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Psychometric evaluation of a lifetime version of the marijuana problems scale

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ABSTRACT

Introduction: The Marijuana Problems Scale (MPS) is a widely-used self-report measure of cannabis-related negative consequences that has a past three-month reporting window. This report describes the psychometric characteristics of a lifetime version (MPS-L).

Methods: As part of a larger study, 119 individuals who had recovered from cannabis use disorder completed the MPS-L on two occasions 2 weeks apart and 91 participant-nominated family and friends also completed a collateral version of the scale.

Results: Item analyses and principal component analysis (PCA) revealed that three of the 19 items were relatively weaker. Omitting these items, the MPS-L showed good internal reliability ($\alpha = 0.88$, for summed severity total, $\alpha = 0.85$ for number of consequences identified) and test-retest reliability ($r = 0.81$ and 0.73). As expected, correlations with collateral reports were moderate ($r = 0.33$ and 0.29), and collaterals reported significantly fewer negative consequences than participants. MPS total scores also correlated as expected with external validity measures (e.g., number of cannabis use disorder symptoms reported, motives for use, lifetime depression, treatment history). PCA supported the use of a total score summed score, but also revealed two secondary factors, measuring internal consequences (e.g., low self-esteem) and external consequences (e.g., financial difficulties).

Conclusions: These analyses provide good preliminary support for a lifetime version of the MPS, with the summed severity total score performing slightly better than the total number of consequences endorsed.

1. Introduction

Cannabis is the most frequently used illicit substance in the world (Hall, Renstrom, & Poznyak, 2016), although some jurisdictions have begun to legalize and regulate its use (e.g., Canada, California, Colorado). Although most users do not experience extensive negative consequences, harms do occur for some individuals. Moreover, 0.5% of the adult population worldwide meet diagnostic criteria for cannabis use disorder (CUD), with rates in Canada, the USA, and Australia ranging from 1 to 2% (Hall et al., 2016).

A number of instruments have been developed to assess a variety of constructs related to CUD, including use, motives for use, problem severity, and diagnostic criteria for CUD (Rohsenow, 2008). The Marijuana Problems Scale (MPS) is a widely used instrument that assesses negative consequences of cannabis use (Stephens, Roffman, & Curtin, 2000). The MPS has a reporting window of the past three months, which makes it a useful index of current problems. However, a parallel lifetime version of the scale also has potential utility in supplementing measures of lifetime severity of cannabis use disorder, to assess level of lifetime problems relative to current problems within samples, and to facilitate comparisons of the severity level of samples recruited for different studies. This report provides some preliminary psychometric description of a lifetime version of the MPS.

The MPS was developed by Stephens and colleagues for their research program on cannabis treatment by adapting items from other drug use severity instruments (Stephens et al., 2000; Stephens, Roffman, & Simpson, 1994). The 19 items, representing various negative consequences, are rated as no problem (0), minor problem (1), or serious problem (2) over the past three months. The scale can be scored as a total count of problems (number of items marked as minor or serious, 0–19) or as a summed total of the severity ratings (0–38). Psychometric evaluation of the MPS has focused mostly on internal reliability, which has been demonstrated to be high in treatment and community samples (Hayaki, Anderson, & Stein, 2016; Stein, Caviness,

Abbreviations: CIDI, Composite International Diagnostic Interview; CUD, cannabis use disorder; DSM, diagnostic and statistical manual of mental disorders; IDD, Inventory to Diagnose Depression; MMM, Marijuana Motives Measure; MPS, Marijuana Problems Scale; MPS-L, Marijuana Problems Scale - Lifetime

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& Anderson, 2013; Stephens et al., 2000; Stephens et al., 2004). Importantly, the MPS can be used to assess change over time. The number of problems score has been shown to be responsive to change as a treatment outcome measure, showing significant reductions post-intervention (Stephens et al., 2000).

The three-month version of the MPS continues to be widely used in cannabis research, despite limited further psychometric evaluation (Rohsenow, 2008). To date, no lifetime version of the MPS has been developed that can be used to assess lifetime problem severity. The current report provides a psychometric examination of a lifetime version of the MPS (MPS-L) that was administered as part of a descriptive study of recovery from CUD (Stea, Yakovenko, & Hodgins, 2015). Preliminary analyses examined the adequacy of the items using item-total correlations and examination of principal component loadings. To assess reliability of the revised scale, internal reliability was assessed and a re-test assessment of participants was conducted two weeks later. To assess convergent validity, a collateral sample of friends and family completed MPS-L describing the participant concurrently and comparisons were made with scales assessing other dimensions of cannabis problems. Specifically, we predicted a moderately size relationship between the MPS-L total scores and the number of DSM-5 CUD symptoms ($r = 0.70$ or greater), and a lower but significant relationship with the collateral report on the same items ($r = 0.30$–0.40). Given the comorbidity between depression and cannabis use disorders (e.g., Stinson, June Ruan, Pickering, & Grant, 2006), we predicted a moderate relationship with lifetime depression severity (r = 0.30–0.40). We also predicted that individuals who reported having received treatment for their cannabis problems would score significantly higher on the MPS-L than individuals who recovered without using treatment because treatment seeking is associated with greater problem severity (Stea et al., 2015). Finally, in terms of predictive validity, we expected that various motives for using cannabis scores would be differentially associated with the MPS- L, with use to cope predicted to have the strongest relationship, based upon previous research (Benschop et al., 2015). Finally, factor structure of the item pool was re-visited.

2. Method

2.1. Participants and procedure

Media recruitment in a mid-sized Canadian city was used to obtain a sample of 119 participants who had recovered from a CUD (American Psychiatric Association, 2013). The sample was 70% male and 30% female with a mean age of 37.3 years (SD = 12.9). The sample was predominately Caucasian (80%; Aboriginal 5%, other 15%). In terms of employment, 52% were employed full-time, 10% part-time, 20% were students, and 11% were unemployed. The mean age of onset of CUD was 20.0 years (SD = 6.5) and the median length of recovery was 5 years. Sixty-eight (57%) were currently abstaining from cannabis use (i.e., had not used cannabis for the past 12 months), and the remainder reported some non-problematic use (for more detail see (Stea et al., 2015)). Formal treatment involvement was reported by 53 participants (45%).

Participants were interviewed in person and were also asked to nominate a family member or friend to act as corroborator, who was interviewed by telephone by a research assistant who was blinded to the participant's initial assessment information. Collaterals were contacted for 91 participants (77%) and interviews were conducted a mean of 10.3 days after the participant interview (SD = 7.7). The collaterals included 21 partners, 17 parents, 17 friends, 3 children, and 6 other types of family members. For the remaining 28 participants, 7 did not provide a collateral, 14 provided names but the collateral was unable to be contacted, and 7 provided names that were contacted but were unwilling to participate. Collaterals provided responses to the MPS-L items and were also asked to rate their confidence in responding to the MPS-L items overall (1 = very uncertain, 2 = uncertain, 3 = certain, or 4 = very certain). The mean confidence score was 3.2 (SD = 0.9), with a mode of 4 and a range of 1 to 4.

Participants were re-contacted within two weeks after their initial interview to assess test-retest reliability of their self-reported cannabis use as well as responses to a variety of the assessment instruments (Stea, 2013). Telephone interviews were conducted by research assistants who were blinded to the participants' initial assessment. The mean number of days for the 107 participants successfully re-interviewed was 9.6 (SD = 13.1).

Ethical approval was provided by the Conjoint Faculties Ethics Review Board at the University of Calgary.

2.2. Measures

The MPS was modified to inquire whether each item had ever been experienced as a problem, using the same response options as the three-month version (0 = no, 1 = minor, 2 = serious). Two summary scores were calculated, a total summed score of the severity ratings (MPS-severity, 0–38) and a total problem score (MPS-number, the number of items scored minor or serious, 0–19).

Lifetime cannabis use disorder was assessed using the Composite International Diagnostic Interview (CIDI) (Kessler & Ustun, 2004), which we updated to assess DSM-5 symptoms and criteria (American Psychiatric Association, 2013). The CIDI is a widely used structured interview designed to be administered by trained laypersons. It has been validated against the Structured Clinical Interview for the DSM-IV (First, Spitzer, Gibbon, & Williams, 2002). The categorical CUD diagnosis was used to assess participant eligibility for the study, and the lifetime symptom count (0−11) was used as an external validity measure.

There were three additional external validity measures used in this report. The Marijuana Motives Measure (MMM) (Simons, Correia, Carey, & Borsari, 1998) provides five motive subscales with respect to lifetime cannabis use: Enhancement, coping, social, conformity, and expansion. Each subscale is measured with five items, and the scale reliability and validity has been replicated with adult samples (Benschop et al., 2015).

Lifetime depressive symptoms were measured with the lifetime version of the 19-item Inventory to Diagnose Depression (IDD) (Zimmerman, 1994). The participant is asked to describe the worst week of their lives when they felt most depressed. The lifetime version total score has good test-retest reliability and discriminative validity (Sakado, Sato, Uehara, Sato, & Kameda, 1996; Sato et al., 1996).

Treatment involvement was assessed by asking whether the participant had ever received at least one session of formal or professional treatment for a cannabis use problem (e.g., talking to a physician, counsellor or therapist, calling a helpline, or receiving medication). The interviewer probed and clarified responses. Involvement in self-help groups was excluded.

2.3. Analyses

As a preliminary step, corrected item-severity total summed scores correlations and principal component analysis of the item pool were computed to identify any weak items. Next, descriptive analyses of each of the MPS-L items and total scores were conducted. To assess internal reliability, coefficient alpha was conducted for both the summed severity total and the number of symptoms total. Internal reliability scores of 0.80 and greater are considered good. For test-retest reliability, Pearson correlations were computed for each MPS-L item and the total scores. To assess the validity of the total scores, Pearson correlations were computed with the number of lifetime DSM-5 symptoms (CIDI), the five MMM scales, and the lifetime severity of depression score (IDD). *T*-tests were used to compare the MPS-L total scores for participants who had or had not attended cannabis treatment. Pearson correlations were conducted between participants and collateral reports