

The role of the cognitive biases along the psychosis continuum: from pathophysiology to treatment options

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Summary

Schizophrenia and related psychoses is primarily characterized by positive and negative symptoms, as well as cognitive disturbances. Cognitive factors crucial in the pathogenesis of psychosis are specifically studied in terms of cognitive biases that may play a role in the formation and maintenance of psychotic symptoms. Cognitive biases refer to systematic errors in both cognitive processing and content that deviate from logical thinking. Cognitive biases can affect attention, decision-making/reasoning, memory recall, motivation or even attributional style. Psychotic-like experiences and psychotic disorders have been associated with a tendency to jump to conclusions, bias against disconfirmatory evidence and bias against confirmatory evidence as well as liberal acceptance bias. Moreover, patients with schizophrenia tend to present higher belief inflexibility in comparison to healthy individuals and are overconfident in wrong judgments. In the monitoring tasks showing they show a higher tendency to misattribute internally-generated stimuli to external sources (externalizing bias) [1]. Finally, patients with schizophrenia tend to have excessive attention toward irrelevant, neutral or familiar stimuli known as the salience aberrant bias. There are several specific psychological interventions designed to ameliorate cognitive biases, such as Metacognitive Training [2, 3], Thinking Well [4], Social Cognition and Interaction Training [5]. These trainings have been shown to teach patients about cognitive biases and how they contribute to symptoms of psychosis and consequently how they can affect their daily life. There is an increasing number of studies showing results of these interventions in reducing cognitive biases and positive symptoms as well as improving clinical and cognitive insight.

cognitive biases psychosis; schizophrenia

INTRODUCTION

Schizophrenia and related psychoses is primarily characterized by positive [i.e., hallucinations and delusions] and negative [e.g., affective flattening, avolition, and anhedonia] symptoms as well as

pervasive cognitive impairments [6] that significantly impacts psychosocial functioning, quality of life and well-being [7]. Biopsychosocial models of psychosis in the recent years have emphasized the central role of cognitive factors in the development of hallucinations and delusions [8, 9]. Cognitive factors crucial in the pathogenesis of psychosis are specifically studied in terms of cognitive biases that may play a role in the formation and maintenance of psychotic symptoms [10].

Cognitive biases refer to systematic errors in both cognitive processing and content that de-

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viate from logical thinking [11]. They are not deficits per se but tendencies of systematic and preferential orientation to treat information in a different way or adopt an alternative thinking style [3]. Although there are studies showing associations between cognitive biases and cognitive deficits, principal component analyses have shown that they are separable constructs [12, 13]. Cognitive biases can affect attention, decision-making/reasoning, memory recall, motivation or even attributional style [11]. The most widely studied are reasoning biases: jumping to conclusion [JTC], belief inflexibility [BIB], need for closure, bias against disconfirmatory evidence [BADE], attentional biases: attention to threat [ATB], aggression, aberrant salience [ASB] and attributional biases: external attribution bias [ETB], personalizing.

Cognitive biases are usually assessed using objective tasks, however, there are also some subjective questionnaires of biases. Since not all patients have insight into their biases, amalgamating objective and subjective assessment is increasingly done to inform us about metacognitive biases in patients, that is, areas where patients' monitoring and self-assessment fails [14]. Moreover, self-report instruments are influenced by social desirability bias – the preference to be well perceived by others [15]. In schizophrenia cognitive biases have been widely researched using a number of behavioral tasks [e.g., bead or fish tasks, ambiguous scenarios task, source or self-monitoring tasks, dot probe task] [15]. Moreover, there are self-assessment screening tools, such as Cognitive Biases Questionnaire for Psychosis (CBQP) [16] or the Davos Assessment of Cognitive Biases Scale (DACOBS) [17].

ASSOCIATION BETWEEN COGNITIVE BIASES AND PSYCHOTIC SYMPTOMATOLOGY

Reviews and meta-analyses demonstrate a higher tendency to make hasty decision – known as tendency to jump to conclusions – among patients with schizophrenia in comparison to healthy controls [18, 19]. In tasks with ambiguous scenarios, patients with schizophrenia demonstrate greater bias against disconfirmatory evidence and bias against confirmatory evidence [20] as well as liberal acceptance bias

than healthy control groups [19]. Moreover, patients with schizophrenia tend to present higher belief inflexibility in comparison to healthy individuals [3] and are overconfident in wrong judgments [21]. There is a meta-analytic study on monitoring tasks showing a higher tendency to confuse sources of information among patients with schizophrenia who tend to misattribute internally-generated stimuli to external sources [externalizing bias] [1]. Finally, patients with schizophrenia tend to have excessive attention toward irrelevant, neutral or familiar stimuli known as the salience aberrant bias often associated with disturbances in dopaminergic neurotransmission [22].

Interestingly, although cognitive biases have been mainly researched in psychosis, there are a few meta-analyses that were conducted in healthy samples with psychotic-like experiences [PLEs] [23, 24]. In the latest systematic review and meta-analysis it has been shown that in both community and UHR samples, positive PLEs were associated with attentional (attention to threat, aberrant salience, aggression bias) and attributional biases (personalizing, external attribution) and to a smaller degree with reasoning biases (jumping to conclusion, belief inflexibility) [15].

Moreover, it has been shown that cognitive biases are associated with psychosis liability – both patients and their relatives show higher probability of cognitive biases compared to healthy controls [25]. Familial clustering with psychosis has been recently replicated on larger international samples [26, 27]. Interestingly, there has been a significant dose-response relationship found between the level of psychosis liability and cognitive bias (JTC), and the association was conditional on the presence of delusional ideation [28]. Overall, these findings suggest that cognitive biases could play a role in the liability for psychotic disorders, perhaps serving as an endophenotype associated with the genetic risk [27]. Moreover, cognitive biases have been shown to better index genetic risk of psychosis than traditional measures of neurocognition and thus reflect population distribution of risk impacting prognosis of psychotic disorder [29]. This result indicates that genetic underpinnings may impact psychopathology by moderating underlying styles of thinking that interact

with underlying biological mechanisms in creating psychotic symptomatology [30].

On the other hand, in the recent years it has been suggested that cognitive biases might be associated with traumatic life events and thus influence psychosis proneness [30-32]. Several models have been proposed so far looking into the interaction between trauma, cognitive biases and psychotic experiences. It has been shown in a non-clinical sample that traumatic life events are related to psychosis proneness through cognitive biases and self-disorders [33]. Moreover, indirect effect has been demonstrated from childhood trauma on psychotic-like experiences that was mediated through cannabis use and cognitive biases [34]. Interestingly, it has also been reported that decreased dopamine catabolism related to genetic underpinnings might increase psychosis proneness in individuals with a history of traumatic life events and high levels of cognitive biases [35]. Finally, models of mediation for the association between psychotic-like experiences and cumulative childhood trauma and neglect showed that there is an indirect mediation through aberrant salience and self-disturbances [36]. Irrespective of early trauma it has been shown that cognitive biases are significant mediators in the relationship between temperament and character on both positive and negative psychotic-like experiences in healthy adults [37]. Additionally, it has been reported that individuals with higher levels of psychotic-like experiences and self-disturbances have also more cognitive biases related to psychosis proneness [38].

Studying cognitive biases is a way of improving our understanding of the psychological processes underlying the onset and the maintenance psychotic symptoms [8, 39]. Patients experiencing delusions are most often overconfident in wrong judgments, jump to conclusions and show a liberal acceptance bias, and belief inflexibility or a bias against disconfirmatory evidence [15]. It has been suggested that two of these biases – bias against disconfirmatory evidence and liberal acceptance bias – are at the heart of a new account aimed to explain the pathogenesis of positive symptoms [39].

PSYCHOLOGICAL INTERVENTIONS TOWARDS COGNITIVE BIASES IN PSYCHOTIC DISORDERS

There are several specific psychological interventions designed to ameliorate cognitive biases, such as Metacognitive Training [MCT] [2, 3], Thinking Well [4], Social Cognition and Interaction Training [5]. These trainings have been shown to teach patients about cognitive biases and how they contribute to symptoms of psychosis and consequently how they can affect daily life of the patients. There is an growing number of studies showing results of these interventions in reducing cognitive biases and positive symptoms as well as improving clinical and cognitive insight. In the recently published systematic review and meta-analysis on psychological interventions targeting cognitive biases in psychotic spectrum disorders, small to moderate effects on the improvement has been shown with respect to cognitive biases, positive symptoms as well as clinical and cognitive insight [40]. Since cognitive biases are observed not only among patients with diagnosis of psychosis but also in at clinical high-risk (CHR) of developing psychosis individuals, psychological interventions targeting cognitive biases may also have preventative effects in the at-risk and possibly lower the risk of conversion to psychosis [41]. Moreover, MCT is listed in several national treatment guidelines [14].

CONCLUSIONS AND FUTURE DIRECTIONS

The relationship of cognitive biases with psychotic-like experiences and psychotic disorders have been established in numerous studies, including systematic reviews and meta-analytic studies [15, 19, 23]. Although cognitive biases have been observed in individuals at clinical high-risk of developing psychosis, in those experiencing a first episode of psychosis and in patients with multi-episode psychotic disorders [41], so far there is little consensus on the ways to measure cognitive biases along psychosis continuum and there are some preliminary work done to synthesize the work in this field [15]. Moreover, there is need for additional work to clarify the definition and assessment of cognitive biases as well as to determine their inter-

relationship with one another in order to create more synchrony in the future studies in order to test how cognitive biases change from the early stages of the illness in the course of disorder. Given evidence that cognitive biases could serve as markers of psychotic disorder they seem to represent interesting therapeutic target [14]. It might be worth to investigate whether the current interventions targeting cognitive biases could be beneficial for at-risk of developing psychosis populations in preventing conversion to psychosis.

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