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The Impact of Locus of Control, Norms, and Social Desirability on Substance Risk Perception

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Honours Psychology Thesis

School of Behavioural and Social Sciences

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Abstract

Drug use among college students is common and can be associated with adverse effects. This study sought to identify how drug-related beliefs about risk and descriptive and injunctive social norms vary for a variety of legal, prescription, and illicit drugs. The relationship between these attitudes, locus of control and social desirability was also assessed. A sample of 58 female undergraduate students from a university in Ontario, Canada completed a web-based survey. Findings indicated no association between locus of control and any other measures apart from social desirability and descriptive marijuana norms, which were also associated. Although marijuana was perceived as the least risky, most commonly used, and most socially accepted substance, there were inconsistent associations between substance specific risk and both types of substance specific norms, generally. Excluding prescription opioids, legal substances were perceived as riskier than illicit substances. These findings suggest that social norms may impact risk perception in certain drugs.

Keywords: locus of control, risk perception, drug beliefs, injunctive norms, descriptive norms, social desirability

The Impact of Locus of Control, Norms, and Social Desirability on Substance Risk Perception

When students begin college, they are typically exposed to many opportunities to use drugs (Allen et al., 2017; Arria et al., 2008a; Schulenberg et al., 2020). Predictably, substance use is common in this demographic and estimates of any past-year drug use range from 36% (Dennhardt & Murphy, 2013) to 59% (Schulenberg et al., 2020). Overall, annual prevalence appears to be increasing, particularly for marijuana and cocaine (Schulenberg et al., 2020). In the sizable epidemiological study, *Monitoring the Future*, 43% of college students surveyed had used marijuana in the past year, and 5.6% had used cocaine (Schulenberg et al., 2020). Eight percent had used stimulants, including the nonmedical use of prescription drugs such as Adderall and Ritalin, and 0.3% of students surveyed had used non-prescription amphetamines such as crystal methamphetamine. A small but not zero (<0.05%) number of students surveyed endorsed having used heroin in the past year, while 1.5% had used narcotics other than heroin such as prescription Vicodin or OxyContin without a prescription.

This prevalence is especially concerning given that even casual or recreational use can lead to adverse effects (Palmer et al., 2012). In a 2012 study, one-third of college students who self-reported the lifetime use of at least one illicit substance or medication misuse experienced at least one adverse event associated with use (Palmer et al.). Strikingly, 26% reported consequences that could indicate drug dependence. Researchers have also associated substance use with discontinuous enrollment (Arria et al., 2013) and lower grade-point average (Garnier-Dykstra, 2012; McCabe et al., 2005), as well as a host of other consequences such as mental health problems, substance use disorders (SUD), increased risk of injury and overdose, and legal issues (Skidmore et al., 2016). It is important to note that not all drug use becomes disordered, or is associated with negative outcomes (Palmer et al., 2012). However, since most individuals who

do progress to develop SUD initiate use during adolescence or emerging adulthood, it is a period of vulnerability to these risks (Arria et al., 2008a; Reyna & Farley, 2006). Accordingly, a clearer understanding of the psychosocial processes that affect drug initiation is warranted. Due to the efficacy of theory-based public health interventions over those not based in theory, established theoretical models present a solid base from which to examine these predictors (Glanz & Bishop, 2010).

The Theory of Planned Behaviour (TPB) can be used to describe the antecedents to drug use intentions, which proximally predict behaviour (Ajzen, 1991; McMillan & Conner, 2003). It posits that three cognitive determinants lead to the intention or desire to engage in a behaviour: beliefs about subjective norms surrounding the behaviour, beliefs or attitudes about the consequences of the behaviour, and perceived behavioural control (PBC), or beliefs about factors that could inhibit or facilitate the behaviour (Ajzen, 1991). Subjective norms relate to the perception of others' approval or disapproval of a behaviour. Expectancies about behavioural consequences include both positive and negative expectations which produce attitudes about the behaviour. Finally, PBC refers to the ease of resisting or engaging in a behaviour (Ajzen, 1991). Whether these beliefs are accurate or not is immaterial; the TPB is only relevant to subjective perceptions of a behaviour (McMillan & Conner, 2003). For example, someone might misperceive their peers' evaluations of marijuana use, the actual health consequences of using marijuana, or their ability to obtain marijuana or refrain from use.

PBC itself has been further delineated into two related but conceptually distinct components: self-efficacy and controllability (Armitage et al., 1999). Self-efficacy can be closely tied to Bandura's concept of it as a measure of confidence in one's abilities (Armitage et al., 1999; Bandura, 1977). Similarly, controllability is more related to Rotter's locus of control

construct, which concerns how much control someone believes they or external forces have on their life outcomes (Armitage et al., 1999; Rotter, 1966). In this way, controllability relies on an individual's judgement of their personal control over the factors that make an action easy or difficult. In contrast, self-efficacy is related to the perceptions of one's skills. Beliefs about controllability and self-efficacy can both involve internal and external factors. Further research is necessary to clarify the nature of control beliefs in particular within the context of drug use intentions in TPB.

The TPB has been widely applied to the use of substances. McMillan and Conner (2003) analyzed whether attitudes, injunctive norms (i.e., perceived peer approval or disapproval) and PBC predicted the intention to use and the actual use of marijuana, LSD, amphetamines, and ecstasy. In this study, researchers used a belief-based measure of PBC. Participants reported how much control they felt they would have over their behaviour depending on their mood, the expense and quality of each drug, being under the influence of another drug, and socializing with others. For each item, they asked participants whether it would make them more or less likely to take a drug. Their findings indicated that all facets of TPB that they studied predicted intention to use drugs, and more importantly, that this intention predicted behaviour. Similarly, in a meta-analysis Armitage et al. supported the application of TPB to drug use intentions and behaviours for alcohol and marijuana through the use of questionnaires and behavioural data (1999). They conducted a factor analysis, which reinforced the distinction between self-efficacy and control beliefs. A later meta-analysis reviewing studies on TPB by Armitage & Conner corroborated these findings, stating that TPB accounted for 27% of the variance in intention and 39% of the variance in behaviour (2001). Although this meta-analysis was not specifically concerned with drug-related studies, its results are compelling and provide further support for the delineation

between self-efficacy and control beliefs. Throughout the substance use literature, researchers have focused on each aspect of the theory indirectly by examining different types of social norms, risk and benefit perspectives, and perceptions of control outside of the rest of the framework.

There is considerable evidence that perceptions of other people's attitudes impact drug use (Borsari & Carey, 2003; Kollath-Catano et al., 2020). A recent study on the role of risk perceptions and social norms of college student drug use of cocaine, designer drugs, prescription stimulants, and prescription opioids found a significant and consistent association between injunctive norms and past-year use of all substances (Kollath-Cattano et al., 2020). In addition to beliefs about others' acceptance of drug use, the perceived frequency of peer use (i.e. descriptive norms) also influences drug use (Arbour-Nicitopoulos et al., 2010; Dennhardt & Murphy, 2013; Kollath-Cattano et al., 2020; Sanders et al., 2014; Schuler et al., 2019; Schultz et al., 2017). Notably, these norms are not always accurate; consequently, the misperception of others' actions and opinions can influence individual behaviour. Repeatedly, studies have demonstrated that college students overestimate peer use, which can, in turn, impact their own use (Arbour-Nicitopoulos et al; Sanders et al., 2014; Sanders et al., 2013). This indicates that these perceptions are essential aspects to consider when developing intervention frameworks.

The relationship between substance use misperception and increased use could be due to social trust, the faith in peer's behaviour to be both enjoyable and relatively safe (Siegrist et al., 2005). Trust and confidence in social systems appears to predict risk perception (Siegrist et al., 2005). When faced with unfamiliar circumstances, or those where there is no, or limited prior knowledge, people tend to rely on social trust to evaluate risk (Siegrist & Chetkovich, 2000). As

mentioned earlier, this seems to apply to drug initiation through social norms, which inform personal drug-related attitudes and behavioural intentions.

A significant challenge in public health is developing interventions tailored to these drug-related attitudes; the motives or expectancies that attract and deter students from using drugs in the first place (Dennhardt & Murphy, 2013). Incentives for use differ across substances based on their presumed effects but enhancing personal and social experiences and performance, coping, and conformity are frequently cited as motivations across drug categories (Biolcatti & Passini, 2019). Predictably, positive outcome expectations have been correlated with increased use intensity and adverse consequences and negative expectations are associated with less frequent use (Gaher & Simons, 2007).

In line with the TPB framework, drugs that college students perceive as most risky are consistently correlated with less drug use initiation and drug use frequency (Arria et al., 2008b; Dennhardt & Murphy, 2013; Grevenstein et al., 2015; Salloum et al., 2018; Schulenberg et al., 2020). When surveyed on their perception of the degree of risk of harm for different drugs, participants report marijuana as the least risky illicit drug, followed by amphetamines, cocaine, and heroin and narcotics other than heroin (Schulenberg et al., 2020).

However, studies analyzing risk perception over multiple substances typically use one or two broad questions regarding risk about the general risk of harm, such as ‘How much do people risk harming themselves if they ____?’ (e.g., Kollath-Cattano et al., 2020; Schulenberg et al., 2020). Consequently, there are more nuanced aspects of risk that have been adequately captured by these measures, such as risk to relationships, physical harm, or addiction. In sum, although there is consistent evidence that the prevalence of drug use is negatively correlated with how

risky it seems, the factors that might influence risk perception remain an important area for study.

The concept of locus of control (LOC) is another key factor that might influence drug-related attitudes and behaviours is (e.g. Caputo, 2019; Lassi et al., 2019, Oswald et al., 1994). LOC relates to one's perceived behavioural control over life event outcomes and has similar features to the controllability aspect of PBC (Armitage et al., 1999). An internal LOC, or internal control beliefs, reflects the belief that someone's own efforts impact their life outcomes. In contrast, someone with external control beliefs attributes control of events to nonbehavioral factors like others and chance.

Both aspects of this construct have been associated with drug use. Internal LOC is associated with better health decisions and outcomes generally than external locus of control (Gale et al., 2008; Macaden et al., 2010). A small body of research appears to point to internal LOC as protective against drug use (Caputo, 2019; Lassi et al., 2019; Oswald et al., 1994), as well as associated with increased time in substance use disorder treatment (Caputo, 2019). Conversely, external LOC seems to be related to disordered substance use (Caputo, 2019; Haynes & Ayliffe, 1991; Lassi et al., 2019; Oswald et al., 1994). Control beliefs have also been shown to be associated with some forms of risk perception. More accurate perception of sexual risks (although not necessarily safer behaviours) in injection drug users, as well as better risk identification in pilots has been associated with internal LOC (Crisp & Barber, 1995; You et al., 2013).

However, the relationships between LOC and risk-related behaviour and opinions are equivocal. This may be due to the reliance of self-report measures, where participants may answer in ways that they assume others would approve of, regardless of whether those

assumptions were accurate (Caputo, 2019). Drug-related reporting in particular has been associated with high degrees of impression management and socially desirable reporting (Davis et al., 2010; Latkin et al., 2017). A 2019 study by Caputo noted that after controlling for social desirability, the relationships between increased drug-related education, duration of treatment, and internal LOC in people in substance use disorder treatment were no longer statistically significant. This calls into question the already limited data on the relationship between LOC and high-risk behaviour and behaviour-related beliefs, which may have failed to take into account the effects of social desirability comprehensively. It may be that self-reports are more indicative of people's assumptions of what they should answer than their actual opinions. Compounding this, those assumptions may not be factual to begin with (Sanders et al., 2013). Thus, research examining drug-related beliefs, norms, and LOC must be mindful of social desirability as a potential additional influence.

Additionally, despite the significant body of research analyzing different aspects of TPB's behavioural antecedents, a clear relationship between social norms, drug-related risk perception, and control beliefs while taking into account social desirability not yet been established. More specifically, no studies fully address the question of whether negative drug-related attitudes are related to a person's LOC (Caputo, 2019). Although without a measure of intentions and actual use, such a correlation would not speak to actual behavioural outcomes, it could contribute to evidence of a relationship between these factors. Thus, a more precise association between the factors mentioned above would have implications for prevention, intervention, and education efforts and could lead to better outcomes in higher-risk populations, such as young adults.

The present study investigated the complex relationship between substance normalization, risk perception, LOC, and social desirability. It assessed the relationship between these factors for the following popularly used substances: marijuana, prescription stimulants, cocaine, prescription opioids, and heroin (Schulenberg et al., 2020). We were explicitly interested in nonmedical prescription drug use (i.e. using the drugs without a physician's permission), due to their harmful impact and prevalence (Arria et al., 2017; Martins et al., 2017; Schulenberg et al., 2020). Participants completed surveys assessing their beliefs related to these substances. LOC was evaluated using the Brief Locus of Control Scale (Sapp & Harrod, 1993), interspersed with items from the Balanced Inventory of Desirable Responses (Hart et al., 2015) to measure social desirability. Normalization was operationalized by substance legality, and two questions concerning descriptive and injunctive norms based on items used in a 2020 study by Kollath-Cattano et al. that investigated the role of social norms and risk perception on college student drug use. We created an 11-item risk perception survey based on questions from the Drug Use Consequence Scale (Palmer et al., 2012), as well as one question appraising general risk ('How dangerous do you think using _____ is for people in general?') for this study. We predicted that participants who demonstrated more external control beliefs would perceive all drugs as riskier than those with more internal control beliefs. Furthermore, participants who scored lower on the measure of social desirability would perceive less risk overall (i.e. across drugs). Additionally, drugs that were more normalized injunctively and descriptively would be perceived as less risky. Finally, we predicted that participants would perceive illegal drugs (i.e., heroin and cocaine) as more dangerous than legal substances (i.e. prescription drugs and marijuana).

Method

Participants

Participants were recruited through the Brescia Psychology Research Participation System SONA website and received two course credits for their participation in the study. Data were drawn from self-administered, web-based surveys from female undergraduate students recruited from Psychology courses 1010A and the statistics course 2855F at Brescia University College. A total of 60 individuals began the survey; however, two were removed for incomplete data, leaving a total sample of 58. Participants' who reported their ages ($n = 56$) ranged from 18 to 28 years ($M = 19.79$, $SD = 2.93$). The study took approximately 35 minutes to complete.

Materials

Demographics questionnaire. This two-item questionnaire (See Appendix A) ask participants about their age and gender.

Locus of control. To assess participants' control beliefs, participants completed the 9-item Brief Locus of Control Scale, a continuous measure (Sapp & Harrod, 1993). Items are measured on a 7-point Likert scale (1 = Strongly Agree, 7 = Strongly Disagree). One sample item is "My life is determined by my own actions". Previous research supports it as a reliable alternative to Levenson's (1974) 24-item Locus of Control Scale that has good construct validity. Moreover, its predictive validity was supported with structural equation analysis using a scaled measure of perceived risk, which has been correlated with similar scales (Sapp & Harrod, 1993).

Socially desirable responding. Socially desirable responding was measured using a modified, 15-item version of the Balanced Inventory of Desirable Responses Short Form (BIDR-16; Hart et al., 2015). One item on the original BIDR-16 ("I have sometimes doubted my ability as a lover") had a factor loading of less than 0.4 and may not have been appropriate for this

sample, so was omitted (Hart et al., 2015). The scale is a reliable and valid way of evaluating the extent that participants might respond in a biased or self-favouring manner to the measures employed in this study (Hart et al., 2015). This scale was interspersed with questions from the Brief Locus of Control scale (See Appendix B; these items were not differentiated by ‘SD’ and ‘LOC’ in participants’ version).

Risk perception measures. The degree of risk which participants attributed to each substance was determined using an 11-item risk perception survey developed for this study (See Appendix B). This survey included drug use consequences from many areas of life, including interpersonal relationships, physical dependence, and work performance. It contained items from the Drug Use Consequences Scale, which included questions based on drug abuse and dependence criteria from the Diagnostic and Statistical Manual IV-TR (Palmer et al., 2012). This measure also had one question appraising general risk (‘How dangerous do you think using _____ is for people in general?’). Each participant completed this measure for each drug category being analyzed: marijuana, prescription stimulants, cocaine, prescription opioids, and heroin.

Norms. After completing the risk perception measures for each drug, participants were asked two questions assessing normalization through descriptive and injunctive norms (See Appendix C), with items borrowed from Kollat-Cattano et al.’s (2020) study on social norms and risk perception on college student drug use. Descriptive norms were evaluated for each drug with the question “How often do you think the average student on this campus uses ____?”. Participants responded using a 9-point Likert scale (1 = Never, 2 = Once per year, 3 = 6 times per year, 4 = Once per month, 5 = Twice per month, 6 = Once per week, 7 = 3 times per week, 8 = 5 times per week, 9 = Every day). Injunctive norms were measured by the question “How do

you think your close friends would feel about you using _____ regularly?” and participants responded using a 5-point Likert scale (1 = Strongly approve, 5 = Strongly disapprove). This measure was also completed for each drug category.

Procedure

The surveys were accessed from the SONA website, where eligible students read a brief description of the study. Interested participants were directed to Qualtrics, an online survey hosting website, to complete the study. Participants could then read the Letter of Information. They indicated consent by proceeding with the survey. They then completed the Brief Locus of Control Scale (Sapp & Herrod, 1993) interspersed with questions from the modified BIDR-16 (Hart et al., 2015). Once completed, participants completed the measures of risk perception and norms for the nonmedical (i.e. without a doctor’s approval) use of each of the marijuana, prescription stimulants, cocaine, prescription opioids, and heroin, in that order. Participants were explicitly instructed to select responses that they actually believed to be true, not those that they would like to be true. For each individual drug category, risk perception and norms were both assessed before moving on to the next category. Once the questionnaires were complete, participants were presented with the Debriefing Form (See Appendix E), which further described the purpose of the study, the principal investigator and the thesis researcher, and listed mental health and wellness resources. Research credits were granted automatically through SONA.

Results

Before beginning the following analyses, responses were reverse scored where necessary. All analyses were computed using *Jamovi*, an open-source alternative to *SPSS* that runs on *R*. Means and standard deviations for study variables are presented in Table 1. A composite norm score combining descriptive and injunctive norms was initially intended to be computed.

Table 1*Means and standard deviations for study variables.*

	<i>M</i>	<i>SD</i>
Personal Beliefs scales		
Locus of control	41.10	7.70
Social desirability	61.33	11.86
Descriptive Norms (Overall)	11.88	2.58
Marijuana	5.35	1.21
Prescription Stimulants	1.59	.73
Cocaine	1.76	.94
Prescription Opioids	1.29	.50
Heroin	1.90	1.94
Injunctive Norms (Overall)	8.16	2.48
Marijuana	2.38	1.11
Prescription Stimulants	1.59	.82
Cocaine	1.81	.98
Prescription Opioids	1.33	.87
Heroin	1.05	.22
Risk Perception (Overall)	337.81	27.22
Marijuana	57.98	12.51
Prescription Stimulants	63.71	8.51
Cocaine	71.26	6.39
Prescription Opioids	70.10	7.11
Heroin	74.76	3.18

However, using a Pearson correlation analysis, it was noted that total descriptive, and injunctive norm scores were not significantly associated with one another for drug categories that total descriptive, and injunctive norm scores were not significantly associated with one another for drug categories overall, $r(56) = 0.249, p = .059$. Additionally, descriptive and injunctive norm scores for marijuana were not correlated, $r(56) = 0.137, p = .306$, nor were descriptive and injunctive norm scores for heroin, $r(56) = 0.174, p = .191$. Therefore, descriptive and injunctive norms were treated as individual variables for our analyses. Accordingly, ten mean norm scores, two for each of the five substances, were computed. Pearson correlation analyses evaluated the relationships between LOC and social desirability, as well as risk perception scores for each substance and their respective injunctive and descriptive norm scores. Three repeated measures ANOVAs, followed by post hoc tests, were used to assess the differences across substances for descriptive norm scores, injunctive norm scores and risk perception scores.

Personal Beliefs: Locus of Control and Social Desirability

To examine the relationships between variables related to personal beliefs and risk perception, Pearson correlations were conducted. Both LOC and social desirability were strongly negatively correlated, $r(56) = -.61, p < .001$. Lower LOC scores indicated more internal control beliefs. However, neither LOC nor social desirability, were associated with total risk perception scores or risk perception scores for any individual drug category, all $p > .05$. For norms, LOC was only significantly correlated with descriptive marijuana norms, which had a moderate positive correlation, $r(56) = 0.56, p < 0.001$. Similarly, the only norm score significantly associated with social desirability was also the descriptive norms of marijuana, demonstrating a moderately positive correlation, $r(56) = -0.40, p = 0.003$.

Normalization Across Substances

Next, to compare the average scores for descriptive (see Figure 1) and injunctive (see Figure 2) norms across all drug categories, two repeated measures ANOVAs were conducted. For both analyses, Greenhouse-Geisser corrections were applied due to violations of the assumption of variance. For descriptive norms, there was a large, significant effect, $F(2.11, 120.43) = 116.97, p < .001, \eta_p^2 = .62$ across drug categories. Post hoc pairwise comparisons using a Bonferroni correction showed that participants perceived descriptive marijuana norms as significantly higher than all other drugs, $p < .001$. However, there were no significant differences between the descriptive norms of all other drug categories.

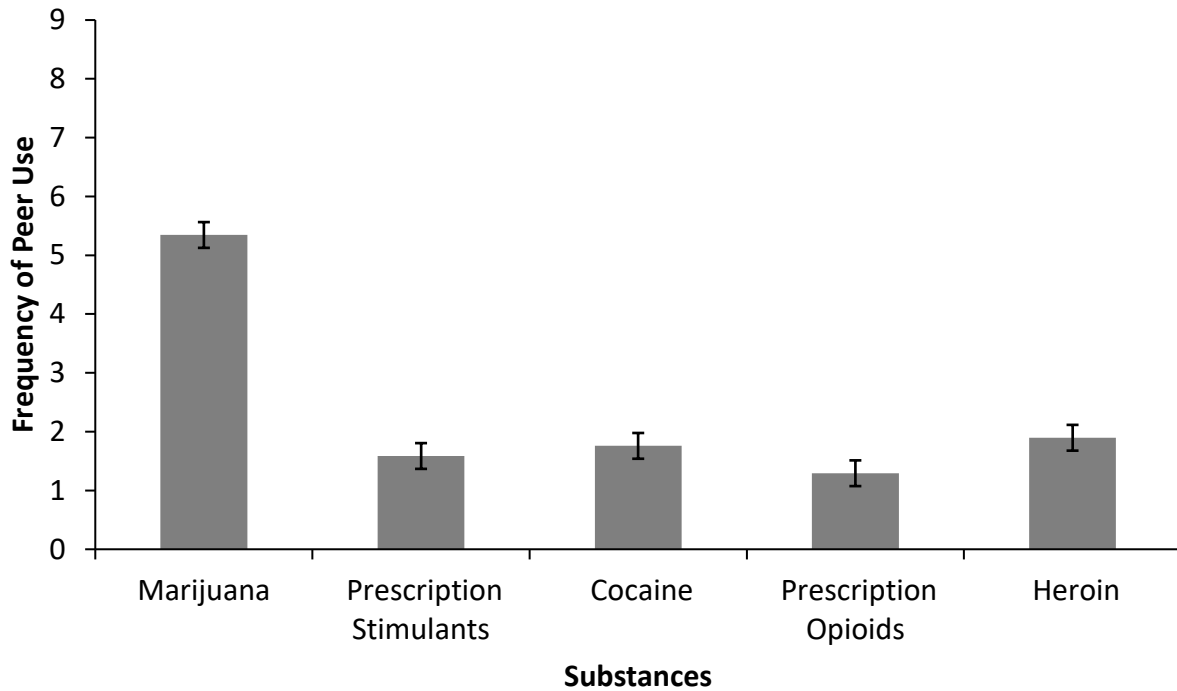
There was a moderate, significant effect, $F(3.18, 181.26) = 24.49, p < .001, \eta_p^2 = .30$ across drug categories' injunctive norm scores. Post hoc pairwise comparisons using a Bonferroni correction demonstrated significantly higher injunctive norm scores for marijuana than those for prescription stimulants, cocaine, prescription opioids, and heroin, all $p < .001$. Injunctive prescription stimulants norms were significantly higher than injunctive heroin norms, $p < .01$, but were not significantly different than injunctive cocaine norms, $p > .05$, or injunctive prescription opioid norms, $p > .05$. Injunctive cocaine norms were significantly higher than injunctive prescription opioid norms, $p < .01$, and heroin, $p < .001$. There were no significant differences in the injunctive norms of prescription opioids and heroin, $p > .05$.

Risk Perception Across Substances

To compare average risk perception across all drug categories, we conducted a third repeated measures ANOVA (See Figure 3). Mauchly's Test of Sphericity was significant, indicating that the assumption of variance was violated, so we used the Greenhouse-Geisser correction. There was a large, significant effect, $F(2.37, 135.22) = 56.86, p < .001, \eta_p^2 = .50$ across the risk

Figure 1

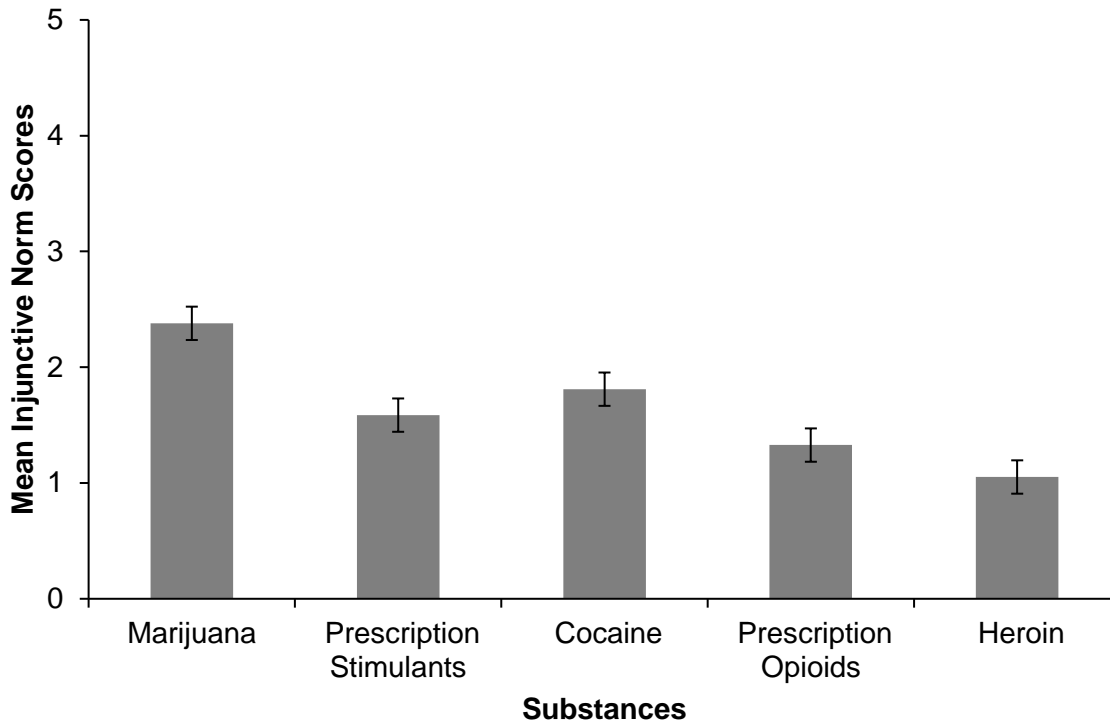
Differences in Mean Descriptive Norm Score



Note. The bars represent the means of all participants' descriptive norm scores for each substance. Higher scores indicate higher normalization and more frequent use. Only marijuana demonstrated significantly different descriptive norm scores, $p < .001$. The error bars reflect the standard error of the mean.

Figure 2

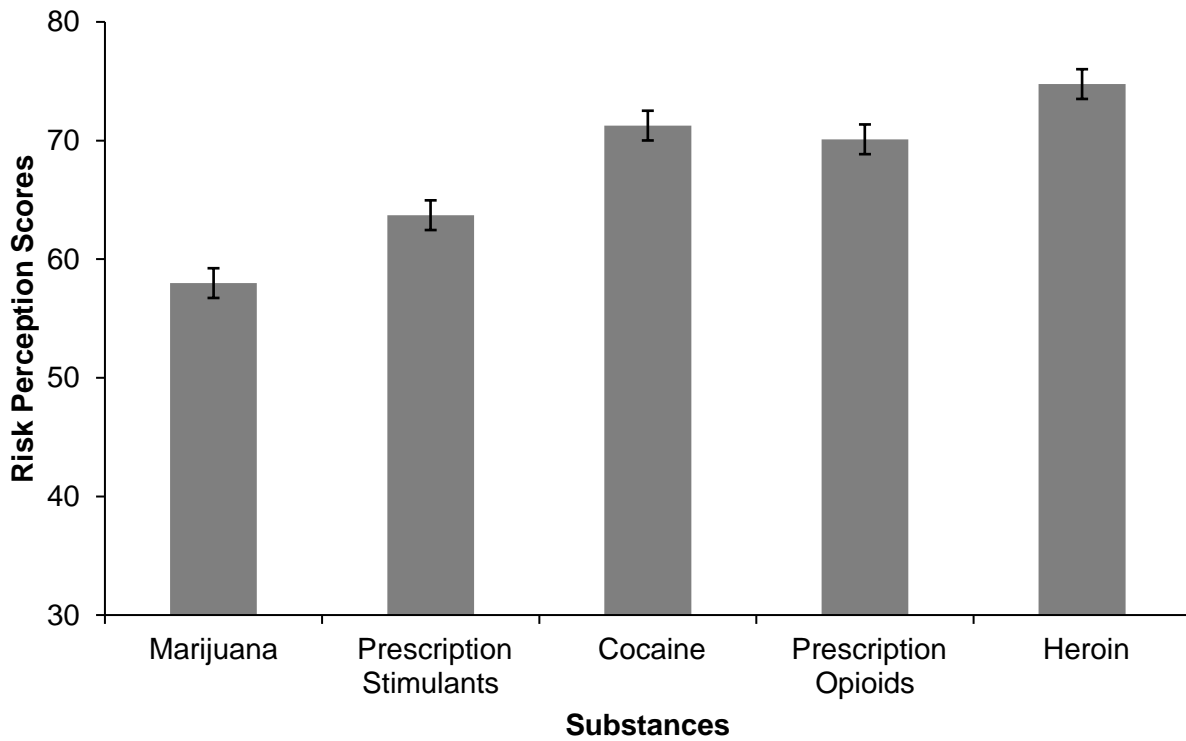
Differences in Mean Injunctive Norm Score



Note. The bars represent the means of all participants' injunctive norm scores for each substance. Higher scores indicate higher normalization and more perceived approval from friends of regular use. The error bars reflect the standard error of the mean.

Figure 3

Differences in Mean Risk Perception Scores Across Drug Types



Note. The bars represent the means of all participants' risk perception scores for each substance. Higher scores indicate higher risk. All drug comparisons are significant (p 's < .01) except the comparison between cocaine and prescription opioids and cocaine and heroin. The error bars reflect the standard error of the mean.

perception scores of the different drug categories. Post hoc pairwise comparisons using a Bonferroni correction showed that participants perceived marijuana as significantly less risky than all other drugs, $p < .001$. Prescription stimulants were perceived as significantly less risky than cocaine, prescription opioids, and heroin, all $p < .001$. Additionally, prescription opioids were perceived as significantly less risky than heroin, $p < .01$. There were no other significant risk perception scores differences, $p > .05$.

Relationship Between Risk Perception and Normalization

Substance-specific risk perception scores were significantly negatively associated with at least one of their own injunctive norms or descriptive norms for all substances except for heroin (see Table 2). Heroin had no relationship between its risk perception scores and either of its descriptive or injunctive norm scores. Marijuana risk perception had a weak negative correlation with its injunctive norms, $p < .05$. Descriptive norms for prescription stimulants had a moderate, negative correlation with prescription stimulant risk perception, $p < 0.001$, and their injunctive norms had a weak negative correlation with their risk perception scores, $p < 0.01$. Cocaine risk perception had a weak negative correlation only with cocaine descriptive norms, $p < .05$, as did prescription opioids' risk perception with prescription opioids' descriptive norms, $p < .05$. There were no other significant correlations between individual drug risk perceptions and their descriptive or injunctive norms.

Discussion

The present study sought to describe how people perceive legal and illicit drugs based on beliefs about the consequences of their use and their social norms. Additionally, it investigated how these perceptions could relate to personal control beliefs and socially desirable responding. Results demonstrated differences in how our sample of female university students

Table 2

Correlations for Descriptive Norms, Injunctive Norms and Risk Perception for Each Substance Type

	Risk Perception				
	Marijuana	Prescription Stimulants	Cocaine	Prescription Opioids	Heroin
Descriptive Norms	-.05	-.46***	-.27*	-.30*	.05
Injunctive Norms	-.28*	-.36**	-.25	-.25	-.08

Note. Scores are specific to each substance. Each column represents the correlations between that substance's distinct risk perception mean and its own descriptive and injunctive norm scores means. Higher scores indicate more normative views.

* $p < .05$, ** $p < .01$, *** $p < .001$.

perceives multiple substances. These beliefs followed similar patterns to those found in earlier research in this age group (e.g. Kollath-Cattano et al., 2020; Schulenberg et al., 2020), but participants in the current study appear to have more normative beliefs about marijuana in particular. Additionally, data supported an association between some but not all of the Theory of Planned Behaviour's (TPB) antecedents to behavioural intention. This suggests that they may operate independently from one another to impact how a person behaves. Our data showed associations between beliefs about at least one type of social norm and attitudes driven by risk perception for most drugs.

However, control beliefs, analogous to perceived behavioural control in the TPB framework, were not significantly associated with higher risk perception scores for any individual substance or drug risk perception overall. Thus, our findings did not support our first hypothesis that internal control beliefs would be associated with higher risk perceptions. Although an association between external control beliefs and increased risk perception might have suggested that those who believe that they have more agency over the events in their lives have a sense of immunity from drug-related risks, the data did not reflect this either. Instead, this study demonstrated no association between how risky participants believed the drugs were to people who use them and the degree to which they feel they have control over their life outcomes.

Since our study asked participants about risks for people in general, a difference in how personal risk and general risk are perceived may have impacted results. Perceptions of general risk are often larger than those for personal risk (Weinstein, 1984). It is possible that if our measures assessed how dangerous participants thought each drug would be for themselves, instead of others more broadly, a significant relationship would have been obtained. Our data

also did not support a relationship between LOC and the other cognitive determinants of behavioural intention according to the TBP, (i.e. attitudes and subjective norms).

Previous studies examining control beliefs concerning TBP that have garnered significant results have assessed it based on an individual's sense of ability to resist or engage in specific behaviours (e.g. McMillan & Conner, 2003). While an individual's overall sense of agency and control does not appear to be related to their perception of drug risk, it might be true that their domain-specific control beliefs are. Although his research operationalized a single-factor LOC, Rotter (1966) initially conceived LOC as a multidimensional construct that may differ across different arenas in life (Marks, 1998). Further studies have validated this multidimensional model, and more specific LOC measures such as the Drinking Related Internal-External (DRIE) LOC scale (Hall, 2001) have been validated. Hall (2001) developed the Drug-Related Locus of Control scale (DR-LOC) to measure the amount of control that individuals believe others have over their drug use, independent from their personal current drug-taking habits (Erche et al., 2012; Hall, 2001). It can be used with drug-using and non-drug using participants and may be more applicable to future research than a more general measure of control beliefs.

In the present study, general LOC scores were significantly linked to social desirability and no other variables. Some participants' awareness of the positive outcomes of having an internal LOC (e.g. Gale et al., 2008; Macaden et al., 2010) might explain this. Even without an explicit familiarity with the concept, people view characteristics of having an internal LOC as culturally preferable, perhaps due to Western ideals of individual autonomy and industriousness (Fink & Hjelle, 1973; Kestenbaum, 1976). In fact, participants' range of LOC scores were fairly normally distributed in the present study, where a Shapiro-Wilk test was not significant, $p = .37$. Thus, participants were not universally inclined towards an internal LOC. It would make sense

that those more apt to answer in socially desirable ways might be compelled to communicate that they embodied those traits. Apart from LOC, social desirability was only associated with descriptive marijuana norms, suggesting that participants who endorsed more peer use of marijuana might engage in more impression management.

Accordingly, our results did not support our second hypothesis that social desirability scores would be associated with higher risk perception. While individuals who are more inclined to respond in socially desirable ways may underreport actual drug use or the riskiness of their drug use, the same pattern did not appear to apply to reporting drug risk perception (e.g. Caputo et al., 2019; Davis et al., 2010; Latkin et al., 2017). Although our data did not support this hypothesis, they suggest that further results in this study might be interpreted with the assumption that social desirability does not cloud other responses, which bodes well for their applicability to the literature and drug use education.

A frequent target of such programming involves interventions surrounding social norms (Dennhardt & Murphy, 2013), which was the focus of our following hypothesis. Interestingly, participants in the present study rated marijuana as more normative than similar past research samples (Schulenberg et al., 2020). When asked about peer usage (descriptive norms), participants indicated that their peers used marijuana significantly more than any other drugs that surveys assessed, which did not differ significantly in descriptive norms (see Figure 1). Participants estimated that their peers used marijuana on average between once and twice per month. These findings were considerably higher than previous research on actual use, which has reported that less than a third of women in our sample's mean age groups used marijuana in the past month (Schulenberg et al., 2020). The inconsistency may be due to the significant variation across campuses or a misperception of actual peer use (Benson et al., 2015; Kollath-Cattano et

al., 2020). Repeatedly, studies have demonstrated that college students overestimate peer use (Arbour-Nicitopolous et al. 2010; Sanders et al., 2014; Sanders et al., 2013). However, according to the past research and the TPB, these misperceptions still impact actual drug use (McMillan & Conner, 2003; Sanders et al., 2014). Within the TPB framework, the mere belief that others use drugs commonly or approve of their use impacts an individual's intention and potentially action (McMillan & Conner, 2003). This suggests that injunctive norms are an essential factor to consider, especially because they appear to be correlated with past-year use of drugs (Kollath-Catano et al., 2020).

Perceptions of social attitudes or approval were similar to those concerning peer use. However, unlike descriptive norms, the present study elucidated distinct differences in the injunctive norms of drugs other than marijuana. Participants felt that their friends would approve significantly more of them using prescription stimulants regularly over heroin and significantly more approving of them using cocaine than prescription opioids and heroin. Like descriptive norms, injunctive norms were also highest for marijuana. In general, participants indicated that their friends would neither approve nor disapprove of regular marijuana use and disapprove of all other drugs' regular use. Some recent research demonstrates a less normative view of marijuana use in respondents in this age group, where 61% disapprove of regular marijuana use, with even higher rates of disapproval for the regular use of other drugs (Schulenberg et al., 2020). However, Amroussia et al. (2020) demonstrated that marijuana legalization contributed to more positive social perceptions of marijuana use in Nevada, a state where its recreational use is legal. Since our sample also came from an area with this type of legislation, legality may have contributed to higher injunctive marijuana norms, which will be discussed further below, in addition to its relation to risk perception.

Drug use risk perceptions in this sample followed a similar pattern to previous studies (Cheeta et al., 2019; Schulenberg et al., 2020). Our participants rated marijuana as the least risky drug we assessed (Cheeta et al., 2018; Schulenberg et al., 2020). We also observed that prescription stimulants were significantly less dangerous than cocaine, prescription opioids, and heroin, which is in line with previous findings (Cheeta et al., 2018). However, our results reflected no difference in risk perception for heroin and cocaine, while Cheeta et al. (2018) found that participants perceived heroin as the more dangerous drug.

The pattern of how risky participants believed drugs are is similar to how normative participants thought they are. Marijuana's low-risk perception aligned with the beliefs that it was the most commonly used and most socially approved drug and prescription stimulants were less accepted and risky than heroin and less risky than all other drugs apart from marijuana. Despite this, the actual correlations between risk perception and both types of norms were less conclusive. Therefore, our data only partially supported our prediction that higher normalization scores would be associated with lower risk perception. Both injunctive and descriptive prescription stimulants norms correlated to how risky they were perceived. However, our data did not demonstrate significant associations between risk perception and descriptive norms for marijuana, injunctive norms for cocaine and prescription opioids, or either type of norms for heroin (see Table 1). In sum, different social norms correlate with the perceived risk for certain types of substances, but not others. Thus, the overall relationship between risk perception and social norms is inconsistent and warrants further investigation into the reasons for this variation.

Similarly, our data partially supported our final hypothesis that illicit drugs would be perceived as riskier than legal drugs. Our results indicated that participants viewed legal prescription opioids as similarly dangerous as illegal cocaine. The increased media attention on

the opioid epidemic, which has been in part fueled by diverted prescription opioids, may have contributed to these beliefs (McGinty et al., 2019). In agreement with our hypothesis, however, participants rated prescription stimulants and marijuana as less risky than cocaine and heroin.

These findings must be considered in light of the differences in how risk perception is measured. Measures vary considerably across studies for how researchers ask participants to evaluate risk in terms of the type of risk and frequency of drug use (Cheeta et al., 2018; Kollath-Cattano et al., 2019; Schulenberg et al., 2020). The present study used an 11-item scale for risk perception, and either did not specify the frequency of use or asked about 'regular' use. However, though Schulenberg et al.'s (2020) prominent, nationally representative, American epidemiological study only evaluated general risk, it assessed it for different drug use frequencies (i.e. 'once or twice', 'regularly', 'daily').

Additionally, other researchers have collected data from samples living in areas where laws prohibit marijuana use (e.g. Kollath-Cattano et al., 2020; Schulenberg et al., 2020). The present study drew from a solely Canadian sample, where recreational marijuana has been legalized since 2018. Fataar et al. (2021) found that in states with legal marijuana sales, 40% of participants reported that legal marijuana was safer to use than illegal marijuana. To put this into context with our other findings, Fataar et al. (2021) also observed that those living in areas where legal markets had been established for longer had more favourable perceptions of legal marijuana. Their findings could account for some of the higher marijuana norms in this study compared to others.

Limitations

The present study should be understood in the context of its limitations. The substantial impact of COVID-19 on daily life, the reliance on self-report measures, differing referents for

measuring norms, and subjective differences in how participants interpreted certain items may have affected our data collection. Given that our pool of participants all identified themselves as women, our results may not be generalizable across genders. Some studies have found that females have lower drug use rates, and perceive lower risk for certain substances (e.g. Hatchel & Armstrong, 2019; Schulenberg et al., 2020). However, this is not consistent throughout the literature (Kollath-Cattano et al., 2020), and few studies examining drug-related risk perception have analyzed gendered differences thoroughly.

A relatively new external factor, the potential influence of the ongoing COVID-19 pandemic on this study's results must be emphasized, especially regarding participants' ratings of descriptive norms and which might vary considerably pre- or post-pandemic. Throughout the pandemic, Dumas et al. (2020) reported that at least in adolescents, substance use, apart from alcohol and marijuana, has decreased. However, increased use in some young adults may be due to loneliness and poor mental health tied to COVID-19 (Horigian et al., 2021). Naturally, the opportunity to use drugs impacts people's use (Allen et al., 2017; Arria et al., 2017). Unlike other years, many students have remained or moved back to living with their parents instead of living closer to their university or with peers (White et al., 2020). Additionally, regardless of their living situation, physical distancing requirements have reduced close contact with others (Horigian et al., 2021). It is possible that this also limited participants' contact with drugs, thus changing their perceptions of peer use (Dennhardt & Murphy, 2013).

Despite limited contact with others and the use of online, anonymous data collection, this study still suffered from many of the limitations inherent in self-report. However, our use of a measure of social desirability provided some insight into whether impression management or

self-deception may have played a role in our results. Furthermore, we found higher rates of norms than elsewhere (e.g. Schulenberg et al., 2020).

Finally, there were two main limitations regarding measurements: referents for norms and subjective differences in what 'regular use' entails. First, we evaluated descriptive norms using distal referents (e.g. 'most students'), while injunctive norms assessed more proximal references (e.g. 'close friends'). It is possible that if both types of norms used a consistent referent, we might have discovered more correlations between types of norms or risk perception. Second, individual differences what how participants understood 'regular' use might have also led to inconsistencies in our data. For example, if some subjects interpret regular marijuana use to be weekly, while others understand it as daily, then their responses to the same item would not be consistent.

Future Directions

Researchers should more thoroughly examine several avenues the present study was unable to investigate. First, it is essential to acknowledge that drug-related beliefs are not static and change over time (Drazdowski, 2016). Also, despite often being referred to as a static personality characteristic, there is considerable evidence that someone's control beliefs can vary throughout their life (Diamond & Shapiro, 1973; Wolinsky et al., 2010). Thus, a longitudinal or within-participants study may be more appropriate for detecting these changes and any interactions between them.

In addition to only assessing one point in time, the current study analyzed beliefs for only five commonly used substances. Future research could examine the correlates of perceptions of risk and norms for other illicit drugs. For example, there is a paucity of research but a high prevalence of use and exposure in young adults to benzodiazepines, hallucinogens and MDMA (Fenton et al., 2010; Kollath-Cattano et al., 2020; Schulenberg et al., 2020). Beliefs about the

latter two of these drugs may also be worthy of more study due to their potential therapeutic value in treating certain mental health disorders and the subsequent media exposure (see Griffiths et al., 2016; Mithoefer et al., 2018). This study also did not analyze risk perception for the misuse of prescription drugs that physicians have prescribed to the user. However, research has documented it as a growing and serious issue (e.g. Faraone et al., 2020; Vowles et al., 2015).

Concerning the application of this research to the TPB, risk perception is only part of what informs behavioural attitudes, which also encompass positive expectations. Robust investigation into how the positive consequences people believe they will experience from drug use may relate to other antecedents to behaviour is necessary for more persuasive conclusions of how the antecedents to drug use are associated. Given the connection between risk perception and social norms that this study has demonstrated, there may be similar or inverse associations between motivations and norms. A further extension of this research type would be developing validated and reliable scales that fully encompass motivations to combat inconsistency across studies (Drazdowski, 2016).

Applications

This study contributes to the literature on college student drug use by assessing participants' beliefs about how risky and normalized five different substances are. In particular, it assessed risk more thoroughly than previous studies, across a number of domains. Additionally, we add to the body of research exploring the relationships between the antecedents to behavioural intention according to the Theory of Planned behaviour. Our results indicate that control beliefs are not related to beliefs about negative consequences for drug use or to beliefs about social norms, except in the case of perceptions of peer use of marijuana. This could be due

to how much more normalized marijuana is as compared to the other drugs we investigated and suggests that social norms are an important area for drug related TPB research to focus on.

The study also provides valuable information for drug use education messaging that is particularly relevant to college-age students. This age group experiences relatively high rates of adverse drug effects (Palmer et al., 2012) and tends to ascribe less risk to substances in general, so they are an important target for these public health measures (Cheeta et al., 2018; Schulenberg et al., 2020). Since this is one of the few studies that has thoroughly investigated the relationship between social norms and risk perception, it also provides insight into how different types of messaging might impact certain drugs' risk perception more than others. For example, injunctive norms are a frequent focus of drug use reduction messaging (Dennhardt & Murphy, 2013), but do not appear to be associated with risk perception for marijuana. If the function of this sort of education is to confer to young people that drugs are dangerous, teaching them that they are socially unacceptable is not likely to be as effective for marijuana as it might be for the nonmedical use of prescription stimulants. In sum, our data paints a complex picture of the way that female college students perceive different drugs. They suggest that educational messaging should be tailored to the specific ways that prospective users perceive different substances.

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Appendix A

What is your gender?

- Female
- Male
- Non-binary (23)
- Prefer not to say (24)

AGE What is your age?

Appendix B

Instructions: The following questionnaires will assess your opinions about the risks of drug use. Select the answers with which you most agree. If you believe multiple alternatives to some extent, select the ones with which you most strongly agree. Be sure to select the answer that you actually believe to be true not the one that you would like to be true. This is an assessment of attitudes and there are no right or wrong answers.

This questionnaire assesses your opinions about the risks of marijuana use.

How likely is it that someone will say or do something they later regret due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will miss school, work, or activities with friends due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will harm themselves physically due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will harm themselves emotionally or psychologically due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will experience legal issues due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will risk damaging or losing a close relationship due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will have to consume more marijuana to avoid or reduce withdrawal with regular use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will have a hard time limiting, cutting down, or stopping marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will spend too much money or lose a lot of money on marijuana?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How likely is it that someone will fail to do what was expected of them due to marijuana use?

- Extremely likely
 - Moderately likely
 - Slightly likely
 - Neither likely nor unlikely
 - Slightly unlikely
 - Moderately unlikely
 - Extremely unlikely
-

How dangerous do you think using marijuana is for people in general?

- Extremely Dangerous
- Moderately dangerous
- Somewhat dangerous
- A little dangerous
- Harmless

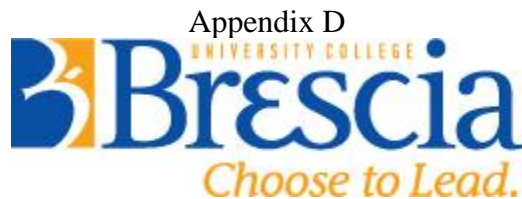
Appendix C

How often do you think the average student on this campus uses marijuana?

- Never
 - Once per year
 - 6 times per year
 - Once per month
 - Twice per month
 - Once per week
 - 3 times per week
 - 5 times per week
 - Every day
-

How do you think your close friends would feel about you using marijuana regularly?

- Strongly approve
- Approve
- Neither approve nor disapprove
- Disapprove
- Strongly disapprove



DEBRIEFING FORM

The Predictive Factors for Substance Risk Perception

Thank you for your participation in this study. The purpose of this study was to evaluate the correlates of perceived drug risk including control beliefs, normalization, and social desirability. Our social desirability scale assessed the degree to which your responses may have been honest but overly positive and biased toward pleasing others. This measure was important because social desirability has obscured the relationship between drug-related reporting and control beliefs in the past. We predicted that having a highly external locus of control would predict decreased risk perception across substances, and that more normalized substances will be perceived as less risky. This was carried out by asking participants to complete surveys assessing their control beliefs and as well as their perceptions of the risks and norms inherent in different substances. If you are uncomfortable with the data collected, please contact the thesis researcher to withdraw it before March 31, 2021. Your results are confidential to the experimenters and all results are published anonymously as group data. If you are upset or distressed by anything in this study, resources are available to help at Psychological Services at Western (<https://www.uwo.ca/health/psych/index.html>), the 24-hour Good2Talk confidential helpline (1-866- 925-5454), or see Western's Mental Health & Wellness Resource Guide (<https://www.uwo.ca/health/MHWRG2018.pdf>).

Here are some references if you would like to read more.

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