Original article

Impaired action self-monitoring and cognitive confidence among ultra-high risk for psychosis and first-episode psychosis patients

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ABSTRACT

Background: Self-monitoring biases and overconfidence in incorrect judgments have been suggested as playing a role in schizophrenia spectrum disorders. Little is known about whether self-monitoring biases may contribute to early risk factors for psychosis. In this study, action self-monitoring (i.e., discrimination between imagined and performed actions) was investigated, along with confidence in judgments among ultra-high risk (UHR) for psychosis individuals and first-episode psychosis (FEP) patients.
Methods: Thirty-six UHR for psychosis individuals, 25 FEP patients and 33 healthy controls (CON) participated in the study. Participants were assessed with the Action memory task. Simple actions were presented to participants verbally or non-verbally. Some actions were required to be physically performed and others were imagined. Participants were asked whether the action was presented verbally or non-verbally (action presentation type discrimination), and whether the action was performed or imagined (self-monitoring). Confidence self-ratings related to self-monitoring responses were obtained.
Results: The analysis of self-monitoring revealed that both UHR and FEP groups misattributed imagined actions as being performed (i.e., self-monitoring errors) significantly more often than the CON group. There were no differences regarding performed actions as being imagined. UHR and FEP groups made their false responses with higher confidence in their judgments than the CON group. There were no group differences regarding discrimination between the types of actions presented (verbal vs non-verbal).
Conclusions: A specific type of self-monitoring bias (i.e., misattributing imagined actions with performed actions), accompanied by high confidence in this judgment, may be a risk factor for the subsequent development of a psychotic disorder.

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1. Introduction

From the very beginnings of modern psychiatry the disturbances of self that lead to loss of ego boundaries (i.e. a sense of awareness that there is a distinction between self and world, and self and others) were considered a core characteristic of psychosis and of schizophrenia spectrum disorders in particular (SSD) [1]. Recently, there has been a renaissance of the idea that self-disorders (i.e., alterations in the "minimal" experiential self associated with a variety of anomalous subjective experiences), including weak ego boundaries, are the core of psychotic disorders [2], and are observed from the very early phase of psychosis [3–6]. Loss of, or weakened,

ego boundaries is hypothesized to underlie severe reality- and self-disturbances. Based on the source monitoring framework [7] that provided a theoretical background on the process of discrimination between different source of information, it was hypothesized that severe reality distortions observed in psychosis, such as hallucinations, may be explained by failures in reality monitoring (i.e., discrimination between internal and external sources; deficits result in inner/outer confusions) [8,9]. This hypothesis has become an influential cognitive model of psychotic symptoms [10,11]. Recently, Nelson et al. linked the cognitive model with the phenomenological analysis by hypothesizing that source monitoring [12], along with aberrant salience [13], may underlie self-disorders observed from very early phases of psychotic symptoms. The authors suggest that source monitoring, along with self-disorders, may precede the development of psychotic symptoms.

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Numerous source-monitoring studies have reported a higher tendency to confuse sources of information in patients with psychosis. For instance, a consistent body of research has shown a tendency to misattribute internally-generated stimuli to external sources, which has been linked to auditory hallucinations [11,14,15] and delusions [16,17]. Independent meta-analyses confirmed the role of source monitoring deficits, especially a tendency to misattribute internally generated events as being generated by external agents, in auditory hallucinations [10,11].

However, less is known about the role of discrimination between imagination and reality, i.e., self-monitoring, in psychosis. It has been shown that patients with schizophrenia make significantly more errors in discriminating between performed and imagined events [18,19]. Patients with schizophrenia confuse imagination with reality and vice versa, and they exhibit some difficulty in discriminating between two types of action presentation (e.g., verbal vs non-verbal instructions) [20]. Further studies have revealed that a specific misattribution pattern, i.e., imagined actions recognized as performed, is related to auditory hallucinations in SSD [21] and in a group of alcohol dependent patients with a history of hallucinations [22].

It is estimated that about 80–90% [23] SSD and other psychotic disorders cases are preceded by warning signs of imminent onset of disorder (i.e., the prodromal phase). The "ultra-high risk" (UHR) for psychosis criteria, introduced about two decades ago [24], attempt to prospectively identify this pre-onset stage of the illness. The criteria include [25] attenuated positive symptoms, states of brief frank psychosis that resolve within a week without treatment, or trait vulnerability (i.e., schizotypal personality disorder or first-degree relatives with psychosis), in combination with a significant decrease or chronic low social functioning as assessed with Social and Occupational Functioning Assessment Scale (SOFAS) [26]. The UHR concept has attracted clinicians' and researchers' attention mostly due to the fact that investigation of the markers that underlie this phase might provide knowledge about mechanisms that drive the onset of full-blown psychotic episodes.

Source monitoring deficits have been observed among UHR individuals [27] and first episode psychosis (FEP) patients [28], as well as among first-degree relatives [29] and individuals with schizotypal traits [30]. This has led to the hypothesis that source-monitoring deficits may be an early risk factor for psychosis [31,32]. Most of the studies that have investigated source monitoring in UHR or FEP have focused on discrimination between internally and externally generated events, i.e., reality monitoring. The question about the role of self-monitoring, i.e., discrimination between two internal sources of information (imagination and reality) in early risk for psychosis remains unanswered. Some preliminary results showing confusion between imagination and reality were observed in non-clinical individuals with high schizotypal traits [30]. However, to the best of our knowledge, deficits in discrimination between imagination and reality have not been investigated in UHR or FEP groups.

Furthermore, in psychotic disorders, incorrect decisions made during various cognitive tasks are accompanied by higher confidence when compared to healthy controls [33]. Similarly, it has been shown that patients with schizophrenia usually make incorrect self-monitoring responses with significantly higher confidence than healthy controls [20,21]. Recently, it was suggested that confidence disruptions may be related to the risk of psychosis based on results showing a high knowledge corruption index (KCI), i.e. a high proportion of failure decisions made with high confidence in relation to the total number of failure responses, in UHR and FEP patients [34].

In the present study, we investigated both the role of self-monitoring and response confidence in the UHR and FEP groups. We utilized the Action memory task [35] that allows for investigating two types of source monitoring (self-monitoring – discrimination between imagined and performed actions; external source monitoring – discrimination between verbally and non-verbally presented actions). We hypothesized that patients with UHR and FEP will make more self-monitoring biases compared to healthy controls, and that both clinical groups will express a higher degree of confidence in their inaccurate judgments compared to healthy controls. Given that both patients with UHR and FEP experience reality distortions that are related to self-monitoring in particular [11], based on a previous study [21], we expected no group differences on verbal vs. non-verbal actions discrimination. Finally, we hypothesized that self-monitoring biases will be related to hallucinations in particular.

2. Methods

2.1. Participants

Participants included 36 individuals at ultra-high risk (UHR) for psychosis, 25 patients with first episode psychosis (FEP) and 33 healthy controls (CON). Participants were aged between 15 and 24 years. Participants with neurological diseases or IQ < 70 as determined using the WASI-II [36] were excluded, as well as participants with lack of proficiency in English. The study was approved by the local ethic committee.

The UHR patients were recruited from a specialist early intervention service for UHR patients, the PACE clinic in Melbourne [37]. The UHR criteria were assessed using the Comprehensive assessment of at risk mental states (CAARMS) [38] and consisted of three help-seeking groups:

- attenuated psychotic symptoms (APS): young people who have experienced attenuated positive psychotic symptoms during the past year;
- Brief limited intermittent psychotic symptoms group (BLIPS): young people who have experienced episodes of frank psychotic symptoms that have not lasted longer than a week and have spontaneously abated;
- Trait risk factor group: young people who have a schizotypal personality disorder or who have a first-degree relative with a psychotic disorder.

All groups must have experienced a decline of 30% in social functioning, as assessed with Social and occupational functioning assessment scale (SOFAS) [26] or have had chronic low social functioning (scores of 50 or below in SOFAS) over the year prior to referral.

The FEP group was defined as having daily positive psychotic symptoms for longer than one week and was recruited from the first episode psychosis clinical service (EPPIC) at Orygen, Melbourne. Only FEP patients that were stabilized from acute psychotic symptoms (based on clinical impression) and with schizophrenia spectrum diagnoses (schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorders) were recruited. This was determined based on the diagnosis provided by the clinical team and confirmed via a SCID research interview. Diagnoses of patients according to the DSM-IV were as follow:

- three patients were diagnosed with schizoaffective disorder;
- two patients had a diagnosis of paranoid schizophrenia;
- one patient had delusional disorder;
- one patient had a diagnosis of major depressive disorder with psychotic features;
- eighteen patients had a diagnosis of psychotic disorder not-otherwise specified.