement group (mean difference = −7.20, SE = 2.56, $p = 0.038$, $d = 0.84$). 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, $p = 0.002$, $d = 1.15$) and the acceptance statement group (mean difference = −16.06, SE = 5.11, $p = 0.025$, $d = 1$), as well as the positive irrational statement group displaying larger decreases than both the negative statement group (mean difference = −20.24, SE = 5.12, $p < 0.001$, $d = 1.16$) and the acceptance statement group (mean difference = −14.71, SE = 4.93, $p = 0.022$, $d = 1$). For *incentive ratings,* the rational positive statement produced greater increases than the acceptance statement (mean difference = 8.05, SE = 2.71, $p = 0.024$, $d = 0.75$). All the other comparisons were not significant. Figure 1 and Figure 2 provide a graphic portrayal of these results for state self-esteem and state anxiety.

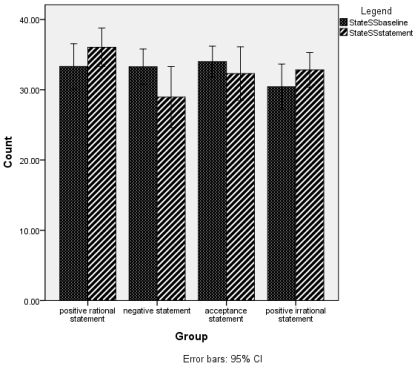


Figure 1. Mean values on the state self-esteem (State SS) measures as a function of condition and evaluation time point (at baseline and after repeating the statement). Higher bars suggest higher self-esteem.

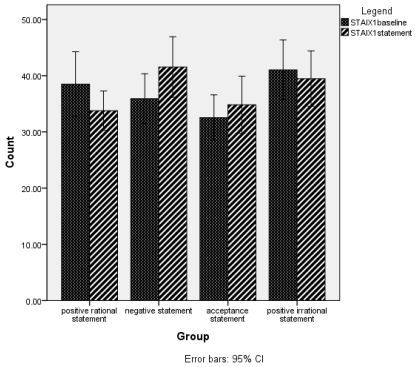


Figure 2. Mean values on the state anxiety (STAI X1) measures as a function of condition and evaluation time point (at baseline and after repeating the statement). Higher bars suggest higher state anxiety.

Moderation analysis

In order to see if trait self-esteem (TSE) would influence these results (i.e. the effect of instruction type on changes in the considered variables), 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 (i.e. reported all the other self-statements to it). Moderation is said to have taken place when the model employing the combination of independent variable and moderator explains variation in the outcome, independent of their additive effects (for more extensive procedural details see Hayes, 2005).

We found evidence of moderation for changes in state self-esteem ($F(3, 80) = 3.58$, $p = 0.017$) and negative emotions ($F(3, 74) = 3.92$, $p = 0.012$), but not for state anxiety ($F(3, 79) = 1.77$, $p = 0.159$) or incentive ratings ($F(3, 75) = 2.15$, $p = 0.101$). 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 ($b_{\text{rat-irrat}} = -0.18$, $p = 0.818$), but differential efficiency emerged for the acceptance and positive irrational ($b_{\text{accept-irrat}} = -1.84$, $p = 0.006$), as well as negative and positive irrational self-statements ($b_{\text{neg-irrat}} = -2.49$, $p = 0.002$). For mean values of self-esteem (MSE), the same pattern emerged, but of a smaller magnitude ($b_{\text{rat-irrat}} = 0.026$, $p = 0.822$; $b_{\text{accept-irrat}} = -0.26$, $p = 0.024$; $b_{\text{neg-irrat}} = -0.48$, $p < 0.001$), while at high levels of self-esteem (HSE) there was no differential efficiency of these strategies (all *b*s n.s.at $p < 0.05$). For negative emotions, the pattern was similar at LSE ($b_{\text{rat-irrat}} = -1.07$, $p = 0.181$; $b_{\text{accept-irrat}} = 1.14$, $p = 0.094$; $b_{\text{neg-irrat}} = 2.05$, $p = 0.012$), at MSE ($b_{\text{rat-irrat}} = -0.13$, $p = 0.905$; $b_{\text{accept-irrat}} = 0.35$, $p = 0.002$; $b_{\text{neg-irrat}} = 0.50$, $p < 0.001$), and at HSE (all *b*s n.s.at $p < 0.05$).

Discussion

Study overview

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 argued self-statements cannot simply be studied under one umbrella and should be separated in distinct, theoretically and empirically supported, categories.

As a starting point, 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. Moreover, there are certain beliefs that cannot be clearly placed in one of the dichotomous positive versus negative category (i.e. unconditional acceptance type).

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, threatening or in other ways challenging, situation. It is in these cases that the individual makes use of them for potential assistance. In fact, in CBT protocols,

the practice of these statements is recommended as a means of coping when the person is confronted with a problematic situation (see Barlow's (1998) panic protocol for an example). We have tried to accommodate these two aspects that have not been approached in the study of Wood et al. (2009) or in the vast majority of studies regarding self-statements.

Possible interpretations of the results

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 rational, neither negative, nor positive, acceptance statement, did not differ from the negative statement in its efficiency on transitory self-esteem and mood (anxiety, distress). It should be noted however that these results apply to explicit, overt measures of mood, but not to all covert, implicit measures (e.g., mood congruent judgment, incentive ratings). No differences were found in mood congruent judgment, while for incentive ratings, the positive rational statement group displayed higher increases than the acceptance group.

While these results could indicate some level of contamination with demand characteristics (i.e., subjects knew what they were expected to answer), it is more likely that the instruments measuring implicit mood are not sensitive enough to detect finer mood changes such as those present in this paradigm. Moreover, an indication that contamination with demand characteristics was unlikely is the fact that following the acceptance statement (a rational, functional type of belief), subjects did not significantly improve their explicit mood, as we would have expected them to based on the REBT theory underlying the practice of this statement in therapy protocols. The participants, however, did not have any type of theory formulation that would clarify the

role and scope of these statements and were left to making their own interpretations of the mere content. This un-guided approach, as well as the use of implicit, as well as explicit, measures of mood, were employed to minimize contamination with demand characteristics.

By their nature, implicit measures of mood are less flexible, responding to more intense or longer lasting changes in mood. Judgment ratings such as those measured by the ARS are sensitive to cumulative, longer term modifications in mood, starting from 7 day intervals (Mayer & Hanson, 1995), while incentive ratings are sensitive to differences between happy mood and depressed mood (Clark & Teasdale, 1985). Consequently these implicit mood instruments are probably not very suited to assess transient and less intense mood changes, as the ones that are induced this type of experimental paradigm. It is however interesting that, in this context, the positive rational statement was the only one that produced higher changes on incentive ratings, hinting to a possible stronger effect of this belief.

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). There was no moderating effect on state anxiety or implicit mood as measured by incentive ratings. However, 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 (around the mean) self-esteem, but not for people with high self-esteem. A similar pattern was found for changes in negative emotions, with the difference that there was no differential efficiency of the acceptance and positive irrational statements in increasing negative emotions at low levels of self-esteem, but this effect was present for medium levels of self-esteem.

What is most interesting is that 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.

Conclusions

These results should not be interpreted however as necessary inconsistent with Woods et al. (2009). It was out goal to build a finer grained picture, by disentangling different types of self-statements at varying levels of self-esteem. Moreover, all our results describe the *relative* efficiency of these statements in rapport to each other and not to a no statement condition. The moderation analysis was carried out using the positive irrational statement as a reference category, so again the results illustrate the way the statements' *relative* efficiency varies at different levels of trait self-esteem. It could also be the case that we used a different, more methodologically robust strategy to assess moderation than Woods et al. (2009), which might have led to some differences in results.

Future research should establish the longer term costs of these quick fixes. If thinking positively and highly irrationally (e.g., the way a narcissist would) seems to momentarily make the situation better for us, while thinking rationally, but not necessarily positive (e.g., in an unconditionally accepting way) does not, the former will probably be a strategy we resort to quite frequently. Is there a longer term price we pay for these frequent quick fixes and what is this price?

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

Introduction

Aldao, Nolen-Hoeksema, and Schweizer (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 (Aldao et al., 2010). The aforementioned meta-analysis has shown large effect sizes for the association between rumination and overall measures of psychopathology. Associations with specific types of psychopathology revealed large effect sizes for anxiety and depression.

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. Martin and Tesser (1996), for instance, argue that rumination has an instrumental role as a strategy aimed to resolve unattained goals, the intrusive concern signaling a discrepancy between the current state and a desired outcome.

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

[4] This study was published (Cristea, Matu, David & Szentagotai, 2012) in *Anxiety, Stress and Coping, 27(1).* 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.

engage in cognitive problem solving to alleviate one's depressive symptoms" (Treynor et al., 2003, p. 256). The second one, named "brooding", was considered the maladaptive component, reflecting "a passive comparison of one's current situation with some unachieved standard" (Treynor et al., 2003, p. 256). Joorman et al. (2006) offered further proof for this separation of ruminative processing into an adaptive and maladaptive component, by showing that brooding, but not reflective pondering, was uniquely associated with an attentional bias towards sad faces, even when depressive symptoms were controlled for. They concluded that reflective pondering, in the absence of brooding and depressive symptoms, might indeed be adaptive.

Acceptance and reappraisal

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, Williams, & Teasdale, 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 (John & Gross, 2004).

Cognitive reappraisal and acceptance have both been associated with wide-spread, major therapeutic approaches. The former is recognized as one of the main active ingredients of cognitive-behavioral therapy/CBT (Hofmann & Asmundson, 2008), while the latter is considered central in more recent therapeutic approaches such as acceptance and commitment therapy/ACT (Hayes, Strosahl, & Wilson, 1999) or mindfulness based therapies (Segal et al., 2002). Reappraisal was viewed, in the previously mentioned meta-analysis, as a strategy placed at the adaptive end of the emotion regulation continuum. Nonetheless, in the same meta-analysis, the authors found only small to medium effect sizes for the association between each of these two strategies and psychopathology.

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. In another study, Low, Stanton, and Bower (2008) showed that evaluating one's emotional response (a component of ruminative processing) impaired heart rate (HR) recovery, relative to both the acceptance and the control group. In spite of this, the observed group differences in HR responses were not accompanied by differences in self-reported positive or negative emotion reactivity.

A few studies compared acceptance and reappraisal as strategies for regulating emotions. Hofmann, Heering, Sawyer, and Asnaani (2009) illustrated suppression resulted in greater HR increases than acceptance and reappraisal, in an anxiety inducing task consisting of giving a impromptu speech. Yet direct comparisons between acceptance and reappraisal revealed no significant differences in HR or anxiety. In another study, Szasz, Szentagotai, and Hofmann (2010) showed reappraisal to be more effective at reducing anger than attempts to suppress or accept it. Furthermore, participants in the reappraisal condition persisted longer in a frustrating task than those who were instructed to suppress or accept their negative feelings.

Hence, on one hand, studies provide mixed results about the differential efficiency of rumination and acceptance/mindful self-focus. This is especially noteworthy since both strategies involve the same fundamental idea of attending to one's emotions. However these studies have approached rumination as an unitary process, without taking into account the potential differential effects of brooding and reflective pondering as subcomponents of rumination. On the other hand, the results are also mixed regarding the efficiency discrepancies between cognitive reappraisal and acceptance. Furthermore, we have not been able to find studies directly comparing rumination and reappraisal.

Objectives of the present study

Consequently, 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 problematic emotions. Moreover, given the mixed reports in the literature, we wanted to investigate the differential efficiency of these strategies.

In an effort to approximate more closely the conditions individuals are confronted with in real life, we asked participants to perform an *online* regulation of their emotions, *while* they were confronted with the anxiety inducing social scenarios. Additionally, to increase the clinical and therapeutic relevance of the study, we included a form of reappraisal (i.e. functional negative reappraisal) informed by cognitive-behavioral therapies, more specifically, Rational-Emotive Behavior Therapy (REBT) and by the empirical developments in this field (Ellis, 1994; David, Schnur, & Birk, 2004). 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). Our previous work has shown an increased efficiency of this form of reappraisal over positive reappraisal in reducing negative mood, following negative mood induction (Cristea, Szentagotai, Nagy, & David, 2011). 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 make use of the emotion regulation strategies.

Method

Participants

One hundred and three undergraduate students (86 females, 17 males) with ages ranging between 18 and 35 (mean age = 20.93, SD = 2.61), all White Caucasian, 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), with this subscale showing optimal reliability (Cronbach's alpha between 0.79 and 0.89).

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, respectively. EMAS-S was adapted on the Romanian population (Miclea et al., 2009) with Cronbach's alpha ranging from 0.83 to 0.92.

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) and we averaged the scores on all four scales for assessing negative mood. All scales have good reliability, with Cronbach's alphas ranging between 0.82 and 0.93.

Mood induction vignettes

For the induction of negative mood we used a procedure that implied guided imagery based on social vignettes. This method has proven to be effective and comparable to other types of mood induction stimuli (Westerman, Spies, Stahl, & Hesse, 1996). We first developed 15 short (2 to 4 phrases) second-person narrations of negative socially-evaluative situations or interactions (e.g. giving a presentation in front of a jury and making an important mistake). Based on a prior pilot study we selected 10 of them that were evaluated as the most anxiety inducing and organized them in two different slide-shows (each scenario being shown for 60 seconds).

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, participants underwent a 20 minutes training in the use of the emotion regulation strategy corresponding to their group. The instruction for the reappraisal (i.e. functional negative reappraisal) group was derived from CBT and more specifically REBT 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, following the model of Cramer & Fong (1991). The instruction for the acceptance/mindfulness condition was derived from mindfulness and acceptance based approaches such as 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. At the end of the training, they also exercised online regulation using the strategy with two social vignettes, similar to the ones that were used later in the experiment. 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. There was a 30 min break between the two phases in which the participants were told that they could relax. The slide-shows with the social vignettes were randomized between the two parts.

Results

Manipulation check

Descriptive data for all the outcome variables in each phase are displayed in Table 1.

The social vignettes reliably determined mood changes across groups in the mood induction alone phase for negative emotions, $t(102) = -9.18$, $p < 0.001$, anxiety (worry cognitive: $t(102) = -5.18$, $p < 0.001$, and emotional-autonomic:, $t(102) = -4.46$, $p < 0.001$). ANCOVA analysis controlling for baseline values revealed there was no effect of Group on negative emotions and anxiety (all ps > 0.05).

Table 1. Means (*M*) and standard deviations (*SD*) in the mood induction and respectively, in the combined mood induction and emotion regulation phase, pre- and post-task *k*

Outcome	Group	Mood induction task		Combined mood induction and emotion regulation task	
		Pre M (SD)	Post M (SD)	Pre M SD	Post M (SD)
Negative emotions (PANAS-X)	Reflective pondering (n = 33)	9.43 (3.74)	13.64 (4.94)	9.02 (3.25)	12.75 (5.25)
	Reappraisal (n = 33)	9.48 (3.68)	13.75 (5.22)	8.14 (2.94)	10.73 (3.81)
	Acceptance (n = 37)	8.18 (2.42)	11.49 (4.37)	7.85 (2.37)	9.59 (3.34)
Worry-cognitive (EMAS-S)	Reflective pondering (n = 33)	17.45 (9.14)	22.64 (12.62)	18.00 (8.22)	21.33 (10.52)
	Reappraisal (n = 33)	16.18 (6.47)	18.94 (9.42)	14.91 (6.76)	16.27 (6.74)
	Acceptance (n = 37)	15.24 (7.27)	18.73 (9.77)	14.00 (6.63)	15.57 (6.54)
Emotional autonomic (EMAS-S)	Reflective pondering (n = 33)	16.42 (8.11)	20.57 (11.29)	15.82 (6.75)	19.57 (9.29)
	Reappraisal (n = 33)	15.94 (5.61)	18.39 (8.42)	14.18 (5.74)	15.06 (4.74)
	Acceptance (n = 37)	14.97 (5.42)	17.43 (7.93)	12.70 (4.23)	14.13 (4.97)

Note. PANAS = Positive and Negative Affect Schedule – Expanded Form; EMAS-S = Endler Multidimensional Anxiety Scales-State

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, $F(2, 99) = 3.40$, $p = 0.014$, and the emotional-autonomic component of anxiety, $F(2, 99) = 4.45$, $p = 0.037$, but not on the worry-cognitive component, $F(2, 99) = 2.19$, $p = 0.117$. 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 =

0.83, $p = 0.032$). Also participants using reflective pondering displayed higher levels of autonomic-emotional anxiety than those using reappraisal (mean difference = 3.14, SE = 1.15, $p = 0.023$) or acceptance (mean difference = 2.83, SE = 1.14, $p = 0.045$)

To further investigate the differential efficiency of the regulation instructions, we looked if the task related increases in negative mood and anxiety would differ between mood induction alone and mood induction plus emotion regulation, as well as whether these differences would depend on the strategy used. For this purpose 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), $p = 0.005$, partial $\eta^2 = 0.08$, and the worry-cognitive component of anxiety, $F(1,100) = 6.09$ (Wilks' Lambda), $p = 0.015$, partial $\eta^2 = 0.06$, but not the emotional-autonomic one, $F(1,100) = 3.05$ (Wilks' Lambda), $p = 0.084$. The main effect of Group, as well as the interaction effect were not significant for any of the outcomes (all ps > 0.05).

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, since we were primarily interested in investigating its possible efficiency as an emotion regulation strategy and the ways in which it compares to more established regulatory strategies. We found evidence of moderation for negative emotions, $F(2, 95) = 4.79$, $p = 0.01$, and the emotional component of anxiety, $F(2, 95) = 4$, $p = 0.021$, but not for the cognitive one, $F(2, 95) = 1.74$, $p = 0.181$. Significant moderation effects were probed using the *pick a point* approach (probing at values of the moderator). Results are displayed in Table 2.

Table 2. Probing significant moderation relations, using social anxiety as a moderator. Values represent standardized beta coefficients for the comparative efficiency of acceptance versus reappraisal and respectively, reflective pondering versus reappraisal, at different values of social anxiety. Outcomes are pre to post change scores from the combined mood induction and emotion regulation phase.

Social anxiety level/Outcome	**21 (min)**	**43 (2st quartile)**	**50.44 (mean)**	**52 (3nd quartile)**	**58 (4rd quartile)**	**72 (maximum)**
Emotional autonomic						
Acceptance – pondering	0.614	−0.007	−0.216*	−0.260*	−0.429*	−0.824*
Reappraisal – pondering	0.465	−0.071	−0.253*	−0.291*	−0.437*	−0.779*
Negative emotions						
Acceptance – pondering	0.414	−0.093	−0.264*	−0.300*	−0.438*	−0.760*
Reappraisal – pondering	0.852*	0.116	−0.133	−0.185	−0.386*	−0.854*

Note. *$p < 0.05$

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 (the worry cognitive component) 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.

Further on, 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. We did not find any differences between reappraisal and acceptance.

Further on we investigated the possible moderating role of social anxiety on the efficiency of these emotion regulation strategies. We did not find evidence of moderation for the cognitive component of anxiety, suggesting worries and dysfunctional thoughts might be more resilient and less accessible to transient variations in regulation strategy. This also corroborates with the finding all three strategies were equally efficient for this component.

An interesting pattern emerged for mood measures: negative emotions and the autonomic-emotional component of anxiety. The differential efficiency of acceptance and respectively reappraisal as contrasted with reflective pondering was impacted by variations in the degree of social anxiety. Subjects with low degrees of social anxiety (i.e. in the 1st quartile) exhibited greater increases in negative mood subsequent to reappraisal, as compared to adaptive rumination. There was a trend in the same direction for the contrast of acceptance and pondering, albeit non-significant. There were no significant differences for anxiety for these subjects, even if the trend followed the same pattern as for negative mood.

Conversely, from mean levels of social anxiety onwards (i.e. 3rd and 4th quartile), reflective pondering produced greater increases in anxiety and negative emotions than both reappraisal and acceptance. The difference was more prominent for anxiety than for negative emotions, as for anxiety the difference had already achieved significance at mean levels of social anxiety while for negative emotions this pattern was more preeminent at high levels.

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. Two interesting conjectures stand out. Firstly this sustains the idea that reflective pondering can indeed be adaptive and useful for regulating emotions in some contexts (such as for individual low on social anxiety). Therefore ruminative processing cannot be considered fully and intrinsically maladaptive.

For high levels of social anxiety, reappraisal and acceptance took over as more efficient strategies for regulating emotions. 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. As they are often faced with these emotions, they might see more tangible benefits in such strategies.

Our study has clear limitations. We only used self-report measures of mood and no physiological measures. Our sample was not a clinical one and even if there was substantial variation in the degree of social anxiety, this did not allow us to test for moderating effects of the true clinical status of the subjects.

PART III. DYSFUNCTIONAL BELIEFS IN EMOTIONAL REGULATION: PATHOLOGY

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

Introduction

Aldao, Nolen-Hoeksema, and Schweizer (2010), in a meta-analysis regarding emotional regulation strategies across psychopathology, revealed the scarcity of studies that use clinical samples when studying emotional regulation. Their meta-analysis focused on the relationship between different emotion regulation strategies and psychopathology. But a lot of empirical studies have analyzed the differential efficiency of various emotion regulation strategies, employing mostly normal, non-clinical samples. However, if the associations of these strategies with psychopathology may differ as a function of the clinical/non-clinical status of the sample taken into account, it is reasonable to assume that their efficiency might vary with this as well.

The above mentioned meta-analysis also indicated that acceptance and reappraisal, two of the most preeminent approaches in treatment models, also displayed the weakest associations with measures of psychopathology. Effect sizes for general psychopathology (collapsed across symptom types), as well as for specific types of psychopathology, were small to medium for reappraisal and acceptance (non-significant for the latter).

In another review, focused on emotion regulation strategies in anxiety disorders, Amstadter (2008) concluded that "despite the inherent relationship between anxiety disorders and emotion deficits, there is a relative lack of studies examining emotion regulation within clinical samples of anxiety disorders"

[5] This study was published (Cristea, Valenza, Scilingo, Szentatgota Tatar, Gentili, & David, 2014) in *Journal of Anxiety Disorders, 28(8).* Author contributions: I. Cristea contributed to the design of the study, data collection, data analyses, interpretation of the results and writing of the manuscript; G. Valenza, P. Scilingo and C. Gentili to the data analyses and interpretation of the results; A. Szentagotai and D. David to the design of the study and interpretation of the results.

(p. 219). Moreover, she emphasized that with the exception of reappraisal and suppression, other specific strategies have not been investigated for anxious patients. In the case of reappraisal, the evidence for its utility in this particular kind of sample was also sparse. While some of the strategies have been tested more on clinical samples of anxious individuals in the period after this review, this has not been the case in the particular situation of social anxiety. In fact, hardly any studies have looked at the efficiency of the regulatory strategies of reappraisal and acceptance (either separately or in comparison) for socially anxious subjects.

Social anxiety has been closely linked to difficulties in emotional regulation (Salovey et al., 2002; Turk et al. 2005; Mennin et al., 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 such study, Goldin et al. (2009a) indicated that behaviorally, social phobic patients reported greater negative emotion than controls during social and physical threat but showed equivalent reduction in negative emotion following the emotion regulation strategy of cognitive reappraisal. But from a neurobiological standpoint, 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. Interestingly enough, greater social anxiety symptom severity was linked with reduced regulation of negative emotion in patients, suggesting the intensity of the disorder might affect regulatory processes.

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 (Gianaros et al. 2004, Lane et al. 2009). For example, Lane et al. (2009) provided evidence that medial prefrontal activity is associated with high frequency heart rate variability (HF-HRV). High frequency heart rate variability is widely considered as representing the flexibility of the vagal (parasympathetic) influence of the heart (Malik, 1996) and thus a key factor of autonomic flexibility, as parasympathetic influences over the heart (in the order of milliseconds) are faster than sympathetic ones (in the order of seconds) and thus more capable of producing rapid adaptive changes in the beat-to-beat timing of the heart. Reviewing neuroimaging and pharmacological evidence, Thayer & 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 HF-HRV. As such, vagal function tone has been hypothesized to play an important role in emotion regulation (Appelhans & Luecken, 2006). In fact, Thayer et al. (in press) in a recent meta-analytic review advance the claim that HRV is an "index of the degree to which the brain's "integrative" system for adaptive regulation provides flexible control over the periphery".

On this line, a few studies showed that phasic increases in HRV in situations that require emotional regulation facilitate emotion regulation. In this sense, Butler et al. (2006), studying healthy individuals in an emotion induction task focused on social interaction, showed that both strategies of cognitive reappraisal and suppression were associated with increases in HF-HRV, while this did not happen in the control group that was not instructed to regulate emotions. The authors suggest a general mechanism of attending to and attempting to modify emotional responses might be behind the reported increases in autonomic flexibility.

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. Unlike healthy subjects, these individuals might have additional difficulties in making use of a particular strategy, difficulties which might also vary as a function of symptom severity. It's worth emphasizing Butler et al. (2006) used healthy participants and did not report contrasts between the two strategies used on autonomic flexibility.

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 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. The authors interpret these results as evidence of reduced flexibility of the vagal function tone during cognitive regulation for subjects scoring high on a personality trait that represents a risk factor for psychiatric disorders (Khan et al. 2005).

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. Reappraisal is recognized as one of the main active ingredients of cognitive-behavioral therapy/CBT (Hofmann & Asmundson, 2008) and it involves the modification of dysfunctional cognitions that sustain psychological distress (Clark, 1999). Acceptance/mindfulness refers to paying attention to one's experiences in the present moment in an open, nonreactive, accepting, and nonjudgmental way (Kabat-Zinn, 1994). It is considered central in more recent therapeutic approaches such as acceptance and commitment therapy (Hayes et al., in press) or mindfulness based therapies (Segal et al., 2002). We aimed to contrast these two strategies against one another, as well as with a control condition that would mimic the typical dysfunctional evaluations socially anxious people may have about a public speaking situation.

Since previous studies on emotion regulation in social anxiety have been tainted by a certain degree of artificiality inherent to neuroimaging studies, we looked for a task that would be ecological and relevant for the disorder. We focused on a public speaking task, which, along with its discrete phases (anticipation, speech, recovery), has been extensively studied and shown to be

highly relevant for socially anxious individuals. To increase the clinical validity of the study, the emotion regulation instructions were constructed to represent beliefs about the public speaking situation which the participants were asked to practice before giving the speech.

We modified the procedure to use a virtual reality (VR) environment in which subjects gave an impromptu speech in front of a virtual audience. Previous studies have shown this particular VR environment reliably induces anxiety (both as self-reported response, and as physiological indices) in individuals that are vulnerable to socially evaluative situations (Cornwell et al., 2006; Cornwell et al., 2011).

Method

Participants

Ninety nine participants (7 men; 92 women; Mean age = 20.19, SD = 2.25) participated in the experiment. They were recruited through online ads and e-mails from the student population at the university of the first author. Out of the 191 respondents to the invitation to take part in those study, we selected those scoring over 30 on the Liebowitz Social Anxiety Scale.

All of them were undergraduate students and of Romanian nationality. Their ethnicity was unanimously White Caucasian. None of the participants had had any previous experience with cognitive-behavioral therapy, nor taken courses regarding it. Participation was voluntary and subjects received course credit in compensation for their involvement. Informed consent was obtained from all the participants.

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. It consists of 24 items, each of them rated separately on two 0 to 3 Likert scales for both the intensity of fear and the frequency of avoidant behaviors. An overall total score is calculated by summing the total fear and total avoidance scores, and this index is the one most commonly employed in clinical trials of social phobia (Heimberg et al., 1999). Excellent

reliability and validity were reported for the LSAS, as well as sensitivity to pharmacological treatments over time (Heimberg et al., 1999). Results of validation studies of the LSAS-SR found little difference in psychometric indexes with the clinician-based version of the instrument, both on scale or subscale scores. 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, Rytwinski et al., 2009). We used the self-report version of the LSAS, which was translated into Romanian. Data indicate excellent reliability (Cronbach's alpha of 0.93).

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. It asks participants how they feel "right now" by rating 7 statements regarding mood in terms of their perceived intensity on a 1 (*not at all*) to 4 (*a lot*) Likert scale. The instrument has good psychometric properties and was shown to be sensitive to fluctuations in state anxiety.

Confidence in the efficiency of the instruction: after having been shown the emotion regulation instruction, subjects were asked to rate how much they believed the instruction would be efficient in decreasing their anxiety on 0 to 100 Visual Analogue Scale (VAS).

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 HRV. The Matlab package was used for data analysis.

ECG was pre-filtered through a Moving Average Filter (MAF) in order to extract and subtract the baseline. The ECG signal was used to extract the HRV (Task force 1996). Since HRV refers to the variation of the time interval between consecutive heartbeats, an R-peak detection algorithm was used, Pan-Tompkins' automatic algorithm (Pan et al., 1985). We corrected for technical artefacts using a proper piecewise cubic spline interpolation method (Lippman 1993). We also manually checked for physiological artefacts (e.g. ectopic beats) and only artefact-free sections have been included in the 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.

Given a reliable signal, the Power Spectral Density (PSD) of the HRV was estimated by means of an Auto-Regressive (AR) model. This approach provides us a better frequency resolution respect to other methods (i.e. nonparametric such as the Fourier transform). Furthermore, conventional frequency transformation based on the Fourier transform technique is not very suitable for analyzing non-stationary signals. We used the Burg method to get the AR model parameters, according to the results presented by Akaike (Akaike, 1969). This method provided high resolution in frequency and yielded a stable AR model. The HF power was calculated by integrating the spectral power across the bandwidth 0.15–0.4 Hz (Task force 1996).

Autonomic flexibility (HF-HRV) was our outcome of interest. However heart rate (HR), the low frequency HRV (LF-HRV), as well as the normalized versions of both HF-HRV (HFn) and LF-HRV (LFn) were also extracted and the analysis reported.

Procedure

Participants were told the purpose of the study was to see how individuals reacted in a task performed in a virtual environment. No details regarding the task or the instruction were offered beforehand. They were randomly assigned to one of the three groups, corresponding to each emotion regulation instruction. 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. Subjects were given a short habituation period with the head-mounted display, after which they were announced a topic and were asked to speak on it for 3 minutes in front of the virtual audience (*speech* phase/T2). Afterwards, subjects were let to rest for 2 minutes, with electrophysiological sensors still attached (*recovery* phase/T3). Subjects were then debriefed. Self-reported anxiety was measured at the beginning of each phase (T1, T2, and T3), while physiological data were recorded continuously (during T1, T2, T3 and T4).

Each of the emotion regulation instructions (see Annex 1 for a translated version) 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.

Data Analysis

We used repeated measures ANOVA with Time as a within-subject factor and Instruction type as a between subjects variable, separately for self-reported anxiety and HF-HRV. In order to control for potential confounding effects of off-task differences in HRV, baseline scores were used as covariates. Correlation analyses were performed to assess the relationships between changes in self-reported anxiety and changes in autonomic flexibility.

We also conducted moderation analysis aimed to see whether the differential efficiency of the emotion regulation strategies tested would vary as a function of the severity of social anxiety. A moderation effect reveals itself statistically as an interaction between the independent variable and the moderator in a model of the outcome variable (Hayes, 2005). We re-coded the independent variable into *dummy 1* (the differential efficiency of the Reappraisal and the

Dysfunctional instruction) and *dummy 2* (the differential efficiency of Acceptance and Dysfunctional). As outcome variables, we successively used the self-reported anxiety and HF-HRV values in the post-baseline phases. Each of the two dummy variables was separated entered as a predictor, with the other dummy variable being entered as a covariate. Baseline scores were also entered as covariates.

Significant moderation effects were tested using the Johnson–Neyman (J–N) technique (Johnson & Fay, 1950) in the way described by Hayes & Matthes (2009) as an application to moderation analysis. This method identified regions in the range of the moderator variable where the effect of the focal predictor is significant and not significant. Analyses were conducted using the MODPROBE macro for SPSS (Hayes & Matthes, 2009) and its extension for constructing graphs of interactions (Hofmann, 2010).

Results

Randomization Check

At baseline there were no significant differences (all *p*s > 0.05) between the groups on measures of social anxiety, self reported anxiety or any of the physiological parameters extracted.

Longitudinal Analysis

Self-reported anxiety. Means and standard deviations in each of the experimental group at each time point for state anxiety are displayed in table 1.

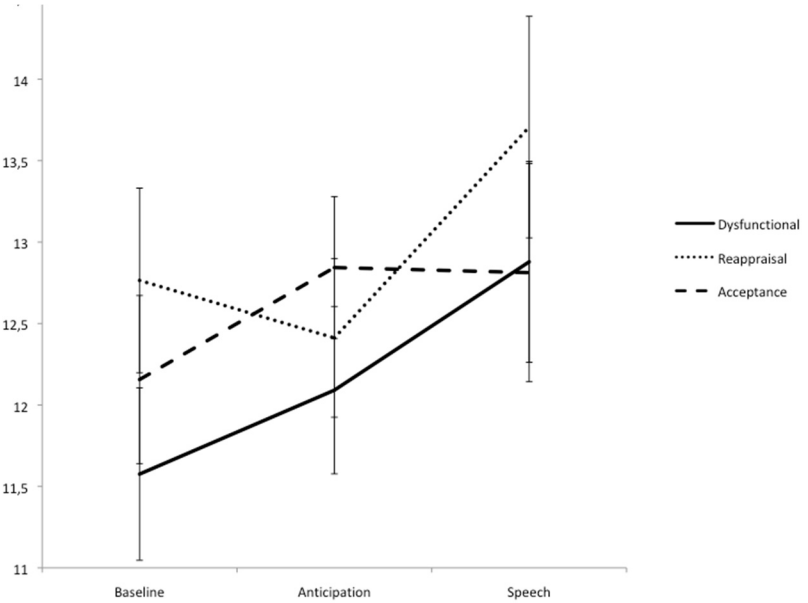
Table 1. Mean values for self-reported anxiety across task conditions.

	Group	**Baseline**	**Anticipation**	**Speech**
State anxiety	Dysfunctional	11.58 (3.04)	12.09 (2.95)	12.88 (3.54)
	Reappraisal	12.76 (3.30)	12.41 (2.84)	13.71 (3.97)
	Acceptance	12.16 (2.92)	12.84 (2.46)	12.81 (3.79)

Note. Values represent means and standard deviations (in parentheses). Measures were taken at the end of each of the phases indicated (baseline, anticipation, speech)

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 $\eta^2 = 0.07$, and a non-significant effect of Group, $F(2, 96) = 0.74$, $p = 0.323$. The Time by Group interaction effect was non-significant, $F(2, 96) = 2.03$ (Wilks' Lambda), $p = 0.137$. Univariate analysis with the Greenhouse-Geisser correction confirmed the significant effect of Time, $F(1.65, 158.82) = 4.51$, $p = 0.018$, partial $\eta^2 = 0.04$. 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 = −0.97, $SE = 0.36$, $p = 0.028$). Results for self-reported anxiety are also displayed in Figure 1.

Figure 1. Self-reported anxiety.



Heart rate variability. Means and standard deviations for the cardiac parameters extracted are displayed in table 2.

Table 2. Mean HRV measures during different task conditions.

	Group	Baseline (T1)	Anticipation (T2)	Speech (T3)	Recovery (T4)
HR	Dysfunctional	82.26 (13.44)	93.24 (13.81)	90.6 (14.4)	99.2 (16.8)
	Reappraisal	87.75 (10.57)	97.7 (9.83)	94.98 (10.26)	103.11 (14.62)
	Acceptance	83.45 (12.97)	96.05 (16.13)	91.14 (14.79)	103.67 (18.47)
HF	Dysfunctional	1264.6 (1427.55)	615.18 (605.75)	791.58 (1007.29)	651.95 (516.13)
	Reappraisal	864.88 (874.35)	449 (408.68)	520.73 (427.85)	411.29 (314.41)
	Acceptance	976.49 (815.85)	584.05 (570.62)	742.9 (803.53)	549.77 (603.36)
HFn	Dysfunctional	42.21 (15.18)	33.24 (14.78)	32.22 (14.59)	29.67 (12.30)
	Reappraisal	37.49 (14.13)	29.24 (10.25)	31.11 (12.38)	30.42 (10.78)
	Acceptance	40.94 (17.67)	33.64 (12.67)	33.2 (15.32)	26.08 (15.03)
LF	Dysfunctional	1504.48 (850.69)	1285.13 (1156.81)	1408.41 (856.64)	1768.58 (1566.96)
	Reappraisal	1335.46 (968.83)	1023.06 (732.37)	1114.85 (699.54)	1079.55 (961.35)
	Acceptance	1270.9 (1034.44)	1168.07 (1274.63)	1388.52 (1216.19)	1669.53 (1724.44)
LFn	Dysfunctional	57.79 (15.18)	66.76 (14.77)	67.77 (14.59)	70.33 (12.30)
	Reappraisal	62.51 (14.13)	70.76 (10.25)	68.88 (12.37)	69.58 (10.78)
	Acceptance	59.06 (17.67)	66.36 (12.67)	66.80 (15.32)	73.91 (15.03)
LF/HF	Dysfunctional	1.78 (1.32)	2.6 (1.54)	2.71 (1.58)	3.12 (2.07)
	Reappraisal	2.06 (1.27)	2.86 (1.46)	2.96 (2.37)	2.74 (1.47)
	Acceptance	2.28 (2.84)	2.84 (3.5)	3.7 (5.6)	5.91 (7.44)

Note. HRV, heart rate variability; HR, Heart rate (beats/minute); HF, high frequency (ms^2); HFn, normalized HF; LF, low frequency (ms^2); LFn, normalized LF.

Values represent means and standard deviations (in parantheses).

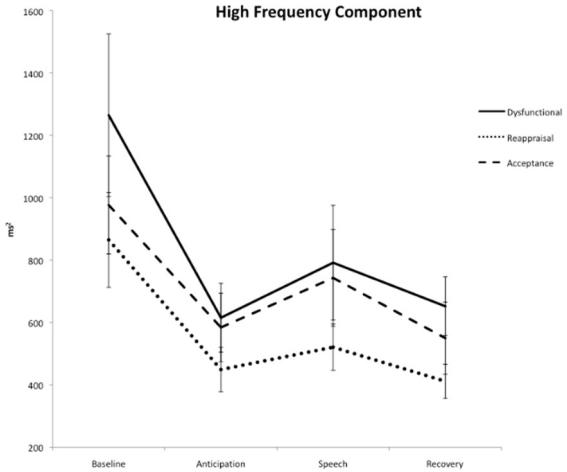
We conducted a 3 (Group: Dysfunctional, Reappraisal, Acceptance) by 3 (Time: anticipation-instruction, speech, recovery) repeated measures ANOVA using HF-HRV as dependent variable. Baseline HF-HRV scores were entered as covariates. Multivariate tests (Wilks' Lambda) indicated a significant effect of Time, $F(2,85) = 5.76$, $p < 0.001$, partial $\eta^2 = 0.12$ and a non-significant effect of the Time by Instruction interaction, $F(4, 170) = 0.70$, $p = 0.59$.

Univariate tests with the Greenhouse-Geisser correction to correct for violations of the assumption of sphericity confirmed the significant effect of Time, $F(1.66, 144.32) = 25.06$, $p < 0.001$, partial $\eta^2 = 0.22$. The main effect of Instruction was non-significant, $F(2, 86) = 1.12$, $p = 0.331$.

Post-hoc tests (Bonferroni corrected) evidenced a significant increase in HF-HRV from T2 to T3 (mean difference = −134.84, SE = 33.71, $p < 0.001$) and a significant decrease from T3 to T4 (mean difference = 146.07, SE = 46.79, $p < 0.001$).

The evolution of HF-HRV from baseline throughout the phases of the task is presented in Figure 2.

Figure 2. The evolution of HF-HRV from baseline throughout the phases of the task.

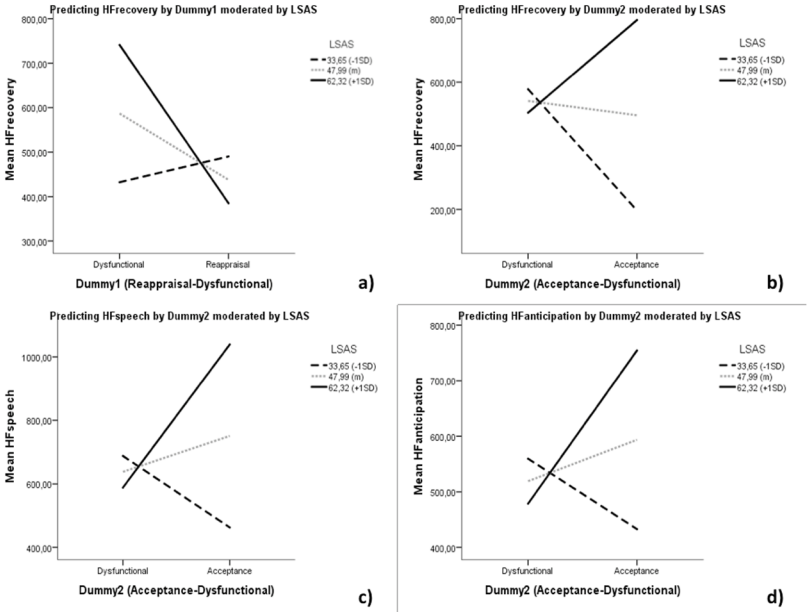


No significant correlation was found between changes in self-reported anxiety and HF-HRV (all *p*s > 0.05).

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 instruction), we found evidence of moderation by the level of social anxiety in the recovery phase, $F_{interac}(5,84) = 6.23$, $p = 0.014$, but not in the speech and anticipation phases (all interaction *F*s non-significant). For dummy 2 (the contrast between the Acceptance and Dysfunctional instruction), we found evidence of moderation in all three phases considered: anticipation-instruction ($F_{interac}(5,84) = 6.81$, $p = 0.01$), speech ($F_{interac}(5,84) = 12.91$, $p < 0.001$) and recovery ($F_{interac}(5,84) = 13.17$, $p < 0.001$).

Figure 3. The results for the moderation analysis.



Significant moderation was further probed using the J-N technique 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.

The results for the moderation analysis are graphically displayed in Figure 3.

Supplementary analysis

Confidence in the efficiency of the instruction.

We also conducted a three way ANOVA using the subject's belief in the efficiency of the instruction as an outcome and Instruction Type as the between subjects variable. Results showed no significant differences between the three groups, $F(2, 97) = 0.54$, $p = 0.58$.

LFs measures analysis

No significant effects were found in the repeated measures Anova on LF-HRV with baseline LF-HRV entered as a covariate (LF-HRV time X group Anova: main effect of time, $F(2, 85) = 1.12$, $p = 0.332$; main effect of group, $F(2, 86) = 2.46$, $p = 0.091$; time X group interaction, $F(4, 170) = 0.574$, $p = 0.682$). The repeated measures ANOVA on normalised frequency values with baseline LFn entered as a covariate revealed a significant main effect of time, $F(2, 85) = 9.65$, $p < 0.001$. The main effect of group, $F(2, 86) = 0.138$, $p = 0.871$, as well as the time X group interaction, $F(4, 170) = 1.62$, $p = 0.171$, were non-significant. Post-hoc tests (Bonferroni corrected) following up on the main effect of time revealed a significant increase in LFn between the speech (T2) and the recovery (T3) phases: mean difference = −3.42, SE = 1.29, $p = 0.029$.

Heart rate (HR) analysis

No significant effects were found in the repeated measures Anova on HR with baseline HR entered as a covariate (HR time X group Anova: main effect of time, $F(2, 85) = 2.25$, $p = 0.112$; main effect of group, $F(2, 86) = 1.12$, $p = 0.331$; time X group interaction, $F(4, 170) = 1.12$, $p = 0.350$).

LF/HF measures analysis

The repeated measures ANOVA on LF/HF values with baseline LF/HF entered as a covariate revealed a significant main effect of time, $F(2, 85) = 10.91$ $p < 0.001$, as well a significant time X group interaction, $F(4, 170) = 3.39$, $p = 0.011$. The main effect of group, $F(2, 86) = 2.21$, $p = 0.116$, was non-significant. Post-hoc tests (Bonferroni corrected) following up on the main effect of time revealed a significant increase in LF/HF between the anticipation instruction and the speech phases (mean difference = −1.15, $SE = 0.35$, $p = 0.004$), as well between the speech and recovery phases (mean difference = −0.80, $SE = 0.29$, $p = 0.022$). Univariate Ancovas on LF/HF in each of the post-baseline phases (anticipation, speech, recovery) with group as an independent variable and baseline LF/HF scores as covariates were used to break apart the interaction effect. Results were significant for the recovery phase, $F(2,86) = 5.26$, $p = 0.007$. Bonferroni post-hoc tests indicated that in this phase, the Reappraisal group presented lower LF/HF than the Acceptance group (mean difference = −2.87, $SE = 0.90$, $p = 0.006$). The results of the Ancovas were non significant for the anticipation-instruction, $F(2,86) = 0.27$, $p = 0.762$, and the speech phases, $F(2,86) = 0.33$, $p = 0.718$.

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. Moreover since the anticipation phase of a social performance has been shown to be particularly stressful (Carrillo et al., 2001; Gonzalez-Bono et al., 2002; Cornwell et al., 2006; Waugh et al., 2010; Cornwell et al., 2011;) and anticipatory anxiety about social situations is considered a key feature of social phobia (Hofmann et al., 2004), we judged the practice of an adaptive

regulation strategy in this particular period as highly relevant. We tested two such strategies (reappraisal and acceptance) against another designed to mimic the dysfunctional negative thoughts socially anxious individuals may have before a social performance situation. We thought this made for an interesting comparison condition, as Schulz et al. (2008) demonstrated that negative self-focused cognitions mediate the relationship between trait social anxiety and anxious responding during the anticipation of a socially threatening situation (public speaking).

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: HF-HRV increased across groups in the speech phase. 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 the social performance task, perhaps due to the engagement in post-event processing, a common phenomenon in social phobic individuals (Clark & Wells, 1995). Interestingly the only study (Hofmann et al., 2009) that employed a similar design using healthy participants did report a recovery (i.e. return to baseline values) of self-reported anxiety and heart rate for all the regulation strategies used. The opposite pattern shown in this study, both for self-report and autonomic measures, is most likely a particularity of our socially anxious sample.

It was our claim 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. Nonetheless we found no differences between the three types of instructions on neither anxiety, nor HF-HRV. We therefore conducted a more refined analysis, aimed to see whether the severity of social anxiety would influence the differential impact of the strategies. As a premise for this idea, Goldin et al. (2009b) showed that increased symptom severity was associated

with reduced regulation of negative emotions in patients. We also showed that the comparative efficiency of emotion regulation strategies subsequently to a social anxiety inducing task was moderated by subjects' trait level of social anxiety (Cristea, Matu, et al., 2013).

For subjects with more severe social anxiety (over a score of 51/52 on the LSAS), the reappraisal instruction used led to *lower* HF-HRV compared to one that mimicked their dysfunctional thinking in social performance situations. It should be noted that this particular value, identified in a purely data driven way, is very close to the cut-off point (around 50 or 60) that literature has established for separating simple social phobia from a more severe, generalized social phobia. While this result might seem puzzling one has to keep in mind it refers to the recovery phase, when in fact we reported a decrease in HF-HRV across groups. 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 also have to consider the particular type of reappraisal we have used in this study. Subjects were given a set of functional beliefs about the situation which did not try to point to a possible positive outcome or to dismiss the possibility of failure. In the study of Hofmann et al. (2009) as well as Goldin et al. (2009a), the reappraisal instructions were focused on the normalization of the anxious reactions and of assuring subjects there was no real threat. In our study we explicitly told subjects there is the distinct possibility of threat and failure, but attempted to change their positioning to this. Using a classical distinction in cognitive-behavioral paradigms (Lazarus & Smith, 1988, Lazarus, 1991), we can reason that, while the Hofmann et al. (2009) was designed to act on "cold cognitions", ours was aimed at "hot cognitions". It has been pointed out that the modification of "hot cognitions" might be a more difficult, profound change (David & Szentagotai, 2006) so it probably requires a more detailed and extensive explanation to be of use.

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 (over the values of 55/56, 52/53 and respectively 60/61 on the LSAS), across *all* phases of the experiment. Yet for participants with smaller social anxiety scores (between 30 and 40/41), the acceptance/mindfulness instruction led to lower HF-HRV in the recovery phase.

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 (Hayes et al., in press). 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, the voluntary withholding of a habitual or impulsive response (Sahdra et al., 2011) and as well as cognitive flexibility and the capacity to inhibit cognitive prepotent responses (Heeren et al., 2008). Additionally, Goldin & Gross (2010) showed that social phobic patients that had undergone a mindfulness based therapeutic program displayed increased brain activity in regions involved in attentional deployment. They speculate this might help attenuate their habitual avoidant, overly self-focused behavior when confronted with threat stimuli, an interpretation that is also consistent with the idea of improved inhibition of prepotent responses.

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. Reappraisal aims to more conceptual, profound changes that if unexplained thoroughly could be associated with a decrease of autonomic flexibility (a freeze reaction), possibly due to their radical disparity to the social phobic's own way of thinking. On the other hand, acceptance/mindfulness strategies by focusing on extending the attentional spectrum to include other things than the threat stimuli might support an increase in HF-HRV as an index of inhibition of habitual responses and thus of greater flexibility.

The study has clear limitations. Most importantly, we did not conduct a structured clinical diagnostic interview to assess whether participants were social phobic. We relied on a validated clinical scale, which might have also selected some false positives. The interpretation of the results is rendered difficult by the scantiness of literature investigating emotion regulation strategies and their autonomic consequences in social anxiety.

PART IV. DYSFUNCTIONAL BELIEFS IN EMOTIONAL REGULATION: BIOLOGICAL APPLICATIONS

Study 7: Neurobiological basis of dysfunctional beliefs

Introduction

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). Irrational or dysfunctional beliefs are cognitively distorted interpretations of a stimulus-situation in a way that is not concordant with reality and that hinders the individuals from achieving their goals (e.g. viewing a situation as the worst thing that could happen). In CBT reappraisal is conceived as a way to turn dysfunctional beliefs into functional thinking. 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. Studies have yet to look at whether the type of negative situation that a patient is expected to reappraise modulates brain response to this process.

A series of neuroimaging studies have investigated the correlated of cognitive reappraisal. In one of the first studies on this topic using fMRI, Ochsner, Bunge, Gross, and Gabrieli (2002) showed that reappraisal of highly negative pictures in unemotional terms reduced subjective negative affect following exposure to these pictures. In terms of brain correlates, 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; Cabeza & Nyberg, 2000), 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 (Miller & Cohen, 2001; 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. Up- and down-regulation also selectively recruited other regions, with the former involving the left rostral medial prefrontal and the posterior cingulate cortex, and the latter the right lateral and orbital prefrontal cortex. 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). Moreover increased activation in the dACC, DLPFC, and VLPFC was not only associated with reductions of negative affect, but it was also related to the degree of decrease. The authors speculate this could indicate the aforementioned circuit to be involved in increasing effectiveness of emotion regulation.

It is also relevant to note that Wager et al. (2008), in a study looking at the effect of positive reappraisal of emotionally negative pictures, found that two independent networks mediated the impact of the prefrontal cortex (PFC) on the modication of affect. The authors propose that reappraisal success could be conceptualized in terms of how the PFC modulates the nature and relative predominance of negative and positive appraisals of a stimulus situation. More specifically, Wager et al. (2008) evidenced two pathways associated to PFC activivity (more exactly, ventrolateral PFC): one involving the amygdala and associated to the generation of a negative emotional response (*negative appraisal*) and another involving the nucleus accumbens/ventral striatum (NAC/VS), typical reward areas in the brain, which was associate to effective reappraisal (*positive reappraisal*). Moreover the authors point out that successful regulation involves both the dampening of the first pathway (PFC-amygdala), as well as the enhancement of the second (PFC-NAC/VS).

A couple of studies also looked at cognitive reappraisal in paradigms that attempted to approach or modify beliefs. In a PET study, Schaefer et al. (2003)

had subjects realize a mental emotional imagery task, while mentally repeating sentences regarding the meaning of scenarios presented. These were the equivalent of beliefs about the situations given and were constructed in two modalities, following the appraisal theory of Richard Lazarus (1991) and the dual-memory model of emotion (Philippot & Schaefer, 2001). In one of them, the *propositional* mode, the sentences given represented explicit questions about specific appraisal components regarding the scenarios presented. In the other, the *schematic,* the sentences given represented holistic, metaphoric interpretations of the scenario ("Everything collapses around me"). Results indicated that the schematic mode was associated with increased activity in the ventromedial prefrontal cortex, while the propositional mode was associated with activation in the anterolateral prefrontal cortex. In another study, Goldin, Manber-Ball, Werner, Heimberg, & Gross (2009b) had normal individuals and social anxiety patients reappraise negative beliefs about the self. They showed both groups had similar amounts of reduction of negative emotion, and a significant initial reduction in amygdala response. However, the healthy subjects had earlier brain responses in cognitive control areas (dorsolateral prefrontal cortex, dorsal anterior cingulate), as well as visual and language areas.

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, Bunge, Gross, & Gabrielli, 2002; Ochsner et al., 2004; Phan et al., 2005; Urry et al., 2006) 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. First of all 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. These approaches may be possible for stimuli such that are not personally relevant (pictures, movie clips), in situations where there is no real stake for the individual. However 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. They also cannot just pretend the emotional event is not really there or it is in fact not as it seems (in reality a body at the scene of an accident truly *is* a body at the scene of an accident, and not in a movie setting). And even if sometimes it might be possible to find positive elements in situations that are aversive or traumatic, it will a lot of times strike as artificial or fake.

These observations hold even truer when dealing with individuals vulnerable to psychopathology, for whom it would prove even more difficult to shift to employ these artificial, laboratory based types of reappraisal. Consequently by using this kind of understanding of understanding of reappraisal in the construction of their experimental tasks, almost all the studies reviewed: (i) cover a small part of what reappraisal represents and how it actually acts in real-life situations; (ii) have reduced practical implications (e.g. optimization, therapy). Therefore, we believe basic research should start addressing more ecological, clinically grounded strategies of reappraisal. Another problem with many of these studies is methodological. An important 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.

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. Instead, we just exposed them to different evaluations of emotional inducing situations and measured their self-reported emotion and brain related changes. The evaluations were constructed to represent irrational and rational beliefs about each situation.

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.

Subjects were instructed to press a button when they had gathered a clear mental image of the scenario and when they judge to have practiced the instructions enough to move forward. However each scenario was presented for a maximum of 30 seconds while each instruction was presented for a maximum of 45 seconds (see Figure 1).

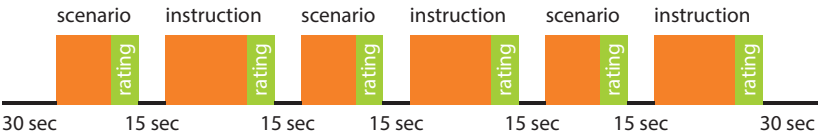


Figure 1. Cartoon of the experimental design

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. Six regressors of "no-interest" were used to take in account head movements during the scan.

After Talairach Transformation we used paired-test to evaluate the contrast between Ambiguous Scenarios VS Rational Instructions, Ambiguous Scenarios VS Irrational Instructions, Negative Scenarios VS Rational Instructions, Ambiguous Scenarios VS Irrational Instructions, Rational Instructions VS Irrational Instructions after an Ambiguous Scenario, Rational Instructions VS Irrational Instructions after Negative Scenario, Rational Instructions after Ambiguous Scenarios VS Rational Instructions after Negative Scenarios and Irrational Instructions after Ambiguous Scenarios VS Irrational Instructions after Negative Scenarios. We consider significant a p-value < 0.01 cluster-size corrected for multiple comparisons at a p-value level < 0.05. The cluster size corresponding to a $p < 0.05$ was estimated on each contrast by the program 3dClustSym in the AFNI package.

Results

Ambiguous Scenarios VS Rational Instructions

Scenarios higher activate Occipital Cortex (BA 18), Precuneus (BA 47), Posterior Cingulate (PCC) bilateral Superior Temporal Sulcus (STS), bilateral amigdalas, anterior cingulate (ACC) (BA 24/BA 25), bilateral Dorsolateral Prefrontal Cortex (DLPFC), bilateral Orbitofrontal cortex (OFC) (BA 47) (Figure 2)

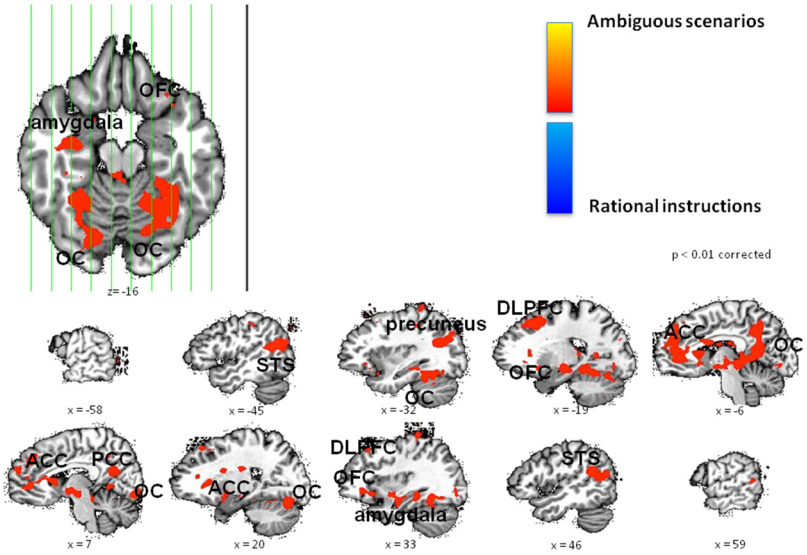


Figure 2. Brain regions active for ambiguous scenarios (red) as compared to rational instructions $p < 0.01$ (corrected)

Ambiguous Scenarios VS Irrational Instructions

Scenarios higher activate Occipital Cortex (BA 18), Precuneus (BA 47), bilateral STS, right amigdalas, ACC (BA 25) (Figure 3)

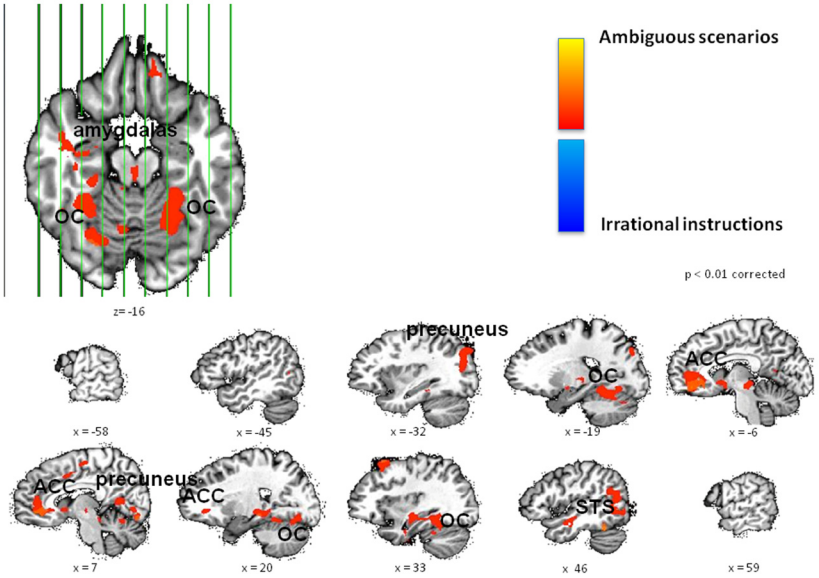


Figure 3. Brain regions active for ambiguous scenarios (red) as compared to irrational instructions $p < 0.01$ (corrected)

Negative Scenarios VS Rational Instructions

Scenarios higher activate PCC, bilateral amigdalas, ACC (BA 25) and left STS (BA 21) (Figure 4)

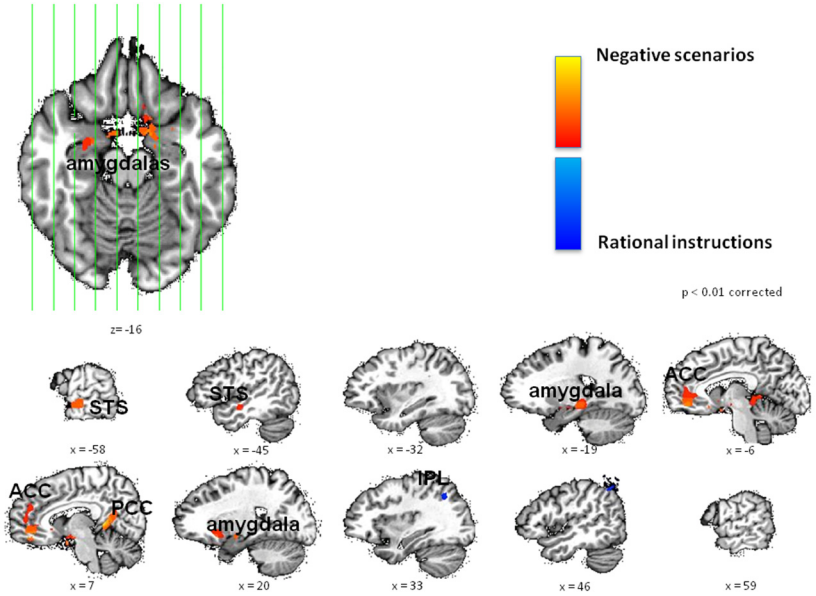


Figure 4. Brain regions active for negative scenarios (red) as compared to rational instructions $p < 0.01$ (corrected)

Negative Scenarios VS Irrational Instructions

Scenarios higher activate PCC, ACC (BA 25), bilateral STS (BA 39) and left putamen, while irrational instructions higher activate left Middle Frontal Gyrus (MFG) (BA 10) (Figure 5)

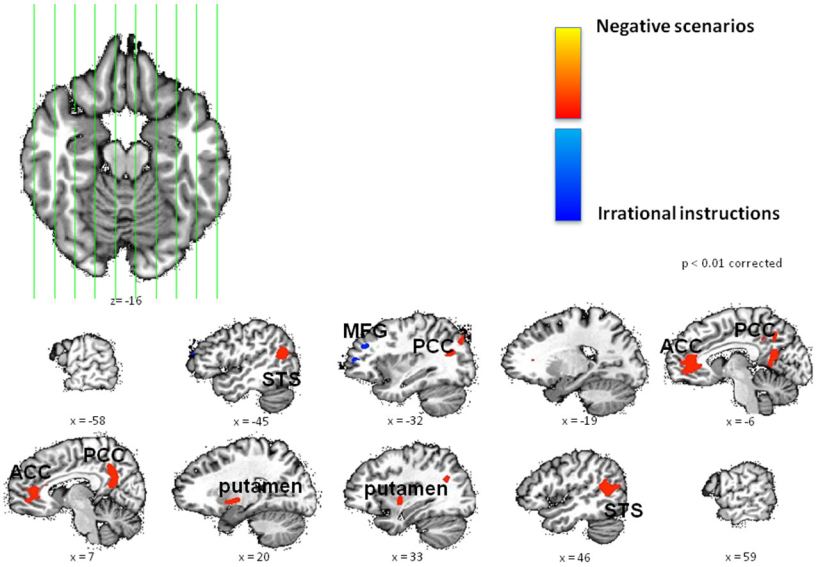


Figure 5. Brain regions active for negative scenarios (red) as compared to irrational instructions (blue) $p < 0.01$ (corrected)

Rational versus Irrational Instructions

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) (Figure 6).

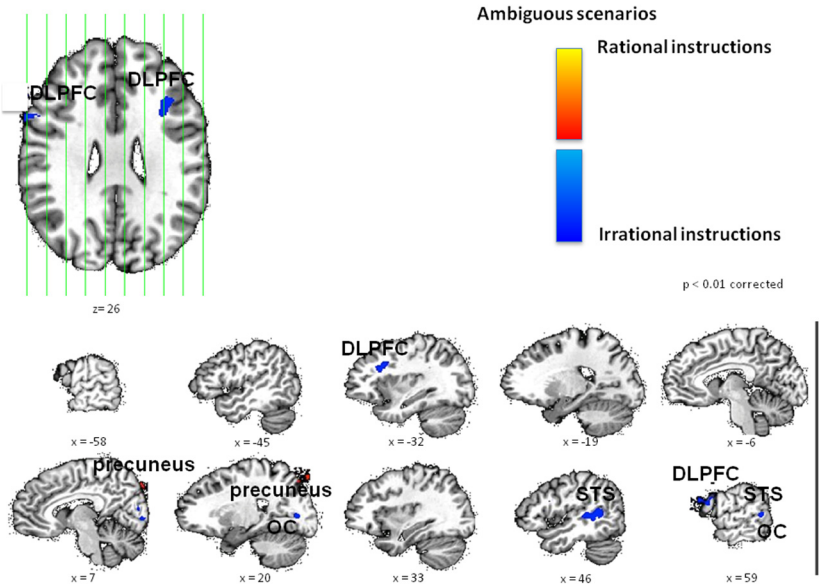


Figure 6. Brain regions active for rational instructions (red) as compared to irrational instructions (blue) after ambiguous scenarios $p < 0.01$ (corrected)

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) (Figure 7).

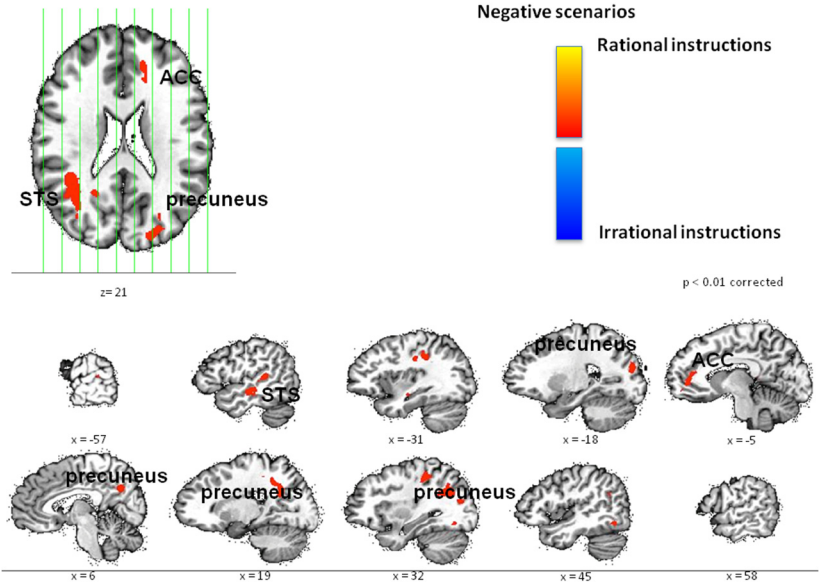


Figure 7. Brain regions active for rational instructions (red) as compared to irrational instructions after negative scenarios $p < 0.01$ (corrected)

Ambiguously Negative Scenarios versus Clearly Negative Scenarios

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) (Figure 8).

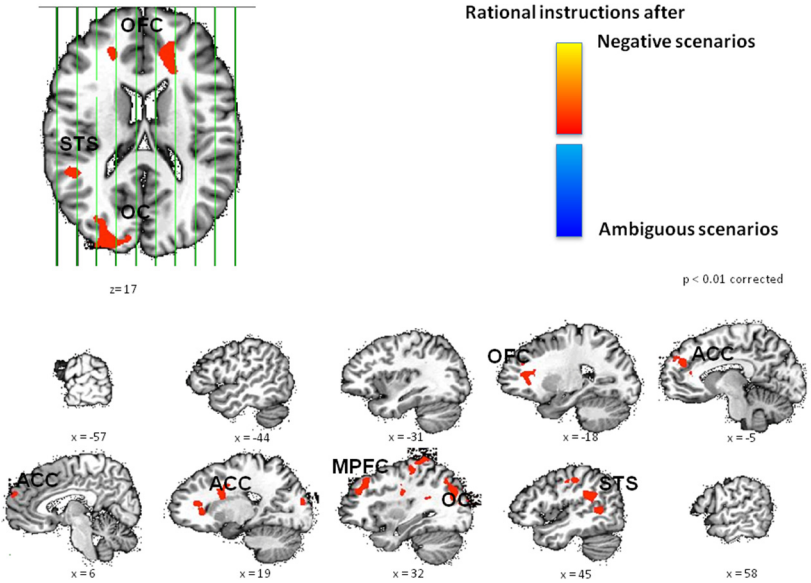


Figure 8. Brain regions active for rational instructions after ambiguous scenarios (red) as compared to rational instructions after negative scenarios $p < 0.01$ (corrected)

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) (Figure 9)

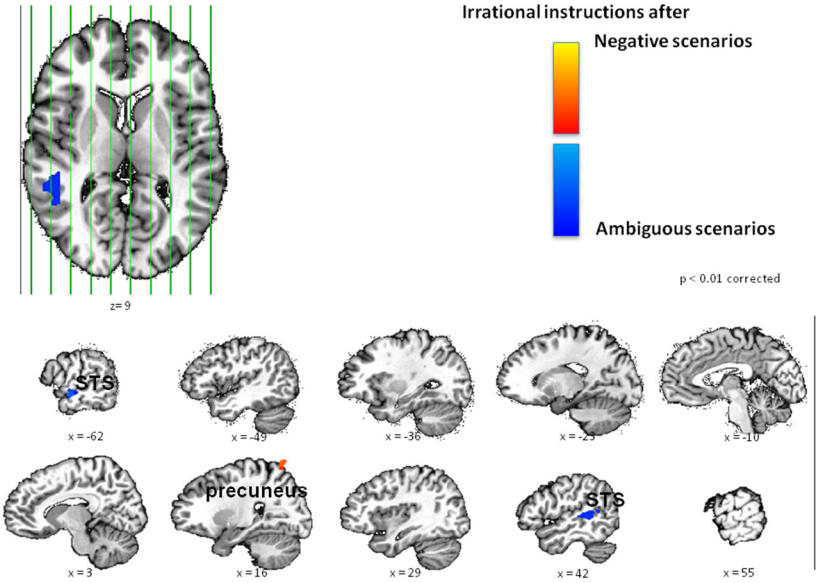


Figure 9. Brain regions active for irrational instructions after ambiguous scenarios as compared to irrational instructions after negative scenarios (blue) $p < 0.01$ (corrected)

Discussion

The results of the study are still preliminary and will have to be related with other measured behavioral and psychological data regarding the participants. However, at the level of brain changes, some interesting results stem out. 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. The aim of the study was to look at the brain correlates of these two processes, which have been shown to be causally involved in most psychopathological models. For this purpose, subjects were not told how they were supposed to influence their emotion experience (decrease or increase), thus restricting the contamination with demand characteristics. 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 ambigously 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 unequivocally 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.

Interestingly enough, activation in the precuneus was recently associated with another form of reappraisal – distancing from aversive stimuli (Koenigsberg, 2010). We found that the rational instruction was consistently associated with increased precuneus activation, regardless of scenario type, which might

point to a more aspecific role of this area in facilitating certain types of reappraisal, possibly ones entailing an acceptance component. These findings expand current emotion regulation knowledge by indicating that the nature of an emotion provoking situation does have a significant modulating effect on how the brain enacts cognitive reappraisal, as they show that rational and irrational thinking differentially affect neural activity in emotional and cognitive brain areas.

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 orbitofrontal 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 in reducing negative affect following this kind of situations, an indication of the increased usefulness of this instruction in situations that don't permit the alternative. The differences were minor regarding irrational thinking between the clearly negative and the ambiguously negative scenarios, pointing to a similar functioning of this process. It is worth noting in the case of the latter compared to the former there was a higher activation in a theory of mind area, pointing again to an increased cognitive effort of thinking irrationally in this kind of situation.

CHAPTER IV
Conclusions and Implications

The present work tries to take a closer look at emotional regulation and specifically at the role played by dysfunctional beliefs. Even though dysfunctional beliefs in the form of evaluations ("hot" cognitions) are acknowledged as the cornerstone of psychopathology and therapy in cognitive behavioral approaches, the situation has recently been challenged by a number of factors. The causal status of the cognitive mechanisms of change as related to CBT efficiency is being contested for a range of disorders (Jacobson et al., 1996; Longmore & Worrell, 2007). It is disputed which is the most feasible approach of these beliefs, as it is argued acceptance strategies could provide a more viable alternative to emotional regulation (Eifert & Heffner, 2003). 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.

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 which represent 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.

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: dysfunctional beliefs (both "cold" and "hot" cognitions), that are believed to be directly altered by reappraisal, and experiential avoidance, which is believed to be directly affected by acceptance. In Study 1 we found that, while there was an amount of shared variance, these constructs were distinguishable from each other. Experiential avoidance appeared to be a more proximal predictor of distress than dysfunctional beliefs and to mediate the relationship between dysfunctional beliefs and distress. 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. This is because our research had a clinical and therapeutic orientation and we wanted to see where these strategies stand from the point of view of clinical protocols using them. Moreover, given that the central construct of our research – dysfunctional beliefs – originated in therapeutic models of psychopathology, we believed this was an important point to start our investigations.

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 (i.e., thinking that a situation is very bad, but not catastrophic; that it is hard to stand, but not unbearable; that we wish some things had not happened, but things don't always have to go the way we want them to go).

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. Subjects low on social anxiety made equal use of all strategies, while for those high on social anxiety reappraisal and acceptance were more efficient than pondering.

In a further 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. Interestingly enough, when it came to positive self-statements, thinking positively, but rationally and thinking positively, but irrationally, were both effective in boosting momentary self-esteem and dampening negative emotions.

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. This study also points out some of the limits of the emotion regulation research paradigms when applied to individuals affected by psychopathology.

Finally, still in regard to our first objective, we found differential neurobiological basis for dysfunctional and functional beliefs in the brain. In a fMRI study looking at the way the process of negative functional reappraisal (moving from a irrational way of evaluating a distressing stimuli to a rational one) 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. Interestingly enough, the neurobiological results seem to point out to the fact that negative functional reappraisal is more efficient for stimuli that are unequivocally negative than for others that are more ambiguously negative.

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. We believed this to be of great relevance since reviews and meta-analyses (Amstadter, 2008; Aldao et al., 2010) concur in signaling 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 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. Even if a reduced number of studies have looked at how trait variables related to psychopathology (e.g. neuroticism) might impact the functioning of a specific strategy (Di Simplicio et al., 2011), no previous study has analyzed whether these traits can moderate the differential efficiency of two regulation strategies both considered adaptive. Two of our studies used clinical samples (Study 1 and Study 6), while another study used healthy individuals but looked at the moderating effects of a variable related to psychopathology (trait level of social anxiety).

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 focused both on subjective, self-report outcomes, as well as on physiological parameters (high frequency heart rate variability), while Study 7 specifically looked at the neurobiological correlates of our construct of interest.

3. General conclusions

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. This form of reappraisal is closely inspired from therapy protocols and can offer a real test of how a strategy used in clinical environments might work in distressing situations.

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.

Our research is one of the first 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 some research has started to show that even adaptive emotion regulation strategies might impact certain parameters differently depending on where the individual is on the normality-pathology continuum (Goldin et al., 2009; Di Simplicio et al., 2011), we took this one step further and demonstrated that the differential efficiency of two diverse strategies, both considered adaptive, varies as a function of the individual's trait characteristics.

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. As previous reviews have pointed out, most studies have tested techniques of emotion regulation on healthy volunteers. The customary paradigms in which subjects received a summary training in the use of regulating instruction and were then prompted to briefly apply it on some distressful stimulus situations might prove unsatisfactory for individuals truly affected by psychopathology. In these cases, we might need to consider a more extensive training in the use of a particular regulatory technique.

4. Limitations and future directions

Specific limitations were listed for each of the studies. One general limitation of our studies is that the emotion regulation instructions used were also not generated by the participants, did not ask them to imagine things of personal relevance or that would be happening to them. 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 different reappraisal alternatives compare to each other.

Future studies could address these limitations. Negative functional reappraisal and acceptance could be compared for less intense, more common emotion eliciting events that are nonetheless of personal relevance to the participants of the study. This could be addressed by asking subjects to imagine a recent, distressful event they were confronted with and employ one of these forms of reappraisal in dealing with this event.

Another general limitation has to do with the investigation of dysfunctional beliefs as mechanisms of change sustaining the functioning of emotion regulation strategies. While in some of our studies we also measure the impact on these variables and we also conducted some preliminary mediation analysis to see if the change in these beliefs is behind the change in emotions, we believe this issue could be addressed more thoroughly in future studies. The mediation analysis was also limited since all the variables were measured cross-sectionally, at the same time-points.

An additional limitation has to do with potential gender effects. While in some studies we looked for 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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APPENDIX 1:
Emotion Regulation instructions (Study 3)

Control instruction

(Source: http://en.wikipedia.org/wiki/Jacqueline_Saburido)

Jacqueline's story

Jacqueline Saburido was born December 20, 1978. The only child of Rosalia and Amadeo Saburido, she lived in Caracas, Venezuela for all of her childhood. Living with her father after her parents divorced, she began studying engineering in the hope of taking over the family air conditioning business. In 1999, Saburido was struggling in college and decided to take a break. She took a trip to Texas to study the English language.

On September 19, 1999, Saburido attended a birthday party near Austin, Texas. She and her friends decided to head home after a few hours. The car they were in was hit by another vehicle, driven by a drunk driver. The impact didn't inflict serious injuries on Jacqueline, but her feet were stuck between the car seat and the dashboard. The car caught fire, and during the 45 seconds needed for the extrication team to get her out of the burning vehicle, she was trapped in the blaze. After being removed from the damaged car, she was airlifted to the burns unit in Galveston.

Saburido suffered second and third degree burns to over 60 percent of her body. All of her fingers had to be amputated, she lost her hair, ears, nose, lips, left eyelid and much of her vision. She has undergone more than 50 operations since the crash, including cornea transplants, which have restored her left eye, and she has many more to go in order to help her regain an acceptable level of independence.

Saburido is currently living in her hometown of Caracas, Venezuela.

Positive reappraisal instruction

Bellow is an interview given by Jacqueline Saburido to a US magazine, after being involved in a car accident caused by a drunk driver.

Marc (reporter): How are you doing, Jacqui?

Jacqueline Saburido: I'm ok, thank you for asking.

Marc (reporter): I feel so strange/weird, I don't even know what I could ask you…

Jacqueline Saburido (smiling): Ask me all you want to know… come on, nothing will happen.

Marc: Honestly… I would like you to tell me all about you, what your life is like after the accident, how did you manage to adapt to the situation… tell me everything!

Jacqueline Saburido: What can I say… obviously as you can imagine, I had a very hard time getting used to the idea that I will not be the same person as before. But since I can't change the situation, what's the point in crying? Especially when I have so many things I can enjoy…

Marc: So what you're telling me is that, despite the fact the accident that changed your life took away two of your closest friends, destroyed your parents… you still have the strength to hope and enjoy life?

Jacqueline Saburido (laughs): Of course, I'm alive, am I not? And I have the support of so many people to whom I'm grateful, my parents and my friends support me also… what more could I ask for? My heart leaps at any small thing that previous to my accident I found to be so insignificant… What more can I say… it's amazing how you can get to be happy even after an accident like mine… I would have never expected this, but no matter how strange it sounds, it's true!

Marc: I'm astounded… I see you laugh with all your heart, you are radiant and happy and I can't stop wondering how this is possible… it seems so unlikely, given your situation.

Jacqueline Saburido (smiling): It seems unlikely if you look at my appearance. But you know, behind a distorted image lies a happy soul. I was a nice person before, but I did not appreciate the true beauty in life until recently… so I think it was worth "the exchange" Maybe this is hard for you to understand, but this is exactly the way I feel…

Marc (surprised): I can see that, you are so natural and serene… and I can't stop wondering…

Jacqueline Saburido (joking, she strokes his shoulder): Hey Marc… come on, pull yourself together!

Marc (laughs): OK, I'm ready… because my boss will fire me otherwise… wait a minute… I had another question for you… (embarrassed, he searches on the page the last question)

Jacqueline Saburido (laughs): I'm waiting… still waiting… but what are you searching for on those pages you have in your hand?

Marc (blushes): Umm, well… what I wanted to ask you… I had it written down here somewhere…

Jacqueline Saburido (jokingly): All right, if you say so…

Marc (victorious): I remembered… see??? Good thing my memory didn't left me or I would still be searching the question on this piece of paper… (They both laugh heartily…)…

After a break…

Marc: For me and many others, you already are a source of inspiration, without having to say anything more… but nevertheless… we all could use some of your advices.

Jacqueline Saburido: Marc, I'm not in a position of giving advice, but I can tell you how I see things now and what I have learned from this experience.

Marc: Please do…

Jacqueline Saburido: The most important thing I've learned, a thing I'm very confident about sharing with you, is that it would be preferable for you to succeed in everything you do, it would be ideal for you to have a fair and easy life, and be surrounded by other people who behave nice and fair to you, that appreciate you… but most times, even if you want a lot of these things to happen, they should not always happen as you want, or because you want them to happen. And if things do not happen the way you want them to happen, you have two options: to spend the rest of your life in regret, crying, or to go on, enjoying life, even if it is harder to start with. You can choose between judging people by the mistakes they make or accepting them as they are, without judging them. And last but not least, you can choose between condemning yourself for your faults and failures or

enjoying life as it is, with good and bad thing. Try to remember that little nothings make the music in our lives… and thank God, we are surrounded by a lot of small things we can find happiness in. It's enough for us to look carefully and we will see them…

Negative functional reappraisal instruction

Bellow is an interview given by Jacqueline Saburido to a US magazine, after being involved in a car accident caused by a drunk driver.

Marc (reporter): How are you doing, Jacqui?

Jacqueline Saburido: I'm ok, thank you for asking.

Marc (reporter): I feel so strange, I don't even know what I could ask you…

Jacqueline Saburido (smiling): Ask me all you want to know… come on, nothing will happen.

Marc: Honestly… I would like you to tell me all about you, what your life is like after the accident, how did you manage to adjust to the situation… tell me everything!

Jacqueline Saburido: What can I say… *obviously as you can imagine,* I had a very hard time getting used to the idea that I will not be the same person as before. I still struggle, but I know that I can't change the situation. I can't turn back time, however I wish I didn't have to go through this trouble.

Marc: Trouble? It's like you are talking about something much less serious than what actually happened to you… I'd rather call it tragedy!

Jacqueline Saburido (smiling): No… It's just a "bigger" trouble… Honestly, although you may find it odd, I'm sure that this was not the worst thing that could have happened to me…

Marc: But what can be worse than this? Because of a drunk driver, your life was destroyed. You lost two friends in the car accident, your parents were devastated, you can't do pretty much anything anymore, you underwent a lot of medical surgeries… your entire universe has completely changed, all in a bad way… and what you are saying is that there can be something worse than all this?

Jacqueline Saburido: Yes… for me to be dead, for instance.

Marc: Don't get me wrong, I'm glad you are alive and that I have the honor of talking to you, but…

Jacqueline Saburido: But… death would have been the best thing for me, isn't it?

Marc (embarrassed): Not really…

Jacqueline Saburido: It's all right, Marc. A lot of people may be thinking: "Oh my God, instead of looking like this, I rather die", but I don't believe that. Life is the greatest gift you can receive and you became aware of its value only when you are about to lose it.

Marc: I'm speechless… (after a break)… For me and many others you already are a source of inspiration, without having to say anything more… but nevertheless… we all could use some of your advices.

Jacqueline Saburido: Marc, I'm not in a position of giving advice, but I can tell you how I see things now and what I have learned out of this experience.

Marc: Please do…

Jacqueline Saburido: The most important thing I've learned, something I'm very confident sharing with you, is that it would be preferable for you to succeed in everything you do, it would be ideal for you to have a fair and easy life, and be surrounded by other people who behave nicely and fairly to you, who appreciate you… but most times, despite you wanting these things to happen, they should not happen as you want, or because you want them to happen. And if things do not happen the way you want them to happen, you have two options: to spend the rest of your life in regret, crying, or to go on, enjoying life, even if it is harder to start with. You can choose between judging people after the mistakes they make or accepting them as they are, without judging them. And last but not least, you can choose between condemning yourself for your faults and failures, or accepting yourself and move forward, taking life as it is, with good and bad parts.

APPENDIX 2:
Emotion Regulation instructions (Study 5)

Instructions for reappraisal group:

"You might think that the situation is not as bad as it looks, that it's tolerable and you can bear it up. You might think that you are a valuable person no matter what is happening in that situation. You can reinterpret other reactions in positive manner or a less negative one: they appreciate you even sometimes they make might hurt you, maybe is just an impression that they don't' like you or that your relationship with them does not depend solely on one single interaction."

Instructions for the acceptance group:

"Imagine each situation as being as real as possible, but no matter what thoughts or emotions you experience, don't judge them as being positive or negative. Look at your thoughts and emotions as being temporary, here and now, they come and go. Focus your attention on the sensations you are experiencing, but don't judge them as being good or bad. If images or thoughts about how others look at you or think about you come into your mind, accept them and don't assign them any positive or negative values. Although at some moment you might judge your-self or your behaviors, go back to accepting any experience you might live without judging it."

Instructions for the self-focus rumination group:

"Imagine each situation as real as you can and focus on what you feel in those moments, what you think, how do others look at you and think about you. Become aware of the sensations you are experiencing and what you think about them. How do others react to your behavior and how does this affect your relationship with them? How do they think about your performance? What do your emotions and your reaction tell about you?"

APPENDIX 3:
Emotion Regulation instructions (Study 6)

Dysfunctional

I must absolutely do as good as possible and hold a speech that is ok; anything else would be unacceptable for me. I might not have any idea what to talk about and say stupid things. This would be a terrible and catastrophic thing. I couldn't tolerate it if this happens. It would just show once more how I as a person am incapable and ridiculous.

Reappraisal

I would really like to do as good as possible and hold a speech that is ok, but I know that I does not have to be like this just because it is my preference. I might not have an idea what to talk about and say stupid things. This would be bad, but I would not be so terrible and catastrophic. I wouldn't like it, but I could handle it. It would not mean that I as a person am incapable or ridiculous.

Acceptance/Mindfulness

Even if I am scared of this situation, I do not try to avoid or control my fear. I accept to feel it and remain with it here and now while letting it follow its natural course. I have thoughts about how I will not do good and not be able to handle the situation, but I accept to just experience them and stay with them here and now, not attempting to change them.

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