

Emotion Regulation in Depression: An Integrative Review

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ABSTRACT

Objective: In recent years, there has been a rising interest in cognitive behavioral research to explore the role of emotion regulation in the development and maintenance of mental disorders and resiliency against or recovery from them. Particularly, different strategies people use to regulate their emotions may have more important role in emotional disorders including depression. The aim of this article is to review the recent literature focusing on the role of ER in depression.

Methods: In this paper, we present a brief review of the latest studies (in English and Persian) regarding depression and 6 relevant emotion-regulation strategies (i.e. suppression, rumination, experiential avoidance, reappraisal, mindfulness, and acceptance). Then, we attempt to integrate findings of these cognitive-behavioral and neurobiological investigations utilizing the Gross's process model of emotion regulation.

Results: According to the research results, we can generally conclude that emotion regulation may be an important mediator/moderator mechanism in the pathogenesis of depression that could also be a good target for intervention in psychotherapy.

Conclusion: Some challenging issues in this area are noted and their implications for cognitive-behavioral research and therapies are discussed.

Introduction

Unipolar depressive disorders are among the most common psychological disorders around the world. Their life time prevalence rates are around 16.6% for major depressive disorder (MDD) and 2.5% for dysthymia (Kessler et al., 2005). Given the wide-spread occurrence and high socioeconomic burden of unipolar depression (Simon, 2003), it is important to investigate factors that may affect the development and maintenance of these disorders as well as facilitate recovery from depressive episodes. In this regard, some problems in emotional states such as altered emotional reactivity and associated emotion dysregulation, has been considered in re-

cent theory and research to have important role in depressive and related psychological disorders (Bylsma, Morris, & Rothenberg, 2008; Liverant, Brown, Barlow, & Roemer, 2008).

What is emotion regulation?

Emotions such as anger and sadness, are multifaceted phenomena that involve changes in all domains of subjective experience, behavior, as well as central and peripheral physiological systems (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Emotion which is classified in the superordinate category of affective states (Gross & Thompson, 2007) {Gross, 2007 #23; Berking, 2012 #22}, has typically rapid onset and short duration (Ekman, 1992), and usually focuses

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on a specific internal or external object (Frijda, 1993). Emotions arise when something important to us is at stake (Gross, 2002). They serve important goal-directed functions, both intrapersonally and interpersonally (Keltner & Gross, 1999). However, emotional responses can also mislead and hurt us, particularly when contemporary physical and social environments differ dramatically from those that shaped our emotions over the millennia. In other words, emotions may be problematic when they are manifested in a wrong type, occur in an inappropriate context, are too intense, or last too long. At such times that emotions seem to be ill-matched to a given situation, people frequently try to influence or regulate their emotional responses to meet their goals better (Gross, 2002; Werner & Gross, 2010).

So, emotion regulation (ER) can be defined as the “processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions” (Gross, 1998). These processes may be automatic (unconscious) or controlled (conscious) that serve to up-regulate or down regulate positive or negative emotions. Moreover, Gross unpacked these processes into 5 time points in the process of emotion generation at which individuals can regulate their emotions: 1) situation selection (e.g. avoidance, social withdrawal), 2) situation modification (e.g. keeping distance, using safety signals), 3) attentional deployment (e.g. distraction, rumination), 4) cognitive change (e.g. rationalization, reappraisal), and 5) response modulation (e.g. expressive suppression, experiential avoidance). These strategies may be applied before or after experiencing emotion. Accordingly, the first four groups of strategies are called antecedent-focused, while the latter is considered response-focused strategies (Gross, 2002; Gross & Thompson, 2007).

Since the introduction of this “process model” in 1998 by Gross, it has attracted many researchers. Later, Gross in collaboration with Thompson (Gross and Thompson, 2007) expanded the conceptualization of ER as it incorporated the ideas of both of them. They suggested that ER refers to the “automatic or controlled, conscious or unconscious process of individuals influencing emotions in self, others, or both”. In other words, this definition integrates Thompson’s (1994) emphasis on the role of extrinsic effects on ER with Gross’s (1998) process model that centered on ER in self. In general, researchers in the adult literature typically focus on intrinsic processes of ER (that is, one regulates his or her emotions). However, researchers in the developmental literature focus more on extrinsic processes (that is, one attempt to regulate others’ emotions), perhaps because extrinsic processes are so salient in infancy and early childhood (Gross & Thompson, 2007). In recent years, both intrinsic and extrinsic ER have been vigorously studied in regard to somatic and mental health, well-being, as well as child and adult psychopa-

thology. These studies altogether, found moderate to strong associations of successful ER with better health outcomes, desirable relationships and improved academic and work functioning (Brackett & Salovey, 2004; John & Gross, 2004; Abdi, Babapoor & Fathi, 2010). Conversely, difficulties with ER are associated with a number of mental disorders (Kring & Sloan, 2009; Mennin & Farach, 2007). Such findings have led some authors to incorporate ER into psychopathological models of specific disorders, including depression (Kovacs et al., 2006; Rottenberg, Gross, & Gotlib, 2005).

2. Methods

Emotion regulation in depression

ER may be a central construct in understanding the causes and pathogenesis of psychopathology. Problems with emotion and ER characterize more than 75% of diagnostic categories (Werner & Gross, 2010) presented in the fourth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychological Association, 2000). The majority of empirical studies regarding ER in clinical context are centered on anxiety disorders, mood disorders, eating disorders, and substance-related disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010). In some cases such as the mood and anxiety disorders, emotion dysregulation is so salient that these disorders are defined mainly on the basis of disturbed emotions (Mineka & Sutton, 1992).

In depressive disorders particularly MDD, problems in ER may be a core deficit. Indeed, the main features required to diagnose MDD are persistent negative affect and sustained reduction in positive affect (Kober & Ochsner, 2011). Many theorists argue that people who cannot effectively manage or regulate their emotional responses to daily events, experience longer and more severe periods of distress that may eventually render clinical depression or anxiety (Mennin & Farach, 2007; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). In addition, prominent neurobiological models of depression are quite consistent with the basic models of ER, suggesting specific disturbances in the reciprocal cortical-limbic circuitry that is considered to underlie ER (Kober & Ochsner, 2011).

Consequently, various therapeutic approaches such as dialectical behavioral therapy (DBT; Linehan, 2001), emotion focused therapy (EFT; Greenberg, 2002), acceptance and commitment therapy (ACT; Hayes et al., 2006), mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002) and emotion-regulation therapy (ERT; Mennin & Fresco, 2009) incorporate some forms of emotion regulation training into their modalities. In the following sections, we present a collection of empirical literature regard-

ing the role of various ER strategies in depression and the efficacy of therapeutic/experimental interventions on depressive symptoms. This issue is completed with a brief review of neurobiological findings related to ER in depression.

Empirical examinations of emotion regulation strategies in depression

In the literature, many different ER strategies were distinguished such as suppression, reappraisal, avoidance, self-blame, other-blame, rumination, catastrophizing, positive refocusing, planning, problem solving, mindfulness, acceptance, engaging in goal-directed behaviors, and compassionately support oneself in distressing situations (Gross & John, 2003; Garnefski & Kraaij, 2006; Gratz & Roemer, 2004; Berking et al., 2008). According to a number of recent studies, there are strong positive or negative relationships between using these strategies and emotional problems (Mashhadi, Mir-Doroghi & Hasani, 2011; Berking & Wupperman, 2012; Garnefski, Kraaij, & Spinhoven, 2001; Garnefski & Kraaij, 2006). In general, the results suggest that individuals who use cognitive strategies such as catastrophizing, rumination, and self-blame may be at more risk of developing emotional problems.

However, people who use other strategies such as positive reappraisal or problem solving may be less vulnerable (Garnefski & Kraaij, 2006; Peyvastegar & Heidari, 2008). In other words, ER strategies that are related to psychopathology considered as maladaptive, while strategies that are associated with psychosocial adjustment viewed as adaptive type. In the present review, we focus on the relationship between depression and 6 widely studied ER strategies. Among these strategies, suppression, rumination and experiential avoidance are viewed as maladaptive, but reappraisal, mindfulness, and acceptance are assumed as adaptive strategies. First, we examine all these strategies separately and then give a conclusive summary after all.

Suppression

Emotion suppression is thought to be a relevant ER strategy in depression (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). While Gross (2002) related suppression to the expression of emotions, other researchers define emotion suppression as an attempt to reduce any of the three behavioral, subjective, or physiological components of emotional responding after their initiation (Liverant et al., 2008). Emotion suppression is often contrasted to emotional acceptance (Hofmann & Asmundson, 2008; Stein, Ives-Deliperi, & Thomas, 2008). Some studies demonstrated destructive effects on well-being when negative emotions are suppressed and not accepted (Richards & Gross, 2000; Roberts, Leven-

son, & Gross, 2008). According to these research findings, MDD patients showed increased suppression of negative emotions (Campbell-Sills et al., 2006). Emotion suppression was also related to depression in adolescents (Betts, Gullone, & Allen, 2009).

In addition to the empirical evidence supporting the role of suppressing negative emotions in depressed patients, there are a few studies investigating the regulation of positive emotions in these individuals. It is assumed that deficient up-regulation of positive emotions contributes to anhedonia in depression (Heller et al., 2009; Mohammadi, Birashk, & Gharaie, 2013). In studies conducted on college students, suppressing and reducing positive emotions has been found to be associated with depressive symptoms (Min'er & Dejun, 2001). In a prospective study with nonclinical participants, researchers found that increased dampening of positive emotions predicted depressive symptoms 3 to 5 months later (Raes, Smets, Nelis, & Schoofs, 2012). Furthermore, it has been shown that anhedonia, increase of negative emotions, and physiological distress are related to attempts in suppressing positive emotions (Nezlek & Kuppens, 2008).

Reappraisal

Cognitive reappraisal is a form of antecedent-focused ER strategy. By using reappraisal, people try to cognitively interpret an emotion-eliciting situation in a manner that changes its emotional impact (Gross & John, 2003). In an earliest experimental study, it is found that cognitive reappraisal decreases both physiological and experiential expression of negative emotions as opposed to the response-focused strategy of emotional suppression (Gross, 1998). Compared to a neutral control condition, cognitive reappraisal was found to be associated with less experienced negative emotion, less expressed emotion and a non-significant tendency toward reduction of the physiological responding. The correlational studies on ER in Iran also demonstrated the negative association between cognitive reappraisal and depressive symptoms (Abdi, Babapoor, & Fathi, 2011; Zare & Solgi, 2012). Obviously, reappraisal is a major component in classical (e.g. Beck, Rush, Shaw, & Emery, 1979) and novel (e.g. Barlow et al., 2010) cognitive behavioral therapies for depression and other emotional disorders.

Rumination

Rumination is a specific form of repetitive negative thinking investigated frequently across a range of disorders, particularly depressive and anxiety disorders. Nolen-Hoeksema defined rumination "as a pattern of responding to distress in which an individual passively and perseveratively thinks about his or her upsetting symptoms and the causes

and consequences of those symptoms, while failing to initiate the active problem solving that might alter the cause of that distress” (McLaughlin & Nolen-Hoeksema, 2011). Experimental studies demonstrated that inducing rumination in the context of distress could increase both depressed and anxious mood (McLaughlin, Borkovec, & Sibrava, 2007).

In a mood induction study in Iran, Mootabi, Jazayeri, Mohammadkhani, and Pourshahbaz (2007) showed that depressed mood induction has more effect on increasing sadness in nonclinical sample compared to depressed patients. To explain these result, they suggested that in depressed individuals, intrinsic stimuli or rumination may have more effect on arising sadness in comparison to extrinsic stimulus applied in the task of this study. In addition, questionnaire-based studies which have used measures such as the Ruminative Responses Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003) show that rumination can predict the later development of depressive symptoms (Broderick & Korteland, 2004; Mohammadi, Farzinrad, Zargar, Mehrabi, & Birashk, 2013) as well as the future onset, number, and duration of major depressive episodes (Robinson & Alloy, 2003). Despite the fact that rumination has long been recognized as an important factor in the pathogenesis and maintenance of mood disorders, traditional CBTs have surprisingly not targeted rumination in a specific and proper manner (McLaughlin & Nolen-Hoeksema, 2011). However, a recent treatment (rumination-focused CBT; Watkins et al., 2007) has been specifically developed to reduce self-focused rumination in adults, which has led to significant alleviation in depression and associated emotional disorders.

Mindfulness

Research in ER has recently begun to explore the role of mindfulness as an important factor that might positively influence the stress response and ER in a more general way. Mindfulness is a state of consciousness originated in Eastern philosophies and religions that focuses on the practice of directing one’s attention to the present moment while adopting a nonjudgmental perspective toward experiences (Kabat-Zinn, 1990). Trait mindfulness has been associated with positive mental health outcomes, including life satisfaction, self-esteem, and optimism (Brown & Ryan, 2003). It has also demonstrated negative correlations with depression, anxiety, and stress-related symptoms (Cash & Whittingham, 2010; Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013). As expected, depressed patients get lower scores in relevant questionnaires such as Mindful Attention Awareness Scale in comparison to healthy individuals (Nejati, Zabihzadeh, Maleki, & Tehranchi, 2012). The most application of mindfulness in the treatment of mood disorders is in MBCT (Segal et al., 2002), which de-

signed to prevent relapse of depressive episodes in remitted patients.

Similar to other countries, outcome research studies in Iran have demonstrated the efficacy of this combined model of cognitive therapy on the reduction of depressive symptoms in both nonclinical samples of college students (e.g. Kaviani, Javaheri & Bahiray, 2005) and in patients with MDD (e.g. Omidi, Mohammadkhani, Mohammadi, & Zargar, 2013). Moreover, MDD patients, which received MBCT, experienced less other psychiatric symptoms comorbid with MDD compared to treatment as usual (TAU) group (Mohammadkhani, Dobson, Hosseini-Ghaffari, & Momeni, 2011; Omidi, Mohammadkhani, Dolatshahi, & Pourshahbaz, 2010).

Experiential avoidance

Experiential avoidance (EA) is an emotion-regulation process involving attempts to suppress, avoid, control, or otherwise down-regulate unpleasant emotions, thoughts, memories, or bodily sensations (Hayes et al., 2004). Some researchers proposed that EA is a transdiagnostic characteristic of many forms of psychopathology, including emotional disorders (Wener & Gross, 2010). Notably, it has been shown that EA is related to the symptoms of depression (Tull, Gratz, Salters, & Roemer, 2004). More interestingly, Barnhofer, Brennan, Crane, Duggan and Williams (2014) showed that as compared to patients with remitting depressive courses, patients suffering from a more persistent period of depression, were more likely to have a history of childhood emotional abuse, and reported higher levels of EA as well as associated core beliefs. Furthermore, EA partially mediated the influence of childhood emotional abuse on persistence of the symptoms (Barnhofer et al. 2014). In one treatment study (Berking, Neacsiu, Comtois, & Linehan, 2009), reductions in EA, were predictive of the improvements in depressive symptoms among patients with borderline personality disorder. Therefore, some principle techniques of the third wave of behavioral therapies such as mindfulness and acceptance are applied primarily to reduce tendency toward EA.

Emotional acceptance

Emotional acceptance is an important component in new generation of cognitive behavior therapy, including ACT (Hayes, Strosahl, & Wilson, 1999) and MBCT (Segal et al., 2002). Treatment outcome research supports the efficacy of acceptance as an adaptive ER strategy with potential utility for individuals with depressive disorders (Bach & Hayes, 2002). In a recent study (Shallcross, Troy, Boland, & Mauss, 2010), trait emotional acceptance (operational-

ized as low scores on the Acceptance and Action Questionnaire: AAQ; Hayes et al., 2004) was found to predict fewer depressive symptoms in the face of high stress in a group of community females at risk for developing depression.

3. Results

Individuals differ in their habitual use of ER strategies, and these differences are associated with specific behavioral, affective, and interpersonal outcomes (Gross & John, 2003; John & Gross, 2004). Generally, maladaptive ER strategies such as suppression, rumination, and experiential avoidance are associated with psychopathology, greater psychological distress, poorer quality of life, stress-related symptoms, and negative affect (Aldao et al., 2010; Hofmann, Sawyer, Fang, & Asnaani, 2012). Instead, adaptive strategies, including reappraisal, mindfulness, and acceptance are related to better emotional outcomes, adjustment with physical and mental pains and greater improvements in anxious/depressive states during therapy. In addition, treatment outcome research generally demonstrated promising results for treatment approaches such as CBT, MBCT, DBT, and ACT incorporating at least an essential component of ER. In summary, habitual reliance on maladaptive ER strategies may play an important role in the generation and maintenance of depression while dispositional or even learned skills to adaptively cope with negative and positive emotions may protect people against vulnerability factors and help them to recover from depressive symptoms after being affected.

Neurobiological correlates of emotion regulation in depression

Following advances in interdisciplinary works over the recent years, researchers have attempted to translate cognitive and behavioral research into clinical neuroscience context. In terms of our subject, they are investigating how different clinical populations can be distinguished by specific dysfunctions in the neural mechanisms of emotion generation and regulation (Kober & Ochsner, 2011). By using variants of the experimental paradigms, a number of neuroimaging studies have addressed ER strategies in both depressive and healthy adults. The majority of these researches have focused specifically on cognitive reappraisal strategy.

In experimental approaches inquiring this strategy, subjects were asked to reinterpret the context of an aversive scene in a manner that it was less negative to them. Taken together, these studies resulted in the identification of subcortical systems thought to generate emotion as well as prefrontal systems believed to execute various

kinds of cognitive control processes and also highlighted the interaction between them (Ertl, et al., 2013; Kober & Ochsner, 2011).

The main brain areas involved in cognitive ER, i.e., amygdala and regions of the prefrontal cortex (PFC), appear to be dysfunctional in depressed people (Erk et al., 2010). For example, using functional MRI, Beauregard, Paquette, and Levesque (2006) showed that the regulation of negative emotions is more difficult for patients with MDD compared to healthy controls. Erk et al. (2010) also investigated the temporal dynamics of cognitive reappraisal in patients with MDD and a healthy control group. Both groups were instructed to look at negative pictures and either allow all their emerging emotions, or cognitively regulate their feelings by taking the position of a detached observer.

Upon analysis of these groups, depressed patients were relatively able to down-regulate negative emotions and related amygdala activation, but this ability attenuated with increasing the severity of the symptoms. Moreover, the regulatory effect in the amygdala only sustained in healthy control subjects after a 15 min delay, while in MDD patients it did not. Finally, the clinical group showed reduced PFC activation and decreased prefrontal-limbic coupling during active regulation. The authors finally concluded that although depressive patients have the capacity to regulate their emotions to a certain degree depending on their symptom severity, but this effect is not sustained over time.

Their correlational analyses also confirmed that this less-enduring regulatory effect may be related to diminished PFC activation during regulation. Other fMRI studies (e.g. Wager et al., 2008) have also reported a negative amygdala-PFC association and demonstrated an inhibitory effect of the PFC on the amygdala and insula during cognitive reappraisal tasks.

Disner, Beevers, Haigh, and Beck (2011) reviewed relevant studies, which might have implications for the neurobiological bases of cognitive model of depression. Accordingly, they conclude that cognitive biases in depression are resulted from dysfunctional bottom-up processes that are usually perpetuated by diminished cognitive control. With restricted top-down cognitive control from the PFC, the bottom-up activity of subcortical regions persists, which in turn, leads to maladaptive and symptomatic consequences. These uncontrolled processes include increased amygdala reactivity (which causes the biased attention and processing), blunted response of nucleus accumbens (which contributes to obstruction of

pleasure) and deviant functioning of the basal ganglia, especially caudate and putamen nucleuses (which leads to dysfunctional attitudes and biased memory). Therefore, in this cognitive formulation of depression, subcortical overactivity and its accompanying cognitive biases is reinforced due to the lack of inhibitory regulation by cognitive control system.

This condition contributes to the ultimate result of heightened awareness for schema-congruent stimuli, which in turn preserves depression. On the contrary, by using CBT technique, patients learn to alleviate cognitive biases in order to finally challenge their perceived accuracy of the schema. Consequently, fewer negative stimuli elicit less bottom-up reactivity and mitigate the burden of cognitive control required to regulate subcortical regions. This notion is supported by studies showing that CBT normalizes amygdala and dorsolateral PFC activity in depressed individuals (Disner et al., 2011).

Despite the overall consensus regarding the prominent role of amygdala-PFC interaction in ER, most of the neurophysiological models (e.g. Clark and Beck, 2010) describing the interaction of these processes, are presented for both anxiety and depressive disorders. The relevance and scope of these effects for specific emotional disorders should be investigated more. Some of these issues and their implications for depression are discussed below.

4. Discussion

Depression and anxiety, both viewed as “distress disorders” (Watson, 2005) or emotional disorders (Barlow, 2002), are widely assumed to be associated with difficulties in regulating emotions (Campbell-Sills & Barlow, 2007; Mennin, Holoway, Fresco, Moore, & Heimberg, 2007; Yousefi, 2007). Many psychological and neuroscientific researches validate this notion in general and lend support to a multilevel and functional model of cognitive ER (Ochsner & Gross, 2008). In this model, cognitive strategies differ in their reliance on prefrontal and cingulate systems for attention, response selection, working memory, language, mental-state attribution, and autonomic control. The regulatory effects of any given strategy - such as reappraisal - can be understood according to that strategy’s way of control processes and the regulatory effects they implement on emotion-generative systems such as amygdala and insula. This model of ER provides a potential framework for guiding basic and translational research on psychopathology (Ochsner & Gross, 2008). Scientific testing of such working models

requires suitable application of new research methods and instruments.

Both behavioral instruments (e.g. self-report questionnaires) and modern imaging technologies, in combination, can augment our understanding in this area. For example, as Kober and Ochsner (2011) warned about Light et al.’s (2011) findings, although right ventrolateral PFC activity might be an indicator of regulatory effort in depressed patients, it may not necessarily be a marker of ER efficacy. Indeed, by not using self-reported measures, the ability to draw robust conclusions about the efficacy of ER is limited. In spite of some authors’ warning that question the validity of self-reports, it is noteworthy that these measures correlate with both neural and physiological markers of ER (Kober and Ochsner, 2011). In addition, in recent years, the emerging advanced techniques such as “imaging genetics” render researchers very good opportunities to study behavioral, neuro-circular, and neuro-genetic (molecular) levels of ER in depression simultaneously (for more information see Hariri & Forbes, 2011).

Research findings at the cognitive-behavioral level are nearly consistent with given neurobiological results. But, some issues in this arena should be considered. First of all, the majority of behavioral researches regarding ER in depressive states have been executed in the general and normal populations, especially college students. Garnefski and Kraaij (2006) compared five specific samples (four groups of general population ranging from adolescents to elderly and one group of psychiatric patients) regarding the use of 9 cognitive ER strategies. Although people in 5 groups showed similar relationships between cognitive ER strategies and depressive symptoms, some remarkable differences were found in their reported strategies (Garnefski & Kraaij, 2006). This may be a remarkable point, particularly because the relational model of ER and depressive symptoms in healthy and clinical individuals may be different. Indeed, by investigating ER exclusively in nonclinical samples, conclusions for depressive patients remain speculative. Thus, it is strongly suggested that ER is studied in healthy individuals and depressed patients at the same time.

In addition to compare ER strategies in depressed and normal people, it is necessary to compare individuals with different clinical diagnoses. It is increasingly believed that ER is a transdiagnostic factor that plays an important role across various psychopathologies, including mood and anxiety disorders as well as eating and substance abuse disorders (Salmani & Hasani, 2013; Aldao et al., 2010; Werner and Gross, 2010). However,

identifying strategies that might have stronger relationships to specific disorders can facilitate the improvement of existing treatments and/or development of novel interventions (Berking et al., 2008). In addition, Salehi, Baghban, Bahrami, and Ahmadi (2012) showed that although both ER training based on DBT and Gross's process model were effective in the reduction of Iranian students' depression and anxiety symptoms, these results did not last the same. Indeed, for depression, only the effect of ER training based on DBT sustained for two months. On the contrary, ER training based on process model, had stronger and more enduring effect on anxiety symptoms compared to DBT. Therefore, it is likely that various treatments comprising emotion regulation components may have different effectiveness patterns. This hypothesis should be examined in future studies investigating ER in mental disorders.

Another issue is the uniqueness vs. overlap of the constructs viewed as different ER strategies. For example, Gross (1998) defines emotion suppression as efforts to inhibit ongoing emotion-expressive behavior, whereas Heyes and Wilson (1994) refer the experiential avoidance to efforts, which inhibit the emotional experience itself. However, some researchers believe that experiential avoidance includes emotion suppression; both of them are correlated to symptoms of depression (Tull et al., 2004). In addition, several studies have found a direct link between rumination and avoidant behaviors such as substance use and wrist cutting behavior (Smith et al., 2007) and procrastination about referring to health care clinics when initial symptoms of breast cancer were observed (Lyubomirsky, Kasri, Chang, and Chung, 2006). This mass of research altogether points to a link between depressive rumination and purposeful avoidance of negative emotions. Studies which report associations between self-reported depressive rumination and experiential avoidance, lend additional support to this avoidance conceptualization of rumination (Cribb, Moulds, & Carter, 2006). This notion also reflects the mentioned question of whether these overlapped strategies are the same constructs or they are related to each other through other mechanisms.

Exploring the mechanisms through which various ER strategies act is also important. Rumination, for instance, may lead to depression and anxiety through a variety of mechanisms. Experimental manipulation, which induce rumination in distressed individuals resulted in more negative, maladaptive thinking (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998), less effective ability to provide solutions to problems (Donaldson and Lam, 2004), uncertainty and immobilization in the application of

solutions (Lyubomirsky et al., 2006), and less readiness to practice distracting, mood-enhancing activities (Lyubomirsky & Nolen-Hoeksema, 1993). Survey and observational studies also demonstrate that ruminative people, experience less social support and more social friction (Nolen-Hoeksema & Davis, 1999), and are graded less favorable by others (Schwartz & McCombs, 1995). Other models have suggested that rumination is detrimental because it associates with right hemisphere activation, contributes to activation of negative beliefs about oneself, and interferes with positive restructuring of negative memories (Martin et al., 2004; Papageorgiou and Wells, 2004). Although support for some of these models has been collected, as previously noted, an alternative hypothesis is that rumination is a manifestation of experiential avoidance (Lyubomirsky et al., 1999).

Experiential avoidance, in turn, exerts its deleterious effects by preventing people from adaptively responding to emotional stimuli and usually has the paradoxical impact of increasing avoided materials (Hayes et al., 2004). Similar to depression, generalized anxiety disorder (GAD) and its core feature, i.e. worry, are associated with experiential avoidance (Newman & Llera, 2011). Given the high rate of comorbidity between GAD and depression (around 60%; Brown, Campbell, Lehman, Grisham, & Mancill, 2001), and the high correlations among measures of rumination and worry ($r = .66$; Beck & Perkins, 2001), it can be likely inferred that rumination, similar to worry, serves an avoidance function. In a more specific context related to depression, it may be that ruminator patients avoid the experience of sadness through recursive cognition (Giorgio et al., 2010).

In addition to worry and rumination, some other regulatory strategies such as emotion suppression (Gross and John, 2003), thought suppression (Wegner & Zanna, 1994), reason-giving (Hayes, 2006) and distraction (Campbell-Sills & Barlow, 2007) may also serve an avoidant function. Accordingly, Shahar and Herr (2011) collected some representative items from measures of these constructs and created a state (daily) experiential avoidance scale. The more comprehensive such instruments are, the more they can accurately assess ER in psychopathology and psychotherapy researches.

Future studies should also specify the mechanisms of action of treatments comprising an ER component. For example, as noted above, Salehi et al. (2012) showed that both ER training based on Gross's process model and DBT, could lead to post-test reduction of depressed and anxious symptoms in Iranian college students. But DBT, for instance, includes four components: ER, mind-

fulness, distress tolerance, and effective communication. Due to the lack of process research in this area, it is not clear that what components or techniques lead to main effect and what did not.

In clinical samples as well, even in depressed inpatients, augmentation of medication with DBT improves effectiveness of the treatment on depressive symptoms and suicidal ideation (Alizadeh, Alizadeh, & Mohamadi, 2013). But, the additive or interactive nature of this augmented effect is obscure. Omidi et al. (2010) also indicated the efficacy of a combination of CBT and MBCT on the reduction of memory overgeneralization as well as depressive symptoms in patients with MDD. However, by this research it is difficult to accurately figure out whether remission of depressive symptoms results in better outcome in autobiographical memory test specificity or vice versa.

However, mindfulness is probably a strategy similar to acceptance that may work regardless of the modification of emotions. Berking et al. (2011) revealed that the ability to modify negative emotions may be the common pathway through which many emotion-regulation skills exert their influence on mental health. However, the skill of accepting/tolerating negative emotions may be valuable to mental health regardless of whether or not it help in changing emotions (Berking et al., 2011). Indeed, by learning these latter types of strategies, patients can notice, tolerate, and accept their emotions nonjudgmentally and without trying to change, suppress or avoid them, which in turn leads to more adjustment with everyday life (Omidi & Mohammadkhani, 2008). With this useful calming strategy in hand, the other question remains that why depressive patients suppress or avoid emotions. Hayes et al., (1996) for example, believe that suppression may result from an increased “fear of emotions”. Therefore, we should investigate the question of whether the effect of ER strategies is conscious or a by-product of other cognitive processes.

Some other cognitive and temperamental factors such as cognitive inhibition, effortful control, emotional schemas, sensitivity to punishment, anxiety sensitivity, and negative affectivity, may also be related to ER as well as anxious/depressive symptoms (Joorman & Gotlib, 2010; Tortella-Feliu, Balle & Sese, 2010; Leahy, 2012; Amani, Shiri, Valipoor & Shiri, 2013). For instance, Joorman and Gotlib (2010) demonstrated that individual differences in using ER strategies play an essential role in depression, and deficits in inhibiting the processing of emotional material are related to the use of maladaptive ER strategies in this disorder. Exploring individual

differences in executive functions, particularly, in the inhibitory control of the contents of working memory, may provide important insights into the vulnerability to depression and sustained negative affect (Joorman & Gotlib, 2010).

Both state and trait negative affects may influence the relation of ER and depression in some ways. For instance, in Berking et al. (2009) study, reductions in experiential avoidance were predictive of improvements in depressive symptoms, but higher levels of experiential avoidance also predicted less subsequent reduction in depression during treatment. These findings suggest that experiential avoidance may not be just a consequence of depressive states. Indeed, as Shahar and Herr (2011) (by employing a daily diary research design) showed, the model of the relationship between experiential avoidance and depression is more complex when changing in daily negative affect are considered.

Moreover, Tortella-Feliu, et al. (2010) examined the mediational role of ER in the path from negative affect to anxiety and depressive symptoms in a large sample of adolescents. Their results suggest that negative affect can determine negative ER to a great extent. Furthermore, negative forms of ER significantly mediate the relationship between NA and anxiety, and the connection between negative affect and depression might be determined by anxiety (Tortella-Feliu, et al., 2010). Preliminary results of a study completed by the authors of the present review also showed that ER may mediate the relational pathways from negative affectivity and dysfunctional cognitions to the severity of depressive symptoms in both depressed patients and normal controls (Mehrabi, 2014). Accumulating such studies may give researchers the opportunity to translate basic theories such as the Gross's Process model of ER to therapeutic models designed to treat depressive disorders.

The modal or ‘Process model’ described by Gross (Gross, 1998; Gross & Thompson, 2007) can be applied as a useful basic framework for understanding and analyzing diverse ER strategies. According to this approach, ER strategies may have their impact at different points along the timeline of the unfolding emotion generative process (e.g., antecedent versus response focused). As alluded to above, these authors highlighted 5 points at which individuals can regulate their emotions.

Many of the clinical features of depression and other emotional disorders can be conceptualized as problematic use of these 5 families of ER strategies (Campbells & Barlow, 2007; Werner & Gross, 2010). So, it is

possible to locate each of the emotion regulatory strategies, including the 6 processes reviewed in the current article, at one of these stations, i.e. situation selection (e.g. avoidance and withdrawal), situation modification (e.g. safety signals and rituals), attentional deployment (e.g. thought suppression, distraction, worry and rumination), cognitive change (e.g. rationalization and non-acceptance of emotional experience), and response modulation (e.g. expressive suppression, experiential avoidance and substance use). The adaptive or therapeutic strategies such as exposure, behavioral activation, mindfulness, cognitive reappraisal, and emotional acceptance are also referred to the mentioned 5 points of this temporal sequence, respectively (Campbell-sills & Barlow, 2007; Werner & Gross, 2010).

It is also noteworthy that although the effect of each ER strategy is mainly related to one point of this sequence, some of these processes may work at more than one point. Acceptance is an example of ER strategies, which includes elements of both antecedent-focused ER (e.g., cognitive reappraisal of the acceptability of emotional experience) and response-focused ER (e.g., allowing the experience of emotion without trying to alter or suppress it after the emotion has been produced) (Liverant et al., 2008).

Altogether, it seems that the 'Process model' could be a useful framework or map to formulate depressive disorders regarding their associated ER strategies. Accordingly, we noted elsewhere (Mehrabi & Taherifar, In press) that it is possible to present an integrative emotion regulation based cognitive behavior therapy (ER-CBT) that incorporates ER training into traditional CBT. Although such trials have been already done in the third wave of behavioral therapies (e.g. in DBT, MBCT and ACT; Zargar, Mohammadi, Omid & Bagherian, 2013), we suggest that it is useful to exert such treatment components in both comprehensive and personalized manner at the same time. It means that instead of training just one or two theory-imposed ER strategies (e.g. cognitive restructuring [reappraisal] in CBT or mindfulness in MBCT), it is wise to enrich our formulation about the patient with all ER deficits, which he or she may exhibit and then add training of relevant ER strategies to therapeutic package offered for him or her. This is consistent with a very important issue regarding the application of ER strategies, which is the flexibility in using these processes.

Indeed, several researchers working on ER have recently emphasized the importance of flexible application of ER strategies for healthy adjustment or resilience

(Bylsma et al., 2008; Liverant et al., 2008). Bonanno et al. (2004) argued that successful adaptation does not result from exclusive use of one universally beneficial ER strategy, but rather from the ability to flexibly suppress or enhance emotional responding. This perspective necessarily raises questions about the factors that determine the given efficacy of particular ER strategies i.e., what situational characteristics or dispositional traits determine the effectiveness of these strategies for specific individuals (Liverant et al., 2008). Finally, an important and interesting issue for ER research is the cultural and gender differences in ER regarding depression. Some researchers, especially in Eastern Asia have recently focused on this area (e.g. Kwon, Yoon, Joormann, & Kwon, 2013), but such comparative studies have rarely been originated in Islamic countries. Development of such cross-cultural researches in Iran with rich cultural and even sub-cultural sources is warranted.

In this article, we reviewed some of the latest studies regarding ER in depression in English and Persian literature. Findings of the cognitive-behavioral and neurobiological studies investigating the association of depression with 6 ER strategies (i.e. suppression, rumination, experiential avoidance, reappraisal, mindfulness, acceptance) presented and integrated particularly by using the Gross's process model of ER. Overall results of both Western and Iranian studies confirmed the important role of ER strategies in maintenance of and recovery from depressed episodes. However, cautiously speaking, whether emotion dysregulation is a causal factor leading to the symptoms of mood disorders is currently unknown. Nevertheless, recent evidence suggests that maladaptive ER is a part of the phenomenology of these disorders. More prospective research is needed in which ER is precisely measured and followed over time. In this respect, good descriptive psychopathology is a necessary foundation for progress accompanying measurement methods and tools, prediction of illness course and effective interventions. Future research should also work on determining how ER is changed by therapy in depressed patients. By more understanding about the process of change in psychotherapy, scientific knowledge can be used to develop novel therapies that are more tailored to the unique characteristics of the disorder or the individual characteristics of the patient. ER-CBT model that proposed in this paper could be a raw but testable example of such trials.

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