

Review Article

Interactions Between Emotion Regulation and Mental Health

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Abstract

Reappraisal and suppression are among the most commonly studied emotion regulation strategies and refer to the cognitive reframing of emotional events (reappraisal), and the behavioral inhibition of emotional reactions (suppression). This selective review examines relationships between trait-expressions of these two emotion regulation styles and psychopathology as well as links with mental health. Findings generally suggest a beneficial role of reappraisal and a maladaptive role of suppression. However, exaggerations of emotion regulation-mental health links are possible as both are subject to reporting biases. Ideally, self-reported emotion regulation styles should be assessed together with behavioral and physiological measures of emotional responding and actual emotion regulation success, to delineate their link to mental health.

Keywords: Emotion regulation; Suppression; Reappraisal; Social desirability

Abbreviations

BIDR: Balanced Inventory of Desirable Responding; ERQ: Emotion Regulation Questionnaire; MCSDS: Marlowe-Crowne Social Desirability Scale; PTSD: Post-Traumatic Stress Disorder

Introduction

The capacity to alter how we experience and express emotions is a key contributor to mental health [1-4], and problems with effectively regulating emotions is a cardinal feature of many psychiatric disorders [5-10]. Increasing recognition of the crucial role of emotion regulation in mental health outcomes over the past decades has helped to identify specific emotion regulation strategies as either maladaptive or adaptive. Emotion regulation via suppression (the behavioral inhibition of overt reactions to an experienced emotion, e.g., frowning when angry) has been associated with maladaptive outcomes including the ineffective down-regulation of negative mood [11], impaired memory [12], maladaptive physiological responding (i.e., increased sympathetic activation of the cardiovascular system) [13], impaired autonomic flexibility [14], and the onset and maintenance of various mental health disorders [15]. In contrast, emotion regulation via cognitive reappraisal (changing the interpretation of the meaning of an emotional stimulus) is thought to be among the most adaptive and effective forms of emotion regulation [16]. For example, reappraisal has been associated with lesser negative emotion experience, greater positive emotion experience, a greater capacity for negative mood repair, higher self-rated adjustment, higher self- and peer-rated social functioning and support [14,17], as well as increased pain tolerance, adaptive patterns of cardiovascular responding, and lesser incidence of depression and anxiety [14,17,18].

This selective review summarizes findings in mental health regarding the scope and effectiveness of reappraisal and suppression. An important limitation of studies on emotion regulation via reappraisal and suppression in mental health is a reliance on

questionnaires. Specifically, we argue that demand characteristics are present in the assessment of emotion regulation via questionnaires, and that such biases may preclude our understanding of the links between emotion regulation and mental health outcomes.

Emotion Regulation

One of the most influential theories of emotion regulation has been James Gross' process model of emotion. Gross defines emotion as a person-situation interaction that guides attention, has specific meaning to an individual, and gives rise to a coordinated and flexible multisystem response [16]. His model views the emotion-generative process as linear and unidirectional, involving an event, attention, an appraisal, and an emotional response [3,16]. In this view, emotions are generated through a process that is recursive, involves multiple components (i.e., an event, attention, appraisal, responses), and evolves over time [3,16]. (but see also non-linear models of emotion regulation) [19].

According to Gross, emotion regulation strategies can be delineated by the time point within the emotion generative process at which they exert their initial impact [16]. 'Antecedent-focused' emotion regulation refers to strategies that can be employed prior to experiencing an emotion. For example, cognitive reappraisal (the most commonly studied form of antecedent-focused emotion regulation) refers to selecting which of many possible meanings will be attached to the attended aspect of a situation. It is the meaning attached to a situation that is thought to elicit emotional responding. Conversely, once an emotion that is already subjectively experienced, individuals can use 'response-focused' emotion regulation strategies to alter their emotional response. Suppression is the most commonly studied response-focused emotion regulation strategy and refers to the behavioral inhibition of overt reactions to an emotional experience or situation. Because cognitive reappraisal is thought to interrupt the full development of an emotion (resulting in a state in

which there is little or no emotion to regulate), reappraisal should be a relatively non-effortful and effective form of regulating (negative) emotions [16]. In contrast, suppression is thought to interrupt only the outward expression of an emotion when it is already present. As a result, regulating emotions via suppression should be more effortful and less effective [16].

Assessment of emotion regulation

The most direct test of the opposing consequences of reappraisal and suppression comes from experiments explicitly instructing participants to use one or the other strategy to regulate their emotions. This approach has been widely applied in psychological and neuroimaging studies with healthy populations; generally showing beneficial effects of instructed reappraisal and detrimental effects of instructed suppression in down-regulating negative emotions and their physiological correlates [13,16,20,21]. However, the ecological validity of such artificially induced, short-lasting regulatory behaviors is limited. This may be particularly true in a mental health context, as the onset of psychopathology involves developmental trajectories spanning many years and is not characterized by a momentary (mis) use of specific emotion regulation strategies [7, 22,24].

An alternative approach is to assume that individuals have a dispositional propensity to using reappraisal or suppression across many situations in everyday life. This type of research is perhaps more important to mental health, in which longer-lasting and pervasive effects of emotional dysregulation are thought to be present [24]. Reappraisal and suppression as personality traits can be measured by the Emotion Regulation Questionnaire (ERQ) [17]. Studies employing an individual differences (i.e., trait) approach have provided important insights about the influence of adaptive and maladaptive forms of emotion regulation (or dys-regulation) on the onset and maintenance of various forms of psychopathology.

Studies of emotion regulation and psychopathology

Many theories of psychopathology highlight the role of emotion dysregulation in the onset and maintenance of mental health disorders [25,26]. In general, findings suggest opposing outcomes of suppression and reappraisal in mental health and psychological well-being. Evidence comes from two lines of research: 1) studies examining links between emotion regulation and risk factors for psychopathology (e.g., neuroticism) in *nonclinical* populations, and 2) studies examining links between emotion regulation and the onset, maintenance, and symptom severity of various forms of psychopathology in *clinical* populations. A general theme in emotion regulation research seems to imply that whereas trait-suppression is maladaptive and may result in poor outcomes for overall mental health, trait-reappraisal is adaptive and helps to promote psychological well-being [17,27,30]. In order to illustrate this theme, we provide a brief overview of the literature examining the opposing correlates of trait-suppression and -reappraisal in mental health.

Suppression

Research in nonclinical populations has shown that individuals who self-report greater habitual use of suppression experience more negative emotions, fewer positive emotions, and endorse a greater number and severity of symptoms associated with various psychopathologies, compared to individuals who self-report lesser

habitual use of suppression [17,31,32]. In addition, studies with clinical populations have found evidence for higher trait levels of suppression in a number of psychopathological disorders, including generalized anxiety disorder, specific phobias, depression [14,15], bipolar disorder [33], post-traumatic stress disorder (PTSD), substance abuse disorders, and eating disorders [34]. For example, Baker et al used questionnaires to examine the links between emotion processing difficulties and panic disorder in a sample of panic disordered patients and a group of healthy controls [35]. They found that individuals in the panic disordered group self-reported greater emotional processing difficulties; marked by greater self-reported suppression of emotional experiences than the control group. Similarly, Gruber et al. found that patients with bipolar disorder reported greater spontaneous use of suppression while viewing emotion-inducing film clips compared to healthy controls [33]. Boden et al. found that trait-suppression was positively associated with PTSD symptom severity in veterans [36]. Furthermore, a decrease in trait-suppression over the course of PTSD-treatment was incrementally predictive of a decrease in symptom severity at discharge, suggesting a significant role of suppression in the maintenance of PTSD. Aldao and Nolen-Hoeksema further found that higher use of maladaptive emotion regulation (e.g., suppression) predicted later self-reported psychopathology (depression, anxiety, and substance-abuse) in a longitudinal community-sample study [31]. These and related findings [15,37-39] suggest that suppression is a maladaptive emotion regulation strategy associated with the onset and maintenance of various forms of psychopathology.

Reappraisal

In contrast to suppression, cognitive reappraisal is thought to be an adaptive and effective emotion regulation strategy and trait-reappraisal has been linked to psychological well-being [17]. For example, Eftkhari et al found that a high self-reported use of reappraisal (along with a low self-reported use of suppression) was related to lower levels of anxiety and incidence of post-traumatic stress disorders in a sample of female undergraduate students who had been exposed to a potentially traumatic event at some point in their lives [40]. Consistent with this finding, Christophe et al found a negative association between self-reported trait-reappraisal and trait-anxiety [32]. In addition, a study examining the association between cognitive emotion regulation, coping strategies (including reappraisal) and depressive symptoms in an elderly community sample found that individuals with more symptoms of depression reported lower trait-reappraisal than did individuals with less depressive symptoms [41].

In clinical populations, Henry et al found that greater self-reported use of reappraisal was associated with lesser self-reported depression and greater self-reported social-functioning in schizophrenic patients [42]. In a study examining the role of emotion regulation in determining symptom improvement in a group of outpatients undergoing treatment for social anxiety disorder, Mocoivitch, et al found that the learned ability to use reappraisal to regulate emotions was predictive of overall reduction in the severity of social anxiety symptoms during treatment [43]. Similarly, Boden et al found that higher trait-reappraisal was associated with less severe PTSD symptoms in a sample of military veterans undergoing PTSD treatment [36]. Thus, these findings support the notion that

reappraisal is adaptive and may play a role in promoting psychological well-being.

In addition to studies demonstrating the *advantages* of greater use of reappraisal for mental well-being, several studies have examined the *consequences* of lesser or *ineffective* use of reappraisal. Generally, findings from these studies suggest that the inability to effectively use adaptive emotion regulation (e.g., reappraisal) to down-regulate negative emotion is associated with poorer outcomes for mental health. Specifically, studies have shown that lesser use of reappraisal is associated with an increase in the severity and number of symptoms of depression, anxiety disorders (e.g., PTSD), and borderline personality disorder [9,15]. For example, Garnefski and Kraaij found that in a mixed group of psychiatric outpatients, lesser self-reported use of reappraisal was associated with a greater number of reported depressive symptoms [44]. Similarly, in a study examining the role of self-reported reappraisal self-efficacy (i.e., perceived ability to effectively use reappraisal to down-regulate negative emotional responding) on symptom severity in a group of social anxiety disordered outpatients, Goldin et al found that reappraisal self-efficacy mediated the effects of cognitive behavioral therapy on symptoms of social anxiety [45]. Finally, the inability to effectively use adaptive emotion regulation (e.g., reappraisal) has been associated with a number of additional maladaptive behaviors, including binge drinking/eating, purging, and/or restricting [34].

An important limitation of studies examining the relationships between emotion regulation and psychopathology is that both emotion regulation and the presence and severity of symptoms of psychopathology (e.g., anxiety, depression, PTSD) are often measured using self-report inventories or patient interviews. We argue that such measures are subject to positive response biases known as desirable responding, which may skew our understanding of the links between emotion regulation and psychopathology.

The role of desirable responding

Desirable responding refers to the conscious and unconscious attempts by an individual to answer questions in a manner that will be viewed favorably. People who score high on measures of social desirability are more likely to endorse personality traits, attitudes, or behaviors that are judged as desirable and to deny their undesirable counterparts, compared to people with low desirability scores [46,48].

Self-reported mental health problems may be impacted by desirable responding. Indeed, mental health problems and symptoms are subject to public and personal/self-stigma, with varying levels across societies and cultures as well as populations within societies [49]. Stigma can be measured through the observation of a number of behaviors including labeling, stereotyping, status loss, and discrimination. Individuals are labeled by society using characteristics that are considered to have high social relevance (e.g., skin color, sexual orientation, mental illness) [50]. These labeled between-group differences are often linked to undesirable characteristics either by the self or others. In the context of mental health, studies have found evidence of labeling, stereotyping, status loss, and discrimination, suggesting stigmatization of mental health populations. Mental health stigma has been identified as a major barrier to seeking psychological and/or psychiatric treatment in community samples in North America and Europe [49,51], among military personnel [52,53], and students

[54,57]. In addition, public and self-stigmatization is recognized as a major barrier to recovery in mental health clients [51,58,59]. Finally, a number of studies also point directly to a mediating role of desirability in reporting psychopathological symptoms and behaviors [60-63]. Thus, desirable responding may be an important variable to consider when assessing mental health and severity of psychopathological symptoms via questionnaires.

Does desirable responding play a role in the assessment of emotion regulation? A few studies suggest this might be the case. For example, Lieberman, et al asked participants to predict the amount of emotional distress they expected to feel while reappraising emotional images, and showed that participants over-estimated the effectiveness of reappraisal as an emotion regulation strategy [64]; on average, participants self-reported higher levels of emotional distress than they had initially predicted as a consequence of applying reappraisal. These findings were taken to suggest a social expectation: That reappraisal is more effective in down-regulating negative emotional states than it actually is. Gross and John, proposed that because individuals with high scores in ERQ trait-reappraisal report having and expressing more positive emotion than individuals with high trait-suppression scores, reappraisers may be more likely sought after as friends and acquaintances [17]. Indeed, in the same study, individuals who self-reported higher trait-reappraisal also reported closer relationships and were rated as better liked by their peers, compared to individuals who self-reported high trait-suppression. Similarly, English et al [65] assessed self-reported emotion regulation in undergraduate students prior to the start of their first year of college and peer-reported social functioning of the same individuals at graduation from a four year degree [65]. English et al found that long-term use of reappraisal, but not suppression, predicted greater peer-rated social functioning and higher social status after 4 years [65]. In addition, Srivastava et al examined links between suppression and self-reported social satisfaction including perceived social support, closeness to others, and social satisfaction in undergraduate students [66]. The authors found that self-reported suppression was associated with lower scores on all measures of social satisfaction [66]. Together, these studies suggest that a social expectation may exist about the nature of the consequences of specific emotion regulation strategies. Specifically, that individuals are aware of the social benefits of using reappraisal and may actively seek out reappraisers and avoid suppressors as social companions. Thus, individuals who are prone to endorse positive personality traits (i.e., individuals high in desirable responding) may also endorse a greater use of reappraisal but not suppression.

As mentioned, the ERQ the instrument most commonly used to assess dispositional reappraisal and suppression [17]. The trait-reappraisal subscale of the ERQ includes questions such as: "When I want to feel less negative emotion, I change the way I'm thinking about the situation" and "I control my emotions by changing the way I think about the situation I'm in". Such items might imply the rather desirable abilities to control and harness one's own emotions and the outcomes of emotionally challenging situations. Conversely, the ERQ trait-suppression subscale contains items such as: "I keep my emotions to myself" and "When I am feeling negative emotions, I make sure not to express them". Such items point to rather deliberate and inauthentic behavioral displays of being calm. Thus, ERQ reappraisal items may measure the desirable ability to

control the impact of emotional events and ERQ suppression items may measure the less desirable ability to use deliberate, inauthentic outward behavioral displays of calmness in the face of emotional events. Of note in this context, English and John found that self-rated inauthenticity (i.e., a consciously perceived mismatch between inner and public self) substantially influenced links between trait-suppression and poor social functioning (e.g., lower relationship satisfaction, lower social support) in college students [67]. That is, the deleterious effects of emotion regulation via suppression might be a consequence of socially desirable but inauthentic behavior.

To examine the role of desirable responding in self-reported emotion regulation, Gross and John used the Marlowe-Crowne Social Desirability Scale (MCSDS) as a measure of desirable responding in a sample of 145 students [17,68]. They found a marginally positive, but non-significant correlation ($r = 0.11$) between trait-reappraisal (as measured by the ERQ) and MCSDS and a marginally negative, but non-significant correlation ($r = -.09$) between trait-suppression and MCSDS. However, questions in the MCSDS focus mostly on socially desirable observable behaviors and less on psychological processes. Thus, although one could expect that suppression (i.e., the behavioral inhibition of emotional reactions) might be related to the MCSDS, reappraisal (the psychological reframing of emotional events) might be underrepresented in the MCSDS.

In contrast to the MCSDS, the Balanced Inventory of Desirable Responding (BIDR) [69] conceptualizes desirable responding as consisting of two different constructs; 1) The tendency toward a positively biased understanding of the self (self-deceptive enhancement scale; for example “My first impression of people usually turns out to be right”) and 2) The deliberately positively biased presentation of the self to others (impression management; for example “I have never dropped litter on the street”). The self-deceptive enhancement subscale has demonstrated associations with other measures of defense mechanisms (repression, distancing, self-controlling) and emotional adjustment (neuroticism, depression, social anxiety) [70]. The impression management subscale has demonstrated associations with traditional “lie scales” e.g., the Eysenck Personality Questionnaire [71], and the Minnesota Multiphasic Personality Inventory [72], and measures of socially desirable responding, including the MCSDS [70]. Thus, the self-deceptive enhancement BIDR subscale evaluates an unconscious positive bias in responses with the aim of protecting self-esteem. Conversely, the impression management subscale evaluates a conscious positive bias in responses with the aim of making a favorable impression on others [73].

Does either aspect of desirability influence the relationships between emotion regulation traits (reappraisal/suppression) and levels of psychopathology? We have asked this question in an undergraduate student population ($N = 4737$) and tested whether desirable responding (self-deceptive enhancement and impression management in the BIDR) mediated the link between self-reported trait-emotion regulation (reappraisal and suppression in the ERQ) and trait-anxiety [74]. In line with findings from previous studies, we found that whereas trait-reappraisal was associated with lower self-reported trait-anxiety, trait-suppression was associated with higher trait-anxiety [15, 17, 75]. However, the relationship between trait-emotion regulation and trait-anxiety was substantially mediated by desirable responding. Specifically, the negative association between

self-reported trait-reappraisal and trait-anxiety was mediated by higher desirable responding (impression management *and* self-deceptive enhancement). In contrast, the positive association between self-reported trait-suppression and trait-anxiety was mediated by lower desirable responding (self-deceptive enhancement but not impression management). Thus, individuals who scored higher in both aspects of desirable responding were also more likely to self-report higher trait-reappraisal and lower trait-anxiety. In contrast, individuals with lower social (but not personal) desirable responding were also more likely to self-report higher suppression and higher trait-anxiety. These findings imply that whereas self-rated trait-reappraisal may be over-reported (at least in this student population) trait-suppression may be under-reported. Therefore, our understanding of the relationship between the use of trait-reappraisal and self-report measures of other non-desirable traits (including potentially stigmatizing psychopathological symptoms and behaviors) could be systematically biased if desirability is not considered.

Treating trait-reappraisal unambiguously as promoting mental well-being and trait-suppression as detrimental to mental well-being is certainly a simplification. Indeed, some forms of reappraisal may actually serve to increase or maintain negative emotional states [76]. Several studies have shown that one form of reappraisal (self-elaboration or self-focusing; i.e., engaging the self in reference to an event) may increase rather than decrease the level of negative emotional responding. For example, Barden et al found that dysphoric individuals who were asked to self-focus experienced higher levels of negative mood compared to dysphoric individuals asked to focus away from the self [77,78]. Although further research is needed to elucidate the nature of the relationship between self-referential processing, emotion regulation, and psychopathology, these findings can be taken to suggest a potentially maladaptive role of some forms of reappraisal. Similarly, in some contexts, suppression may have adaptive outcomes or correlates. For example, in East-Asian individuals or cultures the suppression of emotions is more congruent with social expectations than in Euro-North-American cultures, although this link may exert less negative impacts on psychological well-being [67,79]. Le and Impett examined whether suppression of negative emotions in people with high levels of relationship interdependence might have beneficial as opposed to adverse outcomes [80]. They asked participants to complete measures of suppression, authenticity, and well-being at times when they were making sacrifices for their partner. In individuals with high relationship interdependence, greater suppression during sacrifice times was related to feelings of authenticity, greater self-reported personal well-being, and greater relationship satisfaction. These findings highlight the notion that under some circumstances suppression may have positive, rather than negative, outcomes for psychological well-being.

Future studies on emotion regulation and mental health

Future studies investigating the link between emotion regulation and psychopathology should consider the influence of desirable responding on self-report measures and use complementary assessment strategies of emotion regulation, such as physiological measures. Many studies of *instructed* emotion regulation have convincingly shown that physiological indicators of emotional or arousal-related reactivity (e.g., heart rate, finger pulse amplitude)

are unchanged or increased when individuals are explicitly asked to suppress emotions and decreased when individuals are instructed to reappraise their emotions [13,16,20]. These include a large number of neuroimaging studies [81-86]. An interesting avenue for biological studies of trait-emotion regulation, in addition to effects of instructed emotion regulation strategies on acute stress challenge physiology, pertains to a number of candidate restorative, biological processes in individuals with high or low levels of self-reported reappraisal and suppression [87]. For example, elevations in oxidative stress and downstream leucocyte telomere shortening have been associated with individual differences in hostility [88,90], depressive symptoms and clinical depression [91,93], as well as the experience of perceived psychological stress [94,95]. In addition, positive affect in the context of emotion regulative practices such as meditation [96,97], and yogic breathing [98] have been associated with reduced oxidative stress. Of note, Puterman and colleagues recently found that healthy emotion regulation (measured as low levels of trait-suppression), among other factors (social connections, sleep, exercise), mediated associations between depression diagnosis and leucocyte telomere length [91]: While individuals with low 'multisystem resiliency' (including high trait-suppression, low social support, sleep, and exercise) evidenced positive association between depression diagnosis and leucocyte telomere length, individuals with high 'multisystem resiliency' did not. These findings imply a protective role of low levels of trait-suppression in long-term stress reactivity and associated downstream biological processes that should be explored further and, for example, include trait-reappraisal. Thus, many physiological indicators accompanying the two emotion regulation strategies exist, and more application of these in the mental health field seems promising to complement self-report.

Studies employing mixed method designs to examine links between emotion regulation and psychopathology are limited. However, Ehring et al examined the role of both instructed *and* trait emotion regulation in determining vulnerability to depression [99]. Participants were diagnosed as either never-depressed or recovered-depressed. Trait emotion regulation was assessed using the ERQ. Participants first underwent a mood induction using a sad film clip and were asked to report whether and which emotion regulation strategies they used to regulate their emotional responses. Next, participants underwent a second mood induction under explicit instruction to use either reappraisal or suppression to regulate emotion. The authors found that suppression was ineffective in down-regulating negative emotional responding and that recovered-depressed individuals self-reported greater use of this strategy during the first mood induction than did controls. Importantly, no group differences were found in the effects of instructed reappraisal and suppression on negative mood. These results suggest that trait but not instructed emotion regulation is associated with a vulnerability to depression. Thus, important differences in habitual and momentary use of emotion regulation should be considered and perhaps especially so, in mental health. Whether self-reported emotion regulation traits covary with actual emotion regulation success or ability is an important question requiring mixed methods [100,101]. Certainly, the use of mixed methods designs could help to resolve some of the ambiguities related to influences of desirability in responding in the context of mental health.

In addition, several researchers have suggested that *patterns or styles* of emotion regulation may be a more valid measure of risk for mental health than the use of any single strategy alone [19] (also see [102] for a discussion of the role of a match-mismatch between emotion processing styles and single emotion regulation habits/strategies). Indeed, an important limitation of individual differences research in emotion regulation lies in the use of measures designed to evaluate trait-reappraisal and trait-suppression as separate constructs. The ERQ renders two scores; a reappraisal score and a suppression score. A consequence is that individuals can score high on both reappraisal and suppression, low on both reappraisal and suppression, or any combination thereof. As a result, most studies of trait emotion regulation that use the ERQ do not examine reappraisal or suppression in isolation, but rather examine how scores on each trait subscale are associated with behavioral and/or physiological responses to emotional stimuli while ignoring rather than controlling for the individual's scores on the alternate strategy. Some studies have addressed this issue by pre-selecting samples of participants who endorse a high trait use of reappraisal in combination with a low trait use of suppression (trait-reappraisers) or the reverse (trait-suppressors) [75,103]. Others have argued that emotion regulation strategies are always activated concurrently, and together influence the development of psychopathology [19]. Thus, future research may focus on delineating global patterns of emotion regulatory styles and their influence on psychopathology.

Conclusion

Studies in emotion regulation have highlighted extensively the links to mental health and psychological well-being. Maladaptive emotion regulation or emotion dysregulation is identified as a cause and consequence of a number of mental health disorders. We reviewed findings on the relationships between mental health and two commonly studied emotion regulation strategies: Reappraisal and suppression. Their trait-expressions have been linked to opposing mental health outcomes or concomitants, generally suggesting a beneficial role of reappraisal and a maladaptive role of suppression. However, exaggeration of emotion regulation-mental health links seems plausible, based on biases in self-reporting of both emotion regulation traits and psychopathological traits. Ideally, self-reported emotion regulation traits should be assessed together with behavioral and physiological measures of emotional responding and actual emotion regulation success, to further delineate their link to mental health.

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