

The Atypical Emotional Processing in Bipolar Disorder and Relevant Interventions

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Abstract. Individuals with bipolar disorder (BD) demonstrate impaired functioning including cognitive deficits, neurological damage, and psychosocial dysfunction. Atypical emotional processing, the lack of normal functioning in identifying human emotions, is one of the most significant impairments observed in individuals with BD. Such abnormal emotional processing has different causes. Deficits in emotion perception and recognition can contribute to the impaired social functioning in separation or in combination, which can further impede social functioning. Both facial emotion recognition deficits (FERD) and alexithymia are proven to be powerful predictors of BD development. Relevant interventions including Mindfulness-Based Cognitive Therapy for Children (MBCT-C), Dialectical Behavior Therapy (DBT), and Positive emotion regulation (PRE) intervention are verified to be effective in treatment for BD patients with deficits in emotional processing. By examining recent literature, this review encapsulates the relationships between atypical emotion recognition and perception and impaired social functioning, the relationship between deficits in emotional processing and BD symptoms, and efficacy of the interventions focusing on mindfulness, presenting a more comprehensive understanding in this area. It can provide some guidance to the prevention and intervention studies and practices for at-risk adolescents.

Keywords: Bipolar Disorder; emotional processing; social functioning; interventions

1. Introduction

Bipolar Disorder (BD), according to the National Institute of Mental Health (NIMH), is a mental disorder that shifts a person's mood, energy, activity levels and concentration to an unusual extent, affecting the capacity to handle fundamental tasks in daily life [1]. Individuals with BD may experience intense emotions that are unusual, having either a manic episode or a depressive episode. Being one of the most prevalent mental disorders, bipolar disorder affects more than 1 percent of the global population [2]. The unusual shifting moods in bipolar disorder impair functioning in daily life, impeding patients' normal life and may lead to increasing mortality. Impaired by the illness in the ability to process emotions, individuals with BD may have trouble in school or workplace as it is difficult for them to regulate their own emotions, to retain interpersonal relationships, and to behave appropriately in these situations.

Current research focusing on BD suggests that the illness causes impairment in multiple aspects, including cognitive deficits, neurological damage, and psychosocial dysfunction [3]. With respect to cognitive deficits, it could provide strong predictive power for psychosocial disability. BD patients who suffer from cognitive dysfunction would undergo executive impairment, which means that they experience hardship in higher level cognitive processes, such as planning, making decisions, solving problems, organizing tasks, pursuing goals. Such difficulties in these frequently used processes involving language, judgment, abstraction, and logical reasoning therefore disrupt their educational and vocational development and lead to further psychosocial problems. Psychosocial stress occurring on BD patients with severe illness courses also have toxic effects that lead to neurological damage. The abnormalities in the brain reduce both the neurocognitive ability and psychosocial functioning.

The processes of labeling and describing are of the most unique characteristics that distinguish human beings from animals. Emotion, a consciously experienced intense mental activity, is one of the most frequently experienced mental states by people on a daily basis. It is emotions that help people to understand themselves, to empathize with others, and to connect with the world. People who have deficits in emotion may find their life meaningless and may not be able to adapt to society.

Therefore, emotions have various meanings to people's daily lives and mental health. Not only do people have to cope with their own emotions, but they also need to communicate emotions from other people. It is significant that individuals be able to process emotions, meaning that they should be capable of perceiving emotions, recognizing them, and finally responding to them. According to Niedenthal and Brauer, accurately processing facial expressions is an ability of significant necessity within the social context, as it fosters learning and social understanding and facilitates group empathy, communication, and cohesion [4]. People who have functional disabilities in emotional processing may encounter difficulties in interpersonal relationships, as they may not be able to respond appropriately to the emotions from other people, or fit into the expectation from the society, which may cause distorted behaviors and develop mental illness as time accumulates.

The impaired function of patients with BD in emotional processing may have different causes, as there are a few stages in emotional processing. Therefore, for the purpose of better understanding the relationship between emotional processing and bipolar disorder, as well as better developing the treatment, this paper reviews current research about emotional processing deficits in patients with BD, covering the studies examining atypical emotion recognition and perception in BD patients, effects of emotional processing deficits on the symptoms, and the corresponding interventions. By recapitulating the current literature concentrating on emotional processing and bipolar disorder, this review provides further insights into how deficits occurring in different stages contribute to the atypical emotional processing in BD patients, how these deficits affect the BD symptoms, and how relevant interventions proved to be beneficial in the treatment.

2. Emotional Processing Deficits in Bipolar Disorder

2.1 Atypical Emotion Recognition and Perception

Defined as the process of identifying human emotions, emotional recognition largely affects social functioning. Under a social context, a person needs to correctly recognize emotions from other people in order to communicate smoothly with them. If a person's capability of emotion recognition is impaired, the messages conveyed by emotions will be misinterpreted and the person will not be able to respond in an appropriate manner. Such lack of ability then further weakens the person's social relationships, which eventually undermines the person's social functioning. Among the several stages of emotional processing, researchers have found that deficits could occur in a very early stage, namely, the recognition of emotions, in patients with BD. Struggles in recognizing human emotional facial expressions can be both the symptoms of BD and a predictor for future development of BD. After specifically examining facial emotion recognition deficits (FERD) among a sample consisted of adult subjects with bipolar disorder (BD) in remission period, first-degree relatives of subjects with BD (HR), and matched healthy subjects (HC), Reddy et al. asserted that BD patients demonstrated FRED in general, suggesting that they have significant deficits in emotion-cognitive processing over a broad spectrum of emotions, while HR subjects were found to have explicit deficits in both fear labeling and anger labeling, which indicates impaired emotional processing [5]. These deficits in emotion labeling and recognition implied impairment in social functioning, since BD patients may not be able to figure out the emotion from others and therefore could not respond in an appropriate manner. In emotion processing, if one deviates in the very first stage, being unable to correctly recognize the emotion, it would nearly be impossible that they could maintain healthy relationships with others. For example, in the workplace, individuals with BD may wrongly recognize anger from colleagues as fear, and if they take actions to further irritate the colleagues, the relationship may be endangered. Therefore, deficits in emotional processing could disrupt patients' daily life by impairing their social functioning.

Emotion perception can also exert noticeable influence on social functioning. It is significant that a person is able to correctly label the emotions from others in order to perceive and the emotions correctly. It is also essential that a person interprets the intensity of emotions from others precisely in order to engage in the appropriate behavior to respond. Nevertheless, BD patients demonstrate deficits

in emotion perception, which hints impairment in their social functioning. BD patients may not be able to perceive the intensity of emotions from others accurately. Normally, when looking at the facial expressions of others, people are capable of telling what those expressions are and perceiving how strong the feelings are being conveyed, so that they function accordingly to process the emotions. However, BD patients with the perception deficit may lead them to engage in dysfunctional behaviors: they may receive the wrong message conveyed by others, as BD patients are more inclined to overestimate the intensity of the emotions than they actually are. The research conducted by Branco et al., which examined the accuracy in identifying and perceiving the six fundamental facial expressions of emotions (i.e., happiness, sadness, disgust, anger, fear, and surprise), revealed that patients with BD were less accurate in the identification and intense perception of disgust compared with control groups, and if the facial expression of sadness was shown for a shorter period, BD patients would also become less able to correctly identify it [6]. This lack of ability to accurately identify expression supports the conclusions from the study done by Reddy et al., corroborating that BD patients have deficits in facial emotion recognition and are possibly missing the minor clues from the facial expressions of others in social situations [5]. The tendency to overestimate the intensity of the emotions from others, especially negative emotions such as disgust, may have the possibility to exacerbate their conditions, as they may interpret the subtle meanings conveyed by facial expressions in an incorrect manner, resulting in their maladaptive behaviors and cognitive patterns. As a result, deficits in emotion perception also contribute to the impairment of social functioning in individuals with BD.

Deficits in emotion processing were evidenced not only by studies conducting experiments receiving subjective reports from the participants, but also by objective measurements of physical data. It was found that emotion recognition can be affected by micro saccade, as the subtle eye movements are related to perceiving emotions. When a person sees a facial emotional expression, the stimuli first come into the visual cortex, and then the signals are transmitted to the brain, and the brain starts to label the emotion. People's eyes move to a minute extent in the stage of the visual cortex receiving stimuli, preparing for the perception of emotions. However, BD patients are lacking the micro saccade for the preparation of emotion perception, which results in the impaired capability of emotion recognition. The study conducted by Yep et al. explored the relationship between executive functioning and emotion processing by examining participants with adult attention-deficit hyperactivity disorder (ADHD) and bipolar disorder (BD) [7]. In the experiment, subjects were required to complete emotional prosaccade tasks (i.e., looking toward the target) and anti-saccade tasks (i.e., looking away from the target) and their eye movements were tracked during the tasks. Macro saccade, the greater eye movements in the horizontal direction, of the subjects, as well as micro saccade, the subtle eye movements preceding the appearance of targets, were detected by researchers and were used to analyze the emotional processing of the subjects for each trial. The results provided further verification of the atypical emotional processing manifested in patients with BD, suggesting that a lower micro saccade rate anteceding the commencement of pro vs. anti-saccade was exhibited in the healthy group, which is a critical modulation related to the tasks but was not observed in the patient groups. As the micro saccade rate provides indications of deficits in preparation and attention before receiving the emotions in both disorders, the absence of the micro saccade behavior in the BD group demonstrated that there is functional impairment that impedes the normal emotional processing in individuals with BD. In social situations, BD patients may be incapable of preparing for and paying enough attention to receiving emotions from others. These results indicate that the deficits of BD patients in emotional processing could be generated even before the occurrence of emotions, meanwhile providing further proof for the atypical emotional processing presented in BD patients.

2.2 The Effects of Atypical Emotional Processing on Bipolar Disorder Symptoms

Deficits in emotional processing, especially FERD, can be related to symptoms demonstrated in bipolar disorder. Mood symptoms can be affected by deficits in emotional processing. For instance,

a person who is unable to recognize the sadness from a child may respond in an inappropriate way, which would make the child cry even more. As the person could not understand why the child cried harder, the person might feel more anxious, which may lead to more serious mania. A longitudinal study carried out by Macpherson et al. assessed the relationship between recognition errors (i.e., number of times a participant wrongly identifies an emotion as another one) on child/adult emotional expressions (only measured at baseline) and the ensuing mood symptoms (measured at 6 months, 12 months, 18 months, and 24 months after the emotion recognition tasks) in young adults with childhood-onset BD [8]. The results suggested that the BD patients' inability to recognize the emotional expressions on other people's faces could be a predictor of subsequent mania or depression. The trajectory was analyzed and demonstrated on the basis of the four assessments of the mood symptoms in two years after the execution of the emotion recognition. It was found that, on the one hand, mania was more stable/consistent in BD subjects who made more errors in recognizing child emotional expression, while making fewer errors indicated that mania was more unlikely to set off and the severity of the symptom was decreasing. On the other hand, in recognizing adult sad expressions, BD subjects making more mistakes implied that their depression course would be stable/consistent, along with reducing mania, while making fewer such mistakes hinted that patients would experience tempered depression and the trajectory of mania would be stable/consistent.

It is understandable that young adults who were less capable of recognizing child facial expressions are more prone to have a subsequent stable manic episode, as this may contribute to difficulties in family functioning and parenting. For instance, when these young adults build a new family and have a baby, if they could not understand the child's emotion, they would not be able to react to those emotions correctly and appease the child. The child's response may be out of the young adult's expectation, which therefore make them more likely to feel anxious and mad, leading to a subsequent mania. Also apprehensible is that young adults who make more recognition mistakes in adult sad expressions are susceptible to a depressive episode in the later course. If confronting a peer who was sad, a young adult could not recognize it and show empathy, the relationship could be weakened, which might further worsen the young adult's depression, making that episode become more stable/consistent. This long-term study not only revealed the relationship between FRED in BD patients and the subsequent symptoms, but also verifies that deficits in emotional processing could cause impairments in social functioning.

Alexithymia, i.e., incapable of identifying and describing one's emotions, has an impact on people's social functioning. When the emotions occur, a person cannot identify what they are or to put the feelings into words. Therefore, the person could not communicate the emotions with others to understand them, vent them, and finally digest them. In this case, the person would be less intended to engage in the outside world, which indicates a decreased externally oriented thinking, but could only focus on the inner world. Such a lack of the ability to identify and describe the emotions hinders people's ability to communicate their emotions, which further affects their social functioning. The study conducted by Ospina et al. examined the predictive power of alexithymia for poorer social and everyday functioning in patients with bipolar disorder (BD group) and schizophrenia (SZ group), showing that alexithymia is also observed to be applicable in predicting impaired social functioning in individuals with BD [9]. Both patient groups in the study had higher scores on alexithymia, especially on feeling description and identification, compared to HCs. The results revealed that by evaluating the recognizing difficulties in reporting feelings and externally-oriented thinking, social functioning in the BD group was predictable. In certain other aspects in alexithymia, more specifically, the domain of describing feelings, demonstrated predictive power in functioning independently, supporting the prediction models by verifying that lower levels of functioning can be foreseen by more severe alexithymia. Alexithymia may contribute to the exacerbation of symptoms in BD in the way that patients would find it challenging to identify and describe their feelings, which makes it difficult for them to control their emotion. As time accumulates, they can neither confide their emotions to ease them, nor switch their emotions to eschew the negative feelings, making patients

trapped in either mania or depression. Therefore, alexithymia could impair the functioning of BD patients and deteriorate the symptoms.

3. Relevant Interventions for Bipolar Disorder

Several interventions were substantiated to be effective for individuals with or at-risk for bipolar disorder. One of these interventions is mindfulness-based cognitive therapy, a kind of intervention that aims to promote people's use of meditative practices to notice, identify, accept, and respect their current emotions and thoughts, instead of being resistant to their feelings and being anxious about their futures. Cotton et al. found that compared with children being in the waitlist period, youth in Mindfulness-Based Cognitive Therapy for Children (MBCT-C) period demonstrated more considerable improvements in overall clinical severity, even though no critical differences were observed between the treatment period and the waitlist period with respect to modifications in clinician- and child-rated anxiety, emotion regulation or mindfulness [10]. Due to the challenges encountered in changing cognitive patterns and behaviors the youth who received MBCT-C might not be aware of their improvement during the treatment period, their clinical evaluations were actually ameliorated though.

Dialectical Behavior Therapy (DBT) is another intervention that has been proved to be an effective intervention for BD. The principal purpose of DBT is also cultivating people's ability to regulate their emotions, to keep the balance between having no worries at all and having too many concerns anxiously, and to focus on their life in the moment rather than being distressed by things yet to come. The study by Afshari et al. found that compared with the group put into the waitlist, the group that received DBT intervention demonstrated effects of DBT on multiple perspectives. For instance, patients enhanced their abilities to plan, to solve problems, to regulate their emotions; ameliorations were also detected in the mood symptoms, psychological flexibility, and mindfulness in the BD subjects over the time of the study [11].

Positive emotion regulation (PRE) intervention is also a treatment that could enhance the clinical severity of BD patients. Painter et al. conducted research focusing on PRE intervention for Bipolar I Disorder [12]. It was pointed out that PRE is designed to cultivate BD patients' ability to modulate positive emotions, from the onset, to nature, to the entire course. PRE coaches BD patients to transit from high activation positive emotion (HAP), which means it is more difficult for them to experience positive emotions, to low activation positive emotion (LAP). This intervention aims to provide BD patients with positive emotions experience while avoiding the risk of the onset of mania. Findings in this study suggested that the structure and content of the Learning Affective Understanding for a Rich Emotional Life (LAUREL) intervention, originated for the purpose of increasing low activation positive emotion (LAP), was practical and the employing PER intervention in the BD treatment was efficacious. All the interventions mentioned all aim to improve BD patients' ability to focus on their current emotions, to accept them no matter whether they are desirable or not, so that they could regulate these emotions. With this core principle in mind, BD patients will not have to fight with the undesirable emotions, which make them not only anxious but also exhausted. More improvement followed as BD patients receiving these interventions reported enhanced mindfulness, which further validates the effectiveness of these interventions.

4. Conclusion

In the present review, recent literature related to the atypical emotional processing in bipolar disorder and relevant interventions have been scrutinized. It has been found that FRED leads to the atypical emotion recognition, reflecting remarkable deficits in emotion-cognitive processing that further impairs psychosocial functioning. The inability to notice or to prepare for accepting emotions and to perceive emotion intensity in an accurate manner also can contribute to the psychosocial disability in BD patients. In terms of the effects of emotional processing deficits, it has been

discovered that FRED could be used to predict the following mood symptoms, for either a subsequent mania or depression. Alexithymia, the inability to identify and describe feelings, also can exacerbate the symptoms in BD. Moreover, efficacious interventions are also available for the treatment. MBCT-C focuses on improving patients' mindfulness. DBT, aims to develop patients' ability to find balance in extreme positions. PER interventions cultivate patients' skills to enhance their low activation positive emotion. All the effects of these interventions have been shown to be valid. In summary, atypical emotional processing plays an important role in the psychosocial impairments observed in individuals with BD, as it not only causes deficits in emotion recognition and perception, but also deteriorates BD symptoms. Relevant interventions were found, but ongoing research and treatment methods are still necessary. This review can provide some profound insights to future research and the design of relevant prevention and intervention programs at schools.

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