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Risk-taking in schizophrenia and controls with and without cannabis dependence

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ABSTRACT

Background: Risk-based decision making is altered in people with schizophrenia and in people with cannabis use compared to healthy controls; the pattern of risk-assessment in people with co-occurring schizophrenia and cannabis dependence is poorly understood. This study examined measures of risk-taking and decision-making in people with and without schizophrenia and/or cannabis dependence.
Methods: Participants with schizophrenia (n = 24), cannabis dependence (n = 23), schizophrenia and co-occurring cannabis dependence (n = 18), and healthy controls (n = 24) were recruited from the community via advertisements and completed a one-visit battery of symptom, risk-based decision making, gambling behavior, cognitive, and addiction assessments. This report presents self-assessments of self-mastery, optimism, impulsivity, and sensation seeking and a behavioral assessment of risk (Balloon Analog Risk Task [BART]).
Results: On self-report measures, participants with schizophrenia and co-occurring cannabis dependence were intermediate between those with only cannabis dependence or only schizophrenia on ratings of self-mastery, sensation-seeking, and impulsivity. There were no group differences on ratings of optimism. Their behavior on the BART was most similar to participants with only cannabis dependence or healthy controls, rather than to participants with only schizophrenia.
Conclusions: People with schizophrenia and co-occurring cannabis dependence may represent a unique group in terms of risk-perception and risk-taking. This has implications for interventions designed to influence health behaviors such as motivational interviewing.

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1. Introduction

Personal choices have substantial influence on health — from diet to unprotected sex to drunk driving. By studying how people evaluate risk when making choices, we might prevent many accidents and diseases. Healthy adults often exhibit unrealistic optimism when evaluating risk (Weinstein, 1984; Rutter et al., 1998; Prentice et al., 2005; Weinstein et al., 2005). This bias takes the form of imagining that others are more at risk than one's self for negative events. A major reason for this optimistic bias is that the imagined comparison group is often an especially at-risk population (van der Pligt, 1994; Rothman et al., 1996). Unrealistic optimism is also greater for events that one believes are under personal control versus uncontrollable or random events (van der Pligt, 1994; Zakay, 1996; Prentice et al., 2005). People overestimate the effect of their own mitigating behavior, while underestimating the effects of others' behaviors (van der Pligt, 1994; Rothman et al., 1996; Greening and Chandler, 1997). In addition to weighing the probability of adverse consequences, risky decisions are influenced by tendencies toward impulsivity and sensation-seeking.

We are not aware of any published studies on optimistic bias in cannabis users, but multiple studies have assessed risk-taking propensity in this group. Compared to non-using controls, frequent cannabis users report more impulsivity on self-ratings (Gerra et al., 2004; Griffith-Lendering et al., 2012; Moreno et al., 2012; Solowij et al., 2012). Heavy cannabis users (use 25 out of 30 days, ≥ five years), compared to non-using controls, demonstrate more difficulties balancing rewards with losses on gambling tasks (Whitlow et al., 2004). Yet, at least one study found no differences between young adult cannabis users and non-users in laboratory measures of impulsivity (Gonzalez et al., 2012).

Compared to healthy controls, people with schizophrenia show less optimistic bias (Prentice et al., 2005). This may reflect a more external locus of control, i.e., less conviction they can effect change in personal

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risk. People with schizophrenia also show higher self-report and behavioral-based measures of impulsivity (Hutton et al., 2002; Kaladjian et al., 2011; Nolan et al., 2011).

Cannabis is the most widely used illicit drug among people with schizophrenia (Westermeyer, 2006). About 20% of people with first-episode schizophrenia are regular-to-daily cannabis users (Faber et al., 2012; Wobrock et al., 2013). However, little is known about risk-perception and risk-related behaviors of people with co-occurring schizophrenia and cannabis dependence. One of the few studies of impulsivity and sensation-seeking in this population found that a group with schizophrenia and a lifetime history of cannabis use disorder had higher self-ratings of sensation-seeking and impulsivity than a group with schizophrenia alone (Dervaux et al., 2010). All participants were males and, as inpatients, the co-morbid group was not necessarily using cannabis at the time of assessment.

The present study measured several aspects of risk-perception in people with schizophrenia only (Sz), cannabis dependence only (Cb), co-occurring schizophrenia and cannabis dependence (SzCb), and healthy controls (HC). Specifically, we measured self-reported degree of perceived control over life (self-mastery), insight into illness, optimistic bias, impulsivity, and sensation-seeking. We also assessed actual risk-taking behavior. We hypothesized that the Sz group would show less self-mastery, optimistic bias, and sensation-seeking, but greater impulsivity, than HCs; that the Cb group would report more self-mastery, optimistic bias, impulsivity, and sensation-seeking than HCs; and that the comorbid SzCb group would show intermediate scores on self-mastery, optimistic bias, and sensation-seeking, but greater impulsivity, compared to the Sz and Cb groups. These results would translate into increased risky behavior on the behavioral test in all three illness groups when compared to HCs.

2. Methods

2.1. Participants

Potentially eligible participants were referred from existing studies and clinical programs at the Maryland Psychiatric Research Center (MPRC), University of Maryland, Baltimore (UMB) and the National Institute on Drug Abuse (NIDA) and recruited from the community by IRB-approved advertisements. Applicants were screened with the Structured Clinical Interview for DSM-IV (First et al., 1997) to assess for Axis I disorders and an internally developed Drug and Alcohol Use Survey (DAUS) to assess substance use patterns.

Inclusion criteria for all groups were 18–64 years old and ability to provide valid informed consent. Exclusion criteria for all groups were history of neurological disease, documented mental retardation, or physical impairment preventing computerized testing. HC participants were excluded for any current Axis I disorder other than simple phobia, any current drug dependence other than nicotine, or use of illicit drugs > three times in the previous month. Sz participants required a diagnosis of current schizophrenia/schizoaffective disorder (DSM-IV criteria), and were excluded for any current mood disorder, obsessive–compulsive disorder, drug dependence other than nicotine, or use of illicit drugs > three times in the previous month. Cb participants required a diagnosis of current cannabis dependence (DSM-IV criteria), and were excluded for any current mood disorder, obsessive compulsive disorder, schizophrenia, or schizoaffective disorder. SzCb participants required a diagnosis of current schizophrenia/schizoaffective disorder and cannabis dependence, and were excluded for any current mood disorder or obsessive–compulsive disorder. All participants with schizophrenia were required to be on the same dose of the same medication for the previous four weeks.

This study was approved by the Institutional Review Boards of UMB and NIDA. Written documentation of informed consent was obtained from each participant when clinically stable and not acutely psychotic or intoxicated.

2.2. Design

Participants were administered assessments at a one-day visit. This report highlights the risk-assessment scales/laboratory data. Data on self-reported gambling behavior will be presented separately.

2.3. Self-report scales

The Scale to Assess Unawareness of Mental Disorder (SUMD) (Amador et al., 1993) was used to evaluate insight in the schizophrenia groups.

The Self-Mastery Scale (SMS) was used to assess locus of control (Pearlin and Schooler, 1978). The SMS is a 7-item measure of the extent to which individuals perceive mastery over life outcomes. Each item is rated 1–5; higher scores indicate more feelings of self-mastery.

Optimism was measured using the Revised Life Orientation Test (LOT-R) (Scheier et al., 1994). The LOT-R contains 10 items, of which 4 are unscored filler items. Each item is rated 1–5; higher scores indicate more life optimism.

Risk perception was assessed with two instruments: the Risk Perception Questionnaire (Prentice et al., 2005) and six risk perception questions described by Cherpitel (1993). The Risk Perception Questionnaire includes 40 different events: 14 each are controllable (e.g., being injured from not wearing a seatbelt) or uncontrollable (e.g., experiencing an earthquake) and 12 are neutral (e.g., getting a dog bite requiring treatment). Individuals rate how likely each event is to happen to them in their lifetime, compared to other adults of the same age and gender, on a −3 (much less likely) to +3 (much more likely) scale, with 0 being equally likely. Lower scores indicate more optimism. The Cherpitel risk perception questions, developed from a factor analysis of data from a large study on alcoholism, asks the individual to rate how likely it is that a bad outcome will follow each of 6 poor choices. Each item is rated 1 (very unlikely) to 5 (very likely). Lower scores indicate more optimism.

Impulsivity and sensation-seeking were measured using the relevant items from the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ-Imp & ZKPQ-SS) (Zuckerman, 2002), as well as five Risk-Taking/Impulsivity and four Sensation-Seeking questions described by Cherpitel (1993). The ZKPQ-Imp contains 8 items (numbers 1, 6, 14, 19, 29, 39, 84, and 89 in ZKPQ) and the ZKPQ-SS 11 items (numbers 24, 34, 45, 50, 55, 60, 65, 70, 75, 79, and 95 in ZKPQ) — each rated as true or false. Each Cherpitel question is rated 1–4. Higher scores on each scale indicate more impulsivity/sensation-seeking.

2.4. Laboratory behavioral assessment

The Balloon Analog Risk Task (BART) was used to assess actual risk-taking behavior (Lejuez et al., 2002). Individuals are presented with a simulated balloon and pump on a computer screen. Each press of a button inflates the balloon slightly and earns the participant 2 cents. The money is deposited into a temporary cache visible on-screen. At any time before the balloon pops, the participant can stop inflating the balloon and collect the money in the temporary cache — which is then deposited in a permanent bank (also displayed on-screen). If the balloon pops, all money in the temporary cache is lost. The point at which balloons pop is based on a curve function and not predictable for any individual balloon. The object of the game is to earn as much money as possible. The trial consisted of 30 balloons. We recorded the number of balloon pumps and balloon explosions as measures of risk-taking behavior and amount of money earned as an indication of overall strategy. Participants received actual money for this task.

2.5. Other assessments

The Brief Psychiatric Rating Scale (BPRS) (Overall and Gorham, 1962) and its positive symptom items subscale (conceptual disorganization,