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Adverse Childhood Experiences and Problematic Cannabis Use: The Role of Emotion Dysregulation and Affective Impulsivity

Jenna L. Vieira[1], Lindsey A. Snaychuk[1], Jana Milicevic[1], David C. Hodgins[2], N. Will Shead[3], Matthew T. Keough[4], Hyoun S. Kim[1,5]

[1]Department of Psychology, Toronto Metropolitan University, Toronto, Ontario, Canada
[2]Department of Psychology, University of Calgary, Calgary, AB, Canada
[3]Department of Psychology, Mount Saint Vincent University, Halifax, NS, Canada
[4]Department of Psychology, York University, Toronto, ON, Canada
[5]University of Ottawa Institute of Mental Health Research at the Royal, Ottawa, Ontario, Canada

ABSTRACT

Problematic cannabis use is highly prevalent among postsecondary students. Consequently, there is a need to examine risk factors associated with problematic cannabis use in this population. The present study investigated whether emotion dysregulation mediates the relationship between adverse childhood experiences (ACEs) and problematic cannabis use, and whether affective impulsivity (negative and positive urgency) uniquely moderates this relationship. Participants consisted of current cannabis users ($N = 586$) recruited from five universities across Canada. Participants completed an online survey containing self-report measures of ACEs, emotion dysregulation, negative and positive urgency, and problematic cannabis use. Among the sample of postsecondary students, 36% ($n = 213$) met the threshold for problematic cannabis use. Moderated-mediation analyses revealed that ACEs were positively associated with emotion dysregulation and problematic cannabis use. There was also a significant indirect effect of emotion dysregulation on the association between ACEs and problematic cannabis use at moderate and high (but not low) levels of negative urgency, and at moderate and high (but not low) levels of positive urgency. The moderated-mediation models remained significant when controlling for other facets of impulsivity. Results suggest that elevated levels of emotion dysregulation and urgency are important proximal risk factors for problematic cannabis use among postsecondary students with a history of ACEs. While ACEs cannot be modified given their occurrence in the past, interventions that aim to build mindfulness and adaptive emotion regulation skills may be beneficial for reducing the likelihood that these students will engage in impulsive behaviors, such as cannabis use, when experiencing emotional distress.

Key words: = adverse childhood experiences; problematic cannabis use; postsecondary students; affective impulsivity; emotion dysregulation

Cannabis use is highly prevalent in North America (Conway, 2022; Substance Abuse and Mental Health Services Administration, 2023). Data collected within the past five years has indicated that a greater number of North American emerging and young adults aged 16-25 years reported past-year cannabis use relative to adults aged 26 and older (Statistics Canada, 2021; Substance Abuse and Mental Health Services Administration, 2023). Many postsecondary students fall within the age range wherein elevated rates of cannabis use have been identified and may comprise a key at-risk group for problematic cannabis use, as indicated by

Corresponding Author: Hyoun Kim, Ph.D., Department of Psychology, Toronto Metropolitan University 350 Victoria Street, Toronto, ON, M5B 2k3. Phone: 416-979-5000 ext. 552624, Email: andrewhs.kim@torontomu.ca.

persistent use despite negative impacts on social functioning and health (Connor et al., 2021). Indeed, elevated rates of problematic cannabis use and cannabis use disorder (CUD) have been observed among postsecondary students (Arterberry et al., 2020; Caldeira et al., 2007). While emerging and young adults are collectively at heightened risk of problematic cannabis use (Health Canada, 2022; Parekh et al., 2020), postsecondary students are confronted with various unique factors that may further increase this risk. Postsecondary students frequently report elevated stress levels that are potentially attributable to high study demands and challenges with work-life balance, which can encourage increased cannabis use as a way to cope with such feelings (Istasy et al., 2019). Many postsecondary students also transition to living situations that involve cohabitation with peers during their studies, which are associated with increased prevalence of cannabis use (O'Brien et al., 2017). Such situational factors may underpin the increase in cannabis use that has been observed among students as they begin postsecondary education (Cadigan et al., 2019).

Unfortunately, cannabis use has been linked to various harms, including increased risk of depression (Gobbi et al., 2019), anxiety (Stiles-Shields et al., 2021), suicidal ideation and attempts (Gobbi et al., 2019), and psychosis (Hall & Degenhardt, 2008). The risks associated with cannabis use may be especially heightened for postsecondary students, as emerging adulthood is recognized as a critical developmental period during which individuals may be particularly susceptible to the consequences of substance use (Stone et al., 2012). Moreover, individuals who used cannabis heavily in early adulthood have been found to endorse more physical, cognitive, and mental health conditions at 40 years of age relative to those who did not use cannabis heavily during this period (Patrick et al., 2021). Consequently, it is important to elucidate the risk factors and mechanisms of problematic cannabis use among postsecondary students to better understand the constructs that may contribute to this vulnerability.

Adverse Childhood Experiences and Cannabis Use

Adverse childhood experiences (ACEs) are defined as potentially traumatic events that occur in an individual's life prior to 18 years of age (Felitti et al., 1998). Studies have consistently observed that young adults (Shin et al., 2018) and postsecondary students (Schwartz et al., 2022) with a history of ACEs are at greater risk of being diagnosed with a substance use disorder, including CUD, later in life. For example, a longitudinal study found that the total number of ACEs endorsed by participants was significantly associated with the development of all severity levels of CUD in young adulthood (Moss et al., 2020). In another longitudinal study, young adults with a history of ACEs were significantly more likely to be classed as high-severity cannabis users relative to those without a history of ACEs (Davis et al., 2021). Among postsecondary students in particular, endorsing a greater number of ACEs has been linked to significantly higher likelihood of having used cannabis in the past 30 days (Forster et al., 2018).

As ACEs are events that take place before the age of 18 years, they may be conceptualized as a distal risk factor (Nolen-Hoeksema & Watkins, 2011). In other words, ACEs represent a static underlying vulnerability for future cannabis-related problems that unfortunately cannot be modified given their occurrence in the past. However, it is possible that ACEs increase an individual's propensity for developing problematic cannabis use indirectly through proximal risk factors, which comprise vulnerabilities that are more immediate and receptive to modification (e.g., attentional biases, negative affectivity, emotion dysregulation; Nolen-Hoeksema & Watkins, 2011). Understanding the proximal mechanisms through which ACEs may heighten the risk of problematic cannabis use among postsecondary students can reveal potential constructs that can be targeted to reduce the negative impacts of these early life experiences.

Emotion Dysregulation, ACEs, and Cannabis Use

A proximal risk factor that may account for the association between ACEs and problematic cannabis use is emotion dysregulation. Emotion dysregulation is a multidimensional construct that encompasses deficits in an individual's ability to fully experience and manage emotions (Gratz & Roemer, 2004). According to Gratz and Roemer (2004), emotion dysregulation is specifically characterized by difficulties with emotional awareness, acceptance of emotions, controlling impulsive behaviors when

experiencing negative emotion, behaving in goal-oriented ways when experiencing negative emotion, and using adaptive strategies to regulate emotions.

Studies have consistently demonstrated a positive relationship between ACEs and emotion dysregulation (Dvir et al., 2014; Michopoulos et al., 2015; Poole et al., 2017). One potential interpretation of this association is that ACEs may hinder emotion regulation development, potentially by depriving youth of emotional nurturance and other opportunities from caregivers that would allow them to learn the skills necessary for effectively recognizing and modulating their emotions (Dvir et al., 2014). However, it is important to note that some ACEs do not involve caregivers, and thus their negative effects may occur through other pathways. Indeed, ACEs may also impact emotion regulation development through their effects on the stress response system within the brain (Clemens et al., 2020). Consistent exposure to stressful life events in childhood may lead the brain to release excess amounts of stress hormones, which in turn trigger the hypothalamic-pituitary-adrenal (HPA) axis (responsible for the "fight or flight" response; Sheng et al., 2021). HPA axis overactivation may lead other functions of the brain to be limited, including those controlled by the limbic system, which are responsible for emotional reactivity (Clemens et al., 2020). Consequently, ACEs and their resulting stress may impact the brain such that youth are left with less capacity to regulate their emotions. In turn, the heightened emotion dysregulation resulting from ACEs may increase risk for problematic cannabis use. For example, one study found that emotion dysregulation was particularly elevated among a group of cannabis users characterized by frequent, heavy use and many associated consequences (Manning et al., 2019). In another study, the positive association between stressful life events and problematic cannabis use was found to be stronger among individuals who endorsed greater levels of emotion dysregulation (Cavalli & Cservenka, 2021).

Taken together, it is plausible that ACEs may precipitate the development of emotion dysregulation which could, in turn, lead to problematic levels of cannabis use. In support of this notion, there is a growing body of evidence that suggests emotion dysregulation mediates the association between ACEs and a variety of substance and behavioral addictions (Lim et al., 2019; Kim et al., 2023; Poole et al., 2017; Wolff et al., 2016). However, to our knowledge, no studies to date have investigated whether emotion dysregulation mediates the relationship between ACEs and problematic cannabis use specifically. Given the robust associations that have been identified between ACEs, emotion dysregulation, and other addictions as noted above (Lim et al., 2019; Kim et al., 2023; Poole et al., 2017; Wolff et al., 2016), these relationships are also likely to exist in the context of problematic cannabis use, which the present study tests directly.

The Potential Role of Negative and Positive Urgency

Beyond emotion dysregulation, there are likely additional constructs implicated in the hypothesized pathway from ACEs to problematic cannabis use among postsecondary students. It is possible that the association between emotion dysregulation prompted by ACEs and problematic cannabis use may be stronger among some postsecondary students depending on the extent to which they endorse certain personality traits. Two personality traits in particular, negative urgency and positive urgency (Cyders & Smith, 2008), may play such a role. Negative and positive urgency comprise a dispositional tendency to behave impulsively when experiencing intense negative or positive emotion, respectively (Cyders & Smith, 2008) and therefore can be conceptualized as affective impulsivity.

Of importance to the present study, elevated levels of both negative and positive urgency have been identified among individuals with a history of ACEs (Oshri et al., 2018; Shin et al., 2018) and have also been linked to greater emotion dysregulation (Benzerouk et al., 2022; Reff & Baschnagel, 2021) and problematic cannabis use (Um et al., 2019; Wardell et al., 2016). Individuals high in positive or negative urgency as well as emotion dysregulation may be more prone to experiencing heightened emotional intensity and relying on maladaptive strategies, such as impulsive behaviors (e.g., substance use), to regulate their emotional distress. For example, negative urgency has been found to interact with emotion dysregulation to predict more positive cigarette smoking expectancies among youth (Dir

et al., 2016), suggesting that individuals with elevated levels of both of these constructs may be at greater risk of engaging in addictive behaviors. To our knowledge, the extent to which emotion dysregulation mediates the association between ACEs and problematic cannabis use depending on levels of negative and positive urgency has not been empirically examined in the existing literature. Consequently, the present study aims to directly test this.

The Present Study

Given that existing research has established emotion dysregulation as a mechanism of the relationship between ACEs and various addictive behaviours (Lim et al., 2019; Kim et al., 2023; Poole et al., 2017; Wolff et al., 2016), this multicenter study of Canadian postsecondary students tested whether emotion dysregulation similarly mediates the relationship between ACEs and problematic cannabis use. As impulsivity is conceptualized as a personality and individual differences variable (Birkley & Smith, 2011; Whiteside & Lynam, 2001) and may thus inform our understanding of the conditions under which relationships between other psychosocial variables occur, the present research extends the models tested in previous studies by assessing whether emotion dysregulation mediates the relationship between ACEs and problematic cannabis use at high levels of negative or positive urgency, specifically. We hypothesized that i) ACEs would be positively associated with problematic cannabis use, ii) emotion dysregulation would be positively associated with problematic cannabis use, and iii) emotion dysregulation would mediate the association between ACEs and problematic cannabis use at high levels of both negative and positive urgency.

METHODS

Participants and procedure

The sample consisted of 592 undergraduate students recruited from five universities across four provinces in Canada who reported having used cannabis in the past year. Due to missing data within variables of interest, six participants were excluded from analyses; consequently, the final sample consisted of 586 participants (M_{Age} = 20.72, SD = 4.79, Range = 17-62). Full demographic characteristics of the sample are presented in Table 1.

Data were collected between October and November 2021. All participants completed the self-report questionnaires of interest as part of a larger survey battery hosted by Qualtrics. Ethics approval was obtained from the Research Ethics Board at the authors' respective institutions and participants' informed consent was obtained prior to data collection. Participants were granted course credit for completing the online survey.

Three manuscripts resulting from the dataset used in the present study have been published previously (Kim et al., 2023, Coelho et al., 2023a/b). However, this is the first and only paper that has specifically examined problematic cannabis use. The data underlying the present manuscript is available on OSF (https://osf.io/ajz7s).

Table 1. *Demographic characteristics of the sample.*

Demographic Variable	*n*	%
Gender		
Man	119	20.3
Woman	448	76.5
Non-binary	7	1.2
Transgender man	3	.5
Genderqueer	3	.5
Gender questioning	2	.3
Agender	1	.2
Prefer to specify	3	.5
Transgender woman	0	0

Ethnicity		
White	322	54.9
East Asian	75	12.8
South Asian	43	7.3
Black	37	6.3
Multiple ethnicities	45	7.7
Middle Eastern	24	4.1
Latino	17	2.9
Prefer to specify	7	1.2
Indigenous	16	2.7
Sexual Orientation		
Straight	414	70.8
Gay or Lesbian	20	3.4
Bisexual	95	16.2
Queer	25	4.3
Questioning	19	3.2
Asexual	2	.3
Prefer to specify	2	.3
Pansexual	0	0
Two-spirit	0	0
Education		
High school	256	43.7
Some college/university	265	45.2
College/university degree	48	8.2
Post-high school (not college)	9	1.5
Professional school diploma	5	.9
Post-graduate work	2	.3
Post-graduate degree	1	.2
Employment status		
Not working	200	34.1
Working part-time	350	59.7
Working full-time	36	6.1
Relationship status		
Single – never married	390	66.6
Single – divorced	3	.5
Single – widowed	1	.2
Married	17	2.9
Living common law	43	7.3
In relationship – living separately	132	22.5

Measures

Cannabis Use Descriptives

Participants were asked three questions regarding their engagement in, frequency, and quantity of cannabis use. The first, "Have you consumed marijuana, tincture, hashish, hash oil, weed, grass, or pot in the past 12 months?", was rated dichotomously (1 = Yes, 0 = No), and was used to identify past-year cannabis users (i.e., the study sample). For the second, "In the past 30 days, on how many days did you consume marijuana, tincture, hashish, hash oil, weed, grass, or pot?", participants were shown a drop-down menu and asked to select a number from 0 to 30. For the third, "In the past 30 days, how many grams of marijuana, tincture, hashish, hash oil, weed, grass, or pot did you consume?", participants were also shown a drop-down menu and asked to select a number from 0-99.

Problematic Cannabis Use

The Screener for Substance and Behavioral Addictions (SSBA; Schluter et al., 2018) is a self-

report measure that assesses addiction problems in relation to four substances (alcohol, cannabis, nicotine, cocaine) and six behaviors (gambling, shopping, video gaming, overeating, sexual activity, overworking/overstudying) experienced in the past year. For the present study, only items related to problematic cannabis use were used. Using a five-point Likert scale ranging from 0 ("None of the time") to 4 ("All of the time"), participants were asked to report on the following four self-report statements in relation to their cannabis use: "I did it too much", "Once I started, I couldn't stop", "I felt I had to do it in order to function", and "I continued to do it, even though it caused problems" (Schluter et al., 2018). Total scores were calculated by summing the four items and ranged from 0 to 16, with higher scores reflecting greater problematic cannabis use. Consistent with Hodgins et al. (2022), a total score of 3 or greater was used to indicate problematic cannabis use. The SSBA cannabis portion has demonstrated good convergent validity in relation to the Cannabis Abuse Screening Test (r = .74), a well-validated measure of problematic cannabis use (Schluter et al., 2020). Internal consistency of the SSBA cannabis portion was α = 0.91 in the present sample.

The Adverse Childhood Experience Questionnaire (ACE)

The Adverse Childhood Experience Questionnaire (ACE; Dong et al., 2004) is a 29-item self-report questionnaire that measures ten categories of ACEs that individuals may be exposed to during childhood including emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, domestic violence, household substance abuse, mental illness, parental separation or divorce, and household crime. Participants are asked to rate the extent to which they experienced each item on a 5-point Likert scale from "Never" to "Very often". The 29 items were then coded to reflect a dichotomous score of either 0 = No or 1 = Yes for each category of ACE. Consistent with Dong et al. (2004), the scores were then combined to generate a total score (zero to 10) to determine the total number of ACE categories an individual was exposed to. The internal consistency of the ACE total score was α = 0.76 in the present sample.

Brief Version of the Difficulties in Emotion Regulation Scale (DERS-18)

The brief version of the Difficulties in Emotion Regulation Scale (DERS-18; Victor & Klonsky, 2016) is an 18-item self-report questionnaire that assesses facets of emotion dysregulation including awareness, clarity, non-acceptance, strategies, goals, and impulse. Participants are asked to rate the extent to which each item applies to them using a five-point Likert scale from 1 ("Almost never") to 5 ("Almost always"). The DERS-18 has demonstrated strong internal consistency, as well as convergent and concurrent validity (Victor & Klonsky, 2016). Given our interest in the overall construct of emotion dysregulation, total scores calculated from all 18 items summed were used in the present study, whereby higher scores reflect greater emotion dysregulation. In the present sample, the internal consistency of DERS-18 total score was α = 0.90.

UPPS-P Short Form (SUPPS-P)

The short-form version of the UPPS-P Impulsive Behavior Scale (SUPPS-P; Cyders et al., 2014) is a 20-item self-report measure designed to assess different facets of impulsivity including sensation seeking, lack of premeditation, lack of perseverance, negative urgency, and positive urgency. Each facet is represented by a separate subscale consisting of 4 different items. For the present study, only the negative and positive urgency subscales were measured. Participants were asked to rate each item on a four-point scale from 1 ("Strongly agree") to 4 ("Strongly disagree"), and the 4 items that correspond to the negative and positive urgency subscales were averaged. The averages of each item were summed to produce scores for these subscales, whereby higher scores reflect greater negative and positive urgency, respectively. The SUPPS-P has been supported as a valid and reliable alternative to the original 59-item UPPS-P measure (Cyders et al., 2014). In the present sample, internal consistency of the negative urgency subscale was α = 0.72 and the internal consistency of the positive urgency subscale was α = 0.78.

Data Analysis

Analyses were performed using IBM SPSS Version 27. To examine between-variable associations, bivariate correlations were obtained

for all variables. Two moderated-mediation models were then run using PROCESS Macro for SPSS (Model 14; Hayes, 2013). For the first model, ACEs was entered as the independent variable, SSBA problematic cannabis use as the dependent variable, emotion dysregulation as the mediating variable, and negative urgency as the moderating variable. The second model was identical to the first, but with positive urgency entered as the moderating variable instead of negative urgency. The same two models were run a second time with the other SUPPS-P subscales (i.e., sensation seeking, lack of premeditation, lack of perseverance, and the urgency construct that was not entered as a moderator in a particular model) entered as covariates. To control for the potential influence of demographic variables, age, gender, and ethnicity were also entered as covariates in each model. In all models, moderation effects were tested on the b path between emotion dysregulation (M) and cannabis use (Y). Interaction terms between emotion dysregulation and negative or positive urgency were produced by PROCESS Macro (Hayes, 2013) for all models, and significant interaction terms were probed at +1 and -1 SD from the mean.

RESULTS

Data Screening and Assumption Tests

Datapoints within the variables included in the moderated-mediation models were defined as outliers if they exceeded a cut-off score of z = 3.29 standard deviations from the mean (Tabachnik & Fidell, 2013). No outliers were identified, and consequently, all datapoints were included in analyses. Assumptions for moderated-mediation were tested including independence of observations, linearity of relationships between variables, homoscedasticity of error values, multicollinearity between independent variables, and normal distribution of error values (Hayes, 2018). All assumptions were met with the exception of normality, which was somewhat positively skewed. Given that regression analysis is robust against minor violations of normality (Hayes, 2018), we proceeded with moderated-mediation analyses.

Preliminary Results

On average, participants reported having consumed cannabis on 5.98 days (*SD* = 9.07) and having consumed a total of 5.11 grams of cannabis (*SD* = 10.64) in the past 30 days. Scores on the cannabis subscale of the SSBA ranged from 0-16, with 36% (*n* = 213) of the sample meeting the cutoff for problematic use. There were significant positive associations between all variables included in the main study analyses, with effect sizes ranging from small to medium. Means, standard deviations, and correlation coefficients are presented in Table 2.

Table 2. *Means, standard deviations, and bivariate correlations between problematic cannabis use, negative urgency, positive urgency, ACEs, and emotion dysregulation.*

Measure	M *(SD)*	Range	1	2	3	4	5
1. Problematic cannabis use	3.13 (4.25)	0-16	-				
2. Negative urgency	2.47 (.68)	1-4	.29**	-			
3. Positive urgency	2.02 (.67)	1-4	.34**	.55**	-		
4. ACEs	2.89 (2.43)	0-10	.29**	.18**	.22**	-	
5. Emotion dysregulation	50.00 (13.47)	21-90	.30**	.58**	.38**	.26**	-

*Note. ** p < .01*

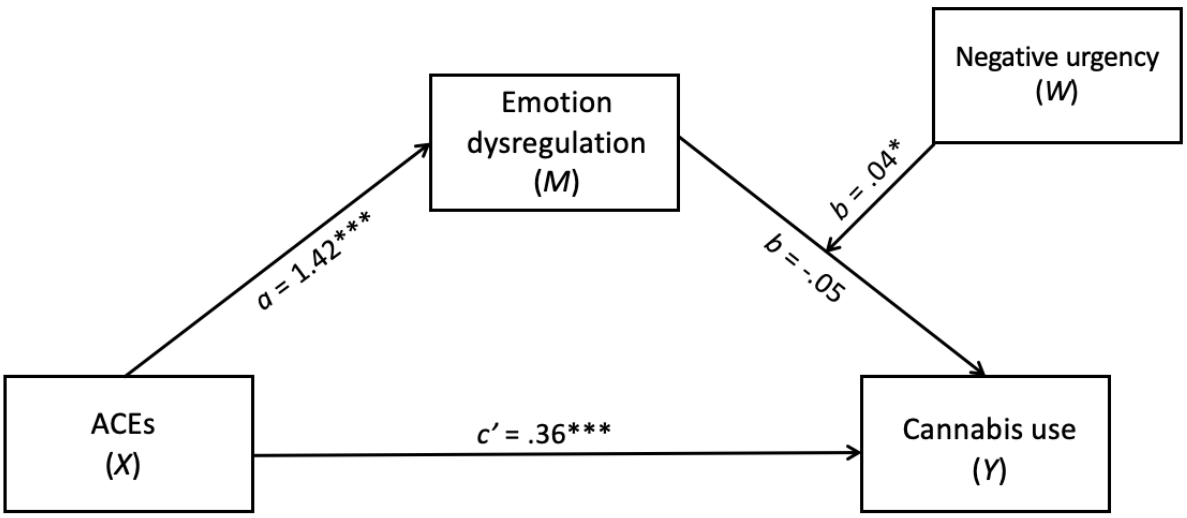
Moderated Mediation (PROCESS Model 14)

Negative Urgency

The index of moderated-mediation was significant (b = .04, SE = .03, 95% BCa CI [.01, .12]; See Figure 1), suggesting that the mediation model between ACEs, problematic cannabis use, and emotion dysregulation depended on levels of negative urgency when controlling for age, gender, and ethnicity. In other words, there was a significant moderation effect on the b path between emotion dysregulation (M) and cannabis use (Y). There was a significant direct effect of ACEs on problematic cannabis use (c' = 36, SE = .07, 95% CI [.22, 50], t = 5.11, p < .001) such that increased ACEs was associated with increased problematic cannabis use. Further, there was a significant effect of ACEs on emotion dysregulation (M) (a = 1.42, SE = .22, 95% CI [.99, 1.86), t = 6.42, p < .001), such that increased ACEs was associated with increased emotion dysregulation. There was no significant effect of emotion dysregulation (b = -.05, SE = .05, 95% CI [-.14, .04], t = -.1.15, p = .207) nor negative urgency (b = -1.0, SE = .87, 95% CI [-2.70, .70]) on problematic cannabis use. Negative urgency moderated the relationship between ACEs, emotion dysregulation and problematic cannabis use (b = .04, SE = .02, 95% CI [.01, .07], t = 2.43, p = .016) at moderate (2.50; b = .05, SE = .02, 95% BCa CI [.02, .08]) and high (3.25; b = .08, SE = .02, 95% BCa CI [.04, .11]) but not low (1.75; b = .02, SE = .02, 95% BCa CI [-.04, .06]) levels of negative urgency.

The hypothesized moderated-mediation model remained significant when controlling for other facets of impulsivity (i.e., positive urgency, sensation seeking, premeditation, and perseverance) (b = .04, SE = .02, 95% BCa CI [.01, .08]). Specifically, negative urgency moderated the relationship between ACEs, emotion dysregulation and problematic cannabis use at moderate (2.50; b = .04, SE = .02, 95% BCa CI [.01, .08]) and high (3.25; b = .07, SE = .02, 95% BCa CI [.03, .12]) but not low (1.75; b = .01, SE = .02, 95% BCa CI [-.02, .05]) levels of negative urgency.

Figure 1. *Moderated-mediation model testing the relationship between adverse childhood experiences, emotion dysregulation, negative urgency, problematic cannabis use.*



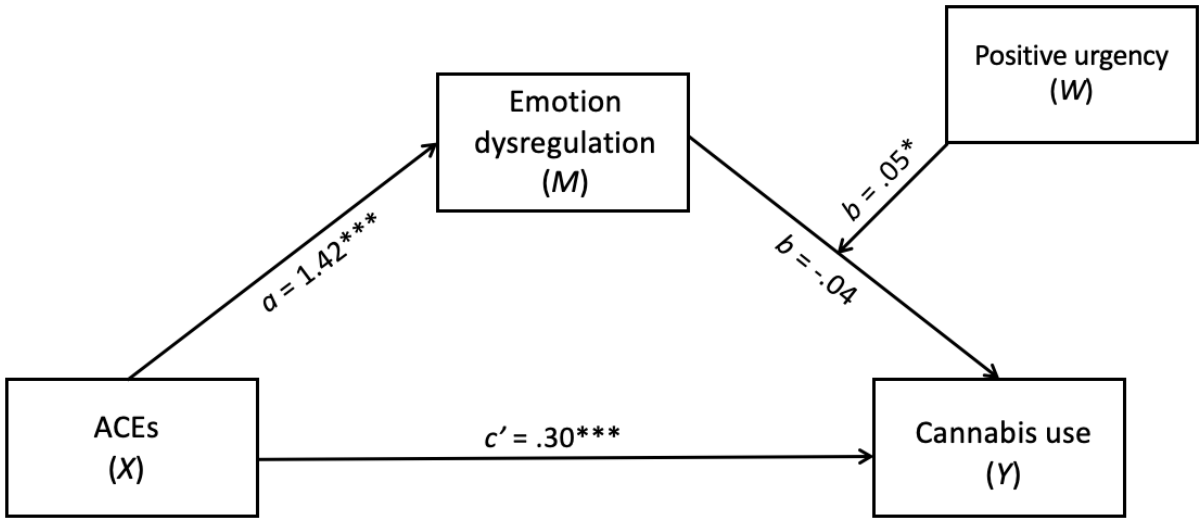
Note. b = unstandardized coefficient; SE = standard error, * = significant at the α = .05 level; *** = significant at the α = .01 level.

Positive Urgency

The index of moderated-mediation was significant (b = .07, SE = .03, 95% BCa CI [.01, .12]; See Figure 2), suggesting that the mediation model between ACEs, problematic cannabis use, and emotion dysregulation depended on levels of positive urgency when controlling for age, gender, and ethnicity. In other words, there was a significant moderation effect on the b path between emotion dysregulation (M) and cannabis use (Y). There was a significant direct effect of ACEs on problematic cannabis use (c' = 30, SE = .07, 95% CI [.22, 50], t = 4.37, p < .001) such that increased ACEs was associated with increased problematic cannabis use. Further, there was a significant effect of ACEs on emotion dysregulation (M) (a = 1.42, SE = .22, 95% CI [.99, 1.86), t = 6.42, p < .001), such that increased ACEs was associated with increased emotion dysregulation. There was no significant effect of emotion dysregulation (b = -.04, SE = .04, 95% CI [-.11, .02], t = -.1.25, p = .210) nor positive urgency (b = -.81, SE = .82, 95% CI [-2.43, .81]) on problematic cannabis use. Positive urgency moderated the relationship between ACEs, emotion dysregulation, and problematic cannabis use (b = .05, SE = .02, 95% CI [.02, .08], t = 3.01, p = .003) at moderate (2.00; b = .05, SE = .01, 95% BCa CI [.02, .08]) and high (2.75; b = .08, SE = .02, 95% BCa CI [.05, .11]) but not low (1.25; b = .01, SE = .02, 95% BCa CI [-.02, .05]) levels of positive urgency.

The hypothesized moderated-mediation model remained significant when controlling for other facets of impulsivity (i.e., negative urgency, sensation seeking, premeditation, and perseverance) (b = .04, SE = .02, 95% BCa CI [.01, .08]). Specifically, positive urgency moderated the relationship between ACEs, emotion dysregulation and problematic cannabis use at moderate (2.00; b = .03, SE = .02, 95% BCa CI [.01, .07]) and high (2.75; b = .07, SE = .02, 95% BCa CI [.03, .12]) but not low (1.25; b = -.002, SE = .02, 95% BCa CI [-.03, .04]) levels of positive urgency.

Figure 2. *Moderated-mediation model testing the relationship between adverse childhood experiences, emotion dysregulation, positive urgency, problematic cannabis use.*



Note. b = unstandardized coefficient; SE = standard error, * = significant at the α = .05 level; *** = significant at the α = .01 level.

DISCUSSION

ACEs have been strongly implicated in the etiology and maintenance of problematic cannabis use among postsecondary students (Schwartz et al., 2022), highlighting the importance of identifying the mechanisms and moderators of this relationship that may be targeted to reduce negative impacts. Consistent with this objective, the present study examined whether emotion dysregulation mediates the association between ACEs and problematic cannabis use at differing levels of affective impulsivity (negative and positive urgency) among postsecondary students. The hypothesized moderated-mediation models were supported.

As predicted, ACEs were positively associated with problematic cannabis use in the present study. This finding is consistent with previous research that has demonstrated a robust link between ACEs and various addictions, including gambling (Poole et al., 2017), alcohol use (Loudermilk et al., 2018), and cannabis use (Forster et al., 2018). Also as predicted, emotion dysregulation was found to mediate the association between ACEs and problematic cannabis use at high levels of both negative and positive urgency in the present study. In other words, for people with greater affective impulsivity, the indirect effect of emotion dysregulation on the relationship between ACEs and problematic cannabis use is particularly powerful. ACEs expose youth to chronically elevated stress levels, which can lead to longstanding dysregulation of the immune and endocrine systems as well as parts of the brain such as the hippocampus, prefrontal cortex, and amygdala (Boullier & Blair, 2018). Deficits in the functioning of such systems and brain regions are proposed to play a role in elevated emotion dysregulation (Martin & Ochsner, 2016) and impulsivity (Mitchell & Potenza, 2014), which have also been identified as risk factors for substance use (Hildebrandt et al., 2021; Weiss et al., 2015) and problematic cannabis use specifically (Cavalli & Cservenka, 2021; Manning et al., 2019; Wardell et al., 2016).

Given that emotion dysregulation is characterized in part by difficulty adaptively regulating emotions (Gratz & Roemer, 2004), individuals who endorse higher levels of affective impulsivity may experience greater frequency and duration of intense emotions (Gross & Jazaieri, 2014). In turn, experiencing intense emotions regularly may present individuals who also endorse higher levels of negative or positive urgency with an increased likelihood of engaging in risky and impulsive behaviors such as cannabis use, which can become problematic when used repeatedly. Individuals with both a history of ACEs and elevated urgency may also be more prone to using cannabis to a problematic extent as a way to reduce distress. According to the self-medication hypothesis (Khantzian, 1997), individuals engage in substance use and addictive behaviors to regulate their emotions and specifically, to reduce distress. Indeed, attending university can be a stressful experience involving challenging life transitions (e.g., moving out of the family home, seeking part- or full-time work) and intense academic pressure, which can contribute to mental health difficulties including anxiety and depression (Pedrelli et al., 2015). Consequently, postsecondary students who endorse a history of ACEs and a greater tendency to behave rashly when experiencing intense emotion may represent a group that is particularly vulnerable to engaging in risky behaviors (e.g., excessive cannabis use) as a means of coping with distress, particularly given that ACEs may have impacted their ability to develop healthy ways of doing so (Dvir et al., 2014). The interaction between emotion dysregulation and urgency among postsecondary students who have encountered ACEs is particularly concerning, as emerging adults are already generally prone to increased engagement in risk-taking behavior, a susceptibility that may be enhanced among students as they leave the family home and transition into postsecondary education (Smith & Cyders, 2016).

Emotion dysregulation and urgency are proximal risk factors for addictions that may be more receptive to modification (Nolen-Hoeksema & Watkins, 2011) than the more distal ACEs. Consequently, the findings of the present study may carry important implications for the prevention and treatment of problematic cannabis use among postsecondary students with a history of ACEs. Interventions targeting both emotion dysregulation and affective impulsivity may be particularly beneficial for this subset of individuals. For example, dialectical behavior therapy skills training (DBT-ST) is often used

with substance use disorders to treat problems rooted in emotion dysregulation and specifically aims to increase an individual's ability to tolerate and regulate distress (Warner & Murphy, 2021). Further, mindfulness-based interventions (MBIs) are also commonly used to target emotion dysregulation and reduce impulsivity through mindfulness, which involves maintaining non-judgmental awareness of one's thoughts and emotions in the present moment (Kabat-Zinn, 1994). Mindfulness meditation encourages individuals to "sit with" uncomfortable emotions rather than attempt to suppress or act upon them rashly. This skill may, in turn, reduce their likelihood of engaging in maladaptive and impulsive behaviors, such as cannabis use, when experiencing heightened emotional intensity. Moreover, developing greater emotional awareness, acceptance, and understanding, as well as replacing emotion-based impulsive behaviors with more adaptive regulation skills, may further decrease their propensity for developing problematic cannabis use.

Limitations and Future Directions

While the findings of the present study supported the hypothesized moderated-mediation models, several limitations should be noted. First, a cross-sectional design was employed, which precludes conclusions regarding the causal nature of the relationships between ACEs, emotion dysregulation, negative and positive urgency, and problematic cannabis use among postsecondary students. Future studies should consider examining these relationships longitudinally, such as by measuring emotion dysregulation and urgency at several time points and tracking the transition to problem cannabis use overtime among youth who have encountered ACEs. Second, a self-report measure was used to assess problematic cannabis use. Although the SSBA (Schluter et al., 2018) was administered in the present study given its brief length and minimal burden on participants, a structured diagnostic interview may be used in future studies to more comprehensively and accurately confirm the presence of CUD.

Third, the present study was conducted in a Canadian context wherein cannabis has been legalized since 2018 (Rotermann, 2020). Previous research has identified higher rates of cannabis use among individuals residing in regions where it is legal relative to those residing in regions where it is still criminalized (Goodman et al., 2020), suggesting that postsecondary students with a history of ACEs may display different patterns of problematic cannabis use depending on their geographic location. Another important contextual factor to note is the COVID-19 pandemic, which was ongoing during data collection for the present study. There is evidence to suggest that rates of substance use significantly increased among emerging and young adults during the pandemic (Marchand et al., 2022). As such, participants in the present study may have endorsed greater cannabis use severity than would typically be observed. Future studies may consider testing the present moderated-mediation models among postsecondary students living in regions where cannabis is not legal, as well as outside of the context of the Covid-19 pandemic, to determine whether results diverge. Finally, it is important to note that the majority of participants were white, single, straight women pursuing post-secondary education. Therefore, the homogeneity of the sample may limit the external validity, or in other words, generalizability of our findings (Henrich et al., 2010). Future studies should consider including a more diverse sample, particularly with regards to gender, ethnicity, and socioeconomic status. For instance, this may be achieved by using a pre-screener to identify and selectively invite participants who both use cannabis and identify as members of underrepresented sociodemographic groups.

Conclusion

In conclusion, the findings of the present study found support for the mediating role of emotion dysregulation in the relationship between ACEs and problematic cannabis use at high levels of both negative and positive urgency in a large sample of Canadian postsecondary students. Although ACEs represent a distal risk factor and their occurrence cannot be modified, emotion dysregulation and urgency may be promising proximal targets for decreasing the risk of problematic cannabis use among these individuals. Interventions that aim to increase mindfulness and adaptive emotion regulation skills may reduce the likelihood that

postsecondary students with a history of ACEs will resort to risky and impulsive behaviors, such as cannabis use, when experiencing heightened emotional distress.

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