Social Anxiety and Cannabis Problems: Examining the Moderating Role of Perceptions of Parental Use and Approval *

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Cannabis problems (e.g., addiction, misuse) are prevalent among young adults. Some literature points to social anxiety (SA) as a predictor; however, the theoretical and empirical evidence suggests that the pathway is unclear. Perceptions of parental cannabis use (descriptive norms) and approval of cannabis use (injunctive norms), as well as gender differences, might influence the SA-cannabis problems association. The purpose of the current study was to examine the moderating role of parental injunctive and descriptive norms and gender on the SA-cannabis problems association. Undergraduate participants (N = 172) self-reported on age, gender, SA, parental injunctive and descriptive norms, and cannabis problems. The results suggested that SA was a positive predictor of cannabis problems, but only among men, and this effect was particularly strong for men high in parental injunctive norms. This research has the potential to clarify the risk trajectory and inform prevention and intervention efforts targeting problematic cannabis use among those high in SA.

Social Anxiety and Cannabis Problems

Cannabis is the most commonly used drug in Canada, particularly among young adults (18 to 24 years old) [1, 2]. There is a myriad of unfavourable consequences associated with cannabis use, such as motor vehicle accidents, and increased likelihood of using other illegal drugs [3]. Because of the problems associated with cannabis use, there is a need to better characterize the risk pathway to cannabis misuse, which could contribute to the development of preventative interventions aimed at mitigating cannabis problems, particularly among young adults.

Anxiety disorders and in particular social anxiety (SA) have been implicated in predicting cannabis problems [4, 5, 6]. SA is defined as a phobic disorder characterized by fear of being judged and scrutinized by others in social situations that are either endured with extreme discomfort or avoided altogether [7, 8]. Research shows that young adults with SA are five times more likely to develop cannabis problems than those without SA [6].

Three theoretical models lend themselves to elucidating the association between SA and cannabis problems. The tension-reduction model suggests that cannabis is used to reduce symptoms of anxiety and emotional distress in social situations (i.e., to cope) [5]. Supporting this, using questionnaires in a cross-sectional study, Buckner and colleagues (2007) found that undergraduates high in SA used cannabis as a way to reduce tension and cope with SA symptoms [5]. The substance refusal efficacy theory postulates that those high in SA may have difficulty refusing substances offered by their peers [9]. This fits with the definition of SA, such that those high in SA fear neg-

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ative evaluation from their peers, which might happen if they refuse substances [5]. Supporting this theory, with the use of multiple self-report questionnaires, cross-sectional studies show that those high in SA use cannabis to conform with their cannabis-using peers [5, 10]. Finally, the buffer perspective suggests a protective association between SA and cannabis problems, such that those high in SA will avoid social situations, thus have reduced opportunities and pressure to use cannabis. Indeed, a study conducted by Nelemans and colleagues (2016) found that the link between SA and cannabis use was moderated by peer involvement, such that elevated SA was associated with a reduced likelihood of cannabis use, among those who had less involvement with their peers [11].

Taken together, theoretical models and empirical evidence support a complex link between SA and cannabis problems. On the one hand, those high in SA may use cannabis to reduce tension and conform with their peers, while on the other hand, those high in SA may avoid cannabis because it is typically used in a social context that is not sought out. This complexity points to the need to consider how other factors may be impacting this association.

Moderators of the Risk Pathway

Social Norms

According to Azjen's (1991) theory of planned behaviour, behavioural intentions are determined by one's perception of whether others perform and approve of the behaviour (i.e., social norms) [12]. There are two types of social norms that have been investigated as contributing to the SA-cannabis use association: (1) descriptive norms, which are an individual's perceptions of others' cannabis use, and (2) injunctive norms, which are an individual's perceptions of others' approval of cannabis use and related behaviours [13, 14, 15].

Research demonstrates that peer use and approval are positively correlated with self-reported cannabis problems [17]. Buckner and colleagues (2006) found that peer cannabis use moderated the SA-cannabis association, such that SA was a positive predictor of cannabis problems when peers were perceived as heavy cannabis users [18]. In addition, Buckner (2013) found that college students who experienced negative affect in social situations were more likely to use cannabis to cope with their anxious symptoms and conform with their peers if they perceived their peers to approve of cannabis use [5, 13].

The role of perceived parental approval in the SA-cannabis problems association has also been investigated. Ecker and Buckner (2014) found that elevated SA was associated with increased cannabis problems when individuals perceived that their parents approved of cannabis use [17]. Likewise, Foster and colleagues (2016) found that elevated SA predicted increased cannabis problems among those with high perceived parental approval [16]. Interestingly, this work suggests that norms may play a role even if those high in SA avoid social contexts typical of cannabis use, as they may look to parents for approval. Notably, researchers have not yet investigated perceptions of actual parental cannabis use (i.e., descriptive norms).

Gender

Evidence is mixed regarding the potential role of gender in the SA-cannabis problems relationship. Some studies show no gender differences in the association between SA and cannabis problems [5, 14], while others support gender effects. For example, some evidence indicates that

men, and more specifically, men with SA, have more cannabis problems than women [17,19]. However, Buckner and colleagues (2006) found that the association between SA and cannabis use – and the interaction between SA and peer influence on cannabis problems – was only supported for women, such that an increase in SA was linked to cannabis problems when perceiving that friends approve of cannabis use, only among women [18]. This work suggests that gender plays a role in the SA-cannabis problems association; however, the direction of the association is unclear.

The Current Study

The goal of the current online study was to test the effect of SA on cannabis problems among young adults, as moderated by parental descriptive norms, parental injunctive norms, and gender. A cross-sectional online questionnaire study was used to assess the following hypotheses: (1) parental descriptive and injunctive norms, and gender would moderate the association between SA and cannabis problems, (2) elevated SA would positively predict an increase in cannabis problems among those who perceive their parents as using cannabis (i.e., high descriptive norms), and this effect would be particularly strong for men, and (3) elevated SA would positively predict cannabis problems among those who perceive their parents as approving of cannabis use (i.e., high injunctive norms), and this effect would be particularly strong for men.

Method

Participants

The sample included 172 young adults, of which 154 (83.8% women, 16.2% men) were retained for analyses for two main reasons. First, these individuals had complete data on the questionnaires of interest. Second, given that the sample size of self-reported non-binary individuals was small (n = 4), we chose to only include individuals who self-reported as man or woman. These young adults ranged from 18 to 34 years old (M = 21.67, SD = 2.471). Based on a priori power analysis (conducted in G*Power), a sample size of 103 has sufficient power (>.80) to detect an effect size of .15 (with α=.05) for hypothesis testing. Thus, the total sample size of 154 was sufficiently powered. The participants were undergraduate students from Concordia University and young adults from the greater Montreal area. Participants reported their racial/ethnic background (Caucasian = 66.2%; Aboriginal = .6%; Arab = 5.2%; African American/Black = 3.2%; Chinese = 3.2%; Filipino = .6%; Latin American = 3.2%; South Asian = 6.5%; West Asian = 3.9%; Multiracial = 7.1%). Inclusion criteria were an age of at least 18 years and fluency in English, as the questionnaires used were all in English. There were no exclusion criteria for the current study.

Measures

Demographics questionnaire. Participants completed a demographic questionnaire wherein they self-reported their age and gender.

Liebowitz Social Anxiety Scale (LSAS) [20]. The LSAS is a 24-item self-report questionnaire assessing fear/anxiety and avoidance in various social situations (e.g., 'using a telephone in public'). Participants indicated their level of fear/anxiety using a 4-point scale from 0 (none) to 3 (severe), and their level of avoidance using a 4-point scale from 0 (never) to 3 (usually). One global sum score was calculated by combining the total score from the fear/anxiety subscale and the total score from the avoidance sub-scale (i.e., sum of 24 items). Previous studies have suggested that the LSAS demonstrates significant test-retest reliability, and convergent, divergent, and discriminant validity [5, 21]. In the current study, the LSAS demonstrated high internal consistency

(Cronbach's α = 0.93).

Drinking Norms Rating Form [22] **adapted for Cannabis Use.** This adapted measure is a 16-item self-report questionnaire assessing perceptions of parents' actual cannabis use (i.e., parental descriptive norms; e.g., 'How often do you think your parents/legal guardian(s) use cannabis?'). Participants reported their perceptions with the use of open-ended response options and behavioural anchors. The items were summed to reflect the amount of cannabis consumed (in grams) per week. Higher scores reflected perceiving higher parental cannabis use. Baer's (1991) Drinking Norms Rating Form has demonstrated adequate face validity, predictive utility, and moderate test-retest reliability (0.69) [23].

Perceived Approval of Risky Drinking Inventory (PARDI) [24] **adapted for Cannabis Use.** The PARDI adapted for Cannabis Use is a 29-item self-report questionnaire assessing participants' perceptions of parental approval of cannabis use and associated behaviours (i.e., parental injunctive norms; e.g., 'You use cannabis in order to flirt, have sex, or increase the likelihood of hooking up with someone'). Participants indicated to what degree they believe their parents would approve of a list of behaviours on a 7-point scale from 1 (strongly disapprove) to 7 (strongly approve). The PARDI adapted for Cannabis Use was scored by summing each participant's responses, with higher sums denoting higher perceived parental approval of cannabis behaviours. The PARDI is a new measure that has not yet been used in other cannabis use studies; however, it is currently being analyzed for its psychometric properties. In the present study, the internal consistency was high (Cronbach's α = 0.97).

Cannabis Use Problems Identification Test (CUPIT) [25]. The CUPIT is a 16-item self-report questionnaire assessing participants' current and potential cannabis problems using various scales and behavioural anchors (e.g., 'How difficult do you think you would find it to stop using or go without cannabis altogether'). This measure was scored by summing each participant's responses. Higher scores reflect a higher number of cannabis problems. The CUPIT had high internal consistency in the current study (Cronbach's α = 0.88) and has shown excellent test-retest reliability (0.89-0.99), and significant construct and discriminative validity in previous testing [25].

Procedure

The online study was advertised on Concordia's participant pool website and through flyers posted around the greater Montreal area. Interested undergraduate students contacted the laboratory manager, who gave them a unique code and the link to access the survey. Participants were then asked to provide informed consent, and those who did, gained access to the study. The questionnaires took approximately an hour and a half to complete. Participants from the Concordia participant pool were compensated with one course credit and participants from the community were given the option to enter a draw for one of two $50 cash prizes. This online study was approved by the Concordia University Human Research Ethics Committee.

Results

Data Integrity

Listwise deletion, rather than pairwise deletion, was used to address missing data, as it allowed for better interpretation of the data and has been the preferred method in other SA and cannabis use studies [e.g., 32]. Fourteen of the total 172 participants had missing data on at least one variable of interest, and were therefore excluded from analyses. A t-test was conducted to as-

sess whether those with complete data versus those without (i.e., missing on at least one variable) differed in age. The results suggest that there was no statistically significant difference between the 158 participants with complete data (M age = 21.61, SD = 2.483) versus the 14 participants without (M age = 21.64, SD = 1.277) on age ($t(170)$ = -.052, p = .958). A chi-square test was conducted to ensure that participants with complete data did not differ from those without complete data based on gender. The results suggest that there was no statistically significant difference between participants with complete versus incomplete data based on gender ($x^2(3, N = 172) = 2.024$, p = .567).

The data were screened for the assumptions of moderated multiple linear regression, including outliers, multicollinearity, and linearity. Outliers were defined as data falling $|3.29|$ standard deviations (SD) above and below the mean and were replaced with the maximum and minimum non-outlier values [26]. The assumption of multicollinearity was checked using the Variance Inflation Factor (VIF) and tolerance statistic. Our results suggest that the assumption of multicollinearity was met (VIF = .997, Tolerance = 1.003). Finally, the assumption of linearity was assessed by visual inspection of the data using a scatterplot of standardized residuals, in which scores should be randomly scattered [26]. The data were reasonably linear, however, perfect linearity was not expected given the nature of this population, where participants tend to score closer to 0.

Aiken and West (1991), suggest that when analyzing interaction terms, all predictor variables should be centered [27]. Therefore, SA, parental descriptive norms, and parental injunctive norms were centered by subtracting participant's mean scores from the total predictor mean. The interaction terms were computed by multiplying the centered means with one another. For example, centered SA was multiplied by centered parental descriptive norms to generate the interaction term.

Analytic Overview

A multiple regression analysis was used to test parental injunctive norms, parental descriptive norms, and gender as moderators of the association between SA and cannabis problems. Descriptive statistics and bivariate correlations of each variable of interest are presented in Table 1. Separate models were run for each of the two hypothesized moderators: parental descriptive norms and parental injunctive norms. In the first model, cannabis problems were regressed on the first-order effects of SA, parental descriptive norms and gender, all two-way interaction terms, and the three-way interaction term of interest (i.e., SA × gender × descriptive norms). If any of the interaction terms were statistically significant (p<.05), they were followed up with simple slopes analyses, where the model was conditioned on high (+1 SD) and low (-1 SD) levels of parental descriptive norms (i.e., high perceived parental cannabis use, low perceived parental cannabis use) and conditioned on gender (men, women).

Table 1

Correlations, Means, and Standard Deviations for all Study Variables.

Variables	1	2	3	4	5
1. Social Anxiety (SA)	—				
2. Parental Descriptive Norms	-.047	—			
3. Parental Injunctive Norms	-.062	.550**	—		
4. Gender (0=Men, 1=Women)	.113	-.039	-.055	—	
5. Cannabis Problems	.061	.093	.203*	-.269**	—
M	59.181	1.181	49.558	83.8% women	15.623
SD	27.314	4.052	24.591	—	11.518

Note. $N = 154$.
*$p < .05$.
**$p < .01$.

The second model followed the same analytic plan as the first model, except with parental injunctive norms as the moderator of interest (instead of parental descriptive norms). Again, if any of the interaction terms were statistically significant ($p<.05$), they were followed up with simple slopes analyses, where the model was conditioned on high (+1 SD) and low (-1 SD) levels of parental injunctive norms (i.e., high perceived parental approval, low perceived parental approval) and conditioned on gender (men, women).

Hypothesis Testing

SA predicting Cannabis use Problems

A simple linear regression was conducted to test levels of SA as a predictor of cannabis problems. The results suggest that the association between SA and cannabis problems was not statistically significant ($F(1,152) = .569$, $p = .452$, $R^2 = .004$).

Model 1: SA, Parental Descriptive Norms, and Gender on Cannabis use Problems. Results of the first model suggest that the SA-cannabis problems association was statistically significant ($F(7,146) = 5.178$, $p < .001$, $R^2 = .199$). The regression coefficients indicated that the two-way interactions between SA and parental descriptive norms, and parental descriptive norms and gender were not statistically significant. Furthermore, the three-way interaction between SA, parental descriptive norms, and gender was also not statistically significant. However, the two-way interaction between SA and gender was statistically significant. The results of the first model had an observed medium to large effect size ($f^2 = .25$) [28], and are presented in Table 2. Because the two-way interaction between SA and gender was statistically significant, simple slopes analyses were conducted to determine the direction of the association for men and women. The results of the simple slopes analyses are presented in Figure 1. For men, SA positively predicted an increase in cannabis problems. However, for women, the association between SA and cannabis problems was not statistically significant.

Table 2

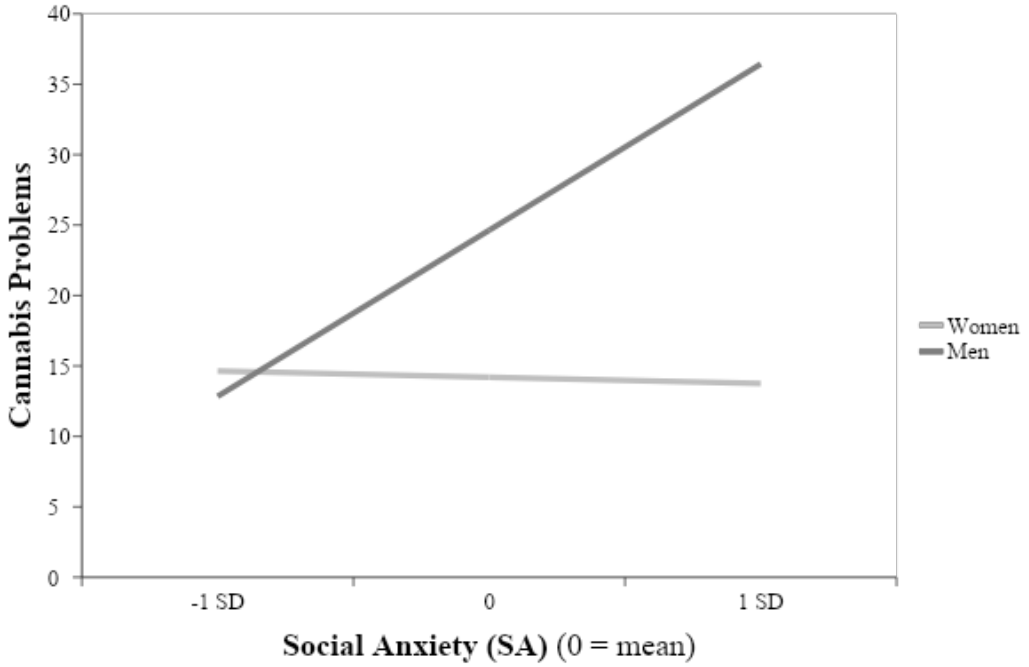
Results of Multiple Regression Analysis of SA, Parental Descriptive Norms and Gender Predicting Cannabis Problems

Predictor	Unstandardized coefficients				
	B	*SE*	*B*	*t*(151)	*p*
Social Anxiety (SA)	.432	.120	1.026	11.152	< .001*
Parental Descriptive Norms	-.719	.524	-.253	-1.372	.172
Gender (0=Men, 1=Women)	-10.431	2.398	-.335	-4.350	< .001*
SA x Parental Descriptive Norms	.100	.081	.802	2.238	.218
SA x Gender	-.448	.125	-.961	-3.586	< .001*
Parental Descriptive Norms x Gender	1.019	.579	.312	1.760	.080
SA x Parental Descriptive Norms x Gender	-.113	.082	-.887	-1.390	.167
Constant	24.629	2.209	—	11.152	< .001*

Note. $N = 154$, $R = .446$, $R^2 = .199$, *Adjusted* $R^2 = .160$.
*$p < .05$.

Figure 1

Simple slopes analysis for social anxiety predicting cannabis problems as moderated by gender



Model 2: SA, Parental Injunctive Norms, and Gender on Cannabis use Problems. Results of the second model suggest that the SA-cannabis problems association was statistically significant ($F(7,146) = 6.423$, $p < .001$, $R^2 = .235$). The regression coefficients suggest that the two-way interaction between gender and parental injunctive norms was not statistically significant. However, the

two-way interaction between SA and parental injunctive norms, the two-way interaction between SA and gender, and the three-way interaction between SA, parental injunctive norms, and gender were all statistically significant. The results of the second model had an observed medium to large effect size (f^2 = .31) [28], and are presented in Table 3. Because the three-way interaction was significant, this was the only interaction that was further analysed with simple slopes, in order to understand the direction of the association for men and women. The model was conditioned on high and low levels of parental injunctive norms (i.e., high perceived parental approval, low perceived parental approval) and conditioned on gender (men, women). Perceiving high approval versus perceiving low approval was defined as data falling at least one SD above or below the mean. The results of the simple slopes analyses are presented in Figure 2 for men and in Figure 3 for women. The simple slopes analyses suggest that high SA positively predicted cannabis problems among men high in parental injunctive norms. High SA did not predict cannabis problems for men low in parental injunctive norms, or for women high or low in parental injunctive norms.

Table 3

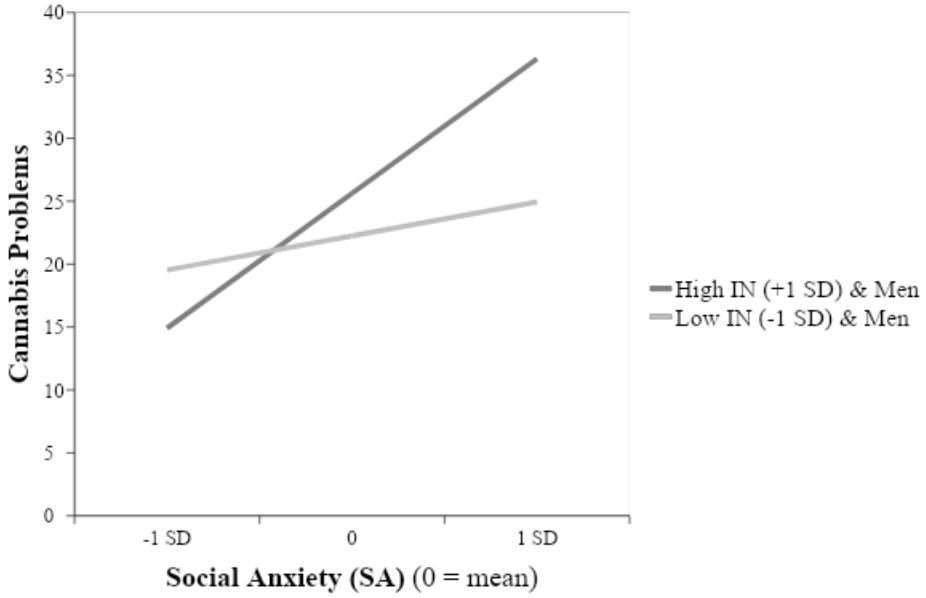
Results of Multiple Regression Analysis of SA, Parental Injunctive Norms and Gender Predicting Cannabis Problems

	Unstandardized coefficients				
Predictor	*B*	*SE*	*B*	*t*(151)	*p*
Social Anxiety (SA)	.246	.077	.583	3.181	.002*
Parental Injunctive Norms	.069	.089	.147	.770	.443
Gender (0=Men, 1=Women)	-9.615	2.340	-.309	-4.108	< .001*
SA x Parental Injunctive Norms	.006	.002	.380	2.615	.010*
SA x Gender	-.257	.084	-.552	-3.052	.003*
Parental Injunctive Norms x Gender	.002	.097	.004	.022	.982
SA x Parental Injunctive Norms x Gender	-.006	.003	-.316	-2.237	.027*
Constant	21.931	2.155	—	11.104	< .001*

Note. N = 154, R = .485, R^2 = .235, *Adjusted* R^2 = .199.
*$p < .05$.

Figure 2

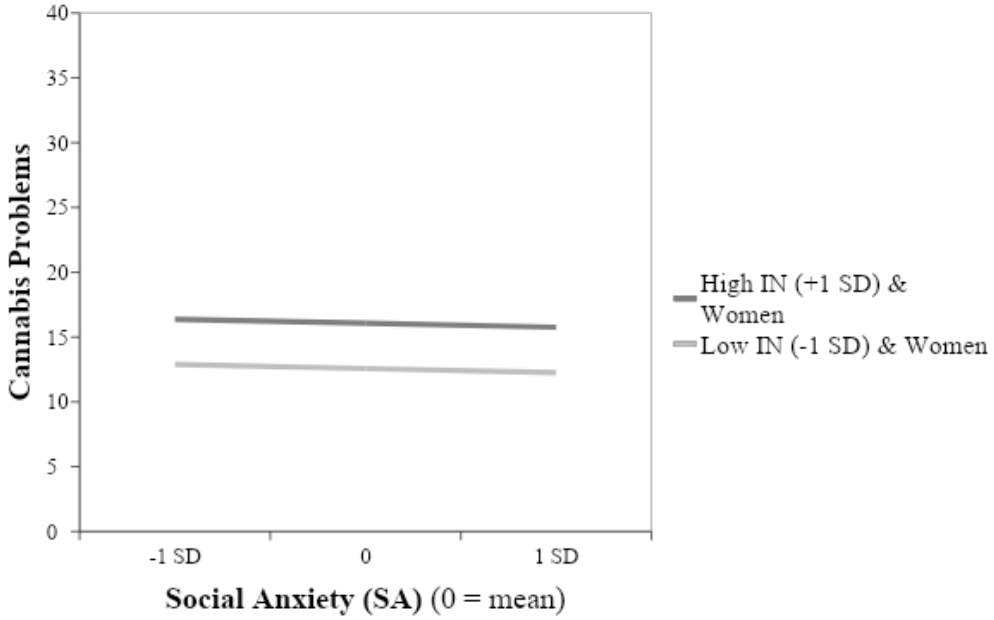
Simple slopes analysis: parental injunctive norms, selected for men



Note. Simple slopes analysis for social anxiety predicting cannabis problems, as moderated by high (+1 SD) and low (−1 SD) parental injunctive norms

Figure 3

Simple slopes analysis: parental injunctive norms, selected for women



Note. Simple slopes analysis for social anxiety predicting cannabis problems, as moderated by high (+1 *SD*) and low (−1 *SD*) parental injunctive norms

Discussion

The goal of the current study was to clarify the SA-cannabis problems risk trajectory by considering the roles of parental injunctive and descriptive norms, and gender in the association. The main findings indicate that gender and parental injunctive norms, in particular, influence the association between SA and cannabis problems. Specifically, increased SA predicts cannabis problems among men who perceive high parental approval of cannabis use.

In the current study, elevated SA did not predict an increase in cannabis problems. These findings highlight the inconsistent theoretical and empirical support for SA as a risk or protective factor for cannabis problems. Buckner and colleagues (2008) suggested that increased levels of SA predicted an increase in cannabis problems [6], whereas, Nelemans and colleagues (2016) suggested that increased levels of SA predicted a decrease in cannabis problems [11]. The inconsistent results in the literature, and the current studies' findings emphasize the importance of including moderators that impact the SA-cannabis problems association.

Contrary to our second hypothesis, gender and parental descriptive norms did not moderate the association between SA and cannabis problems. These findings are possibly due to the role of coping and conformity motives in the association. Previous research suggests that young adults with SA use cannabis to conform with their peers [17] and to cope with stressful social situations [5]. Thus, perceptions of parental cannabis use may not impact their cannabis use behaviours in stressful social situations. Another possibility is that young adults do not know about their parents' cannabis use. Cannabis was legalized in Canada in 2018, which was not very long ago [29]. Therefore, cannabis use may still be seen as taboo and restricted among parents. Accordingly, if parents use cannabis, or plan on starting to use cannabis, their children may not yet be aware. Future research should assess parental cannabis use when young adults today become parents themselves, as children in the future may be more aware of their parents' cannabis use.

Although gender and descriptive norms did not moderate the SA-cannabis problems association, gender alone did moderator the association. Specifically, elevated SA predicted a tendency to be higher in cannabis problems among men in general. These results are in line with previous research suggesting that SA is associated with cannabis problems, particularly among men [19, 30]. Indeed, Buckner and colleagues (2012) found that conformity and coping motives partially explained the association between SA and cannabis problems only among men. Their results suggested that men are more susceptible to using cannabis to avoid scrutiny from their cannabis-using peers than women are, and therefore, are more likely than women to develop cannabis problems [30]. Furthermore, a recent Statistics Canada report found that 21% of men, as compared to 12% of women have consumed cannabis [31]. Therefore, it is likely that men with elevated SA would feel more compelled than women with elevated SA to use cannabis to conform with their cannabis-using male peers.

Consistent with our third hypothesis, the SA and cannabis problems association was moderated by gender and parental injunctive norms, such that elevated SA was associated with increased risk for cannabis problems among men who perceive high parental cannabis approval. These results are in line with previous research investigating the role of parental injunctive norms in the SA-cannabis problems association. Ecker and Buckner (2014) investigated the role of parental injunctive norms in the SA-cannabis problems association and found that higher levels of SA predicted elevated cannabis problems among those who perceived higher parental approval of

cannabis behaviours [17]. The current study adds to the body of literature by considering how both parental injunctive norms and gender impact the SA-cannabis problems association. Ultimately, higher levels of SA predicted higher levels of cannabis problems, particularly among men who perceive high parental approval of cannabis. Inconsistent with the buffer perspective, the current study suggests that elevated SA predicted an increase in cannabis problems. Indeed, individuals high in SA who may be less involved with their peers, may consequently spend more time at home and be more involved with their parents. Therefore, individuals with elevated SA may still be at risk of developing cannabis problems if parents approve of cannabis use behaviours. Moreover, given that men are more fearful of scrutiny from their peers [30], approval from their parents regarding cannabis may lead to a greater desire to use cannabis during stressful social situations.

Despite the strengths of this study, such as including both gender and parental norms in the investigation of the association between SA and cannabis problems, this study has several noteworthy limitations. First, because this study was conducted during the COVID-19 pandemic, individuals with increased SA may not have been experiencing as many stressful social situations as they typically do, because of the restrictions on social events. Therefore, participants' reports of their SA may not have been entirely typical. Similarly, individuals may not have been consuming the same amount of cannabis (whether it be more or less than normal) and therefore, their cannabis use estimates may not have been completely characteristic. Although empirical investigation during the COVID-19 pandemic is a limitation, it can also be considered a strength, as it sheds light on SA and cannabis use during an unprecedented global pandemic. Future research should investigate whether an individual's levels of SA following the pandemic predicts an increase or decrease in cannabis problems, when individuals are transitioning back into normal, pre-pandemic, social situations. Second, the study was conducted primarily among anglophone women participants, and thus the results cannot be adequately generalized to Quebec's young adult population. Further research should be conducted with an adequate size of men and women to ensure that the sample is sufficiently powered and with French-translated questionnaires to include the large population of francophone young adults in Quebec. Third, the questionnaires used in this study rely on self-report responses from the participants, and thus, scores may not be as accurate as they would be if assessed by a professional. Future research would benefit from conducting a similar study in which SA and cannabis problems are assessed using semi-structured interviews conducted by trained professionals. Finally, future research should be conducted using a longitudinal design to assess the SA-cannabis use association, moderated by parental norms and gender, and see if the pattern of results remains stable or changes across the lifespan and as cannabis, which is now a legal drug, becomes less novel.

In conclusion, the current study aimed to assess the moderating role of gender and parental norms on the association between SA and cannabis problems. The results suggest that men who are high in SA tend to experience more cannabis problems, compared to women. Furthermore, men with elevated SA who perceive high parental approval of cannabis use tend to experience more cannabis problems than men with elevated SA who perceive low parental approval, or women with elevated SA regardless of their perceptions of parental approval. The results of the current study extend our understanding of the role of gender and parental approval on the SA-cannabis problems risk pathway. This study could help inform prevention and treatment strategies, given the important role that parents' approval of cannabis use behaviours has on their children's cannabis use. Therefore, prevention and treatment should include parents, especially for individuals with elevated SA at risk for cannabis problems.

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