ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

The Role of Cognitive Reappraisal Emotion Regulation Strategies in Adolescent Depression

Yu Zhu[1,a,*]

[1]*Ningxia University, Yinchuan, Ningxia Hui Autonomous Region, 750021, China*
[a]*876273868@qq.com*
[*]*Corresponding author*

Abstract: *Depression is the most common mental illness in adolescence, characterized by an inability to regulate the negative emotional response to stress. In recent years, as the number of adolescents with depression has increased, how to treat it has gradually become a widespread social concern. Cognitive reappraisal, an emotion regulation strategy that can be pre-occupied and widely adaptable in psychopathology, may be a new direction to improve adolescent depressive symptoms. By studying a large body of English literature, this article provides an overview of adolescent depression and cognitive reappraisal strategies, and reviews the application and current status of cognitive reappraisal emotion regulation strategies to improve adolescent depression.*

Keywords: *Cognitive reappraisal; adolescent depression; emotion regulation*

1. Introduction

Depression is a psychological state of agitation and sadness and is a negative emotional response exhibited by an individual in the face of internal or external stimuli [1]. According to the World Health Organization (WHO), more than 300 million people worldwide suffer from depression, and nearly 800, 000 people commit suicide due to depression every year. Depression not only affects the mental health of individuals, but also has a huge negative impact on families and society. Therefore, how to effectively prevent and treat depression has become an important public health issue.

Adolescence is an important transitional stage from adolescence to adulthood and a critical period of physiological and psychological development. With physiological and psychological development, adolescents gradually begin to think about their life goals and values, and at the same time face more challenges and pressure. If they are in an unhealthy emotional state for a long time, teenagers are prone to depression. Studies have shown that the prevalence of depression among adolescents is on the rise and has become a serious public health problem, as shown in Figure 1. Therefore, how to effectively improve adolescent depression symptoms has become an urgent issue. During adolescence, an individual's self-identity develops rapidly, with increasing initiative and a growing desire for freedom and independence [2]. During this period, adolescents who are chronically in unhealthy moods and do not have good psychological quality are prone to depression [3]. Although the prevalence of depression has increased in all age groups, it has grown faster in the adolescent population than in adults. One research study showed that the prevalence of depressive symptoms in the adolescent population exceeded 30% [4], as shown in Figure 2. The rise in the rate of depression among adolescents is particularly worrisome as depression is closely associated with suicide. It is therefore necessary to help adolescents adopt appropriate emotional regulation to cope with negative life events. The meta-analysis of the effectiveness of emotion regulation strategies shows that cognitive reassessment is proved to be an effective means of regulating depressed mood [5]. It is an emotion regulation strategy that emphasizes the ability of individuals to change their perceptions of emotions by reevaluating events or situations in the face of negative emotions, thereby reducing the impact of negative emotions. Research has shown that cognitive reappraisal can reduce an individual's negative emotions and increase positive emotional experiences, thereby improving mental health. Cognitive reassessment can help adolescents to see their emotional problems from a different perspective so that they can better understand and resolve them. Some studies have shown that cognitive reappraisal is highly effective in improving adolescents' depressed mood and can help adolescents better cope with negative life events. However, some studies have also shown that cognitive reassessment is not effective for all adolescents. Therefore, it is necessary to explore the improvement effect of cognitive reappraisal emotion regulation strategy

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

on adolescents' depressed mood and the applicable conditions.

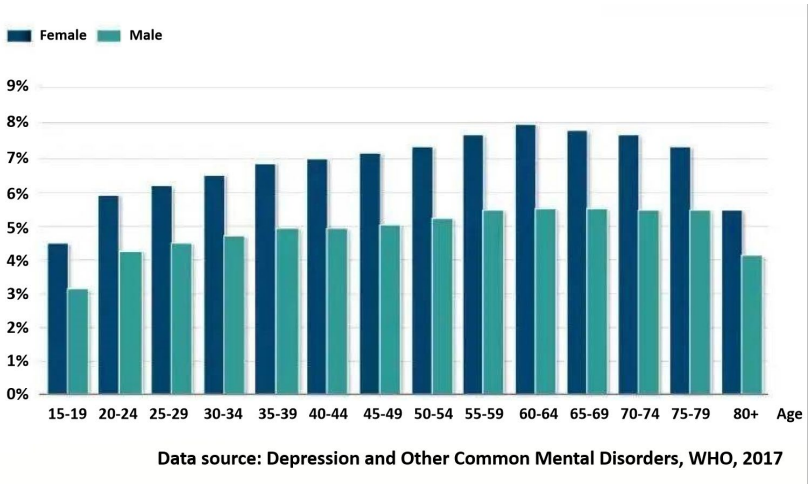

Figure 1: Global prevalence of depressive disorders, by age and sex (%)

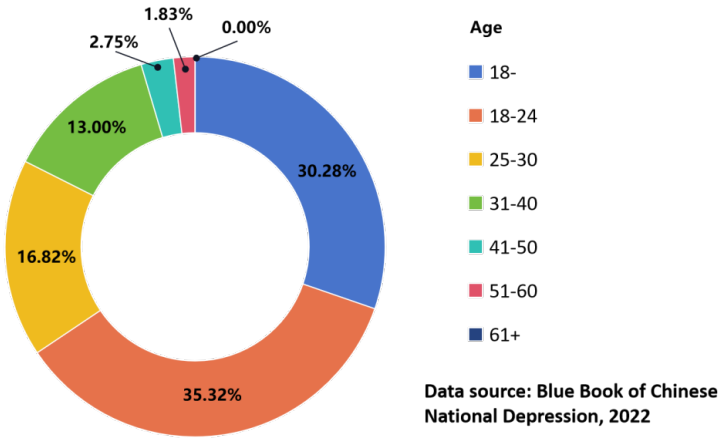

Figure 2: Depression patients under the age of 18 account for 30. 28% of the total population

The purpose of this study is to synthesize the relevant literature at home and abroad, to summarize the improvement effect and applicable conditions of cognitive reassessment emotion regulation strategy on adolescents' depressed mood, in order to be able to provide valuable references for the subsequent related research, and to provide ideas and methods for the treatment and prevention of adolescent depression.

2. Adolescent depression

Depression is a common, recurrent, and physically and emotionally debilitating illness that affects individuals and society as a whole. It is characterized by low mood, loss of interest, changes in sleep and appetite, fatigue and poor concentration, etc. Depression can have a significant negative impact on an individual's physical and mental health and affect their daily life and social functioning. The likelihood of developing depression is relatively low in childhood, but the prevalence increases dramatically from early to late adolescence and is six times that of normal children [6]. This is accompanied by increasing stress. Importantly, depression in adolescence is associated with an increased risk of suicide and can predict the odds of developing serious psychosocial problems in adulthood. Adolescent depression is therefore an important public health issue. However, not all adolescents with depressive symptoms develop mood disorders, which may be due to issues with differences in adolescents' ability to regulate mood in response to stressors. Therefore, examining the cognitive and behavioral characteristics of adolescent depression, as well as exploring the effects of cognitive reappraisal on depressive symptoms, is important for the prevention and treatment of adolescent depression. The current study addresses this theme and examines whether cognitive reappraisal, in which alterations to elicited emotional and physiological experiences lead to more

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

adaptive responses [7], reduces the impact of depressive symptoms. Previous findings suggest that cognitive emotion regulation strategies are associated with depressive symptoms. In a longitudinal study of adolescents, Silk et al. found that intensity and instability of mood and low effectiveness of emotion regulation in daily life were positively associated with depressive symptoms [8]. This means that for adolescents, learning and practicing effective emotion regulation strategies, as well as reducing overreactions to negative emotions, may help prevent or reduce depressive symptoms.

Developmental models of psychopathology suggest a strong association between a person's emotional response to a stressor and maladaptive outcomes, for example, when faced with stress, some individuals may show strong emotional reactions, major depression. This may stem from the interplay between stressors, emotional reactions to negative events, and poor cognitive coping methods. Numerous studies have shown that depression is associated with emotional reactivity [9], Ineffective emotion management in the face of stressful events may lead to severe cognitive conflict in individuals, thereby increasing the risk of psychiatric disorders [10]. At the same time, individuals with psychiatric disorders may have higher sensitivity and intensity of emotional responses to experienced stressful events, requiring more time to recover from emotional tension (i. e., peak activation) to baseline levels of normal mood [11]. For adolescents, this developmental shift in emotional management tools is especially important, such emotion management tools are particularly important during the developmental transition to adolescence, a time of significantly increased sensitivity to emotional reactions and stress. Additionally, adolescents with more depressive symptoms report greater emotional ups and downs and extreme instability. Therefore, it is essential for the adolescent population to acquire emotion regulation strategies to cope with negative life events and thus alleviate their maladaptive responses. However, this does not mean that all adolescents should use cognitive reappraisal strategies. Different individuals should have corresponding emotion regulation strategies. Future research should further explore the role of individual differences in emotion regulation and depressive symptoms, and how to develop personalized mental health interventions based on individual characteristics. Overall, there is a need for a deeper understanding of the complex etiology and pathogenesis of depression in adolescents, as well as the development of more effective interventions and treatments.

3. Overview of cognitive reappraisal

The ability to regulate emotions is highly complex, involving multiple stages of monitoring, assessing, and modifying emotional responses. In a process model of emotion regulation, Gross (1998a) distinguishes between two different types of regulation: regulation that occurs before the full activation of the emotion and regulation that occurs after the emotional response has occurred. The former is referred to as preoccupation emotion regulation and the latter is referred to as response-attention emotion regulation. Pre-attentive emotion regulation involves changing the interpretation of an emotional situation in order to control the emotional response before it is fully activated. Reactive attention emotion regulation, on the other hand, involves controlling emotional responses by reappraising or changing the situation after they have already occurred [12]. Numerous studies have found cognitive reappraisal to be a preoccupied and adaptive regulation strategy that is effective in regulating emotions and reducing the experience of psychopathology [13]. Cognitive reappraisal reflects an individual's subjective effort to change his or her appraisal of an emotion-producing situation, thereby influencing his or her own emotional experience. For example, a person who is nervous about an interview may tell himself that the interview is "my chance to learn more about the company," thus alleviating some of his anxiety. This positive reinterpretation can reduce the impact of negative emotions, such as anxiety, and increase an individual's mental health. The habitual use of cognitive reappraisal has been shown to be associated with several indicators of psychological well-being, such as good interpersonal functioning, positive emotions, and higher life satisfaction. Thus, cognitive reassessment plays an important role in reducing negative emotions and maintaining levels of mental health.

It has been suggested that cognitive reappraisal is an effective emotion regulation strategy because it often self-reports expected changes in emotion in order to control emotional responses before they become fully activated. The effectiveness of cognitive reappraisal has been further supported by several empirical sample studies examining cognitive reappraisal in naturalistic settings, whose findings are generally consistent with those of laboratory studies. Interestingly, the success of cognitive reappraisal was contrasted with inhibition. In contrast to suppression, where individuals tend to experience negative emotions appearing as a weak, ineffective, or paradoxical (reversed) change, success in cognitive reappraisal would allow individuals to understand and appraise their emotional responses in

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

an adaptive manner, resulting in more positive outcomes. Furthermore, the results of cognitive reappraisal were contrasted with those of attentional distraction; in some cases, distraction may be able to reduce negative emotions for a short period of time; however, in the long term, cognitive reappraisal was more effective in reducing negative emotions, i. e., reappraisal was not as effective as distraction for short-term timeliness in reducing negative emotions. Therefore, the timing of the use of cognitive reassessment strategies is particularly critical, and it has long-term positive effects that can help individuals better adapt to stress and challenges, thereby improving their mental health.

The frequency of cognitive reassessment use is typically associated with adaptive outcomes such as being in good physical condition, achieving high academic success, obtaining positive social outcomes, having a healthy psychological state, less psychological maladjustment [14-17]. These associations contrast with higher frequencies of disinhibition, which are typically associated with lower well-being, more maladaptive symptoms, and lower relationship satisfaction. This may be because inhibition is a cognitive strategy for coping with personal stresses and challenges in a non-adaptive manner. For example, inhibition may make it difficult for people to express their feelings and needs, which may lead to unsatisfactory relationships and unhealthy psychological states. In addition, inhibition may also make it difficult for people to cope effectively with difficult or challenging situations, which may lead to maladaptive symptoms and a lower sense of well-being. In summary, the frequency of use of cognitive reassessment is typically associated with a range of adaptive outcomes, whereas higher frequencies of inhibition are typically associated with lower well-being, more maladaptive symptoms, and lower relationship satisfaction. This suggests that cognitive reappraisal may be a useful tool to help people better adapt to different kinds of stress and challenges. However, further research is needed to explore whether the frequency of cognitive reassessment use actually affects people's physical condition, academic achievement, social outcomes, mental health, and relationship satisfaction.

Emotion regulation refers to a variety of strategies and techniques to change the nature, intensity, and expression of emotions to suit different situations and needs. Emotion regulation strategies vary in the degree and frequency of their use, and the results they bring can vary greatly. To address this issue, research has been conducted to confirm the personal and environmental factors that contribute to the successful use of emotion regulation strategies. Successful use of cognitive reappraisal varies by context: laboratory studies have shown that when negative affect is of moderate (not high) intensity, stimulus events are composed of cognitive stimuli rather than emotional stimuli, while possessing a relatively generous adjustment time. The effects produced are better when cognitive reappraisal strategies are utilized [18,19]. The effects of cognitive reappraisal may be realized when the emergence of negative emotions that are antagonistic to positive emotions is triggered [20]. Cognitive reappraisal utilizes cognitive control. Neuroimaging findings support these conclusions by showing that during cognitive reappraisal, brain responses in emotion-producing regions under the control brain regions of the prefrontal cortex, including the amygdala [21]. Gross et al. showed that cognitive reappraisal is less effective when cognitive activity controlled by prefrontal cortex regions is impaired. Indeed, sleep deprivation, low quality sleep, stress, and developmental variability in the integrity and functioning of the prefrontal cortex are all critical factors that influence the successful use of cognitive reassessment [22-24]. Therefore, we should pay attention to the conditions of cognitive reappraisal application and the influencing factors so that it can be effective in regulating emotions.

4. Cognitive reappraisal in adolescent depression

Coping with emotions during adolescence can be quite a challenge, especially in the face of unpleasant life events such as having to stay in an unfamiliar environment, disruptions in family, social, and school life, separation from friends and peers, stress, and changes that occur in the body [25]. Unpleasant life situations may lead to problems such as dysfunction. Numerous studies have shown a significant positive correlation between experiencing negative events and depressive symptoms [26]. The consequences of a depressed mood state are severe, negatively impacting overall mental and physical health, increasing the experience of pain, and slowing the recovery process. One of the main ways to cope with negative emotions is to use emotion regulation strategies. This will be important to protect individuals from the negative consequences of stressful events. Adolescents have the ability to regulate their emotions, which means that, to a large extent, they will have an impact on the emotions they experience, the duration of those emotions, and the way they are expressed.

When moderating the stress response, cognitive reappraisal is able to reduce state emotional responses in adults [27]. However, little is known about the effects of cognitive reappraisal on the relationship between depressive symptoms and emotional stress responses. Knowing that adolescents

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

with depressive symptoms are more likely to report higher levels of stress reactions, cognitive reappraisal may be one of the mechanisms that attenuate this relationship. In other words, reappraisal of stressful events may reduce the impact of depressive symptoms on emotional responses.

Several seminal experiments have reported neural differences in cognitive reappraisal between depressed and non-depressed adults [28]. Typically in these studies, participants undergo reappraisal training prior to functional magnetic resonance imaging, where they learn to minimize negative reactions (e.g. , it is not as bad as it seems) by reconstructing negative events/photographs [29]. During functional magnetic resonance imaging, subjects' responses during the implementation of the training (guided cognitive reappraisal) were compared to simply observing the negative stimuli (unguided emotion regulation): although behavioral data suggest that depressed adults are just as capable of using guided cognitive reappraisal as non-depressed adults, their brains show different patterns of activity [30]. A review of studies in mentally healthy adults identified three main areas involved in cognitive reassessment: (1) the dorsolateral prefrontal cortex, posterior prefrontal cortex, and inferior parietal lobe (involved in selective attention and working memory); (2) dorsolateral anterior cingulate cortex (thought to be involved in tracking the success of the reassessment), and (3) ventral prefrontal cortex (which may play a role in selecting targets from semantic memory for an appropriate responses). The main brain region involved in these is the prefrontal region, which modulates emotion by directly altering responses in subcortical regions associated with emotional responses (e.g., amygdala, ventral striatum, and insula) [31]. Activation of brain regions in depressed individuals differs, with enhanced activity in affective regions (e.g. , amygdala, insula), reduced activity in prefrontal regions (e.g. , ventral lateral prefrontal region), reduced connectivity between these regions, and altered levels of activation in brain regions associated with maintaining emotion regulation over time .

Whether these differences are also associated with adolescent depression remains an open question. Although prefrontal regions associated with cognitive reappraisal also continue to mature during adolescence, findings from normally developing adolescents suggest areas very similar to those involved in adult emotion regulation [32,33]. Based on studies of unguided emotion regulation in depressed adults and adolescents, a more recent study has found that under maintenance (as opposed to to reappraisal) conditions, depressed adolescents showed stronger activation of the right amygdala than controls [34-37]. Adult studies, which were also conducted, showed less connectivity between the amygdala, insula, and medial prefrontal cortex in this case, implying that adolescent depression may be related to impaired neural control over emotional responses. In contrast to studies with adults, brain regions in the experimental group showed stronger activation in connectivity between the amygdala, left medial frontal gyrus, and anterior cingulate cortex during guided reappraisal than in the control group [37]. The results tentatively suggest that under guided cognitive reassessment, depressed adolescents appear to be more able to resolve their pre-existing emotional regulation difficulties than normal adolescents. This may be due to the fact that adolescents with depressive symptoms are more susceptible to impact and change due to their unbalanced emotional state and impaired psychological functioning compared to normal individuals. This advantage is more likely to be found in adolescents, as prefrontal regions are not fully developed at puberty and are therefore relatively plastic. While these preliminary data involving cognitive reappraisal of static emotional photographs are interesting, the jury is still out on whether these neural distinctions apply when adolescents reappraise real-life interpersonal stressors. Further research could be conducted in this direction in the future.

5. Discussion

This paper provides a review of the role of cognitive reappraisal strategy in improving depression in adolescents, a strategy that changes perceptions and emotional responses to a negative event by reappraising it. The results of a large number of studies have demonstrated that cognitive reappraisal strategies are effective in enhancing adolescents' psychological resilience, thus helping them to better cope with negative emotions such as depression.

First, regarding the mechanism of action of the cognitive reappraisal strategy, some studies have shown that it achieves the regulation of negative emotions mainly through the activation of prefrontal regions (physiologically relevant studies). However, the mechanism of action of the cognitive reappraisal strategy seems to be more complex for adolescent depressed individuals. For example, it has been found that adolescent depressed individuals are more likely to activate brain regions related to emotion processing, such as the amygdala and insula regions, when confronted with negative events (another physiologically relevant study). This difference may be due to differences in the physiological mechanisms of emotion regulation in different groups when faced with negative events. However,

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

these findings are not yet sufficient to explain the ameliorative effects of cognitive reappraisal strategies on depression in adolescents, and further studies are needed to explore the mechanisms of action.

Secondly, there are studies on the differences between different groups, the first one compares the findings of depressed adolescents with non-depressed adolescents; there is no difference in the ability of depressed adolescents to use cognitive reappraisal strategies compared to non-depressed adolescents. This may be due to the fact that depressed adolescents' ability to change maladaptive cognitive processes was enhanced after receiving cognitive reassessment instruction. However, although the behavioral data were collected retrospectively and may be more susceptible to bias, these findings provide valuable clues for subsequent research. The second category is comparisons between different groups; it was found that under cognitive reappraisal, depressed adolescents' emotion regulation performance differed significantly from that of depressed adults, and future research needs to take this into account as well, and even more so by expanding the types of subjects such as depressed adolescents with specific experiences in childhood. In early adolescence, emotion regulation is lower, whereas adolescence goes through a long maturation period and is superior to adults in terms of plasticity. In fact, depressed individuals who receive cognitive reappraisal training may respond better than non-depressed adolescents and depressed adults. Thus, it is difficult to know whether depressed adolescents show stronger positive or negative functional connectivity relative to controls, and if we can be supported by more research in the future, including more extensive cognitive reassessment interventions and longitudinal measures of functional connectivity, the data from these studies could have significant implications for the treatment of adolescent depression and inform future interventions in depressed adolescent populations.

At the same time, differences in the use of cognitive reappraisal strategies across groups need to be further explored in future research. For example, are there differences in the use of cognitive reappraisal strategies across different types of depression (e.g., bipolar disorder and depression)? In addition, do factors such as different cultural backgrounds, gender, and life experiences influence the use of cognitive reappraisal strategies? These are all questions that need to be explored in depth in future research.

6. Conclusion

In conclusion, although depressed adolescents may have difficulty achieving adaptive cognitive reappraisal strategies without instruction, the available data clearly indicate that it is entirely possible for them to acquire and utilize such emotion regulation strategies if given appropriate instruction and training. These behavioral data, as well as evidence of enhanced connectivity in prefrontal cortical regions during emotion regulation, provide strong support for the value of cognitive reappraisal in the treatment of adolescent depression. These preliminary findings not only identify the potential of cognitive reappraisal strategies in optimizing the treatment of adolescent depression, but also provide clues in the search for neuromarkers that can be used to optimize existing treatments.

In addition, these data not only provide new perspectives and ideas for the treatment of depression, but also contribute to the development of other clinical techniques. For example, by understanding how adolescents with depression perform on cognitive reappraisal strategies, we can more specifically tailor treatment programs to help them better cope with the stresses and challenges in their lives. At the same time, these data also provide important references for other techniques and therapies aimed at improving the treatment outcomes of adolescent depression.

Therefore, the results of these studies are of great significance to the in-depth understanding of the pathogenesis of adolescent depression, the search for effective treatments, and the promotion of the development of related fields. We expect that future studies will further reveal the potential of cognitive reappraisal strategies in the treatment of adolescent depression and provide more comprehensive and effective support for mental health services for this important group.

References

[1] Valerie S Harder, Sara E Barry, Sarah French, et al. Improving Adolescent Depression Screening in Pediatric Primary Care [J]. Academic Pediatrics, 2019, 19(8):925-933.
[2] Jami Young. 25.2 interpersonal psychotherapy: adolescent skills training for the prevention of adolescent depression [J]. Journal of the American Academy of Child & Adolescent Psychiatry, 2016,

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

55(10):S38-S39.
[3] Bježančević Marina, Groznica Hržić Ivana, Dodig-Ćurković Katarina, et al. Self-Injury in Adolescents: A Five-Year Study of Characteristics and Trends [J]. Psychiatria Danubina, 2019, 31(4): 413-420.
[4] Brian Suffoletto. Expanding Adolescent Depression Prevention through Simple Communication Technologies [J]. Journal of Adolescent Health, 2016, 59(4):373-374.
[5] Webb Thomas L, Miles Eleanor, Sheeran Paschal, et al. Dealing with feeling: a meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation [J]. Psychological bulletin, 2012, 138(4):775-808.
[6] Ronald C Kessler, Patricia Berglund, Olga Demler, et al. The Epidemiology of Major Depressive Disorder: Results from the National Comorbidity Survey Replication (NCS-R) [J]. JAMA: The Journal of the American Medical Association, 2003, 289(23):3095-3105.
[7] James J Gross. The Emerging Field of Emotion Regulation: An Integrative Review [J]. Review of General Psychology, 1998, 2(3):271-299.
[8] Silk Jennifer S, Steinberg Laurence, Morris Amanda Sheffield, et al. Adolescents' emotion regulation in daily life: links to depressive symptoms and problem behavior [J]. Child development, 2003, 74(6):1869-1880.
[9] van Rijsbergen Gerard D, Bockting Claudi L H, Burger Huibert, et al. Mood reactivity rather than cognitive reactivity is predictive of depressive relapse: a randomized study with 5.5-year follow-up [J]. Journal of consulting and clinical psychology, 2013, 81(3):508-517.
[10] Amelia Aldao, Susan Nolen-Hoeksema, Susanne Schweizer, et al. Emotion-regulation strategies across psychopathology: A meta-analytic review [J]. Clinical Psychology Review, 2010, 30(2): 217-237.
[11] Rothbart M K, Derryberry D. Development of individual differences in temperament [M]. Advances in developmental psychology, 1981.
[12] Gross J J. Antecedent- and response-focused emotion regulation: divergent consequences for experience, expression, and physiology [J]. Journal of personality and social psychology, 1998, 74(1): 224-237.
[13] Moore Sally A, Zoellner Lori A, Mollenholt Niklas, et al. Are expressive suppression and cognitive reappraisal associated with stress-related symptoms? [J]. Behaviour research and therapy, 2008, 46(9): 1993-1000.
[14] Hermann Andrea, Kress Laura, Stark Rudolf, et al. Neural correlates of immediate and prolonged effects of cognitive reappraisal and distraction on emotional experience [J]. Brain imaging and behavior, 2017, 11(5):1227-1237.
[15] Appleton Allison A, Loucks Eric B, Buka Stephen L, et al. Divergent associations of antecedent- and response-focused emotion regulation strategies with midlife cardiovascular disease risk [J]. Annals of behavioral medicine: a publication of the Society of Behavioral Medicine, 2014, 48(2): 246-255.
[16] Zorana Ivcevic, Marc Brackett. Predicting school success: Comparing Conscientiousness, Grit, and Emotion Regulation Ability [J]. Journal of Research in Personality, 2014, 52:29-36.
[17] Cludius Barbara, Mennin Douglas, Ehring Thomas, et al. Emotion regulation as a transdiagnostic process [J]. Emotion (Washington, D.C.), 2020, 20(1):37-42.
[18] Shafir Roni, Schwartz Naama, Blechert Jens, et al. Emotional intensity influences pre-implementation and implementation of distraction and reappraisal [J]. Social cognitive and affective neuroscience, 2015, 10(10):1329-1337.
[19] Silvers Jennifer A, Weber Jochen, Wager Tor D, et al. Bad and worse: neural systems underlying reappraisal of high- and low-intensity negative emotions [J]. Social cognitive and affective neuroscience, 2015, 10(2):172-179.
[20] Waugh Christian E. The roles of positive emotion in the regulation of emotional responses to negative events [J]. Emotion (Washington, D.C.), 2020, 20(1):54-58.
[21] Carmen Morawetz, Stefan Bode, Birgit Derntl, et al. The effect of strategies, goals and stimulus material on the neural mechanisms of emotion regulation: A meta-analysis of fMRI studies [J]. Neuroscience and Biobehavioral Reviews, 2017, 72:111-128.
[22] Walker Matthew P, van der Helm Els. Overnight therapy? The role of sleep in emotional brain processing [J]. Psychological bulletin, 2009, 135(5):731-748.
[23] Zhan Jun, Wu Xiaofei, Fan Jin, et al. Regulating Anger under Stress via Cognitive Reappraisal and Sadness [J]. Frontiers in Psychology, 2017, 8:1372.
[24] McRae Kateri, Gross James J, Weber Jochen, et al. The development of emotion regulation: an fMRI study of cognitive reappraisal in children, adolescents and young adults [J]. Social cognitive and affective neuroscience, 2012, 7(1):11-22.

ISSN 2618-1584 Vol. 5, Issue 10: 112-119, DOI: 10.25236/FMSR.2023.051016

[25] Dorit Maor, Katherine Mitchem. Hospitalized Adolescents' Use of Mobile Technologies for Learning, Communication, and Well-Being [J]. Journal of Adolescent Research, 2020, 35(2):225-247.
[26] van den Heuvel Marieke W H, Stikkelbroek Yvonne A J, Bodden Denise H M, et al. Coping with stressful life events: Cognitive emotion regulation profiles and depressive symptoms in adolescents [J]. Development and Psychopathology, 2019, 32(3):1-11.
[27] J Gaab, N Blättler, T Menzi, et al. Randomized controlled evaluation of the effects of cognitive–behavioral stress management on cortisol responses to acute stress in healthy subjects [J]. Psychoneuroendocrinology, 2003, 28(6):767-779.
[28] Ochsner Kevin N, Silvers Jennifer A, Buhle Jason T, et al. Functional imaging studies of emotion regulation: a synthetic review and evolving model of the cognitive control of emotion [J]. Annals of the New York Academy of Sciences, 2012, 1251(1):E1-24.
[29] Kevin N Ochsner, Rebecca D Ray, Jeffrey C Cooper, et al. For better or for worse: neural systems supporting the cognitive down- and up-regulation of negative emotion [J]. Neuroimage, 2004, 23(2):483-499.
[30] Erk Susanne, Mikschl Alexandra, Stier Sabine, et al. Acute and sustained effects of cognitive emotion regulation in major depression [J]. The Journal of neuroscience: the official journal of the Society for Neuroscience, 2010, 30(47):15726-15734.
[31] Phan K Luan, Fitzgerald Daniel A, Nathan Pradeep J, et al. Neural substrates for voluntary suppression of negative affect: a functional magnetic resonance imaging study [J]. Biological psychiatry, 2005, 57(3):210-219.
[32] J Lévesque, Y Joanette, B Mensour, et al. Neural basis of emotional self-regulation in childhood [J]. Neuroscience, 2004, 129(2):361-369.
[33] Naomi B Pitskel, Danielle Z Bolling, Martha D Kaiser, et al. How grossed out are you? The neural bases of emotion regulation from childhood to adolescence [J]. Developmental Cognitive Neuroscience, 2011, 1(3):324-337.
[34] Dannlowski Udo, Ohrmann Patricia, Bauer Jochen, et al. Amygdala reactivity to masked negative faces is associated with automatic judgmental bias in major depression: a 3 T fMRI study [J]. Journal of psychiatry & neuroscience: JPN, 2007, 32(6):423-429.
[35] Teresa A Victor, Maura L Furey, Stephen J Fromm, et al. Relationship Between Amygdala Responses to Masked Faces and Mood State and Treatment in Major Depressive Disorder [J]. Archives of General Psychiatry, 2010, 67(11):1128-1138.
[36] Christopher G Davey, Nicholas B Allen, Ben J Harrison, et al. Increased Amygdala Response to Positive Social Feedback in Young People with Major Depressive Disorder [J]. Biological Psychiatry, 2010, 69(8):734-741.
[37] Greg Perlman, Alan N Simmons, Jing Wu, et al. Amygdala response and functional connectivity during emotion regulation: A study of 14 depressed adolescents [J]. Journal of Affective Disorders, 2012, 139(1):75-84.