

**Indirect Associations between PTSD Symptoms and Cannabis Problems in Young Adults:
The Unique Roles of Cannabis Coping Motives and Medicinal Use Orientation**

Kyra N. Farrelly¹, Matthew T. Keough¹, & Jeffrey D. Wardell^{1,2,3*}

¹Department of Psychology, York University, Toronto, Ontario, Canada

²Institute for Mental Health Policy Research, Centre for Addiction and Mental Health, Toronto,
Ontario, Canada

³Department of Psychiatry, University of Toronto, Toronto, Ontario, Canada

*Corresponding author. *Email address:* jwardell@yorku.ca

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Abstract

Cannabis use in young adulthood has been associated with exposure to traumatic events and posttraumatic stress disorder (PTSD). Coping motives for cannabis use represent one mechanism linking PTSD with cannabis problems, yet some individuals with PTSD consider their cannabis use to be medicinal in nature. While a medicinal orientation to cannabis overlaps conceptually with coping motives, it could be associated with unique cannabis outcomes. This study examined trauma-related coping motives and medicinal cannabis orientation as mediators of the association between PTSD symptoms and cannabis outcomes in young adults. Data came from an online survey of 212 university students (M age = 19.41; 70.3% Women; 43.4% White) who used cannabis in the past month and endorsed a traumatic life event. Path analyses examined associations of PTSD symptoms with past month cannabis frequency and problems through medicinal cannabis orientation (i.e., number of mental health symptoms that cannabis is used to manage) and trauma-related coping motives. PTSD symptoms were associated with trauma-related coping motives but not with medicinal cannabis orientation. Both trauma-related coping motives and medicinal cannabis orientation were uniquely associated with greater cannabis use frequency, but only trauma-related coping motives were associated with greater cannabis problems. There were significant indirect relationships from PTSD symptoms to cannabis use frequency and problems through trauma-related coping motives but not through medicinal cannabis orientation. Results support unique contributions of trauma-related coping motives and medicinal cannabis orientation to cannabis outcomes and suggest that trauma-related coping motives are specifically implicated in the link between PTSD and cannabis problems.

Key words: cannabis; trauma; coping motives; medicinal

**Indirect Associations between PTSD symptoms and Cannabis Problems in Young adults:
The Unique Roles of Cannabis Coping Motives and Medicinal Use Orientation**

Cannabis is a commonly used substance among young adults (aged 18-25; Government of Canada, 2021; Substance Abuse and Mental Health Services Administration, 2022). Rates of cannabis use in this age group are on the rise, which may be related to the legalization of adult cannabis use in certain jurisdictions (Farrelly et al., 2023). Increasing rates of cannabis use in this population are notable as heavy cannabis use has been linked with a variety of consequences among young adults (e.g., academic problems and risk of cognitive impairments; Hall et al., 2020; Lisdahl et al., 2014). Thus, examining risk factors for cannabis use among young adults is important for informing intervention efforts.

Exposure to traumatic life events is one such risk factor. Early traumatic life events are common (McLaughlin et al., 2013) and may heighten the risk of later posttraumatic stress disorder (PTSD) and more severe symptomology. Young adulthood represents an age of considerable change and critical development (Arnett, 2007; Galanaki & Leontopoulou, 2017); thus, trauma exposure within this population may be extremely disruptive. Importantly, a history of trauma exposure has been linked with higher odds of lifetime cannabis use and steeper increases in cannabis use over time for both young adult and general adult samples (Kevorkian et al., 2015; Rogers et al., 2021). Further, research supports a link between cannabis use and PTSD, highlighting the importance of studying cannabis use in trauma-exposed samples (Hicks et al., 2022). However, there remains a need to examine potential mechanisms linking PTSD and cannabis use outcomes among young adults.

One potential pathway between PTSD and cannabis-related problems is coping motives for using cannabis, which involve using cannabis to reduce negative affect or distress (Simons et

al., 1998). Theoretically, individuals may learn that consuming substances when experiencing trauma-related distress can temporarily alleviate symptoms (Khantzian, 1997), thus reinforcing the idea that cannabis may be used as a trauma-related coping mechanism. Empirically, PTSD and trauma-related distress have been linked with coping motives for cannabis use (Bonn-Miller, Babson et al., 2014). Further, using cannabis to cope is associated with using greater quantities of cannabis and increased cannabis-related problems across a variety of samples (e.g., young adults, general community samples, medical cannabis patients; Blevins et al., 2016; Bonar et al., 2017; Bonn-Miller, Boden et al., 2014; Scarfe et al., 2022). Additionally, using cannabis to cope with distress has been found to mediate the relationships between childhood trauma and later cannabis use problems as well as between PTSD symptoms and cannabis use disorder (CUD) symptoms (Brammer et al., 2022; Scarfe et al., 2022), establishing coping motives as a potentially important mechanism in these associations. However, an in-lab cue study found that PTSD symptom severity was not associated with global cannabis coping motives (Farrelly et al., 2022), suggesting there may be a need to examine more trauma-specific coping motives. As much of the previous literature has defined coping motives as using cannabis to manage negative affect and distress broadly, the role of coping motives that are specific to trauma-related distress in the relationship between PTSD symptoms and cannabis outcomes in young adults is unclear and requires further examination.

While using cannabis to cope with distress is typically considered to be a risk factor for negative cannabis-related outcomes, there are young adults who consider their use of cannabis to manage mental health symptoms to be medicinal in nature. This medicinal orientation towards cannabis involves use to manage physical and mental health symptoms, typically without medical authorization. This is common in Canada where young adults are easily and legally able

to access cannabis to manage symptoms without healthcare provider support. Indeed, 16% of Canadians above age 16 who use cannabis report medicinal reasons for use, whereas only 27% of these individuals report having current medical authorization (Government of Canada, 2021). Additionally, approximately 20% of individuals who report medicinal cannabis use meet criteria for PTSD (Orsolini et al., 2019), with sleep problems and stress - two common symptoms of PTSD - among the most commonly reported symptoms that cannabis is used to manage (Kvamme et al., 2021). Military veterans, a sample with elevated rates of PTSD, have reported beliefs that cannabis use can help manage PTSD-related symptoms (e.g., intrusions, re-experiencing, avoidance, and arousal; Earleywine & Bolles, 2014; Walsh et al., 2017), suggesting that medicinal cannabis use is relevant for those with a trauma history. However, although using cannabis to manage symptoms is perceived to have certain therapeutic benefits (Walsh et al., 2013), medicinal cannabis use may still pose a risk for negative cannabis-related consequences, as individuals who report medicinal cannabis use tend to use cannabis more often and are at a higher risk for CUD and cannabis-related problems than those who report only recreational cannabis use (Hummer et al., 2021; Metrik et al., 2018; Pederson et al., 2019; Wardell, 2022). Thus, it is important to examine the role that medicinal cannabis orientation may play in cannabis-related consequences among trauma-exposed young adults.

Within the extant literature, coping motives for cannabis use and medicinal cannabis orientation appear to overlap among individuals with a trauma history. In samples of medicinal cannabis users, individuals show elevations on measures of cannabis coping motives (Bonn-Miller, Boden et al., 2014; Haug et al., 2017), and veterans with PTSD who endorse using cannabis to cope report similar reasons for use to individuals who report using cannabis medicinally (e.g., to manage stress and anxiety; Elliot et al., 2015). However, while coping

motives for cannabis and medicinal orientation toward cannabis overlap conceptually, it is possible that they represent distinct constructs that have different associations with cannabis outcomes. Motivational models of substance use purport that substance use more broadly is often driven by affect regulation (Cox & Klinger, 1988). Thus, coping is considered to be a major motive for cannabis use even outside of a medicinal context. For example, many young adults report that they use alcohol to cope with anxiety or depressed mood (Grant et al., 2009), and because alcohol is not typically considered a “medicine,” presumably young adults do not consider their alcohol use to be “medicinal.” For cannabis use, because there is widespread public perception that cannabis can have therapeutic benefits (Kruger et al., 2020; Walsh et al., 2013), it is possible that some individuals perceive their use of cannabis to cope with negative mood as a “medicinal” reason for use (e.g., they use it to manage symptoms of anxiety), but it is also possible that when cannabis is used to cope outside of a medical context, this is not perceived as “medicinal.” Indeed, individuals who report recreational-only cannabis use still endorse coping-motivated cannabis use (Metrik et al., 2018; Vedelago et al., 2020), suggesting that not all coping-motivated use is perceived as medicinal. This distinction is important as individuals with PTSD who perceive their use as medicinal may differ in how they use cannabis relative to those who perceive their use as recreational, even if they have similar levels of trauma-related coping motives for cannabis use. Further, medicinal and recreational orientation are linked with different levels of risk for cannabis-related consequences among youth (Wardell, 2022). However, it is unclear in the extant literature if cannabis use to cope with trauma-related symptoms represents a construct that is distinct from medicinal orientation to cannabis. If these are distinct constructs, it is possible that they play different roles in the link between PTSD symptoms and cannabis-related outcomes.

Present Study

Medicinal cannabis orientation and cannabis coping motives are both associated with greater cannabis-related problems, but their unique associations with cannabis-related problems among those with a trauma history have yet to be examined. To date, no study has examined cannabis coping motives and medicinal cannabis orientation as simultaneous mediators to understand if each construct represents a distinct mechanism in the link between PTSD and cannabis-related outcomes among young adults. Further, much of the extant literature has examined associations of PTSD with coping motives broadly rather than coping motives specifically related to PTSD-related distress. Thus, the current study aimed to elucidate the unique roles of trauma-specific coping motives and medicinal cannabis orientation (defined as using cannabis to manage mental health symptoms). We hypothesized that greater medicinal cannabis orientation (i.e., using cannabis to manage a greater number of symptoms) and greater trauma-related coping motives would each partially explain unique variance in the indirect relationship between greater PTSD symptoms and cannabis-related outcomes (both greater frequency of use and related problems).

Method

Participants and Procedures

Young adults ($N=212$) who reported experiencing a traumatic life event and having used cannabis in the past month were recruited through the Undergraduate Research Participant Pool (URPP) at a large university in Ontario, Canada. Participants had a mean age of 19.41 ($SD = 1.49$, Range: 18-24). Participants primarily identified as women (70.3%), and 43.4% of participants identified as White. Additional participant demographics can be found in Table 1.

[Insert Table 1 near here]

To be eligible, participants were required to use cannabis at least once a month for medicinal and/or recreational purposes, and report consuming products that contained THC at least once a month (i.e., CBD-only use was excluded). Participants first completed a pre-screening survey administered centrally by the URPP to confirm eligibility. Eligible participants were then invited to complete an online self-report survey through Qualtrics examining cannabis use, cannabis motives, cannabis consequences, trauma exposure, and PTSD symptomatology. Data collection took place between 2022 and 2023, several years after the 2018 legalization of adult cannabis use in Canada. There was a total of 338 responses; however, $n=77$ were removed due to duplicate or unfinished entries, $n=17$ were removed as they did not endorse any trauma history, and $n=28$ were dropped as they reported not consuming cannabis in the past month. One participant was dropped for having greater than 10% missingness on the PTSD symptom measure. Finally, $n=2$ were removed for endorsing medicinal cannabis use exclusively for physical symptoms (as this was outside of the scope of the current paper's focus on medicinal use to manage mental health symptoms), and $n=1$ was removed for reporting use of cannabis to manage "other" symptoms, without further specifying the type of symptoms. This left a final sample of $N=212$ for the present analyses.

Measures

Demographics

Participants completed a demographics questionnaire assessing age, gender identity, race and ethnicity, and income.

Trauma Exposure

The Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake et al., 2013) was used to measure participants' exposure to traumatic life events. The LEC-5 consists of 17 Criterion A traumatic life events, defined as actual or threatened death, serious injury or sexual assault (American Psychiatric Association, 2013). The LEC-5 asks participants if they have ever directly experienced or witnessed each event, learned about it happening to a close family member or friend, or were exposed to it as part of their job (Weathers, Blake et al., 2013). Responses to each event were coded as 0 = *never experienced* and 1 = *experienced in some capacity* (i.e., happened to me, witnessed it, learned about it, or experienced it as part of my job). The LEC-5 has exhibited good psychometric properties and convergent validity with other trauma measures (Weathers et al., 2013).

PTSD Symptoms

PTSD symptoms were measured using the PTSD checklist for DSM-5 (PCL-5; Weathers, Liz et al., 2013). The PCL-5 is a 4-factor 20-item questionnaire asking participants how much they have been bothered by a given PTSD symptom over the past month in response to a very stressful experience. Participants were asked to rate their level of symptoms on a scale from 0 = *Not at all* to 4 = *Extremely*, with possible scores ranging from 0-80. The PCL-5 has exhibited good psychometric properties and is considered a well validated self-report measure of PTSD symptomatology (Blevins et al., 2015). The PCL-5 consists of four subscales measuring the PTSD symptom clusters: intrusive symptoms (Cluster B), avoidance (Cluster C), negative mood and cognitions (Cluster D), and arousal/reactivity (Cluster E). In the current study, total PTSD symptoms (summed across clusters) was used in the primary analysis as there were high intercorrelations among the symptom clusters ($r = .583$ to $.745$). For participants with less than

10% of items missing, mean imputation was used for missing items at the total scale level (when creating the total PTSD score) and the subscale level (when creating symptom cluster subscales). Internal consistency for the total PCL-5 total symptom score was excellent (Cronbach's $\alpha = .95$). Further, internal consistencies for Cluster B (Cronbach's $\alpha = .91$), C (Cronbach's $\alpha = .85$), D (Cronbach's $\alpha = .90$), and E (Cronbach's $\alpha = .83$) were high.

Medicinal Cannabis Orientation

Participants were asked questions regarding their medicinal reasons for cannabis use in the past month. Participants were first asked if they had used cannabis for recreational reasons only, medicinal reasons only, or both medicinal and recreational reasons. Medicinal use was defined for participants as using cannabis to manage physical or mental health symptoms regardless of whether they had medical authorization from a healthcare provider. Participants who endorsed any medicinal use were then asked to report the symptoms/conditions they used cannabis to manage, with options including pain, anxiety, stress, insomnia, depression, appetite, headaches, nausea, muscle spasms, and other (specify), and were permitted to check all that applied. For the present study, we were interested in medicinal cannabis use for mental health reasons; thus, we considered only mental health symptoms in analyses (i.e., anxiety, stress, insomnia, depression, or other specified mental health reasons). For the analysis, medicinal cannabis orientation was represented as a continuous variable reflecting the number of mental health symptoms each participant reported using cannabis to manage, and thus higher values reflected more extensive engagement in medicinal cannabis use. Participants who reported that they used cannabis exclusively for recreational reasons were given a value of 0 on this variable, and so total scores ranged from 0 (no mental health medicinal orientation) to 5 (cannabis used to manage 5 different mental health-related symptoms).

Trauma-Related Cannabis Coping Motives

Trauma-related coping motives for cannabis use were measured using an adapted version of the Trauma Related Drinking questionnaire (TRD; Hawn et al., 2020). The TRD consists of four questions surrounding alcohol use to cope with PTSD symptoms. The four items map onto the DSM-5 PTSD symptom clusters of intrusion/re-experiencing, avoidance, negative cognitions and mood, and arousal. The TRD is a more trauma-specific coping measure compared to the Drinking Motives Questionnaire coping subscale (Hawn et al., 2020). For the current study we modified the TRD to ask about using cannabis to cope with the four trauma-related symptom clusters. To our knowledge, this is the first study to adapt the TRD for cannabis use. Participants were asked to report how often they used cannabis to cope with each symptom cluster on a scale from 1 = *Almost Never/Never* to 5 = *Almost Always/Always*, with possible scores ranging from 4 to 20. Trauma-related coping motives were included as a total score rather than symptom specific clusters to capture coping with overall PTSD-related symptomology and to map onto the total PTSD symptom variable used in the primary analysis. Cronbach's alpha for the current sample was .87, indicating high internal consistency.

Cannabis Use

Past month frequency of cannabis use, main route of cannabis administration, and the primary form of cannabis used over the past month were assessed using a modified version of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU; Cuttler & Spradlin, 2017). For the present study, the item assessing frequency of cannabis use was included as an outcome. The frequency item asked participants to enter the number of days they used cannabis in the past month rounded to the nearest whole number. Only frequency was included instead of quantity, as aggregating quantity across various forms of cannabis is not

always viable and there was variability in the forms of cannabis used across participants. Thus, focusing on cannabis use frequency allowed us to capture individual differences in cannabis use patterns across all participants and forms of cannabis consumed.

Cannabis-Related Problems

The number of cannabis-related problems experienced over the past month was assessed using the 21 item Brief-Marijuana Consequences Questionnaire (BMACQ; Simons et al., 2012). Response options for each item were dichotomous (yes or no), and participants were asked if they experienced the relevant problem over the past month. Items were summed to create a count of the total number of cannabis problems. Cronbach's alpha indicated high internal consistency ($\alpha = .90$).

Data Analysis

We first examined descriptive statistics for all model variables. Cannabis use frequency (skewness = 0.22, kurtosis = -1.61) and problems (skewness = 0.45, kurtosis = -0.92) were not notably skewed. To examine the unique role of coping motives and medicinal cannabis orientation in the link between PTSD symptoms and cannabis outcomes (use frequency and number of cannabis problems) we specified a path model in Mplus using full information maximum likelihood estimation. The main independent variable was total PTSD symptom score, with cannabis use frequency and related problems entered as correlated dependent variables in the model. Trauma-related coping and medicinal cannabis orientation were included as parallel mediators that were allowed to freely covary with one another. Participant age, gender, and number of traumatic life events were included as covariates. Gender was represented as two dummy coded variables (men vs. women and men vs. nonbinary/other gender). 95% bias-

corrected bootstrapped confidence intervals (with 10,000 samples) were obtained for all path coefficients (Hayes, 2015). Paths were deemed to be statistically significant if the 95% confidence interval did not include zero.

A sensitivity analysis was conducted to examine whether the four PTSD symptom clusters showed differential associations with outcomes. Due to the risk of multicollinearity from high correlations among the subscales, we ran four separate path models, one for each of the different PTSD symptom clusters. Other than swapping the PTSD total score for one of the cluster subscales, all path models were identical to the main analysis described above. Significance was determined using 99% confidence intervals to correct for multiple comparisons.

Results

Descriptive Statistics

Means and standard deviations of model variables can be found in Table 2. Participants' mean PCL-5 score was 34.80 ($SD = 19.83$), and $n=103$ (48.6%) participants met or exceeded the clinical cut-off score of 33 for PTSD (Weathers, Liz et al., 2013). The mean number of days participants reported using cannabis was 14.97 ($SD = 11.34$) and ranged from 1 to 31. Smoking was the most commonly endorsed route of cannabis administration (66.5%), followed by vaporizing (28.8%) and oral ingestion (4.17%). No other method of cannabis use was endorsed. Eighty-nine participants (39.2%) endorsed using cannabis to manage mental health symptoms and reported using cannabis to manage an average of 1.08 ($SD = 1.49$) different symptoms. A breakdown of symptoms managed with cannabis reported by participants who endorsed medicinal cannabis orientation can be found in Table 1.

[Insert Table 2 near here]

Correlations among model variables can be found in Table 3. Trauma-related coping motives and medicinal orientation were significantly correlated ($r = .300, p = .01$), suggesting some overlap among these constructs, but also considerable unique variance ($r^2 = .09$). PTSD symptoms were significantly correlated with both trauma-related coping and medicinal cannabis orientation. Both greater cannabis problems and past month frequency of use were significantly correlated with greater trauma-related coping motives, and with greater medicinal cannabis orientation (see Table 3.)

[Insert Table 3 near here]

Path Analysis

Results of the main path model are shown in Figure 1. The direct paths from PTSD symptoms to cannabis use frequency and cannabis problems were both nonsignificant. However, both medicinal cannabis orientation and trauma-related coping motives were significantly associated with greater cannabis frequency over the past month, such that using cannabis medicinally for more mental health symptoms and having greater trauma-related coping motives were each uniquely associated with greater cannabis use frequency (see Figure 1). Further, trauma-related coping motives were associated with greater cannabis problems in the past month, but medicinal cannabis orientation was not. PTSD symptoms were associated with trauma-related coping motives but not with medicinal cannabis orientation (see Figure 1). Additionally, there was a significant relationship between gender and medicinal cannabis orientation, such that participants reporting their gender as non-binary or “other” had higher medicinal cannabis orientation than those identifying as men ($B = 1.919, 95\% \text{ CI: } 0.979, 2.796$), and a significant relationship between gender and cannabis problems, such that participants reporting their gender

as non-binary or “other” had lower cannabis problems than those identifying as men ($B = -3.335$, 95% CI: -6.524, -0.065). No other covariates were associated with model mediators or outcomes.

[Insert Figure 1 near here]

Finally, there were significant indirect paths from PTSD symptoms to cannabis use frequency ($B = 0.147$, 95% CI: 0.074, 0.223) and cannabis problems ($B = 0.068$, 95% CI: 0.030, 0.109) through trauma-related coping motives. However, the indirect relationships through medicinal cannabis orientation were not significant for cannabis use frequency ($B = 0.015$, 95% CI: -0.003, 0.044) nor for cannabis problems ($B = 0.001$, 95% CI: -0.002, 0.009).

Sensitivity Analysis

The separate path models for each PTSD symptom cluster subscale be found in Supplementary Tables 1, 2, 3, and 4 respectively. All PTSD symptom clusters were associated with trauma-related coping, such that experiencing more symptoms was associated with more trauma-related coping motives. No PTSD symptom clusters were significantly associated with medicinal cannabis orientation. Finally, there were significant indirect paths from each symptom cluster to both cannabis use frequency and cannabis problems through trauma-related coping motives (see Supplementary Tables 1-4). However, there were no significant indirect relationships through medicinal cannabis orientation for any PTSD symptom cluster.

Discussion

We aimed to examine the unique roles of trauma-related coping motives and medicinal cannabis orientation (specifically, using cannabis to manage mental health symptoms) in the relationships between PTSD symptoms and cannabis-related outcomes. Our findings provide new insight into motives for cannabis use among young adults who have experienced traumatic

life events, establishing a specific role for trauma-related coping motives in the link between PTSD symptoms and cannabis outcomes that is distinct from self-reported medicinal cannabis use to manage mental health symptoms. The significant association of trauma-related coping with cannabis-related problems also highlights the utility of assessing specific, rather than general, coping motives among trauma-exposed individuals. Our findings can inform cannabis intervention efforts, suggesting that interventions tailored toward those with trauma-specific coping motives for cannabis use may be beneficial.

In line with our hypothesis, we found that trauma-related coping motives was a significant mediator of the indirect relationship between PTSD symptoms and both cannabis use frequency and cannabis problems. These findings extend previous studies examining general coping motives as a mediator between childhood trauma and problem cannabis use (e.g., Brammer et al., 2022) by focusing on a specific trauma-related coping measure, suggesting that these specific motives can explain the relationship between current PTSD symptom severity and cannabis outcomes. Our findings are also consistent with previous studies that have found that cannabis coping motives are associated with more cannabis-related consequences and heavier cannabis use (Blevins et al., 2016; Bonar et al., 2017; Bonn-Miller, Boden et al., 2014; Scarfe et al., 2022). As all previous research has examined coping motives more generally, this study provides novel insight into the role of trauma-specific coping motives in the link between PTSD symptoms and cannabis-related outcomes. Further, a sensitivity analysis with the PTSD symptoms clusters included as separate predictors suggested there were not differential influences of specific symptom clusters.

While trauma-related coping motives helped to explain associations between PTSD symptoms and cannabis use outcomes, medicinal cannabis orientation did not, which was

surprising and inconsistent with our hypothesis. Further, findings suggested that trauma-related coping motives and medicinal cannabis orientation were distinct constructs. While the two variables were significantly correlated ($r = .300$), there was still notable unique variance (with only 9% of variance overlapping). Additionally, our finding that only trauma-related coping motives was a unique mediator of the association between PTSD symptom severity and cannabis use outcomes suggest that coping motives and medicinal cannabis orientation play different roles in this pathway, further supporting their distinction. One explanation is that the trauma-related coping measure is agnostic to whether one considers their use of cannabis to cope with PTSD symptoms to be medicinal or recreational, while medicinal orientation only captures cannabis use to manage symptoms that is perceived as medicinal use and includes symptoms that are relevant to, but not necessarily specific to, PTSD. Thus, this study provides evidence that specific trauma-related coping motives appear to be more relevant in understanding the relationship between PTSD and cannabis outcomes than more general medicinal cannabis orientation.

With respect to predicting cannabis outcomes, while our finding that trauma-related coping motives was associated with both greater cannabis use frequency and cannabis-related problems was expected, medicinal cannabis orientation was only associated with greater cannabis use frequency but not cannabis problems. The association with cannabis use frequency is consistent with previous research showing that youth and adults who report medicinal cannabis use consume cannabis more often than those who report exclusively recreational use (Turna et al., 2020; Wardell, 2022), suggesting that perceiving one's cannabis use as "medicinal" (in addition to reporting cannabis use to cope with PTSD) can further increase the risk for frequent cannabis use in young adults with a trauma history. However, the lack of an association

between medicinal reasons for use and cannabis problems conflicts with prior studies of youth and young adults that have observed a significant association (Hummer et al., 2021; Wardell, 2022; Wardell et al., 2021). As we controlled for coping motives within the path model, and there was some overlap between medicinal orientation and coping motives, our findings may suggest that coping-motivated use might explain the associations between medicinal cannabis orientation and cannabis problems that have been observed in prior studies. Indeed, there was a significant (albeit small) bivariate correlation between medicinal cannabis orientation and cannabis problems that was not apparent when covarying for trauma-related coping motives in the path model. However, the weak relationship between medicinal cannabis orientation and cannabis problems in our study may also reflect a restriction in range, as all participants were required to have consumed cannabis in the past month. Thus, we may be missing a broad range of cannabis use, especially light use, which that may be common among those who have no medicinal orientation to cannabis.

Understanding trauma-related coping motives and medicinal cannabis orientation as distinct factors related to cannabis use may have clinical implications by pointing to individuals who may be a high priority for interventions (i.e., young adults with greater PTSD symptoms that report using cannabis to cope with trauma-related symptoms). Future research may need to consider the utility of adopting condition-specific measures of coping motives to better capture cannabis motives among clinical samples. It should also be noted that this study was the first to our knowledge to adapt the TRD (Hawn et al., 2020) for cannabis use. In bivariate analyses, we observed that trauma-related coping motives showed a slightly stronger association with cannabis use problems than with frequency of cannabis use. This aligns with the findings in Hawn et al. (2020) where greater trauma-related coping was found to be more strongly

associated with alcohol use problems than with frequency of alcohol use. Although the difference in these correlations was small and not formally tested in the current study, the findings do indicate that trauma-related coping motives play an important role in predicting cannabis use problems in particular.

Limitations and Future Directions

The findings should be considered along with the following limitations. First, the study was cross-sectional in nature. While cross-sectional studies can be a useful first step in examining mechanisms within a relationship (Hayes, 2017), future longitudinal studies would help to elucidate a clearer temporal sequence among PTSD, cannabis use motives, and cannabis consequences, and help to further clarify differences among coping-motivated and medically motivated cannabis use. Second, as the study consisted only of self-report questionnaires, future research would benefit from including interview assessments of PTSD (e.g., Clinician-Administered PTSD Scale for DSM-5; Weathers, Blake, et al., 2013) and cannabis use (e.g., Timeline Follow Back; Sobell & Sobell, 1992).

Third, as our medicinal orientation question did not ask about cannabis use to manage trauma-related symptoms directly, future research should include a more comprehensive range of specific trauma-related symptoms when assessing symptoms that are managed with cannabis to further disentangle differences among trauma-related coping motives and medicinal orientation. Fourth, we included cannabis use frequency as an outcome to capture all forms of cannabis consumption, but quantity of cannabis use should be considered in future work as cannabis-related consequences may be explained by heavier use rather than just frequent use. Fifth, future research should also consider the role of medical cannabis authorization to better understand differences in cannabis-related consequences among individuals with medical cannabis

authorization and individuals who only report self-medication, although medical authorization is rare among young adults in the context of legal access to cannabis for nonmedical use in Canada (Government of Canada, 2021).

The study also has some limitations to generalizability as our sample consisted primarily of White women, with less representation of other racial or gender identities. The generalizability of the findings is also limited as the sample was comprised exclusively of young adults enrolled in university. Future research should consider replicating our study within broader age samples and in more severe clinical populations. Additionally, a substantial number of participants were removed from the analyses due to incomplete responses, thus there may be limits to generalizability due to exclusion of incomplete responders. Finally, there were several potential confounding variables that we did not consider. For example, we did not control for other motives of cannabis use (i.e., social, enhancement, expansion, conformity) or use of any substances other than cannabis. Further, we did not control for mental health diagnoses outside of PTSD; thus, it is possible that findings could be accounted for by other mental health concerns (e.g., Major Depressive Disorder, Generalized Anxiety Disorder).

Conclusion

We aimed to examine the role of trauma-related coping motives and medicinal cannabis orientation in the link between PTSD symptoms and cannabis use outcomes in young adults. Our findings provide preliminary evidence that trauma-related coping and mental health-related medicinal cannabis orientation (specifically, using cannabis to manage a greater number of mental health symptoms) are distinct constructs and have differential relationships with PTSD and cannabis-related outcomes. Only trauma-related coping motives were found to mediate the link between greater PTSD symptoms and more frequent cannabis use and cannabis problems.

These findings may have implications for targeted cannabis use interventions among individuals who report using cannabis to cope with trauma.

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Declaration of Interest Statement

The authors have no conflicts of interest to disclose.

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Table 1.

Demographic Characteristics and Medicinal Orientation Symptoms

Variable	n (%)
Gender Identity	
Woman	149 (70.3)
Man	56 (26.4)
Non-Binary	6 (2.8)
Other	1 (0.5)
Race/Ethnicity ^a	
White	92 (43.4)
Black	30 (14.2)
Asian	24 (11.3)
Pacific Islander	0 (0.0)
Indigenous	4 (1.9)
East Indian	21 (9.9)
Middle Eastern	33 (15.6)
Hispanic/Latino	21 (9.9)
Other	31 (14.6)
Prefer Not to Disclose	2 (0.9)
Household Income ^b	
\$0-\$29,999	36 (17.0)
\$30,000-\$59,999	27 (12.7)
\$60,000-\$99,999	37 (17.4)
\$100,000-\$159,999	40 (18.8)
\$160,000-\$199,999	4 (1.9)
\$200,000+	13 (6.1)
Endorsed cannabis use for medicinal reasons	83 (39.2)
Symptoms for which medicinal cannabis is used ^c	
Anxiety	70 (33.0)
Stress	64 (30.2)
Insomnia	43 (20.3)
Depression	45 (21.2)
Other	10 (4.7)

Note.^a Race/ethnicity categories were not mutually exclusive. ^b25.9% of participants were missing data on household income. ^c Symptoms were not mutually exclusive; only mental health symptoms are shown.

Table 2.

Means and standard deviations of model variables

Variable	Mean	SD	Range
Trauma-Related Coping Motives	9.53	4.81	4-20
Medicinal Cannabis Orientation ^a	1.08	1.49	0-5
Traumatic Life Events	9.41	4.88	1-17
Cannabis Problems	7.19	5.27	0-21
Cannabis Use Days	14.97	11.35	1-30
Total PTSD Symptoms	34.81	19.84	0-80
PTSD Cluster B Symptoms	8.54	5.95	0-20
PTSD Cluster C Symptoms	4.12	2.68	0-8
PTSD Cluster D Symptoms	12.57	7.93	0-28
PTSD Cluster E Symptoms	9.58	6.02	0-24

Note. Total PTSD Symptoms = total score on the PCL-5; Cluster B = Intrusion symptoms; Cluster C = Avoidance symptoms; Cluster D = Negative cognitions/mood symptoms; Cluster E = Arousal/reactivity symptoms. ^aRepresents the number of symptoms for which cannabis is used medicinally.

Table 3.

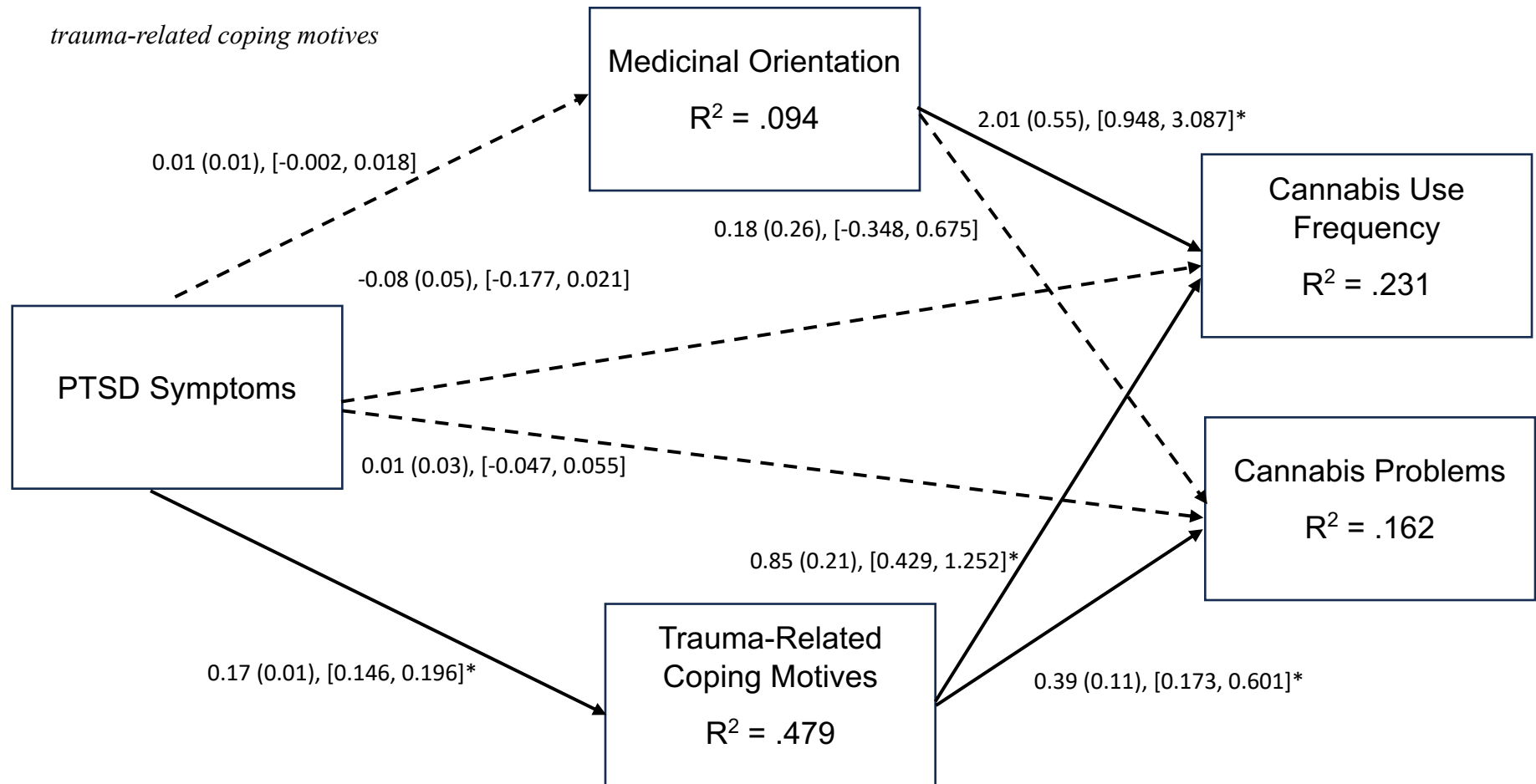
Correlations among model variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Medicinal Cannabis Orientation ^a	-	.300**	.172*	.141*	.155*	.369**	.135*	.160*	.138*	.183**
2. Trauma-related Coping Motives		-	.684**	.084	.379**	.344*	.552**	.554**	.647**	.609**
3. Total PTSD Symptoms			-	.212**	.255**	.147*	.880**	.800**	.913**	.867**
4. LEC Total				-	.115	.052	.172*	.128	.165*	.256**
5. Cannabis Problems					-	.454**	.116	.194**	.276**	.280**
6. Cannabis Frequency						-	.030	.143*	.166*	.171*
7. PTSD Cluster B							-	.742**	.693**	.668**
8. PTSD Cluster C								-	.667**	.581**
9. PTSD Cluster D									-	.710**
10. PTSD Cluster E										-

Note. PTSD Symptoms = total score on the Posttraumatic Stress Disorder Checklist for DSM-5; LEC Total = Number of traumatic life events on the Life Events Checklist; Cluster B = Intrusion symptoms; Cluster C = Avoidance symptoms; Cluster D = Negative cognitions/mood symptoms; Cluster E = Arousal/reactivity symptoms. * $p < 0.05$; ** $p < 0.01$. ^aRepresents the number of symptoms for which cannabis is used medicinally.

Figure 1.

Direct and Indirect Paths from PTSD Symptoms to cannabis use frequency and problems through medicinal cannabis orientation and trauma-related coping motives



Note. Unstandardized coefficients, standard errors, and 95% confidence intervals are shown. *Indicates significant pathway (i.e., 95% confidence intervals do not include zero). Dashed and solid arrows denote nonsignificant and significant paths, respectively. Covariances were estimated but omitted from the figure. Gender identity, age, and number of traumatic life events included as covariates but omitted from the figure.

Supplementary Table 1.

Path Model of PTSD Cluster B Symptoms to Cannabis Use Frequency and Problems Through Medicinal Orientation Trauma-Related Coping Motives

	Estimate	LL 99% CI	UL 99% CI
Outcome: Cannabis Frequency			
Medicinal Orientation	1.980 *	0.551	3.355
Trauma-Related Coping	0.905*	0.441	1.349
Cluster B	-0.414*	-0.766	-0.022
LEC Total	0.035	-0.341	0.424
Gender: women vs. men (ref)	-2.846	-7.312	1.488
Gender: nonbinary/other vs. men (ref)	3.666	-6.317	11.819
Age	-0.007	-1.142	1.145
Outcome: Cannabis Problems			
Medicinal Orientation	0.144	-0.569	0.789
Trauma-Related Coping	0.479*	0.216	0.717
Cluster B	-0.111	-0.297	0.082
LEC Total	0.114	-0.070	0.301
Gender: women vs. men (ref)	-0.738	-2.947	1.488
Gender: nonbinary/other vs. men (ref)	-2.589	-6.947	1.875
Age	-0.111	-0.732	0.517
Outcome: Trauma-Related Coping			
Cluster B	0.456*	0.315	0.586
LEC Total	-0.008	-0.148	0.139
Gender: women vs. men (ref)	-0.482	-1.964	1.005
Gender: nonbinary/other vs. men (ref)	0.031	-3.489	3.950
Age	0.286	-0.337	0.850
Outcome: Medicinal Orientation			
Cluster B	0.019	-0.024	0.064
LEC Total	0.031	-0.019	0.085
Gender: women vs. men (ref)	0.044	-0.544	0.629
Gender: nonbinary/other vs. men (ref)	1.985*	0.658	3.173
Age	0.076	-0.097	0.270
Indirect Paths: Predictor – Cluster B			
Outcome: Cannabis Frequency			
Mediator: Medicinal Orientation	0.038	-0.042	0.154
Mediator: Trauma-Related Coping	0.412*	0.199	0.680
Outcome: Cannabis Problems			
Mediator: Medicinal Orientation	0.003	-0.011	0.035
Mediator: Trauma-Related Coping	0.218*	0.095	0.377

Note. LL 99% CI = Lower limit of 99% confidence interval; UL 99% CI = Upper limit 99% confidence interval; Cluster B = total PTSD Intrusion symptoms; LEC Total = Number of traumatic life events on the Life Events Checklist. Gender represented as two dummy-coded variables with men as the reference category. *Indicates significant path (i.e., 99% CI does not contain zero).

Supplementary Table 2.

Path Model of PTSD Cluster C Symptoms to Cannabis Use Frequency and Problems Through Medicinal Orientation Trauma-Related Coping Motives

	Estimate	LL 99% CI	UL 99% CI
Outcome: Cannabis Frequency			
Medicinal Orientation	2.078*	0.680	3.425
Trauma-Related Coping	0.688*	0.173	1.172
Cluster C	-0.212	-1.028	0.630
LEC Total	-0.007	-0.399	0.379
Gender: women vs. men (ref)	-3.760	-8.196	0.663
Gender: nonbinary/other vs. men (ref)	1.669	-7.812	10.037
Age	0.069	-1.098	1.294
Outcome: Cannabis Problems			
Medicinal Orientation	0.175	-0.526	0.819
Trauma-Related Coping	0.411*	0.175	0.652
Cluster C	-0.023	-0.434	0.373
LEC Total	0.101	-0.080	0.284
Gender: women vs. men (ref)	-1.000	-3.124	1.234
Gender: nonbinary/other vs. men (ref)	-3.186	-7.511	0.833
Age	-0.093	-0.703	0.527
Outcome: Trauma-Related Coping			
Cluster C	0.982*	0.683	1.262
LEC Total	0.013	-0.125	0.156
Gender: women vs. men (ref)	-0.049	-1.538	1.446
Gender: nonbinary/other vs. men (ref)	0.771	-4.145	4.889
Age	0.172	-0.390	0.675
Outcome: Medicinal Orientation			
Cluster C	0.060	-0.038	0.160
LEC Total	0.031	-0.020	0.085
Gender: women vs. men (ref)	0.044	-0.549	0.604
Gender: nonbinary/other vs. men (ref)	1.965*	0.729	3.099
Age	0.069	-0.108	0.260
Indirect Paths: Predictor – Cluster C			
Outcome: Cannabis Frequency			
Mediator: Medicinal Orientation	0.126	-0.065	0.435
Mediator: Trauma-Related Coping	0.676*	0.188	1.255
Outcome: Cannabis Problems			
Mediator: Medicinal Orientation	0.011	-0.030	0.093
Mediator: Trauma-Related Coping	0.404*	0.159	0.728

Note. LL 99% CI = Lower limit of 99% confidence interval; UL 99% CI = Upper limit 99% confidence interval; Cluster C = Total PTSD avoidance symptoms; LEC Total = Number of traumatic life events on the Life Events Checklist. Gender represented as two dummy-coded variables with men as the reference category. *Indicates significant path (i.e., 99% CI does not contain zero).

Supplementary Table 3.

Path Model of PTSD Cluster D Symptoms to Cannabis Use Frequency and Problems Through Medicinal Orientation Trauma-Related Coping Motives

	Estimate	LL 99% CI	UL 99% CI
Outcome: Cannabis Frequency			
Medicinal Orientation	2.050*	0.646	3.429
Trauma-Related Coping	0.718*	0.185	1.211
Cluster D	-0.089	-0.402	0.216
LEC Total	0.000	-0.381	0.388
Gender: women vs. men (ref)	-3.739	-8.222	0.672
Gender: nonbinary/other vs. men (ref)	1.789	-7.964	10.244
Age	0.104	-1.101	1.341
Outcome: Cannabis Problems			
Medicinal Orientation	0.208	-0.507	0.847
Trauma-Related Coping	0.353*	0.086	0.620
Cluster D	0.048	-0.116	0.202
LEC Total	0.091	-0.095	0.283
Gender: women vs. men (ref)	-1.106	-3.200	1.163
Gender: nonbinary/other vs. men (ref)	-3.516	-7.671	0.701
Age	-0.119	-0.715	0.503
Outcome: Trauma-Related Coping			
Cluster D	0.395*	0.299	0.475
LEC Total	-0.024	-0.154	0.110
Gender: women vs. men (ref)	-0.164	-1.529	1.115
Gender: nonbinary/other vs. men (ref)	0.179	-3.331	3.592
Age	-0.008	-0.527	0.502
Outcome: Medicinal Orientation			
Cluster D	0.014	-0.019	0.046
LEC Total	0.031	-0.019	0.084
Gender: women vs. men (ref)	0.064	-0.528	0.635
Gender: nonbinary/other vs. men (ref)	2.012*	0.718	3.167
Age	0.066	-0.112	0.257
Indirect Paths: Predictor – Cluster D			
Outcome: Cannabis Frequency			
Mediator: Medicinal Orientation	0.029	-0.037	0.121
Mediator: Trauma-Related Coping	0.284*	0.069	0.515
Outcome: Cannabis Problems			
Mediator: Medicinal Orientation	0.003	-0.007	0.029
Mediator: Trauma-Related Coping	0.139*	0.035	0.269

Note. LL 99% CI = Lower limit of 99% confidence interval; UL 99% CI = Upper limit 99% confidence interval; Cluster D = Total PTSD negative mood/cognition symptoms; LEC Total = Number of traumatic life events on the Life Events Checklist. Gender represented as two dummy-coded variables with men as the reference category. *Indicates significant path (i.e., 99% CI does not contain zero).

Supplementary Table 4.

Path Model of PTSD Cluster E Symptoms to Cannabis Use Frequency and Problems Through Medicinal Orientation Trauma-Related Coping Motives

	Estimate	LL 99% CI	UL 99% CI
Outcome: Cannabis Frequency			
Medicinal Orientation	2.072*	0.687	3.449
Trauma-Related Coping	0.683*	0.148	1.191
Cluster E	-0.080	-0.488	0.324
LEC Total	0.003	-0.394	0.398
Gender: women vs. men (ref)	-3.739	-8.255	0.637
Gender: nonbinary/other vs. men (ref)	1.849	-7.972	10.355
Age	0.052	-1.130	1.294
Outcome: Cannabis Problems			
Medicinal Orientation	0.205	-0.494	0.835
Trauma-Related Coping	0.333*	0.064	0.582
Cluster E	0.095	-0.115	0.297
LEC Total	0.079	-0.113	0.278
Gender: women vs. men (ref)	-1.231	-3.425	1.051
Gender: nonbinary/other vs. men (ref)	-3.915	-8.011	0.253
Age	-0.085	-0.701	0.513
Outcome: Trauma-Related Coping			
Cluster D	0.516*	0.401	0.621
LEC Total	-0.070	-0.215	0.075
Gender: women vs. men (ref)	-0.545	-2.210	0.940
Gender: nonbinary/other vs. men (ref)	-1.216	-5.162	3.366
Age	0.264	-0.302	0.809
Outcome: Medicinal Orientation			
Cluster E	0.027	-0.017	0.073
LEC Total	0.027	-0.024	0.080
Gender: women vs. men (ref)	0.027	-0.570	0.586
Gender: nonbinary/other vs. men (ref)	1.888*	0.589	3.061
Age	0.075	-0.098	0.260
Indirect Paths: Predictor – Cluster E			
Outcome: Cannabis Frequency			
Mediator: Medicinal Orientation	0.055	-0.029	0.192
Mediator: Trauma-Related Coping	0.352*	0.083	0.637
Outcome: Cannabis Problems			
Mediator: Medicinal Orientation	0.005	-0.012	0.048
Mediator: Trauma-Related Coping	0.172*	0.034	0.320

Note. LL 99% CI = Lower limit of 99% confidence interval; UL 99% CI = Upper limit 99% confidence interval; Cluster E = Total PTSD arousal/reactivity symptoms; LEC Total = Number of traumatic life events on the Life Events Checklist. Gender represented as two dummy-coded variables with men as the reference category. * Indicates significant path (i.e., 99% CI does not contain zero).