DELINEATING THE ROLES OF IMPULSIVITY AND GENDER IN ALCOHOL AND CANNABIS CO-USE AMONG POST-SECONDARY STUDENTS

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Abstract

Substance use peaks during early adulthood, particularly during the transition to post-secondary education. Among post-secondary students, alcohol and cannabis co-use is associated with greater harms. Although impulsivity is a risk factor for substance use, its relationship with alcohol and cannabis co-use remains unclear. This study explored UPPS-P impulsivity, alcohol and cannabis use outcomes (i.e., frequency, amount, and severity of problematic use), and gender among post-secondary students who reported co-use. Regression analyses examined whether total and facet-level impulsivity predicted substance use outcomes and whether these associations varied by gender. Higher total impulsivity predicted greater problematic alcohol use and cannabis use severity. At the facet level, positive urgency was the most consistent predictor of alcohol outcomes, whereas facet-level associations with cannabis outcomes were generally non-significant. Higher negative urgency was associated with lower alcohol use amount among men but not women. Implications for interventions targeting substance-related motivations, expectancies, and positive urgency are discussed.

Keywords: impulsivity, UPPS-P, cannabis use, alcohol use, post-secondary, co-use, gender

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1. Introduction

Substance use often peaks during early adulthood (Wisk & Weitzman, 2016), signaling a period of heightened vulnerability to its negative consequences. The transition to post-secondary education, in particular, marks a tumultuous period when alcohol and cannabis use significantly increase (Carter et al., 2010; H. R. White et al., 2006). Substantial life changes such as moving away from home, adapting to academic demands in a new setting, and integrating into university life characterize this transition, which unfolds in environments where alcohol and cannabis use may be more prevalent and more accessible (Wisk & Weitzman, 2016). Within post-secondary settings, alcohol and cannabis use has been reliably linked to a wide range of deleterious consequences across health and safety, as well as academic and social functioning (Esmaeelzadeh et al., 2018; Jackson et al., 2020; Soe et al., 2018). Therefore, alcohol and cannabis use among post-secondary students represents an important public health concern.

1.1 Alcohol and Cannabis Co-Use

Within the above context, the co-use of alcohol and cannabis, whether concurrent (i.e., use of both substances at different times without overlapping effects) or simultaneous (i.e., use of both substances at the same time with overlapping effects) (Yurasek et al., 2017), represents a particularly problematic pattern where the severity of use and its consequences may be significantly worse. Specifically, co-use of alcohol and cannabis has been associated with greater substance-related harms compared to single substance use, including heavier use, increased risk of impaired driving, risky sexual behaviour, and adverse mental health outcomes (Cummings et al., 2019; Haas et al., 2015; Jackson et al., 2020; Linden-Carmichael et al., 2019; Mohler-Kuo et al., 2003; Thompson et al., 2021; Yurasek et al., 2017). Moreover, emerging evidence suggests that

co-use of alcohol and cannabis is prevalent and increasing among young adults, especially among post-secondary students (Bravo et al., 2021; Government of Canada, 2022; McCabe et al., 2021; Waddell et al., 2021; H. R. White et al., 2019). Therefore, it is necessary to better understand the factors that underlie co-use, which will in turn facilitate risk mitigation through early detection, as well as timely and more effective intervention.

1.2 Impulsivity and Substance Use

While the etiology of disordered substance use is considered to be multifactorial (Horák & Verter, 2022), the personality construct of impulsivity has been widely studied as an important determinant of problematic substance use (Moeller & Dougherty, 2002). Impulsivity is a construct that broadly encapsulates characteristics such as a tendency to act with little deliberation, take risks, and/or engage in emotionally driven decision-making (DeYoung & Rueter, 2016). It is considered to be a key vulnerability factor for substance use and substance use disorders (SUDs) (DeVito et al., 2020; Perry & Carroll, 2008), and it is also a core feature of numerous mental health diagnoses, including SUDs (Whiteside & Lynam, 2001). Impulsivity has also been implicated in several stages of SUD, including early initiation, transition to regular use, escalation to problematic use, and relapse after abstinence (Perry & Carroll, 2008).

A growing body of literature has begun to examine the role of impulsivity in the context of post-secondary substance use. On one hand, impulsivity has been linked to more favourable beliefs about substance use, increased risk of problematic substance use, and worsened sequelae of substance use among post-secondary students (Adan et al., 2016; Bravo et al., 2018; Gierski et al., 2017; LaBrie et al., 2014; Reilly et al., 2016; Tackett et al., 2017; Yarmush et al., 2016). On the other hand, some research findings indicate that the relationship between impulsivity and substance use may not always be consistent (Balodis et al., 2009; Carlson & Johnson, 2012; Czapla

et al., 2015), and that impulsivity may even demonstrate a paradoxical relationship in some contexts (Daros et al., 2022). While there may be several explanations for these conflicting findings that suggest a complex relationship between impulsivity and substance use, a significant barrier for reconciling nuanced findings across studies has been the conceptual complexity of the impulsivity construct.

Impulsivity is a multifaceted construct that has been operationalized using various measurement approaches, particularly with regard to self-report instruments. Within this conceptual multiplicity, the UPPS Model of Impulsive Behaviour (Whiteside & Lynam, 2001) has emerged as an influential unifying framework for operationalizing impulsivity. Under this framework, the UPPS-P impulsive behaviour scale operationally defines impulsivity across five distinct facets: negative urgency (i.e., a tendency to engage in hasty behaviour in response to intense negative emotions), positive urgency (i.e., a tendency to engage in hasty behaviour in response to intense positive emotions), lack of premeditation (i.e., making decisions without considering consequences), lack of perseverance (i.e., difficulty maintaining effort on tasks due to a loss of interest), and sensation seeking (i.e., preference for exciting and novel experiences) (Whiteside & Lynam, 2001). Thus, the UPPS-P provides a comprehensive tool for operationalizing impulsivity in clinical research (Whiteside & Lynam, 2001), particularly in the context of substance use.

1.3 Alcohol and Cannabis Use From an UPPS-P Lens

Previous research has examined the relationship between UPPS-P-measured impulsivity and alcohol and other forms of substance use, although findings have been mixed across studies (Coskunpinar et al., 2013; Hildebrandt et al., 2021; Kaiser et al., 2012; LaBrie et al., 2014; Tran et al., 2018; VanderVeen et al., 2016; Waddell et al., 2022).

1.3.1 Alcohol Use

Research indicates that certain individual impulsivity facets may differentially contribute to multiple alcohol and other substance use-related outcomes (e.g., amount, frequency, and problematic use) (Coskunpinar et al., 2013; Hildebrandt et al., 2021). In a meta-analysis using the UPPS-P framework to examine alcohol use outcomes broadly, lack of perseverance was identified as the strongest predictor of alcohol use amount, while all other traits of impulsivity predicted alcohol use amount to a relatively lesser extent (Coskunpinar et al., 2013). Additionally, problematic alcohol use was most closely linked to negative and positive urgency, whereas alcohol dependence was significantly linked to negative urgency and lack of premeditation (e.g., "lack of planning") (Coskunpinar et al., 2013). A handful of studies have also examined the relationship between UPPS-P-based impulsivity and alcohol use among post-secondary students, with similarly mixed results. Specifically, while sensation seeking has been consistently linked to alcohol use amount or frequency across studies (Cyders et al., 2009; King et al., 2023; LaBrie et al., 2014; Murphy & MacKillop, 2012), some evidence suggests that it may not be linked to alcohol-related problems (e.g., health problems, hangovers, blackouts, etc.) (King et al., 2023; Murphy & MacKillop, 2012). Positive urgency has been linked to alcohol-related harms and consequences (Cyders et al., 2009; King et al., 2023; LaBrie et al., 2014). Findings regarding negative urgency have been more variable. While some studies have reported no association between negative urgency and alcohol use frequency or the amount of use (Cyders et al., 2009; Hallihan et al., 2023; Waddell et al., 2022), others have found a link to amount (Kaiser et al., 2012) and frequency of use (Murphy & MacKillop, 2012), as well as alcohol-related problems (Hallihan et al., 2023; Kaiser et al., 2012; King et al., 2023; LaBrie et al., 2014; Murphy & MacKillop, 2012). Additionally, while lack of premeditation has been primarily linked to alcohol use amount

in some studies (King et al., 2023; Waddell et al., 2022), it has been linked to alcohol-related problems in others (King et al., 2023; Murphy & MacKillop, 2012). Collectively, these studies suggest that different alcohol use outcomes may reflect distinct underlying mechanisms.

1.3.2 Cannabis Use

Research suggests that the associations between impulsivity and cannabis outcomes vary across UPPS-P facets. VanderVeen et al. (2016) reported that most impulsivity traits demonstrated similar associations with cannabis outcomes, with the exception of lack of perseverance, which was unrelated to either cannabis use (e.g., frequency and lifetime use) or cannabis-related consequences. Cannabis-related consequences (e.g., problematic use such as cannabis dependence and cannabis-related problems at home or school) were significantly related only to sensation seeking, lack of premeditation (e.g., "lack of planning"), and positive urgency. Furthermore, impulsivity traits were more strongly associated with cannabis-related consequences than with cannabis use (i.e., frequency), with small effect sizes observed for cannabis use and medium effect sizes observed for cannabis-related consequences (VanderVeen et al., 2016).

Research examining UPPS-P traits in relation to cannabis use has often emphasized cannabis-related consequences and dependence symptoms (Falco et al., 2021; Keough et al., 2018; Waddell et al., 2023). In a study of post-secondary students, Falco et al. (2021) examined the associations between specific UPPS-P facets and past-month cannabis use frequency (i.e., number of days), through positive and negative expectancies. Higher negative urgency, lack of premeditation, and sensation seeking were associated with an increased likelihood of past-month cannabis use, whereas higher positive urgency was associated with a decreased likelihood of use. Only one facet, lack of perseverance, was unrelated to cannabis use. Additionally, positive expectancies demonstrated a direct effect on the presence of past-month cannabis use, with

stronger positive expectancies being associated with a higher likelihood of use and stronger negative expectancies being associated with a lower likelihood of past-month use. Furthermore, indirect effects were observed for all impulsivity facets except lack of perseverance, with the associations involving negative urgency, lack of premeditation, and positive urgency being mediated by negative expectancies, whereas the association involving sensation seeking was mediated by positive expectancies (Falco et al., 2021).

Using the UPPS-P framework, Waddell et al. (2023) found that the relationship between impulsivity and cannabis-related consequences (e.g., impaired driving) varied depending on whether cannabis was used in solitary or social contexts. Specifically, more frequent solitary cannabis use was associated with greater cannabis-related consequences among individuals with high and mean levels of negative urgency and among those with high levels of lack of perseverance. In contrast, more frequent social cannabis use was associated with greater cannabis-related consequences among individuals with high and average levels of sensation seeking (Waddell et al., 2023).

Keough et al. (2018) investigated negative urgency as a mediator of the associations between anxiety sensitivity and cannabis-related problems (e.g., problems with a partner) and dependence symptoms (e.g., unsuccessful attempts to cut down). Results indicated that negative urgency uniquely mediated the associations between anxiety sensitivity and both cannabis-related problems and dependence symptoms among post-secondary cannabis users (Keough et al., 2018). Collectively, these findings suggest that cannabis use outcomes may also be differentially associated with specific impulsivity facets. However, compared with the alcohol literature, research on cannabis has focused more on cannabis-related consequences and dependence symptoms.

1.3.3 Co-Use

An emerging body of research also suggests that different facets of impulsivity may play distinct roles in alcohol and cannabis co-use, particularly among young adults. Specifically, Barey et al. (2026) found that individuals who engaged in simultaneous alcohol and cannabis use reported higher sensation seeking and stronger positive expectancies regarding the effects of simultaneous use compared to non-users. Simultaneous users also reported lower withdrawal (i.e., an emotion regulation strategy to withdraw from others when experiencing negative emotions), lower perseverance, and fewer negative expectancies related to simultaneous use. The authors hypothesized that lower withdrawal combined with lower perseverance may promote simultaneous use for immediate emotional relief rather than relying on other emotion regulation strategies (Barey et al., 2026). Another study of post-secondary alcohol and cannabis co-users found that negative urgency was indirectly associated with alcohol and cannabis consequences through coping motives, whereas positive urgency was indirectly associated with cannabis consequences through expansion motives (i.e., to enhance experiences) (Montgomery et al., 2024).

In another study by Stamates et al. (2023), a latent impulsivity profile characterized by high sensation seeking and urgency was associated with a greater likelihood of simultaneous alcohol and cannabis use. However, when impulsivity facets were examined individually, sensation seeking emerged as the only unique predictor of simultaneous use relative to alcohol-only use (Stamates et al., 2023). Although other UPPS-P-derived impulsivity facets, such as negative urgency and lack of premeditation, have been implicated in substance use more broadly, findings suggest that their associations with co-use are less consistent. For example, negative urgency has been shown to strengthen the association between alcohol use amount (i.e., number of standard drinks) and cannabis use amount (i.e., grams of cannabis) (Daros et al., 2022), while

positive urgency and lack of perseverance may have the opposite effect in some contexts (Waddell et al., 2021). Taken together, these findings suggest that some facets of impulsivity may influence co-use patterns through context-dependent mechanisms. Given this complex backdrop, clarifying the relationship between impulsivity and alcohol and cannabis co-use in post-secondary students has the potential to elucidate important determinants of clinical risk and severity, such as amount, frequency, and problematic use.

1.4 Gender

1.4.1 Gender and Impulsivity

In addition to impulsivity, gender represents a crucial consideration in substance use research (Sanchis-Segura & Becker, 2016), especially because it is likely to influence the relationship between impulsivity and substance use. Specifically, previous research indicates that men often have a greater tendency toward impulsive and risky behaviours more generally, which is reflected in their higher rates of death from unintentional injuries such as motor vehicle and firearm accidents (Toigo et al., 2023; Yao et al., 2019). Men also participate more frequently in high-risk sports such as cliff diving and free diving (Frick, 2021). Moreover, men tend to report higher levels of sensation seeking compared to women (Claréus et al., 2017), indicating a stronger drive for novelty and intense experiences. As such, gender may represent an important factor that influences how impulsivity is expressed.

1.4.2 Gender and Substance Use

Important gender differences also exist in substance use. While men and women may engage with the same substances, they may differ significantly on important parameters such as frequency of use (Goh et al., 2024; A. M. White, 2020). Specifically, men consume more alcohol and have a higher prevalence of alcohol use disorder than women (Goh et al., 2024; A. M. White,

2020). Similarly, men use cannabis more frequently, in greater amounts, and are more likely to develop problematic and chronic patterns of use compared to women (Khan et al., 2013; Preston, 2006). Previous research indicates that men also have higher rates of cannabis use disorder than women (Haberstick et al., 2014). Taken together, these findings underscore the importance of evaluating the role of gender in alcohol and cannabis use, particularly given the possibility that gender may contribute to differences in impulsive behaviour (e.g., risk-taking and poor decision-making).

1.4.3 Gender and Co-Use

Gender also represents an important factor in understanding co-use patterns and outcomes. Findings from previous research suggest that gender differences are more pronounced for some contexts of co-use (i.e., simultaneous use) (Lipperman-Kreda et al., 2018; Patrick et al., 2019), with prevalence rates among men nearly double those among women (Subbaraman & Kerr, 2015). However, other contexts of co-use (i.e., concurrent use) have not demonstrated significant gender differences (Subbaraman & Kerr, 2015). Consistent with this pattern, men may also report greater alcohol and cannabis use amount when engaging in co-use (Tomko et al., 2023). Some findings also raise the possibility that the impact of cannabis use on alcohol use amount may vary by gender. Specifically, cannabis use was associated with a slightly larger increase in alcohol use amount among women than men (Ito et al., 2021). Gender may also shape the motivational context of co-use. Men are more likely to report enhancement motives, suggesting they may deliberately combine alcohol and cannabis to intensify their effects, whereas women may be more likely to engage in a substitution pattern, using one substance to reduce or replace the other (Tomko et al., 2023). Additionally, women may be more susceptible to the positive and negative consequences of co-use compared to men (Tomko et al., 2023). As such, this emerging body of evidence

underscores the importance of accounting for possible gender differences in impulsivity and co-use of alcohol and cannabis. Importantly, however, the likely complex relationship between gender, co-use in post-secondary settings, and impulsivity, particularly within an UPPS-P framework, remains underexplored.

1.5 Present Study

The present study aimed to clarify how impulsivity, as defined within the UPPS-P framework, may contribute to alcohol and cannabis use among post-secondary students who co-use these substances. These associations were examined across two levels of impulsivity (i.e., total impulsivity and individual impulsivity facets), and three key substance use parameters: frequency of use, amount of use, and severity of problematic use. Additionally, the present study aimed to explore whether the relationship between impulsivity and substance use in this context varied by gender.

Accordingly, the present study first examined whether the overall level of impulsivity was associated with alcohol and cannabis use outcomes (i.e., frequency of use, amount of use, and severity of problematic use) in a sample of post-secondary students who endorsed current co-use. The study also explored whether specific UPPS-P impulsivity facets were differentially associated with alcohol or cannabis use outcomes. Finally, participant gender was explored as a potential moderator of the relationship between impulsivity (i.e., total and facet-level) and substance use outcomes.

2. Method

2.1 Participants and Procedures

The present study recruited a convenience sample of 288 post-secondary students who self-reported the co-use of alcohol and cannabis. Participants were recruited from the York University Undergraduate Research Participant Pool (n = 92), and the CloudResearch participant recruitment platform (n = 196) between March 23 and May 4, 2026. Following exclusions (see Figure 1), the final analytic sample consisted of 237 participants (M_{age} = 21.32, SD_{age} = 2.08; 65.8% women). All participants were current post-secondary students who were between the ages of 16 and 25 years. All participants reported the co-use of alcohol and cannabis during the past month. Participants who submitted surveys with more than 20% missing data were excluded from analyses. Following guidance from Braitman et al. (2025), participants who failed more than 40% of the attention check items were also excluded from analyses. Fourteen participants who completed the survey identified as non-binary and were excluded from the analyses due to insufficient sample size for adequately powered statistical comparisons. As such, the presented analyses consisted of only men and women. Additional details regarding participant characteristics are provided in Table 1. The study was approved by the York University Office of Research Ethics: Human Participants Review Committee (Certificate # e2026-041).

2.2 Measures

2.2.1 Impulsivity

Impulsivity was measured using the Short UPPS-P (SUPPS-P; Cyders et al., 2014) scale, which has been previously validated and offers a reliable tool for operationalizing impulsivity within the UPPS-P framework (Cyders et al., 2014). In addition to a total impulsivity score

indicating an overall propensity to behave impulsively, the SUPPS-P also provides subscale scores representing five facets of impulsivity: Negative Urgency (e.g., "*When I am upset, I often act without thinking*"), Positive Urgency (e.g., "*I tend to lose control when I am in a great mood*"), Lack of Premeditation (e.g., "*My thinking is usually careful and purposeful*"), Lack of Perseverance (e.g., "*Unfinished tasks really bother me*"), and Sensation Seeking (e.g., "*I quite enjoy taking risks*"). All items were rated on a 4-point Likert scale ranging from 1 ("*strongly agree*") to 4 ("*strongly disagree*"). Descriptives and correlations among the SUPPS-P subscales are presented in Table 2.

2.2.2 Alcohol and Cannabis Use Outcomes

In line with previous studies examining substance use, alcohol and cannabis use outcomes, including frequency, amount, and severity of problematic use, were examined separately, as these may uniquely index underlying mechanisms that drive alcohol and cannabis use behaviour (Coskunpinar et al., 2013). Additionally, such an operationalization of alcohol and cannabis use is further supported by prior research demonstrating that different facets of impulsivity may be differentially associated with substance use outcomes (Coskunpinar et al., 2013; VanderVeen et al., 2016). Therefore, severity of problematic alcohol use was assessed using the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993). The AUDIT is the most widely used screening instrument for identifying risky and hazardous alcohol consumption. The AUDIT provides a measure of problematic alcohol use during the past 12 months, with scores ranging from zero to 40 across 10 items, with higher scores indicating more severe problematic alcohol use. Among young adults, including post-secondary students, the AUDIT has demonstrated adequately reliable scale scores (Sriken et al., 2023). Participants reported a mean AUDIT score

of 9.25 (*SD* = 7.25). An overview of the distribution of responses on the AUDIT is presented in Table 3.

Severity of problematic cannabis use was assessed using the Cannabis Use Disorders Identification Test-Revised (CUDIT-R; Adamson et al., 2010), which provides a rating of problematic cannabis use during the past six months. The CUDIT-R is an abbreviated eight-item version of the CUDIT (Adamson & Sellman, 2003), a screening tool adapted from the AUDIT to assess problematic cannabis use, with total scores ranging from 0 to 32. The CUDIT-R is considered a reliable and valid screening measure among post-secondary students (Schultz et al., 2019). Participants reported an average CUDIT-R score of 10.69 (*SD* = 7.02). An overview of the distribution of responses on the CUDIT-R is presented in Table 4.

Participants also reported the average weekly frequency of use (i.e., days of use per week) and amount of use (i.e., number of alcoholic drinks, grams of cannabis) of alcohol and cannabis during the past month. This timeframe has been well-established in the literature as being optimal for reliably capturing typical use patterns on retrospective measures (Buu et al., 2014; Robinson et al., 2014). On average, participants reported consuming alcohol on 1.98 days (*SD* = 1.37) per week and reported drinking 5.27 alcoholic drinks (*SD* = 4.97) on each occasion they consumed alcohol. Participants also reported an average cannabis use frequency of 2.97 days (SD = 2.29) per week and reported using 1.59 grams (*SD* = 3.21) of cannabis on each occasion. Descriptive statistics for all study measures across gender categories are presented in Table 5.

2.3 Statistical Analyses

Data were analyzed using hierarchical multiple regression models, with alcohol and cannabis use outcomes (i.e., frequency of use, amount of use, and severity of problematic use) examined separately. In Step 1, impulsivity and effect-coded gender were entered as predictors,

with the substance use outcome as the dependent variable. In Step 2, the Gender × Impulsivity interaction was added to test whether gender moderated the relationship between impulsivity and the substance use outcome. Two sets of analyses were conducted across the two levels of impulsivity. Specifically, the first set of regression models featured total impulsivity (i.e., SUPPS-P total score) and its interaction with gender. The second set of analyses included all five SUPPS-P-derived impulsivity facets and their interactions with gender. Given the intercorrelations between UPPS-P impulsivity facets, multicollinearity diagnostics were examined. Tolerance values ranged from .42 to .98 and variance inflation factor (VIF) values ranged from 1.02 to 2.39, indicating that multicollinearity was within acceptable limits. Consistent with previous research examining the link between UPPS-P-derived variables and substance use outcomes (e.g., Cyders et al., 2009, 2010; LaBrie et al., 2014), frequency and amount of use were modeled as continuous outcomes within a multiple regression framework. Participant recruitment source was included as a covariate across all analyses. Statistically significant interactions were further probed to evaluate simple effects across gender categories. All analyses were conducted using IBM SPSS Statistics for Windows, Version 31 (IBM Corp, 2025). Statistical significance was set at $p < .05$ for all analyses. Sample sizes varied slightly across models (N = 236–237) due to missing responses on select alcohol and cannabis use measures. Analyses were conducted using listwise deletion within each model.

3. Results

3.1 Alcohol

3.1.1 Total Impulsivity and Alcohol Use Outcomes

3.1.1.1 Frequency of Alcohol Use. The model examining the effect of total impulsivity on alcohol use frequency was significant ($F(3, 232) = 9.40$, $p < .001$, *adjusted* $R^2 = .10$). While total

impulsivity emerged as a significant predictor of alcohol use frequency (b = 1.01, SE = .21, t = 4.87, p < .001), gender did not (b = -.02, SE = .18, t = -.10, p = .92). Participant recruitment source was a significant predictor in this model (b = .53, SE = .20, t = 2.71, p = .007).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit (ΔR^2 < .01, $\Delta F(1, 231) = .39$, p = .53). While the overall model remained significant ($F(4, 231) = 7.13$, p < .001, *adjusted* R^2 = .10), an Impulsivity × Gender interaction was not found for alcohol use frequency (b = -.29, SE = .46, t = -.62, p = .53).

3.1.1.2 Amount of Alcohol Use. The model examining the effect of total impulsivity on the amount of alcohol use was not significant ($F(3, 233) = 1.59$, p = .19, *adjusted* R^2 = .01). Neither total impulsivity (b = 1.38, SE = .79, t = 1.75, p = .08) nor gender (b = -.84, SE = .69, t = -1.22, p = .22) was a significant predictor of the amount of alcohol use. Participant recruitment source was also not a significant predictor in this model (b = .31, SE = .74, t = .42, p = .68).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit (ΔR^2 < .01, $\Delta F(1, 232) = 1.11$, p = .29), and the overall model remained non-significant ($F(4, 232) = 1.47$, p = .21, *adjusted* R^2 = .01). The Impulsivity × Gender interaction was also not a significant predictor (b = -1.82, SE = 1.73, t = -1.05, p = .29).

3.1.1.3 Severity of Problematic Alcohol Use. The model examining the effect of total impulsivity on severity of problematic alcohol use (i.e., AUDIT total score) was significant ($F(3, 233) = 11.19$, p < .001, *adjusted* R^2 = .12). While total impulsivity emerged as a significant predictor of severity of problematic alcohol use (b = 6.23, SE = 1.08, t = 5.76, p < .001), gender did not (b = -.17, SE = .95, t = -.17, p = .86). Participant recruitment source was not a significant predictor in this model (b = 1.13, SE = 1.01, t = 1.12, p = .27).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit ($\Delta R^2 < .01$, $\Delta F(1, 232) = .09$, $p = .77$). While the overall model remained significant ($F(4, 232) = 8.38$, $p < .001$, *adjusted* $R^2 = .11$), the Impulsivity × Gender interaction was not significant ($b = -.71$, $SE = 2.38$, $t = -.30$, $p = .77$).

3.1.2 Facets of Impulsivity and Alcohol Use Outcomes

3.1.2.1 Frequency of Alcohol Use. The model examining the effects of impulsivity facets on alcohol use frequency was significant ($F(7, 228) = 4.18$, $p < .001$, *adjusted* $R^2 = .09$). While positive urgency was a significant predictor of alcohol use frequency ($b = .39$, $SE = .17$, $t = 2.25$, $p = .03$), no other impulsivity facets demonstrated significant associations with alcohol use frequency ($|b|$s $\leq .26$, SEs $\geq .14$, $|t|$s ≤ 1.44, ps $\geq .15$). Gender was not associated with alcohol use frequency ($b = -.04$, $SE = .19$, $t = -.23$, $p = .82$). Participant recruitment source was a significant predictor in this model ($b = .54$, $SE = .20$, $t = 2.67$, $p = .008$).

Although the addition of the Impulsivity × Gender interaction terms did not significantly improve model fit ($\Delta R^2 = .02$, $\Delta F(5, 223) = .81$, $p = .55$), the overall model remained significant ($F(12, 223) = 2.76$, $p = .002$, *adjusted* $R^2 = .08$). No significant Impulsivity × Gender interactions were found across all facets of impulsivity ($|b|$s $\leq .38$, SEs $\geq .29$, $|t|$s ≤ 1.18, ps $\geq .24$).

3.1.2.2 Amount of Alcohol Use. The model examining the effects of impulsivity facets on the amount of alcohol use was not significant ($F(7, 229) = 1.44$, $p = .19$, *adjusted* $R^2 = .01$). While positive urgency was a significant predictor of the amount of alcohol use in this model ($b = 1.46$, $SE = .65$, $t = 2.25$, $p = .03$), no other facets of impulsivity demonstrated significant associations with the amount of alcohol use ($|b|$s ≤ 1.02, SEs $\geq .51$, $|t|$s ≤ 1.48, ps $\geq .14$). Gender was also not associated with the amount of alcohol use ($b = -1.01$, $SE = .71$, $t = -1.43$, $p = .16$). Additionally,

participant recruitment source was not a significant predictor in this model (b = .33, SE = .75, t = .44, p = .66).

The addition of the Impulsivity × Gender interaction terms significantly improved model fit (ΔR^2 = .06, $\Delta F(5, 224) = 2.76$, p = .02), and the overall model became significant ($F(12, 224)$ = 2.03, p = .02, *adjusted* R^2 = .05). In this second model, positive urgency was a significant predictor of the amount of alcohol use (b = 1.95, SE = .69, t = 2.83, p = .005). A significant main effect of negative urgency was also found (b = -1.45, SE = .59, t = -2.47, p = .01), along with a significant Negative Urgency × Gender interaction (b = -3.93, SE = 1.18, t = -3.34, p < .001). Probing this interaction revealed that negative urgency predicted significantly lower alcohol use for men (b = -3.37, SE = .98, t = -3.44, p < .001), while negative urgency was not associated with the amount of alcohol use by women (b = .50, SE = .65, t = .77, p = .44). No other Impulsivity Facet × Gender interactions were significant ($|b|$s ≤ 2.47, SEs ≥ 1.06, $|t|$s ≤ 1.52, ps ≥ .13).

3.1.2.3 Severity of Problematic Alcohol Use. The model examining the effect of impulsivity facets on the severity of problematic alcohol use (i.e., AUDIT total score) was significant ($F(7, 229) = 5.72$, p < .001, *adjusted* R^2 = .12). Positive urgency was a significant predictor of the severity of problematic alcohol use in this model (b = 3.39, SE = .89, t = 3.80, p < .001). No other facets of impulsivity demonstrated significant associations with this outcome ($|b|$s ≤ 1.32, SEs ≥ .71, $|t|$s ≤ 1.40, ps ≥ .16). Gender was also not associated with the severity of problematic alcohol use (b = -.43, SE = .98, t = -.44, p = .66). Additionally, participant recruitment source was not a significant predictor in this model (b = 1.19, SE = 1.03, t = 1.15, p = .25).

The addition of the Impulsivity × Gender interaction terms did not significantly improve model fit (ΔR^2 = .01, $\Delta F(5, 224) = .69$, p = .63), and the overall model remained significant (F(12,

224) = 3.60, $p < .001$, *adjusted* $R^2 = .12$). No Impulsivity Facet × Gender interactions were significant ($|b|$s ≤ 2.74, *SE*s ≥ 1.49, $|t|$s ≤ 1.65, ps $\geq .10$).

3.2 Cannabis

3.2.1 Total Impulsivity and Cannabis Use Outcomes

3.2.1.1 Frequency of Cannabis Use. The model examining the effect of total impulsivity on cannabis use frequency was not significant ($F(3, 232) = .25$, $p = .86$, *adjusted* $R^2 < .01$), and neither total impulsivity ($b = .01$, $SE = .36$, $t = .03$, $p = .98$) nor gender ($b = -.22$, $SE = .32$, $t = -.67$, $p = .50$) was a significant predictor. Participant recruitment source was also not a significant predictor in this model ($b = .23$, $SE = .34$, $t = .67$, $p = .50$).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit ($\Delta R^2 < .01$, $\Delta F(1, 231) = .01$, $p = .92$), and the overall model remained non-significant ($F(4, 231) = .19$, $p = .94$, *adjusted* $R^2 < .01$). The Impulsivity × Gender interaction was also not significant ($b = -.08$, $SE = .80$, $t = -.10$, $p = .92$).

3.2.1.2 Amount of Cannabis Use. The model examining the effect of total impulsivity on the amount of cannabis use was not significant ($F(3, 232) = .53$, $p = .66$, *adjusted* $R^2 = -.01$). Neither total impulsivity ($b = .03$, $SE = .51$, $t = .05$, $p = .96$) nor gender ($b = -.34$, $SE = .45$, $t = -.76$, $p = .45$) was a significant predictor of the amount of cannabis use. Participant recruitment source was also not a significant predictor in this model ($b = .54$, $SE = .48$, $t = 1.13$, $p = .26$).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit ($\Delta R^2 < .01$, $\Delta F(1, 231) = .98$, $p = .32$), and the overall model remained non-significant ($F(4, 231) = .64$, $p = .63$, *adjusted* $R^2 = -.01$). The Impulsivity × Gender interaction was also not significant ($b = 1.11$, $SE = 1.12$, $t = .99$, $p = .32$).

3.2.1.3 Severity of Problematic Cannabis Use. The model examining the effect of total impulsivity on the severity of problematic cannabis use (i.e., CUDIT-R total score) was significant ($F(3, 233) = 4.64$, $p = .004$, *adjusted* $R^2 = .04$). While total impulsivity emerged as a significant predictor of the severity of problematic cannabis use ($b = 3.87$, $SE = 1.09$, $t = 3.56$, $p < .001$), gender did not ($b = -.84$, $SE = .96$, $t = -.87$, $p = .38$). Participant recruitment source was not a significant predictor in this model ($b = .23$, $SE = 1.02$, $t = .22$, $p = .83$).

The addition of the Impulsivity × Gender interaction term did not significantly improve model fit ($\Delta R^2 < .01$, $\Delta F(1, 232) = .67$, $p = .41$). While the overall model remained significant ($F(4, 232) = 3.64$, $p = .007$, *adjusted* $R^2 = .04$), an Impulsivity × Gender interaction was not found ($b = -1.96$, $SE = 2.39$, $t = -.82$, $p = .41$).

3.2.2 Facets of Impulsivity and Cannabis Use Outcomes

3.2.2.1 Frequency of Cannabis Use. The model examining the effects of impulsivity facets on cannabis use frequency was not significant ($F(7, 228) = 1.63$, $p = .13$, *adjusted* $R^2 = .02$). None of the impulsivity facets were associated with cannabis use frequency ($|b|$s $\leq .44$, SEs $\geq .23$, $|t|$s ≤ 1.89, ps $\geq .06$). Gender was not associated with cannabis use frequency ($b = -.33$, $SE = .33$, $t = -1.00$, $p = .32$). Participant recruitment source was also not a significant predictor in this model ($b = .39$, $SE = .34$, $t = 1.12$, $p = .27$).

The addition of the Impulsivity × Gender interaction terms did not significantly improve model fit ($\Delta R^2 = .01$, $\Delta F(5, 223) = .61$, $p = .70$), and the overall model remained non-significant ($F(12, 223) = 1.19$, $p = .29$, *adjusted* $R^2 = .01$). Significant Impulsivity Facet × Gender interactions were not found ($|b|$s ≤ 1.03, SEs $\geq .50$, $|t|$s ≤ 1.59, ps $\geq .11$).

3.2.2.2 Amount of Cannabis Use. The model examining the effects of impulsivity facets on the amount of cannabis use was not significant ($F(7, 228) = .48$, $p = .85$, *adjusted* $R^2 = -.02$).

None of the impulsivity facets demonstrated significant associations with the amount of cannabis use ($|b|$s $\leq$ .39, *SE*s $\geq$ .33, $|t|$s $\leq$ .80, *p*s $\geq$ .42). Gender was also not associated with the amount of cannabis use (b = -.42, SE = .47, t = -.91, p = .37). Additionally, participant recruitment source was not a significant predictor in this model (b = .63, SE = .49, t = 1.28, p = .20).

The addition of the Impulsivity × Gender interaction terms did not significantly improve model fit (ΔR^2 = .04, $\Delta F(5, 223) = 1.83$, p = .11), and the overall model remained non-significant ($F(12, 223) = 1.05$, p = .41*, adjusted* $R^2 < .01$). No significant Impulsivity × Gender interactions were found for lack of premeditation, lack of perseverance, or sensation seeking ($|b|$s $\leq$ .83, *SE*s $\geq$ .70, $|t|$s $\leq$ .77, *p*s $\geq$ .44). However, Negative Urgency × Gender (b = -1.78, SE = .78, t = -2.29, p = .02) and Positive Urgency × Gender (b = 1.96, SE = .91, t = 2.15, p = .03) interactions were significant. Given that the overall model was non-significant, these significant interaction effects were not further probed to avoid overinterpretation.

3.2.2.3 Severity of Problematic Cannabis Use. While the model examining the effects of impulsivity facets on the severity of problematic cannabis use was significant ($F(7, 229)$ = 2.20, p = .04*, adjusted* R^2 = .03), no impulsivity facet demonstrated a significant association with the severity of problematic cannabis use ($|b|$s $\leq$ 1.47, *SE*s $\geq$ .71, $|t|$s $\leq$ 1.92, *p*s $\geq$ .06). Gender was also not associated with this outcome (b = -.86, SE = .99, t = -.87, p = .39). Additionally, participant recruitment source was not a significant predictor in this model (b = .35, SE = 1.05, t = .34, p = .74).

The addition of the Impulsivity × Gender interaction terms did not significantly improve model fit (ΔR^2 = .01, $\Delta F(5, 224) = .50$, p = .78), and the overall model became non-significant ($F(12, 224) = 1.48$, p = .14*, adjusted* R^2 = .02). No significant Impulsivity Facet × Gender interactions were found ($|b|$s $\leq$ 1.58, *SE*s $\geq$ 1.69, $|t|$s $\leq$ .94, *p*s $\geq$ .35).

4. Discussion

4.1 Summary of Findings

The present study examined the associations between impulsivity, operationalized within the UPPS-P framework, gender, and alcohol and cannabis use outcomes among post-secondary students who reported co-use of these substances. Higher total impulsivity was associated with more frequent alcohol use, greater problematic alcohol use, and greater problematic cannabis use, but was not associated with alcohol use amount, cannabis use frequency, or cannabis use amount. At the facet level, positive urgency emerged as the most consistent predictor, demonstrating positive associations with alcohol use frequency, alcohol use amount, and severity of problematic alcohol use. In contrast, the remaining impulsivity facets were not consistently associated with alcohol or cannabis use outcomes. Gender was not independently associated with substance use outcomes across most models, and there was limited evidence that gender moderated the associations between impulsivity and substance use across analyses. Specifically, Total Impulsivity × Gender interactions were not significant for any alcohol or cannabis use outcome, and facet-level interactions generally did not improve model fit when considered. The Negative Urgency × Gender interaction predicting alcohol use amount was the only significant interaction that was retained for interpretation, such that higher negative urgency was associated with lower alcohol use amount among men but was unrelated to alcohol use amount among women. Overall, these findings suggest that impulsivity, particularly positive urgency, may be more consistently implicated in alcohol-related outcomes than cannabis-related outcomes among post-secondary students who co-use alcohol and cannabis, whereas gender appears to play a comparatively limited role.

4.2 Impulsivity and Alcohol Use Among Co-Users

Although impulsivity is often conceptualized as a multidimensional construct of impulsive personality within the UPPS-P framework, the SUPPS-P total score provides an omnibus index of impulsivity that could convey general vulnerability. Consistently, in the present study, higher total impulsivity scores were associated with more frequent alcohol use and greater problematic alcohol use. These findings are largely consistent with previous research that has implicated general impulsivity within the UPPS-P framework as a significant predictor of alcohol use (Coskunpinar et al., 2013), particularly with regard to problematic alcohol use within a post-secondary setting (MacKillop et al., 2007). However, unlike frequency and severity of problematic use, amount of alcohol use was not associated with total impulsivity among the co-users in the present study. This suggests the possibility that the contribution of overall impulsivity to alcohol use may differ across specific outcomes. Although frequency, amount, and severity of problematic use are interrelated, they are not interchangeable constructs, and each may index unique mechanisms underlying alcohol use behaviour (Coskunpinar et al., 2013). On the other hand, it is also possible that associations between impulsivity and substance use outcomes may differ based on how impulsivity is operationalized, where behavioural measures and not self-report measures may predict alcohol use amount (Henges & Marczinski, 2012). Overall, results from the present study are largely supportive of the notion that general impulsivity may represent a risk factor for more frequent and severe problematic alcohol use among post-secondary students who co-use alcohol and cannabis.

While the present study also explored the relationship between alcohol use outcomes and all five facets of UPPS-P-derived impulsivity in this sample of co-users, only positive urgency reliably emerged as a consistent predictor of all alcohol use outcomes. Positive urgency is an emotion-based facet of impulsivity that is characterized by rash action during heightened positive

affect (Cyders & Smith, 2008). This finding is in line with previous literature that has linked positive urgency to risky alcohol use among post-secondary students, supporting the notion that positive urgency represents a propensity for reckless behaviour during elevated positive affective states (Cyders et al., 2007, 2009; Cyders & Smith, 2008; Dora et al., 2022). Consistent with this, prior ecological momentary assessment-based findings have shown that positive affect is associated with alcohol use probability (Dora et al., 2026). This pattern of findings may be particularly relevant for post-secondary settings, where alcohol use may be prevalent in positive social contexts (Baer, 2002; Howard et al., 2015; Waddell et al., 2022), potentially making individuals high in positive urgency more vulnerable to problematic alcohol use in such settings. Accordingly, positive urgency has been reliably linked to problematic alcohol use more generally (Coskunpinar et al., 2013), and specifically among post-secondary students (Cyders et al., 2010). While previous research suggests that the relationship between alcohol use and positive urgency may be nuanced across alcohol use outcomes (Coskunpinar et al., 2013), the present findings underscore the notion that positive urgency may represent a risk factor for alcohol use more generally, across frequency, amount, and severity of problematic use.

Past research has delineated the impact of facets of impulsivity on alcohol-only use more generally (Coskunpinar et al., 2013; Cyders et al., 2009; King et al., 2023; LaBrie et al., 2014; Shin et al., 2012). Emerging research has also highlighted certain facets of impulsivity as potential predictors of co-use more specifically. For example, Barey et al. (2026) found that, compared to alcohol-only users and non-users, alcohol and cannabis co-users reported higher levels of sensation seeking, stronger positive expectancies, and weaker negative expectancies regarding simultaneous alcohol and cannabis use. This suggests that facets other than positive urgency may differentiate co-users from non-co-users of alcohol and cannabis. Although this may be the case, results from

the present study indicate that positive urgency may be the key impulsivity facet that drives problematic drinking among post-secondary co-users. Taken together, one speculative interpretation of these findings is that sensation seeking and positive urgency may operate at different points in a developmental pathway toward problematic alcohol use among co-users, where sensation seeking may contribute to the likelihood of becoming a co-user and positive urgency may, in turn, shape problematic drinking once co-use has begun. Directly testing this two-stage hypothesis using a prospective design that follows individuals from single-substance use into co-use could provide useful insight into the developmental trajectory of co-use. It is important to note that the role of positive urgency in shaping alcohol use among co-users may be further nuanced by contextual factors. For example, in a sample of veterans co-using alcohol and cannabis, individuals with mean and low levels of positive urgency and lack of perseverance drank less on co-use days than on alcohol-only days. In contrast, drinking quantity was similar on co-use and alcohol-only days among those with high levels of positive urgency and lack of perseverance. The authors suggested that individuals with lower levels of these impulsivity traits may be less inclined to engage in heavier drinking on co-use days (Waddell et al., 2021).

4.3 Impulsivity and Cannabis Use Among Co-Users

While higher total impulsivity was associated with greater severity of problematic cannabis use among co-users of alcohol and cannabis, it was not associated with cannabis use frequency or amount. This pattern of results is consistent with prior research showing that impulsivity is more strongly related to cannabis use-related harms than to cannabis use itself. For example, VanderVeen et al. (2016) demonstrated that impulsivity was more strongly associated with problematic cannabis use than with cannabis use (i.e., frequency and lifetime use) (VanderVeen et al., 2016). As such, these findings may suggest that, while impulsivity may not be linked to

frequency or amount of cannabis use among co-users of alcohol and cannabis, it may contribute to cannabis use in situations or ways that carry greater risk or are more prone to negative consequences. The effects of impulsivity on cannabis use, however, appear to be relatively weak, particularly when compared to the link between impulsivity and alcohol use in the sample of co-users in the present study.

At the facet level, impulsivity was not associated with any of the cannabis use outcomes in the present study. This was surprising given the established link between cannabis use more generally and UPPS-P impulsivity facets in the literature, with the exception of lack of perseverance, which has generally shown weak or non-significant associations with cannabis use outcomes (VanderVeen et al., 2016). It is possible that such discrepancies may reflect differences in sample characteristics (e.g., very frequent use) and differences in how outcome variables were operationalized across studies. It is also possible that these discrepancies may reflect distinct co-use-specific motivational processes, such as beliefs about cannabis use and its consequences (Falco et al., 2021; Pilatti et al., 2021; VanderVeen et al., 2016). For example, facets of impulsivity such as positive urgency may be indirectly associated with problematic cannabis use through internalized norms regarding cannabis, such as the belief that cannabis is an important part of college life (Pilatti et al., 2021). Additionally, research has shown that personality factors such as positive urgency may impact cannabis use indirectly through motivational factors such as expansion motives (Montgomery et al., 2024). As such, it may be that not accounting for such contextual factors may have obfuscated the direct relationship between impulsivity facets and cannabis use outcomes in the current study. Alternatively, in the specific context of alcohol and cannabis co-use in post-secondary settings, factors other than impulsivity-related constructs may be more relevant for problematic cannabis use. While overall impulsivity predicted severity of

problematic cannabis use, no individual facet emerged as a unique predictor, suggesting that cannabis-use-related problems may be associated with the cumulative influence of multiple impulsivity-related personality factors rather than any single impulsivity facet. Given the intercorrelations among UPPS-P facets, it is additionally possible that shared variance across impulsivity facets may contribute to problematic cannabis use in ways that are not captured when attempting to deconstruct these effects across specific facets.

4.4 Effect of Gender

Across analyses, gender was not a significant independent predictor of most substance use outcomes. This absence of gender effects in regression analyses is consistent with descriptive results demonstrating broadly comparable levels of alcohol use, cannabis use, and overall impulsivity across men and women in the current study. These null findings, however, were inconsistent with previous research indicating that men use alcohol and cannabis more frequently and are more likely to develop problematic patterns of use compared to women (Goh et al., 2024; Khan et al., 2013; Preston, 2006; A. M. White, 2020). As such, existing literature may create an expectation that the effects of impulsivity on substance use differ by gender, particularly suggesting that men may be more vulnerable to the negative impact of positive urgency and sensation seeking (Claréus et al., 2017; Maxwell et al., 2023). It is important to note that more recent evidence suggests that gender was not found to be a significant predictor of alcohol or cannabis use in a large, multinational sample of post-secondary students (Montgomery et al., 2024). Other research suggests that the effect of gender may also differ across types of co-use, where men may be more likely to engage in simultaneous use, while reliable gender differences were not found for concurrent use (Subbaraman & Kerr, 2015). Moreover, past research also suggests that gender differences may only emerge at higher levels of alcohol and cannabis co-use (Asuncion,

2024). Within this context, it is possible that results from the present study may reflect sample characteristics and the way in which co-use was operationalized.

Across analyses, gender largely did not moderate the relationship between impulsivity and substance use, with the exception of negative urgency. Specifically, higher negative urgency was associated with lower alcohol use amount among co-using men but was unrelated to alcohol use amount among co-using women. It is possible that this finding may reflect underlying gender differences in determinants such as coping motives. However, this finding should be interpreted with caution, particularly given the absence of Negative Urgency × Gender interactions across other substance use outcomes.

4.5 Implications

The present findings suggest that impulsivity may not contribute equally to alcohol and cannabis use outcomes among post-secondary co-users. Specifically, while total impulsivity and positive urgency emerged as the most consistent predictors of alcohol use outcomes among co-users, associations between these variables and cannabis use outcomes were weaker and less consistent. Consequently, impulsivity alone may be insufficient for understanding problematic substance use outcomes among co-users. The absence of consistent associations between impulsivity facets and cannabis outcomes, in particular, highlights the importance of other potential contributors such as motivational and cognitive factors, including substance use expectancies, social norms, and substance use motives. This is especially notable given that previous research has demonstrated that such factors may mediate the associations between impulsive personality traits and substance use outcomes (Barey et al., 2026; Montgomery et al., 2024; Pilatti et al., 2021). Taken together, results from the present study provide preliminary evidence supporting the notion that the influence of impulsivity on alcohol and cannabis use

behaviours among post-secondary co-users may be complex and should not be conceptualized in isolation.

Findings from the present study also suggest that co-users may be particularly sensitive to positive emotion-driven impulsivity in relation to alcohol use, which provides useful guidance for assessing risk for alcohol use-related harms in the context of co-use. This finding is especially relevant within post-secondary environments that present frequent opportunities and cues for alcohol use that are characterized by positive emotionality or elevated mood states (e.g., festive social gatherings with peers). In such settings, co-users higher in positive urgency may be more vulnerable to problematic alcohol use, particularly given that elevated mood states may interfere with deliberate decision-making and increase the likelihood of rash action (Regan et al., 2022). Therefore, interventions that focus on emotion regulation strategies may be helpful for mitigating alcohol use-related harms in post-secondary co-users. Mindfulness-based and cognitive-behavioural approaches for processing positive emotions may be particularly beneficial in this regard for post-secondary co-users, as such interventions encourage observing and maintaining psychological distance during intense positive emotional experiences (Um & Cyders, 2019). More broadly, the present study also underscores the importance of developing interventions specifically tailored to alcohol and cannabis co-users, rather than assuming that knowledge linked to single-substance users can be generalized to co-use populations.

4.6 Limitations

The present study has several limitations that should be considered. First, the cross-sectional nature of the study precludes conclusions regarding the directionality of the observed associations. As such, longitudinal and experience-sampling methods are needed to better characterize these associations. The overall sample size was modest and the gender distribution

within the sample was unequal, with substantially fewer men than women. Given that interaction effects typically require adequately powered samples to be detected reliably, the present study may have been underpowered, precluding the discovery of small-to-moderate gender moderation effects. Consequently, the largely null findings regarding gender should be interpreted cautiously and should be replicated in future studies to confirm generalizability. Additionally, the small number of gender-diverse participants necessitated their exclusion from the presented analyses, limiting findings to comparisons between men and women. This limits the inclusivity and generalizability of these findings beyond men and women. Future studies should prioritize recruitment strategies that allow for more inclusive and adequately powered analyses.

The present study relied on a large number of regression models that were estimated, which may increase the risk of Type I error. Given the exploratory nature of the study, adjustments for multiple comparisons were not applied. Therefore, it would be prudent to interpret isolated significant findings, particularly those that were not observed consistently across related outcomes, cautiously. These preliminary findings, however, can provide a foundational framework for future research hypotheses focused on replicating these results. Additionally, while treating parameters such as frequency of substance use and amount of substance use as continuous outcome variables is consistent with previous UPPS-P-based research (e.g., Cyders et al., 2009; LaBrie et al., 2014), count-based approaches may offer a better alternative for future replications of these findings (Karoly et al., 2023; Tan et al., 2024).

In the present study, co-use of alcohol and cannabis was operationalized as the use of each substance at least once over the past month. This operationalization of co-use may not fully reflect the complexity of co-use, which may be delineated across concurrent use and simultaneous use, as well as possible heterogeneous patterns of co-use that may emerge based on combinations of

alcohol and cannabis use behaviours (e.g., high alcohol use and low cannabis use vs. low alcohol use and high cannabis use). These nuances may represent important contributory factors that shape the relationship between impulsivity, gender, and substance use among co-users. For example, previous research suggests that men are more likely than women to engage in simultaneous co-use, whereas gender differences appear less pronounced among concurrent co-users (Jackson et al., 2020; Subbaraman & Kerr, 2015). Therefore, adequately accounting for these patterns of co-use would be important to better understand how impulsivity and gender may shape alcohol and cannabis use. Additionally, the AUDIT and the CUDIT-R spanned different retrospective windows (i.e., 12 months and 6 months, respectively), while frequency and amount of use were operationalized over the past month. It is possible that this mismatch may obscure the interpretation of patterns of associations across these outcomes. As such, future research using co-use samples would benefit from aligning recall periods across outcome measures.

Alcohol use frequency differed across recruitment sources, suggesting some potential regional differences that may exist between participants recruited from Canada and the United States. Although recruitment source was statistically controlled for and was unrelated to other substance use outcomes, future research should examine whether location-related differences in alcohol use patterns influence associations between impulsivity, gender, and substance use. Finally, all study variables were assessed using self-report measures, which may be subject to limitations such as recall bias, social desirability, and shared method variance. As such, future studies would also benefit from incorporating multi-method, ecologically valid approaches.

4.7 Conclusions

The present study examined associations between impulsivity, gender, and alcohol and cannabis use outcomes among post-secondary students who reported co-use of these substances

over the past month. Overall, findings suggest that impulsivity may be more strongly implicated in alcohol use-related outcomes than cannabis use-related outcomes among co-users, with positive urgency emerging as the most consistent predictor of alcohol use frequency, alcohol use amount, and severity of problematic alcohol use. In contrast, associations between impulsivity and cannabis outcomes were generally weaker and less consistent, suggesting that cannabis use among co-users may be influenced by a broader range of contextual and motivational factors beyond impulsive personality traits alone. Gender was also found to play a comparatively limited role, as it was not independently associated with most substance use outcomes and did not consistently moderate the associations between impulsivity and substance use. Taken together, these findings highlight the importance of examining specific dimensions of impulsivity within co-use populations and suggest that emotion-driven tendencies to act rashly during heightened positive affect may represent a particularly relevant risk factor for alcohol use among post-secondary co-users. As such, interventions that build capacity in the context of regulating strong emotions may represent an effective approach for mitigating alcohol use-related harms among post-secondary students who co-use alcohol and cannabis. Future research investigating the mechanisms linking impulsivity to specific alcohol and cannabis use outcomes (e.g., frequency, amount, and severity of problematic use) in co-users may benefit from accounting for substance use expectancies, motives, social norms, as well as specific co-use patterns, while incorporating ecologically valid and behavioural measures to better inform targeted prevention and intervention efforts.

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Tables

Table 1.

Participant Characteristics and Descriptive Statistics.

Variable	M (SD) or n (%)
Demographics	
Age	21.32 (2.08)
Women	156 (65.82)
Race/ethnicity	
White	98 (41.35)
Mixed	47 (19.83)
Black	42 (17.72)
South Asian	17 (7.17)
Latin American	11 (4.64)
West Asian	7 (2.95)
Chinese	5 (2.11)
Southeast Asian	2 (.84)
Korean	2 (.84)
Arab	1 (.42)
Filipino	1 (.42)
American Indian or Alaska Native	1 (.42)
Other	3 (1.27)
Highest level of education	
High school diploma	145 (61.18)
College diploma or associate's degree	43 (18.14)
Bachelor's degree	48 (20.25)
Master's degree	1 (.42)
Impulsivity	
SUPPS-P total	2.18 (.41)
Alcohol use	
Severity of problematic use (i.e., total AUDIT score)	9.25 (7.25)
Frequency (days per week)	1.98 (1.37)
Amount (i.e., number of standard alcoholic drinks)	5.27 (4.97)
Cannabis use	
Severity of problematic use (i.e., total CUDIT-R score)	10.69 (7.02)
Frequency (days per week)	2.97 (2.29)
Amount (i.e., amount of cannabis in grams)	1.59 (3.21)

Note. Values are reported as *M (SD)* for continuous variables and *n* (%) for categorical variables. *M* = mean; *SD* = standard deviation; SUPPS-P = Short UPPS-P Impulsive Behaviour Scale; AUDIT = Alcohol Use Disorders Identification Test; CUDIT-R = Cannabis Use Disorders Identification Test–Revised.

Table 2.

Descriptive Statistics, Reliability Estimates, and Intercorrelations Among SUPPS-P Impulsivity Facets.

Impulsivity Facet	M	SD	1	2	3	4	5
1. Negative Urgency (NU)	2.54	.77	**(.80)**				
2. Lack of Perseverance (PS)	1.93	.55	.12	**(.71)**			
3. Lack of Premeditation (PM)	1.86	.56	.35**	.48**	**(.77)**		
4. Sensation Seeking (SS)	2.54	.69	.09	−.18**	.09	**(.64)**	
5. Positive Urgency (PU)	2.01	.71	.63**	.08	.44**	.29**	**(.78)**

Note. Values on the diagonal (in parentheses) represent Cronbach's alpha coefficients. ** $p < .01$.

Table 3.

Distribution of Responses Across AUDIT Items.

Summary of item	Responses				
	0	**1**	**2**	**3**	**4**
1. Frequency of alcohol use	0 (.00)	80 (33.76)	83 (35.02)	57 (24.05)	17 (7.17)
2. Typical number of drinks	79 (33.33)	92 (38.81)	44 (18.57)	16 (6.75)	6 (2.53)
3. Six or more drinks on one occasion	54 (22.78)	112 (47.25)	42 (17.72)	23 (9.70)	6 (2.53)
4. Unable to stop once started	138 (58.23)	45 (18.98)	28 (11.81)	18 (7.59)	8 (3.38)
5. Failed to meet expectations	146 (61.60)	50 (21.09)	24 (10.13)	13 (5.49)	4 (1.69)
6. Needed a morning drink after heavy drinking	189 (79.75)	19 (8.02)	15 (6.33)	12 (5.06)	2 (0.84)
7. Felt guilt or remorse after drinking	88 (37.13)	82 (34.60)	33 (13.92)	17 (7.17)	17 (7.17)
8. Unable to remember events after drinking	101 (42.61)	84 (35.44)	34 (14.35)	14 (5.91)	4 (1.69)
9. Injury related to drinking	195 (82.27)	–	28 (11.81)	–	14 (5.91)
10. Others concerned or suggested cutting down	190 (80.17)	–	22 (9.28)	–	25 (10.55)

Note. Values represent the number of participants with percent out of $N = 237$ in parentheses.
Response options for item 1: 0 = *never*, 1 = *monthly or less*, 2 = *2 to 4 times a month*, 3 = *2 to 3 times a week*, 4 = *4 or more times a week.*
Response options for item 2: 0 = *1 or 2 drinks*, 1 = *3 or 4 drinks*, 2 = *5 or 6 drinks*, 3 = *7 to 9 drinks*, 4 = *10 or more drinks*.
Response options for items 3-8: 0 = *never*, 1 = *less than monthly*, 2 = *monthly*, 3 = *weekly*, 4 = *daily or almost daily*.
Response options for items 9 and 10: 0 = *no*, 2 = *yes, but not in the past year*, 4 = *yes, during the past year*.

Table 4.

Distribution of Responses Across CUDIT-R Items.

Summary of item	Responses				
	0	**1**	**2**	**3**	**4**
1. Frequency of cannabis use	0 (.00)	82 (34.60)	49 (20.68)	43 (18.14)	63 (26.58)
2. Hours stoned on a typical day	23 (9.70)	82 (34.60)	87 (36.71)	27 (11.39)	18 (7.59)
3. Unable to stop once started	127 (53.59)	41 (17.30)	22 (9.28)	22 (9.28)	25 (10.55)
4. Fail to do what was expected	127 (53.59)	51 (21.52)	25 (10.55)	29 (12.24)	5 (2.11)
5. Time devoted to use/recovery	131 (55.27)	40 (16.88)	30 (12.66)	26 (10.97)	10 (4.22)
6. Memory or concentration problems after use	99 (41.77)	61 (25.74)	40 (16.88)	29 (12.24)	8 (3.38)
7. Use in physically hazardous situations	183 (77.22)	28 (11.81)	9 (3.80)	11 (4.64)	6 (2.53)
8. Thoughts about cutting down	75 (31.65)	–	62 (26.16)	–	100 (42.19)

Note. Values represent the number of participants with percent out of $N = 237$ in parentheses.
Response options for item 1: 0 = *never*, 1 = *monthly or less*, 2 = *2-4 times a month*, 3 = *2-3 times a week*, 4 = *4 or more times a week*
Response options for item 2: 0 = *less than 1*, 1 = *1 or 2*, 2 = *3 or 4*, 3 = *5 or 6*, 4 = *7 or more*
Response options for items 3-7: 0 = *never*, 1 = *less than monthly*, 2 = *monthly*, 3 = *weekly*, 4 = *daily or almost daily*
Response options for item 8: 0 = *never*, 2 = *yes, but not in the past 6 months,* 4 = *yes, during the past 6 months*

Table 5.

Gender Differences in Alcohol Use, Cannabis Use, and Impulsivity

	Women	**Men**		
	M (SD)	**M (SD)**	**t (235)**	***p***
AUDIT Total	9.37 (7.39)	9.02 (7.01)	.34	.732
CUDIT-R Total	11.04 (7.38)	10.01 (6.26)	1.08	.284
SUPPS-P Total	2.20 (.43)	2.14 (.38)	1.07	.285
Negative Urgency	2.62 (.77)	2.39 (.75)	2.16	**.032**
Positive Urgency	2.01 (.72)	2.00 (.68)	.12	.907
Lack of Premeditation	1.91 (.58)	1.77 (.51)	1.88	.061
Lack of Perseverance	1.96 (.57)	1.88 (.51)	1.04	.300
Sensation Seeking	2.49 (.70)	2.65 (.66)	-1.66	.099

Note. Negative Urgency was the only UPPS-P impulsivity facet that was significantly different between women and men.

Figure

Figure 1.

Participant Recruitment and Exclusion Flowchart

