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Schizophrenia Involves Impairment in the Activation of Intentions by Counterfactual Thinking

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Schizophrenia has been associated with impairment of counterfactual thinking (Hooker et al., 2000), defined as cognitions about alternatives to past outcomes (i.e., what might have been). Counterfactual thinking in healthy individuals is associated with effective problem-solving, behavioral regulation, and performance improvement (Camille et al., 2004; Ursu & Carter, 2005; Roese, 1997). Specifically, counterfactual thinking (e.g., “If only I had studied harder”) contributes to behavior regulation via activation of intentions (e.g., “Next exam I will study harder”), which in turn elicit corresponding behavior (e.g., studying; see Figure 1). All three causal links in Figure 1 have been verified among healthy participants (Smallman & Roese, 2006). In schizophrenia patients, link 1 is impaired (Hooker et al., 2000), whereas link 3 is intact (Brandstätter et al., 2001). The present research examined whether impairment of link 2 (from counterfactuals to intentions) is associated with schizophrenia.

We used a sequential priming paradigm to assess the automatic activation of intentions by counterfactual thinking (the same paradigm previously demonstrated link 2 among college students, Smallman & Roese, 2006). In this task, the dependent measure is response latency to make intention judgments. If a preceding counterfactual judgment activates information that facilitates completion of a relevant intention judgment, response latencies will be reduced.

Fifteen participants (6 women) who met DSM-IV criteria for schizophrenia and 13 healthy control participants (6 women) completed 45 judgment trials on computer. The prime judgment task was structured around a question about negative everyday life events (e.g., “spilled food on shirt”). After a 2 s delay, a statement appeared (e.g., “eaten more carefully”). The manipulation was whether the stem that randomly preceded this statement focused on a

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counterfactual (“should have”) vs. control (a word-counting judgment) vs. baseline (no judgment); participants pressed a key to indicate agreement with the statement. The target task was an intention judgment, semantically related to the action contained in the preceding prime judgment. Trial order was randomized across participants.

Data were log-transformed to correct for skewed distribution; untransformed means are presented for clarity. We isolated trials in which participants responded “yes” both to the prime task as well as intention prime task (46% of the trials), thus holding constant the element of motor repetition. Among healthy participants, counterfactual judgments facilitated intention RTs relative to control judgments ($M_s = 1126$ ms vs. 1431 ms), $t(12) = 3.31$, $p = .006$, $d = .92$ (baseline RT = 1756 ms); this effect size was similar to that observed among college students in Smallman and Roese (2006). However, schizophrenia patients did not show this facilitation effect: intention RTs did not vary as a function of counterfactual versus control judgment primes ($M_s = 1499$ ms vs. 1774 ms), $t(14) = 1.06$, $p = .31$, $d = .27$ (baseline RT = 2042 ms). Thus, the cognitive link between counterfactual thinking and formation of behavioral intentions appears to be impaired in schizophrenia.

According to the process model depicted in Figure 1, the link between impaired counterfactual thinking and social dysfunction among schizophrenia sufferers might be due to breakdowns in any of three causal links. Our data indicate that link 2 is impaired: counterfactuals do not activate intentions in schizophrenia patients.

If this link had been intact, it would suggest the efficacy of a rehabilitation strategy designed to normalize counterfactual thinking, with regular practice improving social functioning. Instead, our results suggest that such a therapy would be ineffective. Even if counterfactual thinking could be activated in schizophrenia patients, the pathway leading from counterfactual thinking to intention formation is blocked. If counterfactual thoughts do not influence intentions, performance improvement is unlikely to result.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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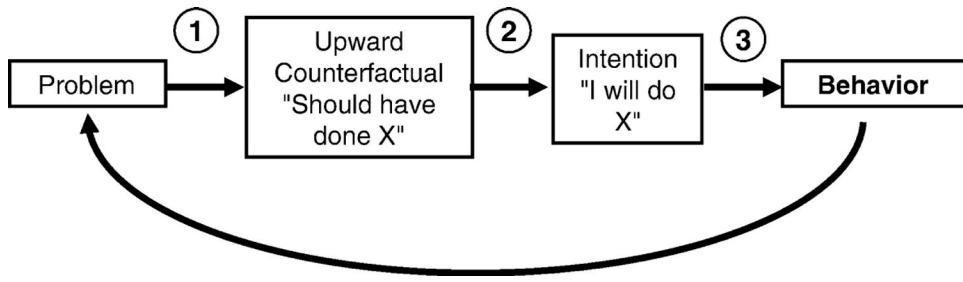


Figure 1.