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Negative affect and a fluctuating jumping to conclusions bias predict subsequent paranoia in daily life: An online experience sampling study

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ABSTRACT

Background and objectives: Negative affect and a tendency to "jump to conclusions" (JTC) are associated with paranoia. So far, only negative affect has been examined as a precursor of subsequent paranoia in daily life using experience sampling (ESM). We addressed this research gap and used ESM to test whether JTC fluctuates in daily life, whether it predicts subsequent paranoia, and whether it mediates the effect of negative affect on paranoia.
Methods: Thirty-five participants with schizophrenia spectrum disorders repeatedly self-reported negative affect, JTC, and paranoia via online questionnaires on two consecutive days. We measured JTC with a paradigm consisting of ambiguous written scenarios. Multilevel linear models were conducted.
Results: Most participants showed JTC consistently on two days rather than only on one day. When time was used as a predictor of JTC, significant slope variance indicated that for a subgroup of participants JTC fluctuated over time. For 48% of participants, these fluctuations equaled changes of approximately ±1 point on the four-point JTC scale within one day. There was no mediation. However, negative affect and JTC both significantly predicted subsequent paranoia.
Limitations: The ESM assessment period was short and encompassed few assessments (8 in total).
Conclusions: Our findings indicate that JTC is both stable (regarding its mere occurrence) and fluctuating simultaneously (regarding its magnitude). Although JTC was not a mediator linking negative affect and paranoia, it did predict paranoia. Further ESM studies on JTC are needed to confirm our findings in longer assessment periods and with other JTC paradigms.

1. Introduction

Textbooks and diagnostic manuals, such as the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association, 2013), posit that paranoid delusions are "fixed beliefs that are not amenable to change in light of conflicting evidence" (p. 87). In contrast, longitudinal studies have suggested that paranoid delusions are not always held with full conviction but may vary over time (Appelbaum, Robbins, & Vesselinov, 2004). Even within few days, paranoid delusions were found to vary with respect to their severity and frequency (Ben-Zeev, Morris, Swendsen, & Granholm, 2012). The finding that paranoid delusions wax and wane led to the question whether there are precursors of these fluctuations (e.g., states such as stress, mood, or certain cognitions that occur shortly before delusional experiences appear or intensify). Identifying such "moment-to-moment" precursors of paranoid delusions could enable clinicians, caregivers and patients to anticipate an escalation of psychotic symptoms and to initiate counteractions before paranoid delusions reach a severity that requires intense treatment. By doing so, psychotic relapses could be prevented or attenuated. However, we are still at the beginning of understanding what kind of precursors exist and how they interact in the pathogenesis of paranoid delusions.

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1.1. Precursors of delusions

Research on precursors of paranoid delusions is commonly conducted using the so called "experience sampling method" (ESM). ESM can be described as a series of diary-like and ecologically valid repeated self-report assessments of variables in daily life (for a review on ESM in psychopathology see Myin-Germeys et al., 2009). In some ESM studies participants use electronic devices, for example handheld computers (e.g., Ben-Zeev et al., 2012), to self-report variables of interest. Studies on moment-to-moment precursors of paranoid delusions found that there are different negative mental or affective states that precede paranoid delusions. These are, for example, low self-esteem and experiential avoidance (Udachina, Varese, Myin-Germeys, & Bentall, 2014), worry and rumination (Hartley, Haddock, Vasconcelos, Emsley, & Barrowclough, 2014), as well as negative affective states, such as feeling "low" or "anxious" (Kramer et al., 2014). A fine-grained analysis reveals that both anxiety and sadness seem to contribute to subsequent persecutory ideation separately (Ben-Zeev, Ellington, Swendsen, & Granholm, 2011). In summary, a variety of mental states that can be pooled under the umbrella term *negative affect* were found to precede paranoia. The finding that negative affect seems to precede paranoia is particularly meaningful because studies indicate that people with schizophrenia are generally vulnerable to experience negative affect. In the light of stressful daily events, they show stronger negative affective reactions than healthy controls (Myin-Germeys & van Os, 2007). This enhanced stress sensitivity (i.e., the amount of negative affect as a reaction to event-related stress) has been found to moderate the influence of negative affect on paranoia (Kramer et al., 2014). Therefore, like in a "vicious circle", psychotic symptoms seem to result from negative affect (maybe triggered by a stressful event) while they predispose for subsequent negative affect at the same time, leading to further symptoms, and so on.

Studies using experimental manipulations corroborate findings from ESM studies that stress (or stress-reactivity) plays an important role in the formation of paranoia. Social stress has been found to evoke paranoid feelings in healthy individuals (Lincoln, Lange, Burau, Exner, & Moritz, 2010; Lincoln, Ziegler, Mehl, & Rief, 2010) and auditory stress increases paranoia in acutely psychotic individuals (Moritz et al., 2011). Freeman et al. (2015) found that exposure to a busy urban area resulted in increased paranoia which was partially mediated by increased anxiety, depression, and negative beliefs about others. Those experimental studies allow insights into causal relationships between stress and paranoia and thus sustain the findings of a moment-to-moment association between negative affect and paranoia. Considering both cross-sectional and longitudinal studies, the big picture suggests that stressful events evoke negative affective states that in turn can lead to paranoia. The enhanced stress-reactivity in individuals with schizophrenia could function as vulnerability in this regard.

1.2. Jumping to conclusions and paranoid delusions

Evidence suggesting that certain stressors and negative affect precede paranoia coincide with cognitive models of persecutory delusions (e.g., Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002; Freeman et al., 2008). Concomitant with affect, cognitive models also ascribe cognitive biases an important role in the formation of paranoid delusions (e.g., Bentall et al., 2009; Freeman & Garety, 2014; Freeman et al., 2002). These biases, however, have so far received little attention in ESM research on paranoia. One of the most prominent cognitive biases associated with paranoid schizophrenia is the jumping to conclusions bias (JTC) that denotes the tendency to gather insufficient information to make decisions (for a review see Dudley, Taylor, Wickham, & Hutton, 2016). This insufficient information gathering style has been linked to liberal acceptance (Moritz et al., 2016). JTC has been found in participants with psychosis (Falcone et al., 2015; Langdon, Still, Connors, Ward, & Catts, 2014) and it also seems to be associated to subclinical delusional ideation in healthy participants (Lincoln, Salzmann, Ziegler, & Westermann, 2011; Menon et al., 2013) although this was not consistently found (Falcone et al., 2015). Evidence suggests that JTC is not only associated to psychosis or delusions in general but to paranoid delusions in particular (Garety et al., 2013) and to subclinical paranoia (Moritz, Van Quaquebeke, & Lincoln, 2012).

Despite the well-established associations between JTC and paranoid delusions in cross-sectional studies (associations seem to be rather small, though) it is not resolved whether JTC serves as a precursor of paranoid delusions in longitudinal designs. JTC could be a thinking style that is sometimes increased and sometimes decreased and that covaries with fluctuations in delusional severity (comparable to negative affect), or it could be permanently present in persons with paranoid delusions as a constant predisposition. There are findings that change in delusions is associated with change in JTC in two consecutive measurements 12 weeks apart (Woodward, Munz, LeClerc, & Lecomte, 2009) which would support the assumption of a fluctuating JTC. However, there are also results suggesting a stable JTC, unaffected by changes in delusional conviction after 12 months of treatment (So et al., 2012). Experimental studies largely support the notion of a variable JTC bias. JTC can be affected through exposure to an urban environment (Ellett, Freeman, & Garety, 2008) as well as through auditory and social stressors administered in the laboratory (Moritz, Kother, Hartmann, & Lincoln, 2015). Furthermore, an induction of anxiety attenuated JTC in two studies (Lincoln, Lange et al., 2010; Lincoln, Ziegler et al., 2010; Moritz et al., 2011) whereas providing feedback on participants' performance seemed to reduce JTC (Lincoln, Ziegler et al., 2010). Taken together, it can be considered reasonable to assume that JTC is variable although further studies are needed. In this context, ESM studies could provide a better understanding of the variability of JTC whilst revealing mechanisms underlying the interplay of JTC and paranoid delusions, especially in shorter periods of time such as weeks or days. There are initial studies that have begun to examine the contribution of JTC to changes of delusions in daily life (Ben-Zeev et al., 2012; So, Peters, Swendsen, Garety, & Kapur, 2014) but those studies have regarded JTC as a "trait" rather than a "state"-like precursor. Accordingly, in both studies JTC was examined only once at the beginning of an assessment period so that no moment-to-moment effects of JTC on subsequent symptoms could be considered.

In the light of the above mentioned research, it can be deemed reasonable to examine JTC and paranoia via ESM. Firstly, results would help to resolve to what extent JTC fluctuates over time, and secondly, it could be examined whether those fluctuations of JTC precede paranoia. Above that, examining associations of JTC and paranoia in daily life could be especially informative because JTC could serve as a mediator linking negative affect and paranoid delusions: preliminary evidence from a cross-sectional study suggested that JTC mediates the association of state anxiety and paranoid feelings in healthy participants (Lincoln, Lange et al., 2010; Lincoln, Ziegler et al., 2010). Lincoln, Lange, et al. (2010) and Lincoln, Ziegler, et al. (2010) found that an experimental induction of anxiety increased paranoia as well as JTC. Mediation analyses revealed that the effect of anxiety on paranoia could partly be explained by an increase of JTC. Whether this finding can be replicated using ESM designs remains unclear. However, it would be worthwhile to test this assumption because JTC could help to explain how negative affect promotes the development of paranoid delusions.

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