

Research on the effect of attentional bias on Non-suicidal Self-injury

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Abstract. Non-suicidal Self-injury means that an individual intentionally and repeatedly changes or injures his or her body tissues without a clear intention to commit suicide. It is a non-lethal or less lethal destructive behavior aimed at self-injury. Self-injury is a major hidden danger to public mental health. Based on the recent research results of NSSI, this paper summarizes the relationship between NSSI and attention bias and emotion regulation. On this basis, an attempt is made to construct a model of how attention bias affects patients' NSSI by influencing their emotional information and putting forward research prospects. People are biased in processing and responding to negative emotional content, and this attention bias will increase the difficulty of emotional regulation in NSSI patients. Patients with NSSI usually have more difficulty controlling negative emotions. For NSSI patients, NSSI behavior is a common way to regulate emotions. NSSI can temporarily relieve negative emotions, and this result strengthens the association between negative emotions and NSSI. Future studies may pay more attention to brain abnormalities in NSSI patients.

Keywords: Non-suicidal Self-injury, attentional bias, emotional information.

1. Introduction

Non-suicidal self-injury (NSSI) refers to the intentional and repeated alteration or injury of one's body tissues by an individual without explicit suicidal intent. It is a non-lethal or less lethal destructive behavior that targets the individual for harm [1,2]. In the latest Diagnostic and Statistical Manual of Mental Disorders (DSM-5), self-harm is no longer classified as a symptom of borderline personality disorder (BPD), but as a separate mental disorder. Non-suicidal self-injury is a major hidden danger to public mental health [3].

It is generally believed that self-injury behavior is related to abnormalities in emotion, control, pain, and reward brain regions. There are a variety of neurophysiological mechanisms to explain the model, and a large number of cognitive and behavioral studies have confirmed it [4]. In recent years, researchers have found that attention bias is a reason for the occurrence and recurrence of some mental diseases [5]. For NSSI patients, there should be other ways to regulate emotions besides NSSI, such as talking, etc. Their preference for NSSI behavior reveals that their attention brain regions may also be abnormal.

At present, there is no research on the mechanism of attention brain regions in patients with NSSI. Based on the existing research, this paper proposes a hypothesis that attention bias affects patients' self-

injury behavior by affecting their emotional regulation. It is helpful to reveal the mechanism of NSSI and help to control and intervene in NSSI.

2. Research status

2.1. *Non-suicidal Self-injury*

Previous studies have shown that some individuals with NSSI do not actively seek clinical attention, and accurate reporting is considered to be socially biased. Liu Hanmei et al. conducted a study with a sample of college students at a university [6]. According to the results of this study, the situation of NSSI among college students is severe. This study found a significant positive association between negative life events and NSSI, and the more frequent and intense negative life events experienced, the more likely NSSI was to be induced. The results support the integrative model of NSSI development that suggests negative life events are risk factors for NSSI in college students [7]. Long-term accumulation of negative life events may cause mental health problems, damage the social function of individuals to a certain extent, and lead to the generation of negative emotions. With the gradual increase of negative events experienced, negative emotions continue to accumulate, and some college students may adopt inappropriate coping styles (such as NSSI) to alleviate negative emotions. It can be found that emotional regulation difficulty was an important mediating mechanism for negative life events affecting NSSI. According to the experience-avoidance model of NSSI, stressful events in the external environment trigger the individual's negative emotional experience [8]. Under the interaction of multiple factors, such as emotional regulation difficulties and a lack of emotional regulation strategies, individuals perform NSSI to avoid or alleviate the negative emotional experience [9]. In this study, individuals with NSSI had higher scores of negative life events and emotional regulation difficulties than those without NSSI, indicating that they were more affected by negative life events and had weaker emotional regulation abilities.

According to ego depletion theory, self-control resources are limited within a certain time range, and usually, negative life events will induce negative emotions. To cope with bad emotions, individuals will mobilize their resources. When self-control resources are excessively consumed, uncontrollable behaviors caused by self-control failure and emotional regulation difficulties may occur. Therefore, NSSI may be the result of emotional regulation difficulties and impaired behavioral inhibition when negative emotions rise sharply. NSSI results in temporary relief of negative affect, which reinforces the link between the experience of unpleasant emotions and NSSI. The next time an individual is unable to cope with the negative emotional experience caused by a negative life event, he or she may resort to NSSI to avoid it.

2.2. *Attentional bias and Non-suicidal Self-injury*

In recent years, attention bias has been proven to be the cause of the generation, maintenance, and recurrence of some mental disorders.

The research results of Ji Jianmao et al. showed that junior high school students involved in harmful behavior showed more attention avoidance to aggressive and harmful event words, and the bullied who had self-harm behavior showed a trend of attention avoidance [10]. Because harmful behaviors are not advocated, junior high school students involved in them are unwilling to face or accept them, which is reflected in the attention avoidance mechanism. Hu Fangfang's study showed that vulnerable children scored significantly lower on the Piers-Harris Child Self-awareness Scale than other children and were prone to passive avoidance when facing problems [11]. Therefore, the bullied and self-injured showed a tendency toward attention avoidance. Osinsky et al. believed that the attention bias of individuals to negative information is related to their usual negative behaviors, and the occurrence of these behaviors can promote cognitive changes [12]. This may also explain the attentional bias of junior high school students involved in injurious behavior toward events that are aggressive or injurious.

The human body has a special sensitivity to the negative emotional information in the environment, which is called the negative bias of emotion. Compared with positive and neutral events, negative stimuli

seem to have a higher cognitive processing priority. Luo Yuejia et al. showed that there is a bias in the processing and reaction of negative emotional content, which may occur at one or several stages in the process of information processing and output, including multiple time points, such as attention, evaluation, and response preparation [13]. In the process of information processing, negative emotional stimuli have some priority at least in the stages of attention, evaluation, and response preparation. Attention bias can also occur in implicit tasks, and negative stimuli can compensate for the lack of attention resources. In terms of the effect of emotion on working memory, the amplitude of P300 decreased in spatial working memory tasks under negative emotion, which may be based on the regulation of emotion in the parietal attention system. However, this effect disappeared in verbal working memory tasks. Behavioral experiment data show that negative events cause faster emotional responses and more significant effects. fMRI results showed that the activation of certain brain regions in response to negative visual and emotional stimuli was enhanced.

The study by Jessica L. Jenness et al. found consistent age-related variation in the association between emotional attentional bias and psychopathology symptoms during childhood, adolescence, and young adulthood [13]. In adolescents and young adults, more attention to angry faces was positively associated with internalizing symptoms, and more attention to happy faces was positively associated with externalizing symptoms, but not in children. In addition, greater attention to happy faces was positively associated with anxiety symptoms in children, but not adolescents or young adults. These findings suggest developmental differences in the association between attentional bias toward emotional stimuli and psychopathology symptoms, which may inform when certain interventions, such as attentional bias correction training, may be most effective.

Lu Ting et al. found that in the priming condition, the response time of s NSSI patients to commonly used words of NSSI was significantly longer than that to infrequently used words of emotion regulation and infrequently used words of NSSI, and the effect size reached a moderate level [14]. This result indicates that when it is necessary to regulate emotion, self-injurious people tend to pay attention to their commonly used ways of NSSI. The reason why NSSI patients show this attentional bias is that for most self-injurers, self-injury is an important way of emotional regulation. When they need to regulate their emotions, they are more likely to pay attention to their common ways of NSSI. This could explain why NSSI patients habitually resort to self-injury rather than other methods when they need to deal with their negative emotions.

2.3. Emotional information and Non-suicidal Self-injury

Studies on the influencing factors of NSSI show that NSSI occurs under the joint action of many factors [15, 16]. Among many influencing factors, researchers emphasize the importance of emotional factors and believe that NSSI is a behavior closely related to emotion [17, 18]. Several previous studies have shown that emotional regulation disorders are a core factor in the maintenance and development of NSSI [19, 20]. Chapman et al. suggested that the emotional management disorder of the self-injured manifests in three aspects: inability to express emotions, difficulty in emotional regulation, and high emotional intensity [21]. Emotional expression disorder, also known as Alexithymia, is a cognitive-affective disorder that affects individuals' emotional experience and expression. Emotional disorders often manifest as abnormalities in the processing of specific emotional information. A large number of theoretical and clinical studies agree that an important function of NSE is to release, express, or transmit emotional feelings. Therefore, emotional expression cannot be correlated with NSE [22, 23]. Emotional regulation refers to the individual's awareness, understanding, and acceptance of their emotional experience and the flexible use of strategies to make appropriate behaviors. The lack of any of the above abilities can be defined as emotional regulation difficulties. When facing stressful events and experiencing negative emotions, NSSI patients often show different degrees of emotional regulation disorders. The abnormality of emotional brain areas in the limbic system, such as the amygdala, may be one of the mechanisms of NSSI.

A study by Gratz et al. on a sample of 97 college students found that emotional regulation difficulties could distinguish 64% of self-injurers from non-self-injurers with an accuracy of 80% [24]. High

emotional intensity mainly includes a low emotional arousal threshold and high emotional response intensity. Herpertz et al. found that the NSE group was more irritable and angrier than the control group, indicating that the NSE group was more likely to produce a high level of emotional arousal, and a high level of emotional arousal itself would increase the difficulty of emotional regulation [25]. The experiential avoidance model of NSSI suggests that individuals with high emotional intensity tend to engage in NSSI when an emotionally evocative event occurs, as NSSI is a practical means of escaping unwanted experiences [21].

Jinmeng Liu et al. found that people with a history of NSSI had significantly lower negative emotional awareness and significantly higher negative emotional control difficulties than those without a history of NSSI [26]. However, the two groups had no significant difference in emotional reactivity or affective inhibition control of positive emotions. The findings also suggest that a reduced ability to suppress negative emotions may be a meaningful indicator of risk for NSSI severity.

3. Future study

In recent years, researchers agree that attention bias is not only an accompanying phenomenon or symptom of some mental diseases, but also the cause of the emergence, maintenance, and recurrence of mental diseases. Intervention attention can change the symptoms of mental illness, which has brought attention to the clinical treatment of this area. Therefore, a large number of studies have emerged on Attentional Bias Training (ABT) for the treatment of various mental diseases, and ABT has been proven to have good clinical effects. ABT originated from innovations in research methodology and has since become a widely used intervention. ABT has not only become a new technique for relieving or treating psychological disorders but also provides a new perspective for understanding the mechanism of psychological abnormalities. In future studies, more attention can be paid to the effect of ABT on NSSI psychotherapy, and the mechanism of psychological abnormalities in NSSI patients can be understood through ABT.

In addition, at present, there is no research on the neural mechanism of the attention brain area in patients with NSSI. However, it is generally believed that the abnormal attention bias is related to the overactivation of the amygdala and the decreased activity intensity of the prefrontal cortex, and future studies can focus more on this part.

4. Conclusion

Existing studies have put forward many views on the mechanism of NSSI. Based on these views, it can be concluded that NSSI may be caused by the combination of an individual's emotional regulation disorder and an abnormal attention bias. However, there is still a lack of research on the effect of attentional bias on NSSI. Therefore, this paper tries to summarize the influence of attentional bias on NSSI by matching the existing psychological research results with cognitive processes.

The human body is more sensitive to negative emotional information in the environment; negative stimuli have a higher cognitive processing priority, and negative life events cause emotional reactions faster. There is a bias in the processing and response to negative emotional content. In the process of information processing, negative emotional stimuli have priority, at least in the stages of attention, evaluation, and response preparation. In the face of negative life events, patients with NSSI will produce high levels of negative emotional arousal based on their attention bias toward negative emotions, increasing emotional regulation difficulty. The ability of NSSI patients to regulate emotions is usually weak, and they have greater difficulty controlling negative emotions. For NSSI patients, NSSI is a common way to regulate their emotions. Negative emotions temporarily relieved negative NSSI, which strengthened the association between negative emotions and NSSI. When the next time NSSI patients need to regulate the negative emotions caused by negative life events, they will be more likely to notice their common ways of NSSI and may take NSSI behavior again to avoid it.

However, at present, this conclusion is based on independent empirical studies. In the future, the overall cognitive process and neurophysiological mechanism of NSSI can be verified from the perspective of integration.

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