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HIGHS AND LOWS: PSYCHOLOGICAL FLEXIBILITY AS AN EXPLANATION FOR THE CANNABIS USE-MENTAL HEALTH RELATIONSHIP

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Abstract

Background: Cannabis use (CU) has rapidly grown worldwide. Cannabis use disorder (CUD) is associated with a three-fold increase in internalizing disorders such as depression and anxiety. Psychological flexibility (PF) encompasses an individual's ability to be open and accepting of emotional experiences (openness to experience; OE), and to adjust their behaviours (behavioural awareness; BA) to be in line with their personal values (valued action; VA). PF can be targeted and improved through Acceptance and Commitment Therapy (ACT), which has been shown to be effective for addressing depression and anxiety symptoms; however, the role of PF in substance use is less explored and mechanisms underlying the comorbidity remain unclear. *Rationale*: The aim of this study was to examine the mediating role of PF in the relationship between CU patterns (i.e., daily use, disordered use), and internalizing symptoms. *Method*: Individuals from an Atlantic Canadian University, the general population, and Prolific (N = 525) completed measures assessing CU patterns (meeting criteria for DSM-5 CUD, daily use), anxiety and depressive symptoms, and PF. *Results*: Daily CU was positively associated with depressive and anxiety symptoms. CUD symptoms were also positively associated with depressive and anxiety symptoms. Daily CU was negatively associated with PF total and with two PF dimensions (OE, BA). As expected, CUD symptoms were negatively associated with PF and with all three PF dimensions. Six mediation models were tested, with daily CU/CUD symptoms entered as independent variables, depression and anxiety as the dependent variables, and total PF or its dimensions as mediators. The three dimensions of PF (OE, BA, VA), and PF total partially explained the relationship between CUD symptoms, and both depressive and anxiety symptoms. The same was found for the relationship between daily CU and depression but only the dimensions of OE and BA mediated the relationship between daily cannabis use and anxiety symptoms. *Conclusions/Impact*: Problematic cannabis users appear lower in PF, which may partly explain why they experience more internalizing symptoms. Interventions aiming to increase PF, such as ACT, may be appropriate for such individuals.

Keywords: *Cannabis use, psychological flexibility, depression, anxiety, substance use.*

1. Introduction

Cannabis use (CU) is common worldwide (Wang et al., 2024). Specifically, CU has increased in Canada since its legalization in 2018 (Public Health Agency of Canada, 2024). In 2024, 1 in 6 people reported CU in the past 30 days and 6% of individuals reported daily or almost daily use of cannabis. Individuals with mental disorders are twice as likely to also have a co-occurring substance use disorder (SUD; Centre for Addiction and Mental Health [CAMH], n.d.). In 2023, the U.S. reported that about one third of individuals with any mental disorder also had a SUD and that access to addiction care continues to be a challenge with only 1 in 4 individuals receiving treatment (SAMHSA, 2023). Individuals with anxiety/depression are more likely to use cannabis or to have a cannabis use disorder (CUD; Kedzior & Laeber, 2014). Specifically, CUD is associated with a three-fold increase in internalizing disorders such as depression and anxiety (Onaemo et al., 2021). The relationship between internalizing disorders and SUDs is complex, however, much of the evidence suggests that internalizing disorders are risk factors for SUDs (O'Neil et al., 2010) and that the self-medication hypothesis may be a contributing factor. To cope with symptoms of internalizing disorders, individuals may use substances through a negatively reinforcing loop (Walters et al., 2018). The comorbidity between internalizing disorders and CUD is well established, however, the role of psychological flexibility (PF) in this relationship remains to be explored.

1.1. Psychological flexibility

PF is the ability to engage in the present moment as a conscious being, and to adapt or maintain behaviours depending on the situation to align with one's values (Hayes et al., 2006). PF consists of six processes: (1) accepting unwanted thoughts, feelings, or sensations without trying to alter them, (2) recognizing thoughts as experiences instead of truths or facts, (3) malleable awareness and attention of the present moment, (4) self-as-context (being flexible in taking perspective from the self or others), (5) identifying fundamental goals and values, and (6) committed actions that correspond with one's goals and values (Boykin et al., 2020). These processes can be captured under three pillars of PF: (1) openness to experience (OE), (2) behavioural awareness (BA), and (3) valued action (VA). An individual who demonstrates high PF would be more aware and accepting of emotional experiences while having the capacity to engage in challenging behaviours or activities to pursue life goals in line with their personal values (Kashdan & Rottenberg, 2010). PF can be improved through Acceptance and Commitment Therapy (ACT; Swash et al., 2017), which helps individuals prevent negative thoughts and feelings from driving their behaviour, as well as encouraging mindfulness and increasing resilience. ACT targets the psychological processes underlying mental health symptoms rather than observable symptoms (Dindo et al., 2017), highlighting its potential as a transdiagnostic target of intervention.

1.1.1. Psychological flexibility and internalizing disorders. About 4% of the population worldwide suffer from depression, similar to the prevalence of anxiety disorders (World Health Organization [WHO], 2023). Approximately 1 in 4-5 adults in the U.S. experience symptoms of anxiety or depression (Terilizzi & Zablotsky, 2024). In individuals with psychopathology, psychological inflexibility (PI), characterized by experiential avoidance and diminished daily functioning appears to be present (Bond et al., 2011). For example, in depression, this presents as rumination, aversive emotional states resistant to change, and incapacity to derive pleasure from the environment (Kashdan & Rottenberg, 2010). In anxiety disorders, PI is associated with anxiogenic thought processes (e.g. catastrophizing) and behavioural responses that exacerbate symptoms, such as avoidance. PI acted as a partial mediator between perceived stress and both general anxiety and depression among COVID-19 patients (Huang et al., 2021). ACT, which enhances PF, can address symptoms of depression and anxiety (Twohig & Levin, 2017). This evidence supports PI in the development and maintenance of internalizing disorders.

1.1.2. Psychological flexibility and cannabis use/cannabis use disorder. There is limited literature on PF in SUDs, and even fewer studies examining its role specifically in CU/CUD. Theoretically, it has been proposed that PF should lead to reduced substance use as it addresses negative experiences rather than avoiding them (Ii et al., 2019). ACT is associated with decreased drug use and disordered use, suggesting that it is a promising treatment option (Lee et al., 2015). Individuals receiving opioid agonist therapy who exhibit more PF are less likely to engage in the continued use of illicit substances (Rosen et al., 2020). However, few studies have directly examined the role of PF in the etiology of SUDs. There is potential to enhance treatment outcomes in those with CUD, as interventions are typically plagued with low abstinence and high relapse rates (Gates et al., 2016).

2. Present study

There is a gap in the literature on the role of PF in SUDs, especially for cannabis. The current study expands knowledge on the factors that contribute to the relationship between CU/CUD and mood and anxiety symptoms. It was hypothesized that individuals who report greater CU behaviours (daily/almost daily use, disordered use) would report greater internalizing symptoms (i.e., depression and anxiety) and that PI would partially contribute to this relationship. No specific hypotheses were formulated regarding the contribution of specific dimensions of PF given the lack of previous research.

3. Method

3.1. Participants

A total of 525 participants (M_{age} = 29, *SD* = 14.01, 62.2% women, 33.5% men, 4.1% other), including 271 undergraduate students from the University of New Brunswick, Canada and 254 participants from the community and Prolific, a Crowdsourcing tool, were recruited. Community participants could participate if they were 19+ and were residents of Canada/U.S.

3.2. Measures

An internally generated *demographics questionnaire* assessed participants' age, ethnicity, gender affiliation, occupation, level of education, relationship status, and income. An abbreviated version of the *Addiction Severity Index* (ASI; McLellan et al., 1992) was used to assess past-year frequency (i.e. never to

almost daily/daily) of CU. The 11 *DSM-5 CUD symptom criteria* (i.e. "Used cannabis in larger amounts or over a longer period of time than you intended") assessed past-year CUD symptoms using a Yes/No checklist. The *Generalized Anxiety Disorder* Scale (GAD-7; Spitzer et al., 2006) includes seven-items to assess general anxiety (e.g., "how often have you been bothered by feeling nervous, anxious or on edge?") on a four-point Likert scale (i.e., "not at all" to "nearly every day"). Higher scores indicate more symptoms of anxiety (α = .92). The *Patient Health Questionnaire* (PHQ-9; Kroenke et al., 2001) measures depressive symptoms using nine items (e.g., "little pleasure or interest in doing things") on a four-point scale ranging from "not at all" to "nearly every day." Higher scores on the PHQ-9 indicate more depressive symptoms (α =. 89). The *Comprehensive Assessment of Acceptance and Commitment Therapy* scale (CompACT; Francis et al., 2016) was used to assess PF. The CompACT is a 23-item measure with three subscales: (1) OE (e.g., "I work hard to keep out upsetting feelings"), (2) BA (e.g., "I find it difficult to stay focused on what's happening in the present"), and (3) VA (e.g., "I behave in line with my personal values"). Items are assessed on a seven-point scale ranging from strongly disagree to strongly agree. Higher scores reflect greater PF (α = .88).

3.3. Procedure

The current study received institutional research ethics approval. Participants accessed the online study through a link provided in advertisements. They were first presented with an informed consent form and then the randomized survey. Participants were given the option to be entered in a draw for one of three $20 Amazon gift cards. Those recruited from Prolific received the equivalent of 10£ (GBP)/hour which was prorated to the time taken to complete the survey.

4. Results

For descriptives on study variables, please contact the primary author (molly.nash@unb.ca). Pearson's *r* correlations showed that daily/almost daily CU was positively associated with depression ($r(511) = .163$, $p < .001$) and anxiety ($r(512) = .091$, $p = .038$) symptoms, as hypothesized. Greater self-reported CUD symptoms were also positively associated with depression ($r(517) = .167$, $p < .001$) and anxiety ($r(519) = .127$, $p = .004$) symptoms. Daily/almost daily CU was negatively associated with PF ($r(506) = -.123$, $p = .006$) and with two PF pillars (OE; $r(506) = -.116$, $p = .009$, BA; $r(507) = -.145$, $p = .001$). As expected, increased CUD symptoms were also negatively associated with PF ($r(512) = -.179$, $p < .001$) and with all three PF dimensions (OE; $r(512) = -.158$, $p < .001$, BA; $r(513) = -.126$, $p = .004$, VA; $r(512) = -.119$, $p = .007$). Six mediation models were tested with either daily/almost daily CU or CUD symptoms as the independent variables, depression and anxiety as the dependent variables, and PF (total CompACT score) or its three dimensions (CompACT: OE, CompACT: BA, CompACT: VA) as mediators. The three dimensions of PF, and PF total partially explained the relationship between CUD symptoms, and both depressive and anxiety symptoms. The same was found for the relationship between daily/almost daily CU and depression but only the dimensions of OE and BA mediated the relationship between daily/almost daily CU and anxiety symptoms. See Table 1.

5. Discussion

In the current study, CU patterns were associated with internalizing symptoms, consistent with previous research. Cannabis is commonly used for its relaxing and sedative effects (Turna et al., 2019). The elevated rates of individuals with depression and anxiety using cannabis may be reflective of the belief that it can alleviate symptoms of these disorders (Kuhns et al., 2022). CU can result in short-term symptom alleviation due to its anxiolytic and antidepressant effects (Li et al., 2020) but can contribute to worsening mental health conditions and negative long-term outcomes (Health Canada, 2018). The mediation analyses conducted suggest that cannabis users appear lower in PF, which may partly explain why they experience more internalizing symptoms. Individuals who exhibit PI often struggle with experiential avoidance which has been shown to play an important role in CU (Buckner et al., 2016). Cannabis users who are low in PF may find it difficult to tolerate negative emotions, leading them to use cannabis to dampen these symptoms. ACT may be a promising intervention for individuals with internalizing disorders and CU. Limitations in the present study include generalizability concerns (Canadian and U.S. participants) and weak (but significant) correlations between the variables of study. It is likely that stronger relationships would have emerged in a sample of individuals with CUD. Despite these limitations, these findings contribute to a greater understanding of PF as a transdiagnostic factor in the comorbidity between internalizing disorders and CUD.

Table 1. Mediation Model of Psychological Flexibility in the CU/CUD and Anxiety/Depression Relationship.

Variable (Y)	Effect (*b*)	Bootstrap *SE*	Boot LLCI	Boot ULCI
GAD-7				
CUD → Y	0.0105	0.0127	-0.0145	0.0355
Total	0.0365	0.0088	**0.0199**	**0.0541**
CUD →OE→ Y	0.0190	0.0057	**0.0087**	**0.0309**
CUD →BA→Y	0.0122	0.0044	**0.0044**	**0.0217**
CUD →VA→Y	0.0053	0.0025	**0.0013**	**0.0109**
DCU → Y	0.0238	0.0840	-0.1413	0.1889
Total	0.1937	0.0610	0.0741	0.3125
DCU →OE→ Y	0.0920	0.0396	**0.0192**	**0.1743**
DCU →BA→Y	0.0939	0.0298	**0.0394**	**0.1549**
DCU→VA→Y	0.0078	0.0130	-0.0174	0.0352
CUD → Y	0.0104	0.0129	-0.0149	0.0358
CUD →PFTOT→ Y	0.0366	0.0085	**0.0202**	**0.0533**
DCU → Y	0.0522	0.0848	-0.1143	0.2187
DCU →PFTOT→ Y	0.1654	0.0578	**0.0527**	**0.2780**
PHQ-9				
CUD → Y	0.0170	0.0099	-0.0025	0.0366
Total	0.0332	0.0079	**0.0182**	**0.0492**
CUD →OE→ Y	0.0128	0.0040	**0.0055**	**0.0209**
CUD →BA→Y	0.0120	0.0041	**0.0047**	**0.0207**
CUD →VA→Y	0.0085	0.0035	**0.0022**	**0.0159**
DCU → Y	0.1528	0.0654	**0.0244**	**0.2812**
Total	0.1661	0.0541	**0.0602**	**0.2743**
DCU →OE→ Y	0.0623	0.0272	**0.0126**	**0.1191**
DCU →BA→Y	0.0909	0.0280	**0.0390**	**0.1485**
DCU→VA→Y	0.0128	0.0204	-0.0265	0.0537
CUD → Y	0.0167	0.0100	-0.0029	0.0364
CUD →PFTOT→ Y	0.0335	0.0079	**0.0180**	**0.0491**
DCU → Y	0.1662	0.0655	**0.0375**	**0.2949**
DCU →PFTOT→ Y	0.1526	0.0533	**0.0468**	**0.2604**

Note. CUD = Cannabis Use Disorder. DCU = Daily/Almost Daily Cannabis Use. OE = CompACT: Openness to Experience. BA = CompACT: Behavioural Awareness. VA = CompACT: Valued Action. PFTOT = Total Psychological Flexibility score on CompACT.

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