Simultaneous Polysubstance Use, Trait Affect, Body Composition, and their Associations with

Acute Adverse Reactions to Cannabis

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Abstract

In 2020, nearly 6.2 million people in Canada aged 15 and older reported using cannabis in the last three months (Statistics Canada, 2021). However, some individuals who consume cannabis may be more prone than others to experiencing acute (i.e., short-term) adverse reactions to cannabis (e.g., paranoia, anxiousness). The primary purpose of this study was to investigate the relationship between simultaneous polysubstance use and trait affect on experienced acute adverse reactions to cannabis. An exploratory aim was to examine the potential relationship between body composition and acute adverse reactions to cannabis. The study was a web-based survey, hosted by SurveyMonkey, using a cross-sectional design. Lakehead University students and the general public across Canada participated in this study ($N = 456$). Pearson product-moment correlations, independent samples t-tests, and hierarchical multiple regression analyses were performed to examine the relationships between simultaneous polysubstance use, trait affect, body composition, and acute adverse reactions to cannabis. Simultaneous use of cannabis and alcohol, trait negative affect, and lower body weight were positively associated with experiencing acute adverse reactions to cannabis. The findings from this study have implications for people that use cannabis, have high negative affect, prescribing health care providers, and public health educators.

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ARS	Adverse Reactions Scale
BAL	Blood Alcohol Level
BFP	Body Fat Percentage
BIA	Bio-electrical Impedance Analysis
BMI	Body Mass Index
CB_1 OR CBR_1	Cannabinoid Receptor 1
CB_1 OR CBR_2	Cannabinoid Receptor 2
CBD	Cannabidiol
CRAFTS-Q	Cannabis Reason, Age, Frequency, Type, and Setting Questionnaire
DASS-21	Depression Anxiety Stress Scales–21
DEXA	Dual-energy X-ray Absorptiometry
ECS	Endocannabinoid System
FFM	Fat Free Mass
NA	Negative Affect
PA	Positive Affect
PANAS	Positive and Negative Affect Schedule
PRF-D	Desirability Scale – Personality Research Form
PRF-IN	Infrequency Scale – Personality Research Form
Q-Q	Quantile-Quantile
SAM	Simultaneous Alcohol and Marijuana
SAT	Subcutaneous Adipose Tissue
SPU	Simultaneous Polysubstance Use

SPU-CAN	Simultaneous Polysubstance Use – Cannabis, Alcohol and Nicotine Questionnaire
THC	Tetrahydrocannabinol
VAT	Visceral Adipose Tissue

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Simultaneous Polysubstance Use, Trait Affect, Body Composition, and their Associations with

Acute Adverse Reactions to Cannabis

Prevalence and Legislation of Cannabis Use

Worldwide, nearly 147 million people consume cannabis (World Health Organization

[WHO], 2020). At the end of 2020, approximately 6.2 million Canadians aged 15 and older

reported using cannabis in the past three months (Statistics Canada, 2021). Maclean's annual

survey for 2019 on Canadian universities' cannabis use reported that 57.7% of Lakehead

University students reported using cannabis at least once in the past year (Bronwell, 2019).

Cannabis is prohibited in most countries worldwide; however, the legality of cannabis use differs

extensively by country and region. In 2013, Uruguay was the first country to legalize non-

medicinal cannabis use (Cerdá, 2017). Subsequently, Canada was the next country that legalized

non-medicinal cannabis use in all three domains: possession, consumption, and sale. Medicinal

cannabis use in Canada has been legal since 2001, when a precedent was set, ruling that the

prohibition of medicinal cannabis was violating an individual's right (i.e., see Regina v. Parker

case) to make their own choices about the type of health care they receive (Cox, 2018). The

Canadian parliament passed the Cannabis Act (i.e., Bill C-45) on June 19th, 2018 (Cannabis Act,

2018; Crépault, 2018) that legalized selling, purchasing, consuming, and growing cannabis for

non-medicinal purposes. On October 17th, 2018, Canadians who were a minimum of 18 years of

age could legally buy, consume, and grow cannabis for non-medicinal purposes (Crépault, 2018).

The legal minimum age varies across provinces (e.g., British Columbia 19+, Ontario 19+,

Quebec 18+). Additionally, Canadian adults can possess a maximum of 30 grams of dried

cannabis or equivalent if cannabis form is non-dried (e.g., one gram of dried cannabis is equal to

70 grams of liquid product) and grow a maximum of four cannabis plants for non-

commercial/profit for each household (Department of Justice Canada, 2020). However, edibles

and concentrates were not legal for sale until the following year, October 17th, 2019 (Department

of Justice Canada, 2020).

Cannabis Taxonomy

Cannabis is the generic name for drugs that come from plants belonging to the species,

Cannabis sativa L. (e.g., marijuana, weed), which falls under the genus *Cannabis* (McParland,

2018; Small & Cronquist, 1976). Cannabis plants can be occasionally monoicous (i.e.,

hermaphroditic), but are mainly dioicous (i.e., male and female) (Thomas & Elsohly, 2016).

However, it is the female cannabis plants that are typically harvested for their flowering tops

(i.e., apical/terminal bud) which contain more cannabinoids than their male counterparts

(Thomas & Elsohly, 2016). Cannabis is comprised of over 400 known chemical compounds

such as terpenes, flavonoids, alkaloids, and cannabinoids (Fisar, 2009).

Cannabinoids, Phytocannabinoids, and Synthetic Cannabinoids

Cannabinoids are single molecules and are the terpenophenolic (i.e., part terpene, part

phenol) components of *Cannabis sativa* L. (Fisar, 2009; Gertsch et al., 2010). These molecules

are classified into three categories: phytocannabinoids, endocannabinoids, and synthetic

cannabinoids (Fisar, 2009). Phytocannabinoids are naturally occurring cannabinoids found in

Cannabis sativa L. plants (Gertsch et al., 2010); endocannabinoids are endogenous cannabinoids

(i.e., cannabinoids originating from an organism); and synthetic cannabinoids are synthesized

cannabinoids (Fisar, 2009). There are more than 100 classified phytocannabinoids (Andre et al.,

2016; Elsohly et al., 2016), but the two most studied and abundant cannabinoids are

tetrahydrocannabinol (THC) and cannabidiol (CBD) (Elsohly et al., 2016; Thomas & Elsohly,

2016). THC is a partial agonist (Huestis et al., 2001), whereas CBD is an antagonist (i.e.,

negative allosteric modulators; decreases agonist affinity) at cannabinoid receptor 1 (CB$_1$ or

CBR$_1$) and 2 (CB$_2$ or CBR$_2$) (Crippa et al., 2012; Laprairie et al., 2015). These cannabinoids and

cannabinoid receptors are a part of the endocannabinoid system (ECS).

Endocannabinoids and the Endocannabinoid System

The ECS is found in all vertebrates and consists of endocannabinoids (i.e., endogenous

cannabinoids) (Khan et al., 2016), cannabinoid receptors, and deactivating enzymes that bind and

alter endocannabinoids (Jacobson et al., 2019; Lu & Mackie, 2016; Silver, 2019).

Endocannabinoids are endogenous lipids that bind to cannabinoid receptors (Kayser et al., 2020;

Lu & Mackie, 2016). The two most researched cannabinoid receptors in the ECS are the CB$_1$ (or

CBR$_1$), which are primarily located in peripheral and central neurons (Freeman et al., 2019;

Katona & Freund, 2012; Pertwee, 2008), and the CB$_2$ (or CBR$_2$) (Matsuda et al., 1990; Munro et

al., 1993; Serrano & Parsons, 2011; Silver, 2019), which are mainly found in immune cells

(Pertwee, 2008). The primary role of the ECS is to regulate brain function homeostasis (Woods,

2007) and seems to be involved with regulating factors such as sleep (Pava et al., 2016) and

affect (Lutz et al., 2015). Long-term cannabis use is associated with specific chronic effects

(Freeman et al., 2019), such as cognitive impairments (Hall et al., 2014), psychotic symptoms

(e.g., delusions) and disorders (Hall et al., 2014), and suicidal ideation (Borges et al., 2016).

Furthermore, brain structural reductions in grey matter (Battistella et al., 2014), the prefrontal

cortex, the hippocampus, and the cerebellum have also been linked with long-term cannabis use

(Hall et al., 2014). In addition to chronic effects, cannabis use is also correlated with, and causes,

various acute (i.e., short-term) reactions (Martin-Santos et al., 2012).

Acute Effects of THC and CBD

An acute effect develops shortly after initial exposure of each use and is short in duration (WHO, 2016). Cannabis can invoke both positive and negative acute effects (Martin-Santos et al., 2012; WHO, 2016). Various acute effects include anxiety and psychotic symptoms, working memory impairments, increased heart rate (WHO, 2016), and psychomotor function impairments (Broyd et al., 2016). Some factors reported to influence these short-term effects are mode of administration (e.g., inhalation, ingestion), previous cannabis use experience, environment, attitude, and dose (WHO, 2016). For instance, some studies have found that THC at lower doses may decrease anxiety, whereas higher doses may increase anxiety (Freeman et al., 2019; Hunault et al., 2009). Furthermore, there is interindividual variation in the acute effects of THC, meaning that different people will have different reactions to the same dosage of THC (Martin-Santos et al., 2012). In a systematic review by Freeman et al. (2019), limited studies were found on the acute effects of CBD. Although limited, CBD's acute effects reported in the literature include antipsychotic, anxiolytic, and sedative effects, but do not include effects on cognitive functioning, motor performance, or pulse rate (Batalla et al., 2014; Martin-Santos et al., 2012).

Medicinal and Non-medicinal Cannabis Use

Medicinal cannabis use (also referred to as therapeutic cannabis use) refers to the use of cannabis in order to lessen symptoms or treat disease (Whiting et al., 2015). Medicinal cannabis use can be further divided into prescribed (i.e., with medical documentation; licensed) or self-prescribed medicinal use (i.e., without medical documentation; un-licensed) (Han et al., 2018; Smith et al., 2019). Non-medicinal cannabis use (also known as recreational cannabis use) refers to the use of cannabis for purposes other than lessening symptoms or treating disease (e.g., enjoyment).

Medicinal cannabis is commonly prescribed and self-prescribed for the following disorders/dysfunctions: anxiety, appetite, chronic pain, depression, epilepsy, nausea, sleep (e.g., insomnia), and Tourette syndrome (Whiting et al., 2015). A systematic review and meta-analysis by Koppel et al. (2014) examined the efficacy of medicinal cannabis by assessing the adverse effects that patients experience from cannabinoid use. Their meta-analysis found that 6.9% of patients stopped taking the medicinal cannabinoids due to the negative effects such as suicidal ideation, mood changes, and dizziness compared to 2.2% in the placebo group who discontinued due to reported adverse effects (Koppel et al., 2014).

In addition, Lin et al. (2016) compared medicinal and recreational adult cannabis users in various domains. They found no differences in areas such as education and prevalence of cannabis use disorder. However, the researchers discovered that medicinal users engaged in less non-cannabis drug use than recreational users (Lin et al., 2016). They suggested that polysubstance usage may occur more frequently in recreational users than medicinal users (Lin et al., 2016).

Simultaneous Polysubstance Use

Polysubstance co-use, or concurrent polysubstance use, refers to using more than one substance, but on separate occasions within a specified timeframe (e.g., last 30 days) (Davis et al., 2019). However, for people that use substances, there is a tendency to administer multiple substances simultaneously (i.e., consuming more than one drug in one session), which is usually referred to as simultaneous polysubstance use (SPU) (Barrett et al., 2006; Davis et al., 2019). One matter that may confound the comprehension of acute adverse reactions to cannabis is that individuals who consume cannabis also engage in SPU (Barrett, 2006). That is, individuals consume at least one other substance at the same time as cannabis. Among those that use

cannabis, alcohol is the most common substance consumed simultaneously with cannabis (Brière et al., 2011; Pape et al., 2009), with one study showing that users reported using alcohol on 82% of the occasions where cannabis was used (Davis et al., 2019; Pape et al., 2009)

There are various reported reasons in the literature for why people partake in SPU (e.g., the effects of other drugs or peer influences) (Olthuis et al., 2013). Researchers have suggested that people may also be inclined to engage in SPU to experience expected pharmacodynamic effects when consuming certain substances simultaneously (i.e., increasing wanted effects or decreasing unwanted effects from a drug by consuming another drug at the same time) (Leri et al., 2003; Olthuis et al., 2013). However, many studies show the opposite result – combining substances simultaneously often decreases the positive acute effects experienced and increases the likelihood of experiencing the negative acute effects of a drug (e.g., Fernández-Calderón et al., 2020; Lipperman-Kreda et al., 2017; Manwell et al., 2019). For instance, in a study conducted on rats, three behavioural tests were performed (i.e., Emergence test, Elevated Plus-maze test, and Social Interaction test) to evaluate their anxiety and socially-related behaviour when THC was injected with nicotine (Manwell et al., 2019). The researchers concluded that the anxiolytic effects of THC, which are typically desired, decreased (e.g., rats spent *less* time in open spaces), and the anxiogenic effects of THC, which are generally undesired, increased (e.g., rats spent *more* time in the "hide box") (Crummy et al., 2020; Manwell et al., 2019). In relation to simultaneous alcohol and marijuana (SAM) use, Lee et al. (2017) found that university students who participated in SAM use reported more substantial acute effects for symptoms such as clumsiness and difficulty concentrating than young adults who consumed either alcohol or marijuana only. The young adults who engaged in SAM may have been more likely to experience acute adverse reactions due to the interactions between the ingested substances

(Fernández-Calderón et al., 2020; Iudici et al., 2015). These interactions that occur due to SPU can result in antagonistic effects (i.e., decrease the efficacy of one or more drugs), synergistic effects (i.e., increase the effects of one or more drugs), or additive/noninteraction effects (i.e., the combined effects of all drugs used; Roell et al., 2017) (Alsherbiny & Li, 2018). Synergistic or additive effects in particular have been found to be the most strongly associated with acute *adverse* reactions (e.g., Chihuri et al., 2017; Meier & Hatsukami, 2016; Pape et al., 2009). Regarding the simultaneous use of THC and ethanol, the evidence varies on whether this substance combination produces synergistic or additive effects, however findings typically lean to synergistic, especially at higher doses (see Ballard & de Wit, 2011 for a brief summary). However, a few studies have shown neither synergistic nor additive effects when simultaneously using THC and ethanol products, which previous researchers have suggested is either due to THC lessening the acute effects from ethanol or decreasing the desire to consume more alcohol (e.g., Ballard & de Wit, 2011). Also, Cummings et al. (2020) conducted a cross-sectional study that surveyed young adult college students about their SAM use patterns. Although cannabis acute adverse reactions were not measured, they found that those that consumed marijuana and alcohol simultaneously were more likely to report academic problems compared to students who consumed these substances on separate occasions (Cummings et al., 2020). There is minimal research on the *simultaneous* use of cannabis with other drugs and how that is associated with acute adverse reactions to cannabis. To the best of our knowledge, studies have not yet evaluated the association between SPU cannabis users, particularly legal substances outside of alcohol, and the variation, frequency, and distress rating of acute adverse reactions to cannabis.

A study found that young adults with polysubstance use disorders were more likely to have certain mental health disorders than those that had an alcohol or cannabis use disorder

(Salom et al., 2016). In addition to the positive correlation between SPU and various mental health disorders (Salom et al., 2016), several mental health disorders have also been discovered to be correlated with trait affect (Saxon et al., 2017). For example, studies have found that mental health disorders such as anxiety and depression have been positively associated with negative trait affect, and positive trait affect has been associated negatively with depression (Saxon et al., 2017). This relationship may exist because mental health conditions, such as major depressive disorder, can affect one's mood or *affect* or both (Centre for Addiction and Mental Health [CAMH], n.d.). Thus, these previous relationships highlight the need to investigate trait affect and its relationship with acute adverse reactions to cannabis.

Positive and Negative Affect

Watson et al. (1988) defined affect as either a state (i.e., how an individual feels at any given time) or trait (i.e., how an individual feels on average, or in general) and is commonly categorized into positive affect (PA) and negative affect (NA).[1] Trait PA is defined as the tendency to respond positively to the environment (e.g., general tendency to feel excitement), and inversely, trait NA is the tendency to respond negatively to the environment (e.g., general tendency to feel irritable) (Clark et al., 1989; Naragon-Gainey et al., 2018; Watson et al., 1988). Watson et al. (1988) show that PA and NA are statistically independent of each other (i.e., orthogonal factors) (Watson, 1988). To illustrate, an individual can have a high PA and NA, high PA with low NA, low PA and NA, or low PA with high NA.

Although affect has shown intraindividual variation, there is also evidence that affect is relatively stable over a person's lifetime (Naragon-Gainey et al., 2018). Naragon-Gainey et al.

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[1] Previous authors have raised concerns about terminology inconsistency in the literature between affect, emotion, and mood (Pressman & Cohen, 2005).

(2018) suggest that intraindividual examination may identify contributors for changes in a specific person's affect at any given moment. Comparably, the interindividual assessment may identify individuals who are more susceptible to having particular types of affective experiences over other individuals (e.g., sadness) (Naragon-Gainey et al., 2018). Evolutionary-based explanations have been used to explain between-person variability in affect (Naragon-Gainey et al., 2018; Watson et al., 1999). Specifically, affect has been described as adaptive in that having high negative affectivity increases the tendency to avoid harmful situations, whereas positive affectivity increases the tendency to seek out rewarding experiences (Naragon-Gainey et al., 2018; Watson et al., 1999). PA is related to various mental health outcomes, such as higher subjective and psychological well-being levels and a lower frequency of suicide ideation (Teismann et al., 2019). Negative affect is also associated with cognitive impairments, such as decreased memory recall of stressful experiences (Ma-Kellams et al., 2016), and both positive and negative affect have been linked to substance use (Serafini et al., 2016; Wills et al., 1999). For example, in outpatient treatment substance users, Serafini et al. (2016) found that PA scores were positively associated with the number of days abstinent from their abused substance. In a longitudinal study following adolescent substance use (i.e., tobacco, alcohol, and marijuana), NA was positively associated with substance use, and PA was found to be negatively associated with substance use (Wills et al., 1999). Research has not yet investigated the association between general trait affect and the experience of the variation, frequency, and distress rating of acute adverse reactions to cannabis.

In addition to substance use abstinence, affect has been linked with mood disorders such as depression and anxiety (Riskind et al., 2013). On a chemical level, the individual levels of certain neurotransmitters may partly explain this relationship between affect and mood disorders.

For instance, a study conducted by William and colleagues (2006) on a small sample of males (*n* = 23) revealed that serotonin (5-HT) blood levels were positively associated with PA (however, no relationship was found between 5-HT and NA in this same study; William et al., 2006). Yet, the authors noted earlier studies that showed that negative affect was negatively associated with 5-HT (Williams et al., 2006). Some mental health disorders, such as clinical depression, were found to be negatively associated with 5-HT levels, which has been explained, and termed by researchers as the serotonin hypothesis (i.e., lower 5-HT activity hypothesized as a partial cause of depression) (Cowen & Browning, 2015), In addition to 5-HT, the hormone cortisol has also been found to be associated with trait affect. Although previous authors have noted the mixed findings (Miller et al., 2016), a few studies have shown that trait PA was negatively associated with cortisol levels (e.g., Hoyt et al., 2015), and trait NA was positively associated with cortisol levels (e.g., Piazza et al., 2013). Similar to the 5-HT literature, cortisol has also been linked to mental health disorders, such as anxiety. In a longitudinal study, Adam et al. (2014) examined the relationship between salivary cortisol and anxiety disorders annually over a six-year period and discovered that cortisol was positively associated with anxiety disorder onset; this association was particularly strong in predicting the onset of *social* anxiety disorders. These chemical (i.e., 5-HT and cortisol) relationships discussed may offer a biological explanation as to why affect is associated with some mental health disorders.

Not only has NA been found to be associated with psychological and chemical components, but previous studies have also shown that NA is associated with human physiological components such as body weight and body mass index (Oinonen & Mazmanian, 2001; Pasco et al., 2013). For example, Oinonen and Mazmanian (2001) found that young adult women with higher BMIs were more likely to have lower depression, anxiety, and negative

affect scores. These earlier findings emphasize the need to explore the relationship between physiological components, such as body composition, and acute adverse reactions to cannabis.

Body Composition

Yu et al. (2013) defined absolute body weight as the composition of adipose (i.e., fat) mass and adipose-free mass (i.e., fat-free mass; FFM). Adipose tissue is comprised of visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) (Shuster et al., 2012). The purpose of adipose tissue is to store energy and secrete hormones into the blood through endocrinological signalling (Shuster et al., 2012). Body mass index (BMI) is an anthropometric measure (e.g., body mass, body fat) (Duren et al., 2008; Martin-Calvo et al., 2016) and is calculated by dividing weight by height squared (e.g., kg/m^2) (Wells & Fewtrell, 2006). A meta-analysis conducted in 2016 reported that BMI was positively correlated (r^2 for a 95% CI ranged from 0.32 to 0.91) with body fat percentage (BFP) (Martin-Calvo et al., 2016). However, BMI does not differentiate FFM (i.e., muscle, bone, organs, and extracellular fluid) from adipose tissue (i.e., fat tissue) (Yu et al., 2013). Despite this limitation, BMI is the most popular substitute for predicting BFP indirectly (Ranasinghe et al., 2013). While BMI is commonly used as a predictor of body fat percentage (i.e., higher BMI predicting higher BFP), ideally, other measures that are more accurate should be used in conjunction with BMI to increase validity and reliability when measuring BFP, such as a skinfold calliper measurement, bio-electrical impedance analysis (BIA), and dual-energy X-ray absorptiometry (DEXA) (Harvard, 2020).

A human body's tolerance to alcohol (i.e., ethanol) is determined by numerous factors, including body weight and BFP. Body weight affects alcohol tolerance in that the more one weighs, the higher tolerance to alcohol effects one may experience. Inversely, BFP affects alcohol tolerance in that higher BFP is associated with lower tolerance to alcohol's acute effects

(Cedarbaum, 2012). This relationship occurs because alcohol is not fat-soluble, which results in

higher blood alcohol levels (BAL) as body fat percentage increases (Cederbaum, 2012). Due to

these mechanisms, women are at an increased risk for alcohol toxicity as women tend to be

lower in body weight and have higher body fat percentages than men (Cederbaum, 2012).

Contrarily, endocannabinoids like THC and CBD are highly lipid-soluble (Basu et al., 2014);

therefore, cannabinoids are soluble in fat. Nevertheless, there is no research to our knowledge

investigating the relationship between acute adverse effects to cannabis and body weight and

BMI.

Gaps in the Literature

Previous researchers investigating predictors of acute adverse reactions to cannabis, such

as Lafrance et al. (2020), suggested that because their predictors only accounted for a maximum

of 25% of the variance, there must be other potential predictors yet to be identified. To our

knowledge, there have been no studies that have investigated the associations between SPU, trait

affect, and body composition with the number, frequency, and distress rating of acute adverse

reactions to cannabis.

Current Investigation

The current study will add to this existing literature by assessing the relationship between

three facets of acute adverse reactions to cannabis and each of the following: simultaneous

polysubstance use and trait affect. Guided by the literature, the following main research

questions will be investigated:

1. Simultaneous Polysubstance Use Comparisons and Associations

   a. Are there significant differences in the acute adverse reactions to cannabis (i.e.,

      measured by: i. the total number of different acute adverse reactions experienced,

ii. the average frequency of acute adverse reactions experienced, and iii. the

average distress ratings from acute adverse reactions) between participants that

have engaged in the *simultaneous polysubstance use of cannabis and alcohol* at

least once in their lifetime, and participants that have never engaged in

simultaneous polysubstance use of cannabis and alcohol?

b.   Are there significant differences in the acute adverse reactions to cannabis

between participants who have engaged in *simultaneous polysubstance use of*

cannabis and nicotine at least once in their lifetime, and participants who have

never engaged in simultaneous polysubstance use of cannabis and nicotine?

c.   Is *simultaneous polysubstance use of cannabis and alcohol frequency* (i.e., the

percentage of cannabis uses in which alcohol was also used) associated with acute

adverse reactions to cannabis?

d.   Is *cannabis and nicotine simultaneous polysubstance use frequency* (i.e., the

percentage of cannabis uses in which nicotine was also used) associated with

acute adverse reactions to cannabis?

2.   Trait Affect Associations

a.   Is *trait positive affect* associated with acute adverse reactions to cannabis?

b.   Is *trait negative affect* associated with acute adverse reactions to cannabis?

3.   Trait Affect Predictions

a.   Taking into account the covariates age, gender, and cannabis consumption

frequency, how much variation can be explained in the acute adverse reactions to

cannabis by adding *trait positive affect*.

b. Taking into account the covariates age, gender, and cannabis consumption

frequency, how much variation can be explained in the acute adverse reactions to

cannabis by adding *trait negative affect*.

Guided by the literature, the following exploratory research questions will be investigated:

1. Body Composition Associations

a. Is *body weight* associated with acute adverse reactions to cannabis?

b. Is *body mass index* associated with acute adverse reactions to cannabis?

Main Hypotheses

The following hypotheses were generated from the research questions listed above:

1. Simultaneous Polysubstance Use Comparisons and Associations

a. The group of participants who have engaged in *simultaneous polysubstance use of*

cannabis and alcohol at least once in their lifetime will have significantly higher

mean acute adverse reaction scores to cannabis (i.e., measured by: i. the total

number of different acute adverse reactions experienced, ii. the average frequency

of acute adverse reactions experienced, and iii. the average distress ratings from

acute adverse reactions) than the group of participants who have never engaged in

simultaneous polysubstance use of cannabis and alcohol in acute adverse

reactions to cannabis.

b. The group of participants who have engaged in *simultaneous polysubstance use of*

cannabis and nicotine at least once in their lifetime will have significantly higher

mean than the group of participants who have never engaged in simultaneous

polysubstance use of cannabis and nicotine in acute adverse reactions to cannabis.

      c. *Simultaneous polysubstance use of cannabis and alcohol frequency* will have a

         positive relationship with acute adverse reactions to cannabis.

      d. *Simultaneous polysubstance use of cannabis and nicotine frequency* will have a

         positive relationship with acute adverse reactions to cannabis.

2. Trait Affect Associations

      a. *Trait positive affect* will have a negative relationship with acute adverse reactions

         to cannabis.

      b. *Trait negative affect* will have a positive relationship with acute adverse reactions

         to cannabis.

3. Trait Affect Predictions

      a. Taking into account the covariates age, gender, and cannabis consumption

         frequency, the addition of *trait positive affect* will explain a statistically greater

         amount of the variation in predicting acute adverse reactions to cannabis.

      a. Taking into account the covariates age, gender, and cannabis consumption

         frequency, the addition of *trait negative affect* will explain a statistically greater

         amount of the variation in predicting acute adverse reactions to cannabis.

Exploratory Hypotheses

    The hypotheses below were created from the exploratory research questions listed above:

1. Body Composition Associations

      a. *Body weight* will have a negative relationship with acute adverse reactions to

         cannabis (i.e., measured by: 1. the total number of different acute adverse

         reactions experienced, 2. the average frequency of acute adverse reactions

         experienced, and 3. the average distress ratings from acute adverse reactions).

      b. *Body mass index* will have a negative relationship with acute adverse reactions to

        cannabis.

Method

Participants

Altogether, 720 participants completed the test battery. However, 156 were removed

from the database due to not using cannabis at least once in their lifetime. An additional 94 were

removed due to non-purposeful responding (i.e., receiving an Infrequency score higher than 3).

Another 13 participants were omitted because they were not currently living in Canada at the

time of the study. Lastly, one more participant was removed from the database as they did not

provide their age. In Canada, and dependent on the province or territory, the lowest age possible

that someone can legally purchase and consume cannabis is 18. After all removal stages, 456

participants remained in the database, including 309 participants from the general public and 147

from the university sample. Participants from the general public were primarily employed full-

time (61.9%), and many had either completed an undergraduate degree (22.3%) or a college

degree (21.4%). The university sample was employed mainly part-time (61.2%), with "some

undergraduate" being the highest level of education completed (70.1%). Additionally, the final

combined sample was 64.1% female and was predominately White (82.2%). Table 1 presents the

combined demographic characteristics consisting of the general public and university

participants.

Table 1

Demographic Characteristics of Participants (N = 456)

Characteristic	*M(SD)*	Frequency	%
Age	29.26 (10.07)		
Sex			
Female		291	(64.1%)
Male		159	(35.1%)
I do not identify with the options listed		1	(0.2%)
Prefer not to say		2	(0.4%)
Gender			
Female		286	(62.7%)
Male		160	(35.2%)
Non-binary		7	(1.5%)
Transgender		0	(0%)
I do not identify with the options listed		1	(0.2%)
Prefer not to say		1	(0.2%)
Race/Ethnicity			
Asian		25	(5.5%)
Black		7	(1.5%)
Caucasian (White)		374	(82.2%)
Hispanic/Latino/Latina/Latinx		3	(0.7%)
Indigenous (First Nations, Métis, or Inuit)		34	(7.5%)
Middle Eastern		2	(0.4%)
I do not identify with the options listed		9	(2.0%)
Prefer not to say		1	(0.2%)
Sampling			
General public		309	(67.8%)
University students		147	(32.2%)
Nationality (i.e., country citizenship)			
Canadian		419	(91.9%)
Canadian with multiple citizenship		27	(5.9%)
None of the above		10	(2.2%)
Country of Residence (Majority of Life)			
Canada		442	(96.9%)
Not in Canada		14	(3.1%)
Province or Territory Residence (*n* = 309)[a]			
Alberta		110	(35.5%)
British Columbia		15	(4.8%)
Manitoba		80	(25.8%)
New Brunswick		2	(0.6%)
Newfoundland and Labrador		2	(0.6%)
Northwest Territories		0	(0%)
Nova Scotia		4	(1.3%)
Ontario		91	(29.4%)
Prince Edward Island		0	(0%)
Quebec		4	(1.3%)
Saskatchewan		1	(0.3%)
Yukon		0	(0%)

[a]Item surveyed from general public sample only.

The mean age of cannabis use onset was 17.66 years old ($SD = 5.01$), ranging from 10 to 49 years of age. Most participants reported consuming a THC dominant cannabis product (i.e., a higher amount of THC than CBD) most frequently during their cannabis use sessions (63.4%), 5.7% of participants reported consuming a CBD dominant cannabis product (i.e., a higher amount of CBD than THC) most of the time, 15.4% of participants reported consuming a balanced cannabis product (i.e., containing a similar amount of both THC and CBD, "Balanced 1:1") most of the time, and 15.6% of participants reported that they were unsure of the cannabinoid profile they most frequently consumed in their cannabis products. The average frequency of cannabis consumption in the last week (i.e., 7 days) was 2.96 days ($SD = 2.97$), in the last month (i.e., 4 weeks) was 12.16 days ($SD = 12.11$), and in the last 3 months (i.e., 12 weeks) was 35.19 days ($SD = 35.73$). The most common method for cannabis consumption was inhalation (e.g., smoking) (74.6%, $n = 340$), followed by ingestion (e.g., edibles) (25.2%, $n = 115$), then absorption (e.g., topicals) (0.2%, $n = 1$).

The primary purpose of cannabis consumption most of the time for participants was mainly or always for non-medicinal or recreational purposes (58.7%, $n = 267$), followed by equal consumption for recreational and medicinal purposes (29.5%, $n = 134$). Mainly or always for medicinal or therapeutic reasons was the least endorsed reason for cannabis consumption (11.9%, $n = 54$). For participants that reported consuming cannabis for medicinal or therapeutic reasons, the dominant three reasons were for anxiety (89.9%, $n = 169$), followed by stress (81.9%, $n = 154$), then insomnia (i.e., a sleep disorder characterized by sleeplessness) (74.5%, $n = 140$). Most participants reported only being around one other person most of the time while consuming cannabis (48.6%, $n = 221$), and most participants consumed cannabis inside their own home/apartment (61.8%, $n = 282$).

Measures

Demographic Information Questionnaire

Data regarding the participants' age, sex, gender, weight, height, ethnicity, marital status,

religion, and level of education attained were collected. BMI was calculated using the weight and

height collected from participants (see Appendix A).

The Cannabis Reason, Age, Frequency, Type, and Setting Questionnaire (CRAFTS-Q)

The CRAFTS-Q is a newly created 20-item self-report tool, developed by the authors, to

collect data regarding the reason for cannabis use (i.e., medicinal or recreational), age of first use

for cannabis use, frequency, mode of consumption (e.g., edibles), cannabinoid-type (e.g., THC

dominant), the status of cannabis use (i.e., regular and/or current cannabis user), and setting (i.e.,

the environment of initial cannabis consumption and effects experienced) (see Appendix B).

Initial draft questions were administered to four respondents from various fields of study (i.e.,

psychology, history, and engineering) where respondents verbalized their mental processes when

providing their answers. Items were edited based on feedback and were re-administered to two of

the original respondents. With the finalized questions, participants were first presented with the

following instructions: "Please read the definition for *Cannabis* provided below. Additionally,

some examples of common *Cannabis* terminology and products have been provided along with

the definition". The definition of Cannabis provided to participants was as follows: "*Cannabis*

(e.g., marijuana, weed, pot, hash/hashish, THC, CBD) refers to the generic name for drugs or

compounds that come from plants belonging to the genus *Cannabis*". Following the definition,

participants showed their comprehension of the meaning using a 3-point scale, from 0 "No, I

have not read the definition for Cannabis stated above" to 2 "Yes, and I understand the definition

for Cannabis stated above". Participants that scored a zero or one on this item were excluded

from the final analysis of this questionnaire. The following question participants received

concerned their lifetime cannabis use. Participants that endorsed "No" (i.e., never used cannabis

in their lifetime) did not answer any more questions remaining in the CRAFTS-Q. Participants

that endorsed "Yes" (i.e., have used cannabis in their lifetime) were asked to complete the

remaining 18 items in the questionnaire. The remaining questions had either a binary "No" or

"Yes", open response, or a 3 to 9-point scale response format. Age of first use was assessed with

one item, two items each to evaluate the status of cannabis user, cannabinoid-type, and mode of

consumption; frequency of cannabis consumption was assessed with three items, and four items

were used to determine reason and setting (i.e., environment) of cannabis use.

Simultaneous Polysubstance Use – Cannabis, Alcohol and Nicotine Questionnaire (SPU-

CAN)

The SPU-CAN is a newly created 7-item self-report tool, developed by the authors, that

evaluates lifetime occurrence and frequency of cannabis SPU with alcohol or nicotine (see

Appendix C). Similar to the CRAFTS-Q, initial draft questions were administered to four

respondents from various fields of study (i.e., psychology, history, and engineering). The

respondents were asked to verbalize their mental processes when providing their answers. Items

were edited based on feedback and re-administered to two original respondents to confirm the

finalized items. With the finalized items, participants were presented with the following

instructions: "Please read the definition for *Cannabis* provided below. Additionally, some

examples of common *Cannabis* terminology and products have been provided along with the

definition*".* The definition of Cannabis provided to participants was as follows: "*Cannabis* (e.g.,

marijuana, weed, pot, hash/hashish, THC, CBD) refers to the generic name for drugs or

compounds that come from plants belonging to the genus *Cannabis".* The following question

participants received was related to their lifetime cannabis use. Participants that endorsed "No" (i.e., never used cannabis in their lifetime) did not answer any more questions remaining in the SPU-CAN. Participants that endorsed "Yes" (i.e., have used cannabis in their lifetime) were asked to complete the remaining 6 items in the questionnaire. The remaining questions either had a binary "No" or "Yes", or a numeric open-response format. The remaining six questions consisted of two separate lifetime-use questions, one for alcohol and the other for nicotine, that had a "No" (e.g., never consumed alcohol in their lifetime) or "Yes" response format. Two more questions involved asking about their SPU with cannabis, separately for alcohol and nicotine; again, with a binary "No" or "Yes" response format. Participants were asked two questions about the frequency of their SPU with cannabis, independently for alcohol and nicotine, using a numeric, open-response format by reporting their percentage of cannabis simultaneous polysubstance use from 1-100% (i.e., 100% indicating that they consume alcohol or nicotine every time they consume cannabis).

Adverse Reactions Scale (ARS; Lafrance et al., 2020)

The ARS is a 26-item self-report tool that measures the total number of different acute adverse reactions to cannabis, the frequency of each adverse acute response to cannabis, and the distress associated with each acute adverse reaction to cannabis (see Appendix D). Participants are requested to indicate if they have experienced any of the 26 listed adverse reactions to acute cannabis intoxication (e.g., anxiety, paranoia, vomiting) with a binary "No" or "Yes" to measure the total number of different acute adverse reactions experienced. For each acute adverse reaction that participants respond with "Yes" to, they also receive two follow-up questions to measure the frequency and distress for each of their experienced acute adverse reactions. The frequency of the acute adverse reactions is measured by asking the participant to report the

percentage of times the acute adverse reaction was experienced out of all of the times that they have ever used cannabis (e.g., "Approximately what percentage of the time that you use cannabis do you experience anxiety?"). The perceived distress for every endorsed acute adverse reaction to cannabis is measured by having the participant rate their distress level on a 5-point Likert-type scale, from 0 "Not at all distressing" to 4 "Severely distressing" (e.g., On average, how distressing was experiencing anxiety while under the influence of cannabis?"). The authors have suggested that the acute adverse reactions of "body humming", "numbness" and "unsteadiness" could be removed from the scale as these reactions may not be perceived as negative to cannabis users. The number of acute adverse reactions for each participant was calculated by counting each adverse reaction endorsed; the average frequency of acute adverse reactions was calculated by averaging the participants' frequency rating for each acute adverse reaction the participant endorsed; and like frequency, average distress ratings for each participant were calculated by averaging the distress rating for every acute adverse reaction endorsed. Internal consistencies reported by Lafrance et al. (2020) were .90, .75, and .99 for prevalence, frequency, and distress, respectively. Kurtosis values were smaller than $+/- 2.0$, and each variable was normally distributed (Lafrance et al., 2020). No estimates of validity were provided for this scale.

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

The PANAS contains two 10-item affect scales, one scale measures NA and the other measuring PA (see Appendix E). Participants are requested to rate how they feel in general, on average, on 20 affect adjectives. Ten PA (e.g., Excited) and ten NA (e.g., Irritable) adjectives were rated on a 5-point Likert-type scale, from 1 "Very slightly or not at all" to 5 "Extremely" (Watson et al., 1988). Watson et al. (1988) reported the general time frame (i.e., lifetime perceived average of affect) for the PA scale to have a .88 internal consistency and the general

time frame for the NA scale to have a .87 internal consistency. The test-retest reliabilities for the

general time frame, with 8-weeks between each test, were .68 and .71 for positive and negative

affect, respectively (Watson et al., 1988).

Social Desirability Scale – Personality Research Form (PRF-D; Jackson, 1987)

The PRF-D consists of sixteen items that measure socially desirable responding (see

Appendix F). The scale has a "true" and "false" response format for all sixteen items (e.g., "If

someone gave me too much change, I would tell him"). Jackson (1987) reported a high test-retest

reliability (.81) and internal consistency (.83).

Infrequency Scale – Personality research Form (PRF-IN; Jackson, 1987)

The PRF-IN consists of sixteen items that measure non-purposeful responding (see

Appendix G). The scale has a "true" and "false" response format for all sixteen items (e.g.,

"Sometimes I feel thirsty or hungry"). Jackson (1987) reported a moderate test-retest reliability

(.46). The author of this scale describes a score of four or more as indicative of non-purposeful

or careless responding; thus, participants in this study who scored greater than three were

removed from further analyses. Internal consistency is low for this scale due to the low

endorsement rates. There is little or no variance because most respondents will either endorse a

small number of the items or none at all.

Cannabis Use During COVID-19 Restrictions Information Questionnaire

On March 11th, 2020, WHO declared a COVID-19 pandemic. Due to this unique time in

cannabis research, data regarding the participants' frequency of cannabis use, first use of

cannabis, and mental health during the COVID-19 restrictions was also collected (see Appendix

H). Participants were presented the following instructions: "Please read the definitions for

Cannabis and *COVID-19 restrictions* provided below. Additionally, some examples of common

Cannabis terminology and products have been provided along with the definition*"*. Like the

CRAFTS-Q and SPU-CAN questionnaire, the definition of Cannabis provided to participants

was as follows: "*Cannabis* (e.g., marijuana, weed, pot, hash/hashish, THC, CBD) refers to the

generic name for drugs or compounds that come from plants belonging to the genus *Cannabis"*.

The definition of COVID-19 restrictions was as follows: "*Refers to a period of time of measures*

set in place (e.g., physical distancing, travel bans, closed borders, lockdowns, etc.) to restrict

human contact because of the Coronavirus disease 2019 (COVID-19) disease which was

upgraded to pandemic status on March 11th, 2020 by the World Health Organization (WHO)".

This collected information is not related to our main research questions, however, we deemed it

appropriate as we realize the timing of our data collection may have an affect on the results of

this study, such as cannabis use frequency (e.g., increased stress and layoffs may increase

cannabis use).

Procedure

This study was a cross-sectional design that required participants to complete an online

self-report questionnaire. They were asked to complete the scales listed above. The university

students were recruited from Lakehead University, and the general public were recruited across

Canada. Online recruitment strategies occurred between November 2020 and February 2021.

Recruitment strategies included emails sent to Lakehead University psychology courses (see

Appendix I), poster advertisements (see Appendix J) on social media (i.e., Facebook, Instagram,

and Reddit), online advertising websites (i.e., Kijiji), and on Sona Systems (i.e., a software to

host research studies that the Psychology department at Lakehead University uses to advertise

and recruit undergraduate psychology students). University students and the general public were

invited to click a hyperlink that directed them to their relevant information letter and consent

form (see Appendix K and L) which provided information about the procedure of the study, that participation is voluntary, they have the right to withdraw from the study at any point, and that their responses are anonymous. After reading the required information for informed consent, participants were then asked to consent to the "The Cannabis Experiences Study" (i.e., The CAN-E Study). Following consent, participants responded to a questionnaire battery through a secured website service (i.e., SurveyMonkey) that included the self-report measures. After the participants completed the online questionnaire, they were provided with the appropriate debriefing letter (see Appendix M and N) that informed them of the purpose of the study, provided instructions on how to be compensated for their time (i.e., eGift card draw or one bonus mark towards an eligible Lakehead University course), and how to request a summary of the results. This study was approved by Lakehead University's Research Ethics Board (#1468303).

Data Analyses

The data were first examined for non-purposeful responding, outliers, and to verify the assumptions for independent samples *t*-tests, Pearson product-moment correlations and hierarchical multiple regressions before conducting any statistical procedure for the hypotheses. For the independent samples *t*-test, outliers (i.e., assessed via boxplots), normally distributed residuals (i.e., analyzed by inspecting a Normal Q-Q plot), and homogeneity of variances (i.e., examined with Levene's test) were examined to determine if assumptions were violated. If homogeneity of variances was violated (i.e., a statistically significant Levene's test), the Welch's *t*-test would be conducted instead of the Student's *t*-test. The assumptions for the Pearson product-moment correlations that were examined were outliers, linearity between both variables (i.e., determined by examining scatterplots), and normality between both variables (i.e., Normal Q-Q plots). Finally, the assumptions analyzed for the hierarchical multiple regression analyses

were the following: outliers, linearity (i.e., scatterplots and partial regression scatterplots), independence of residuals (i.e., Durbin Watson statistic of approximately 2), normal distribution of residuals, homoscedasticity of residuals (i.e., linearity between studentized residuals and unstandardized predicted values), multicollinearity (i.e., tolerance values less than 0.1), leverage points (i.e., cases with leverage points greater than 0.2) (Huber, 1981), and influential points (i.e., Cook's Distance greater than 1). As response bias issues may be more prevalent due to stigmatized topics being examined in this study, such as substance use and body weight, socially desirable responding was controlled by conducting ANCOVAs for the independent samples *t*-tests, partial correlations for the Pearson product-moment correlations, and including social desirability as a covariate in the hierarchical multiple regressions.

Due to the number of statistical tests (i.e., 30), a multiple-test correction, specifically the Benjamini-Hochberg correction, with a false-discovery rate set to .10, was implemented to control Type I errors (Benjamini & Hochberg, 1995). For example, using the Benjamini-Hochberg correction in this study, a *p*-value of .034 would not be considered statistically significant as the equivalent Benjamini-Hochberg correction of this *p* value would approximately be .11. Therefore, a *p*-value greater than or equal to .034 is not statistically significant in these analyses.

Main Hypotheses.

Hypothesis 1a. An independent samples *t*-test analysis was used to investigate the mean differences between participants that have engaged in simultaneous polysubstance use of cannabis and alcohol at least once in their lifetime, and participants that have never engaged in simultaneous polysubstance use of cannabis and alcohol on the three dependent variables for acute adverse reactions to cannabis (i.e., the total number of different adverse reactions

experienced, the average frequency of acute adverse reactions experienced, and the average distress ratings from the acute adverse reactions experienced).

Hypothesis 1b. Comparable to hypothesis 1a, an independent samples *t*-test analysis was conducted to examine the mean differences between participants that have engaged in cannabis and nicotine simultaneous polysubstance use at least once in their lifetime, and participants that have never engaged in cannabis and nicotine simultaneous polysubstance use on the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 1c. A Pearson product-moment correlation analysis was conducted to examine the association between simultaneous polysubstance use of cannabis and alcohol frequency and the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 1d. Similar to hypothesis 1c, a Pearson product-moment correlation analysis was performed to investigate the association between simultaneous polysubstance use of cannabis and nicotine frequency and the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 2a. Another product-moment correlation analysis was performed to investigate the association between trait positive affect and the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 2b. Similar to hypotheses 1c through 2a, a product-moment correlation analysis was done to examine the association between trait negative affect and the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 3a. Hierarchical multiple regression analyses were completed to analyze if trait positive affect predicted the three dependent variables used to measure acute adverse reactions to cannabis. Block one consisted of the covariates age (i.e., continuous variable),

gender (i.e., nominal dichotomous variable), and frequency of cannabis consumption in the last 3 months (i.e., continuous variable). Block two included trait positive affect (i.e., continuous variable).

Hypothesis 3b. Similarly, another hierarchical multiple regression analyses were used to investigate if trait negative affect predicted the three dependent variables used to measure acute adverse reactions to cannabis. Block one consisted of the covariates age, gender, and frequency of cannabis consumption in the last 3 months. Block two included trait negative affect (i.e., continuous variable).

Exploratory Hypotheses.

Hypothesis 1a. A product-moment correlation analysis was conducted to investigate the association between body weight and the three dependent variables used to measure acute adverse reactions to cannabis.

Hypothesis 1b. Another product-moment correlation analysis was performed to explore the relationship between BMI and the three dependent variables used to measure acute adverse reactions to cannabis.

<div align="center">

Results

</div>

Data Screening

Before conducting the analyses to test the hypotheses, infrequent (i.e., non-purposeful) responding was examined for all participants using participant's PRF-IN scores. Participants with PRF-IN scores greater than 3 were not included in the analyses of this study. Additionally, participants were omitted from the final analyses if they completed the study in less than 5 minutes (i.e., average completion time was 30 minutes and 13 seconds).

Scale Characteristics and Internal Consistencies

Where applicable, the mean, range, standard deviation, and internal consistency were examined for each scale used in the analyses (see Table 2).

Table 2

Scale Range, Means, Standard Deviations and Internal Consistencies

Measure Scale (range possible)	N	M(SD)	Internal Consistency
ARS[a]			
Number of Different Acute Adverse Reactions (0-26)	453	7.13(*4.45*)	.79
Average Frequency of Acute Adverse Reactions (0-100%)	456	8.28(*9.13*)	.85
Average Distress Associated with Acute Adverse Reactions (0-4)	456	1.21(*0.86*)	.79
SPU-CAN[b]			
Cannabis with Alcohol (0-100%)	456	20.22(*27.77*)	
Cannabis with Nicotine (0-100%)	456	21.05(*36.91*)	
PANAS[c]			
Positive Affect (10-50)	445	27.98(*8.45*)	.92
Negative Affect (10-50)	443	20.08(*7.91*)	.90
Body Composition			
Body Weight in Pounds	452	173.01(*47.89*)	
Body Mass Index	451	26.84(*6.34*)	
PRF[d]			
PRF-D (0-16)	452	10.97(*2.99*)	.69
PRF-I (0-16)	456	0.32(*0.61*)	.19[e]

[a] Adverse Reactions Scale

[b] Simultaneous Polysubstance Use – Cannabis, Alcohol, Nicotine

[c] Positive and Negative Affect Schedule

[d] Personality Research Form – Desirability and Infrequency

[e] Low internal consistency from the low endorsement rates due to the nature of the scale (*M* close to 0, *SD* < 1).

Main Hypotheses

Simultaneous Polysubstance Use of Cannabis and Alcohol Comparisons

       Hypothesis 1a.

       Total Acute Adverse Reactions. Participants that have consumed alcohol simultaneously with cannabis use at least once ($M = 7.44$, $SD = 4.24$, $n = 371$) had significantly higher total adverse reaction mean scores than participants who have never consumed alcohol simultaneously with cannabis ($M = 5.77$, $SD = 4.10$, $n = 74$), $t(443) = 1.67$, $p = .002$. To explore the potential role of response styles, an ANCOVA was conducted as well using social desirability as a covariate. The findings remained significant, $F(1, 438) = 10.88$, $p = .001$.

       Average Frequency of Acute Adverse Reactions. Four outliers in the average frequency of acute adverse reactions experienced subscale were detected via boxplot. However, upon further examination for each case, and the large sample size, the outliers were included in the analyses. Levene's test for equality of variance revealed that the assumption of homogeneity of variances was violated ($p = .005$). Consequently, a Welch t-test was conducted. The Welch t-test revealed that there was not a statistically significant difference in the mean average frequency of acute adverse reactions between participants that have consumed alcohol simultaneously with cannabis at least once ($M = 7.87$, $SD = 8.87$, $n = 374$) and participants who have never consumed alcohol simultaneously with cannabis ($M = 10.39$, $SD = 11.31$, $n = 74$), $t(90.70) = 1.82$, $p = .072$. Additionally, after controlling for socially desirable responses via an ANCOVA and decreasing Type I errors through the Benjamini-Hochberg procedure, the mean differences for the average frequency of acute adverse reactions remained nonsignificant, $F(1,441) = 4.31$, $p = .039$.

       Average Distress Rating of Acute Adverse Reactions. Levene's test for equality of variance revealed that the assumption of homogeneity of variances was violated ($p = .005$). A

Welch *t*-test was therefore conducted and revealed that there was not a statistically significant

difference in the average mean distress rating of acute adverse reactions between participants

that have consumed alcohol simultaneously with cannabis (*M* = 1.19, *SD* = 0.82, *n* = 367) and

participants who have never consumed alcohol simultaneously with cannabis (*M* = 1.28, *SD* =

1.03, *n* = 67), *t*(81.99) = .70, *p* = .484. This finding also remained nonsignificant when

controlling for social desirability, *F*(1,427) = .95, *p* = .331.

Simultaneous Polysubstance Use of Cannabis and Nicotine Comparisons

   Hypothesis 1b.

   Total Acute Adverse Reactions. The independent samples *t*-test revealed that there was

not a statistically significant difference in the mean total of acute adverse reactions experienced

between participants that have consumed nicotine simultaneously with cannabis (*M* = 7.7, *SD* =

4.3, *n* = 196) and participants who have never consumed nicotine simultaneously with cannabis

(*M* = 7.34, *SD* = 4.6, *n* = 100), *t*(294) = -.66, p = .508. Similarly for the analyses completed for

hypotheses 1a, socially desirable responding was also used as a covariate and the findings

remained nonsignificant (*p* = 1.00).

   Average Frequency of Acute Adverse Reactions. Three outliers in the average frequency

of acute adverse reactions experienced subscale were detected via boxplot. However, upon

further examination of each case, and the large sample size, the extreme outliers were included in

the analyses. The independent samples *t*-test revealed that there was not a statistically significant

difference in the mean average frequency of acute adverse reactions experienced between

participants that have consumed nicotine simultaneously with cannabis (*M* = 7.78, *SD* = 9.18, *n* =

196) and participants who have never consumed nicotine simultaneously with cannabis (*M* =

9.55, *SD* = 9.92, *n* = 101), *t*(295) = 1.53, *p* = .127. However, when controlling for social

desirability, the average frequency of acute adverse reactions for participants who have never consumed nicotine simultaneously with cannabis was significantly higher than participants who have consumed both products simultaneously, $F(1, 291) = 4.94$, $p = .027$.

Average Distress Rating of Acute Adverse Reactions. Levene's test for equality of variance revealed that the assumption of homogeneity of variances was violated ($p = .001$). A Welch *t*-test was therefore conducted and revealed that there was not a statistically significant difference in the mean average distress rating of acute adverse reactions between participants that have consumed nicotine simultaneously with cannabis ($M = 1.26$, $SD = 0.77$, $n = 192$) and participants who have never consumed nicotine simultaneously with cannabis ($M = 1.23$, $SD = 0.94$, $n = 99$), $t(167.39) = -.31$, $p = .758$. After controlling for social desirability, these mean differences remained nonsignificant, $F(1, 285) < .0005$, $p = .989$.

Simultaneous Polysubstance Use of Cannabis and Alcohol Associations

Hypothesis 1c.

Total Acute Adverse Reactions. The association between cannabis and alcohol simultaneous polysubstance use frequency and total acute adverse reactions was not statistically significant, $r(454) = -.04$, $p = .351$. Even after controlling for social desirability via partial correlation, the relationship between the percentage of cannabis uses in which alcohol was also used and total acute adverse reactions remained nonsignificant, $r_{partial}(446) = -.04$, $p = .431$. Please see Table 3 for a summary of the Pearson correlation statistics between total acute adverse reactions and each predictor variable.

Table 3

Pearson Correlation Coefficients for Total Acute Adverse Reactions

Variable	Total Acute Adverse Reactions	
	r	*p*
Cannabis and Alcohol SPU Frequency[a]	-.04	.351
Cannabis and Nicotine SPU Frequency[b]	.10	.037[c]
Trait PA	-.09	.057
Trait NA	.31	< .0005*
Body Weight[d]	-.07	.133
BMI[d]	-.05	.278

[a]Frequency represents the percentage of cannabis uses in which alcohol was also used

[b]Frequency represents the percentage of cannabis uses in which nicotine was also used

[c]Correlation did not maintain significance after Benjamini-Hochberg correction

[d]Variables for exploratory hypotheses

* $p < .001$

Average Frequency of Acute Adverse Reactions. Both variables, cannabis and alcohol simultaneous polysubstance use frequency and average frequency of acute adverse reactions, were not normally distributed when a Normal Q-Q plot was examined. However, as both variables have comparable distribution shapes (i.e., positive skewness) (Tabachnick & Fidell, 2006) and as a Pearson's correlation analysis is robust to normality violations (Knief & Forstmeier, 2021), a Pearson's correlation was nonetheless conducted. A bivariate correlation found between cannabis and alcohol simultaneous polysubstance use and average frequency of acute adverse reactions was not significant, $r(454) = -.01$, $p = .883$. This finding also remained nonsignificant when controlling for social desirability, $r_{partial}(449) = .004$, $p = .936$. See Table 4 for a summary of the Pearson correlation statistics between average frequency of acute adverse reactions experienced and each predictor variable.

Table 4

Pearson Correlation Coefficients for Average Frequency of Acute Adverse Reactions

Variable	Average Frequency of Acute Adverse Reactions	
	r	p
Cannabis and Alcohol SPU Frequency[a]	-.01	.883
Cannabis and Nicotine SPU Frequency[b]	.05	.326
Trait PA	-.07	.148
Trait NA	.35	< .0005*
Body Weight[c]	-.11	.021*
BMI[c]	-.05	.282

[a]Frequency represents the percentage of cannabis uses in which alcohol was also used

[b]Frequency represents the percentage of cannabis uses in which nicotine was also used

[c]Variables for exploratory hypotheses

* $p < .05$

Average Distress Rating of Acute Adverse Reactions. A bivariate correlation between cannabis and alcohol simultaneous polysubstance use frequency and average distress rating of acute adverse reactions experienced was not statistically significant, $r(439) = .05$, $p = .258$. After controlling for social desirability, this relationship remained nonsignificant, $r_{partial}(434) = .06$, $p = .253$. See Table 5 for a summary of the Pearson correlation statistics between average distress rating of acute adverse reactions experienced and each predictor variable.

Table 5

Pearson Correlation Coefficients for Average Distress Rating of Acute Adverse Reactions

Variable	Average Distress Rating of Acute Adverse Reactions	
	r	p
Cannabis and Alcohol SPU Frequency[a]	.05	.258
Cannabis and Nicotine SPU Frequency[b]	.10	.034[c]
Trait PA	-.06	.257
Trait NA	.24	< .0005*
Body Weight[d]	-.14	.004*
BMI[d]	-.03	.520

[a]Frequency represents the percentage of cannabis uses in which alcohol was also used

[b]Frequency represents the percentage of cannabis uses in which nicotine was also used

[c]Correlation did not maintain significance after Benjamini-Hochberg correction

[d]Variables for exploratory hypotheses

* $p < .001$

Simultaneous Polysubstance Use of Cannabis and Nicotine Associations

Hypothesis 1d.

Total Acute Adverse Reactions. An association was not found between simultaneous

polysubstance use of cannabis and nicotine frequency and total acute adverse reactions, when

corrected with the Benjamini-Hochberg procedure, $r(451) = .10, p = .037$. Similar to hypothesis

1c, a partial correlation was conducted to control for social desirability. After partialling out

social desirability, the relationship between the percentage of cannabis uses in which nicotine

was also used and total acute adverse reactions remained nonsignificant, $r_{partial}(446) = .07, p =$

.163.

Average Frequency of Acute Adverse Reactions. Two outliers were detected via

scatterplot. Though, upon more examination for both cases, and the large sample size, the

outliers were included in the analyses as they were not suspected of being data-entry errors. Both

variables, simultaneous polysubstance use of cannabis and nicotine frequency and average

frequency of acute adverse reactions, were not normally distributed when a Normal Q-Q plot

was examined. However, both variables have similar distribution shapes and as a Pearson's

correlation analysis is robust to normality violations, a Pearson's correlation was conducted. An

association was not found between simultaneous polysubstance use of cannabis and nicotine

frequency and average frequency of acute adverse reactions, $r(454) = .05, p = .326$. Additionally,

when controlling for social desirability via partial correlation, the relationship was still

nonsignificant, $r_{partial}(449) = .01, p = .789$.

Average Distress Rating of Acute Adverse Reactions. The average distress rating of

acute adverse reactions was normally distributed when examining a Normal Q-Q plot. However,

cannabis and nicotine simultaneous polysubstance frequency was not normally distributed, but

the distribution shape was similar to the average distress rating Normal Q-Q plot. An association

was not discovered between simultaneous polysubstance use of cannabis and nicotine frequency

and average distress rating of acute adverse reactions experienced when corrected with the

Benjamini-Hochberg procedure, $r(439) = .05$, $p = .034$. This finding remained nonsignificant

when controlling for social desirability, $r_{partial}(434) = .08$, $p = .084$.

Trait Positive Affect Associations

Hypothesis 2a.

Total Acute Adverse Reactions. There was no correlation found between positive affect

and total acute adverse reactions experienced, $r(441) = -.09$, $p = .057$. Further, a partial

correlation was also performed to control for social desirability. After partialling out social

desirability, the relationship between positive affect and total acute adverse reactions remained

nonsignificant, $r_{partial}(436) = .06$, $p = .201$.

Average Frequency of Acute Adverse Reactions. Three outliers were detected via

scatterplot. Similar to previous analyses discussed, the outliers were included in the analyses.

The positive affect variable was normally distributed when examining a Normal Q-Q plot.

However, the average frequency of acute adverse reactions experienced was not normally

distributed, and although the distribution shape was not similar to the positive affect Normal Q-Q

plot, a Pearson's correlation analysis is robust to normality violations. There was no association

found between positive affect and average frequency of acute adverse reactions experienced,

$r(443) = -.07$, $p = .148$. Additionally, when controlling for social desirability via partial

correlation, this relationship was still nonsignificant, $r_{partial}(438) = .06$, $p = .224$.

Average Distress Rating of Acute Adverse Reactions. Positive affect was not associated

with average distress rating of acute adverse reactions experienced, $r(428) = -.06$, $p = .257$. This

finding remained nonsignificant when controlling for social desirability, $r_{partial}$ (423) = -.01, p =

.862.

Trait Negative Affect Associations

      Hypothesis 2b.

      Total Acute Adverse Reactions. The total adverse reactions variable was normally

distributed when examined using a Normal Q-Q plot. However, negative affect was not normally

distributed, but the distribution shape was similar to the total acute adverse reactions Normal Q-

Q plot. There was a positive correlation between negative affect and total acute adverse reactions

experienced, $r(438)$ = .31, p < .001. Further, a partial correlation was also performed to control

for social desirability. After partialling out social desirability, this positive relationship between

negative affect and total acute adverse reactions remained significant, $r_{partial}(433)$ = .20, p <

.0005.

      Average Frequency of Acute Adverse Reactions. Four outliers were detected via

scatterplot. However, upon further examination of each case, and the large sample size, the

outliers were included in the analyses. Both the average frequency of adverse reactions

experienced, and negative affect variables were not normally distributed when examining a

Normal Q-Q Plot. However, the distribution was similar in shape to each other. There was a

positive correlation between negative affect and the average frequency of acute adverse reactions

experienced, $r(441)$ = .35, p < .001. Additionally, when controlling for social desirability via

partial correlation, this significant positive relationship remained significant, $r_{partial}(436)$ = .28, p

< .0005.

      Average Distress Rating of Acute Adverse Reactions. A positive correlation was found

between negative affect and average distress rating of acute adverse reactions experienced,

$r(427) = .24$, $p < .001$. This positive association remained significant when controlling for social desirability, $r_{partial}(422) = .22$, $p < .0005$.

Trait Positive Affect Predictions

Hypothesis 3a.

Total Acute Adverse Reactions. The assumption of homoscedasticity was violated, in that the residual spread increased as the predicted values increased (i.e., increasing funnel-shaped distribution). Three outliers were detected (i.e., studentized deleted residuals greater than 3 standard deviations), however, the outliers were valid (i.e., not due to data-entry errors) and were kept in the analyses. At the second block entry (i.e., "model 2"), the hierarchical multiple regression showed that the addition of positive affect did not show a significant change in R^2 in predicting total acute adverse reactions, $F(1,428) = 1.49$, $p = .223$. Hierarchical multiple regression analyses done in this study were also conducted using social desirability scores as a control measure. The findings remained nonsignificant, $F(1, 423) = 2.85$, $p = .092$. See Table 6 for a summary of the hierarchical multiple regression statistics for predicting total acute adverse reactions with positive affect as an added variable to the model. In addition, see Table 7 for simple correlations between all of the independent variables and each of the three outcome variables used in the remaining hierarchical multiple regression analyses.

Table 6

Hierarchical Multiple Regression Analysis for Trait Positive Affect Predicting Total Acute Adverse Reactions to Cannabis

Dependent: Total Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.04	.04	< .0005
Constant	9.55	.63				
Age	-.08	.02	-.18			
Gender	-.65	.44	-.07			
Cannabis Use Frequency	< .0005	.01	<.01			
Model 2 (variables)				.05	.04	.223[a]
Constant	10.29	.87				
Age	-.07	.02	-.17			
Gender	-.66	.44	-.07			
Cannabis Use Frequency	< .0005	.01	<.01			
Trait Positive Affect	-.03	.02	-.06			

[a]Value for change in R^2 when adding Trait PA to model

Table 7

Pearson Correlation Coefficients Between Independent Variables and Acute Adverse Reactions to Cannabis in Hierarchical Multiple Regression Analyses

	Dependent Variable		
Independent Variable	Total Acute Adverse Reactions	Average Frequency of Acute Adverse Reactions	Average Distress Rating of Acute Adverse Reactions
Age	-.20*	-.25*	-.18*
Cannabis Use Frequency[a]	-.04	-.34*	-.30*
Positive Affect	-.09	-.07	-.06
Negative Affect	.31*	.35*	.24*

[a]Number of days for using cannabis in the last 3 months (i.e., 12 weeks)

*$p < .01$

Average Frequency of Acute Adverse Reactions. The assumption of homoscedasticity was violated (i.e., increasing funnel-shaped distribution). Six outliers were detected (i.e., studentized deleted residuals greater than 3 standard deviations), however, the outliers were valid (i.e., not due to data-entry errors) and were kept in the analyses. At the second block entry (i.e., "model 2"), the hierarchical multiple regression showed that positive affect did not show a significant change in R^2 in predicting average frequency of acute adverse reactions, $F(1,429) =$

.47, p = .493. See Table 8 for a summary of the hierarchical multiple regression statistics for

predicting the average frequency of acute adverse reactions experienced with positive affect as

an added variable to the model. However, after controlling for socially desirable responses, the

addition of positive affect did reveal a significant change in R^2, $F(1,424) = 4.72$, $p = .030$.

Table 8

Hierarchical Multiple Regression Analysis for Trait Positive Affect Predicting Average Frequency of Acute Adverse Reactions to Cannabis

Dependent: Average Frequency of Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.17	.17	< .0005
Constant	16.16	1.25				
Age	-.15	.04	-.16			
Gender	-2.56	.89	-.13			
Cannabis Use Frequency	-.07	.01	-.29			
Model 2 (variable)				.18	.17	.493[a]
Constant	16.99	1.75				
Age	-.146	.04	-.16			
Gender	-2.57	.89	-.13			
Cannabis Use Frequency	-.07	.01	-.29			
Trait Positive Affect	-.03	.05	.05			

[a]Value for change in R^2 when adding Trait PA to model

Average Distress Rating of Acute Adverse Reactions. The assumption of

homoscedasticity was violated, in that the residual spread increased as the predicted values

increased (i.e., increasing funnel-shaped distribution). One outlier was detected (i.e., studentized

deleted residuals greater than 3 standard deviations), however, the outliers were valid and were

kept in the analyses. At the second block entry (i.e., "model 2"), the hierarchical multiple

regression showed that positive affect did not show a significant change in R^2 in predicting the

average distress rating of acute adverse reactions experienced, $F(1,414) = .42$, $p = .516$. This

finding remained nonsignificant when controlling for social desirability, $F(1,409) = .11$, $p =$

.745. Refer to Table 9 for a summary of the hierarchical multiple regression statistics for

predicting the average distress rating of acute adverse reactions experienced with positive affect as an added variable to the model.

Table 9

Hierarchical Multiple Regression Analysis for Trait Positive Affect Predicting Average Distress Rating of Acute Adverse Reactions to Cannabis

Dependent: Average Distress Rating of Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.14	.13	< .0005
Constant	1.78	.12				
Age	-.01	<.01	-.09			
Gender	-.27	.09	-.15			
Cannabis Use Frequency	-.01	<.01	-.26			
Model 2 (variable)				.14	.13	.516[a]
Constant	1.85	.17				
Age	-.01	<.01	-.09			
Gender	-.27	.09	-.15			
Cannabis Use Frequency	-.01	<.01	-.26			
Trait Positive Affect	<.01	.01	-.03			

[a]Value for change in R^2 when adding Trait PA to model

Trait Negative Affect Predictions

Hypothesis 3b.

Total Acute Adverse Reactions. Two outliers were detected (i.e., studentized deleted residuals greater than 3 standard deviations), however, the outliers were valid and were kept in the analyses. At the second block entry (i.e., "model 2"), the hierarchical multiple regression showed that negative affect did indicate a significant change in R^2 in predicting total acute adverse reactions, $F(1,425) = 29.73$, $p < .001$. The variance explained increased by 6.2% with the addition of trait negative affect to the model. There was still a significant change in R^2 after controlling for social desirability, $F(1,420) = 10.14$, $p = .002$. See Table 10 for a summary of the hierarchical multiple regression statistics for predicting total acute adverse reactions with negative affect as an added variable to the model.

Table 10

Hierarchical Multiple Regression Analysis for Trait Negative Affect Predicting Total Acute Adverse Reactions to Cannabis

Dependent: Total Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.05	.04	< .0005
Constant	9.55	.63				
Age	-.08	.02	-.18			
Gender	-.69	.44	-.08			
Cannabis Use Frequency	< .0005	.01	<.01			
Model 2 (variable)				.11	.10	< .0005[a]
Constant	5.90	.90				
Age	-.05	.02	-.13			
Gender	-.30	.43	-.03			
Cannabis Use Frequency	<.0005	.01	.01			
Trait Negative Affect	.14	.03	.26			

[a]Value for change in R^2 when adding Trait NA to model

Average Frequency of Acute Adverse Reactions. The assumption of homoscedasticity was violated. Five outliers were detected (i.e., studentized deleted residuals greater than 3 standard deviations), though, the outliers were valid (i.e., not due to data-entry errors) and were kept in the analyses. At the second block entry (i.e., "model 2"), the hierarchical multiple regression showed that negative affect did show a significant change in R^2 in predicting average frequency of acute adverse reactions experienced, $F(1,427) = 36.05$, $p < .001$. The variance explained increased by 6.4% with the addition of trait negative affect to the model. Therefore model 2, which included the addition of trait negative affect, explained 23% of the variation in average frequency acute adverse reactions to cannabis. After controlling for social desirability, a significant change in R^2 remained, $F(1,420) = 10.14$, $p = .002$. See Table 11 for a summary of the hierarchical multiple regression statistics for predicting the average frequency of acute adverse reactions with negative affect as an added variable to the model.

Table 11

Hierarchical Multiple Regression Analysis for Trait Negative Affect Predicting Average Frequency Acute Adverse Reactions to Cannabis

Dependent: Average Frequency of Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.17	.17	< .0005
Constant	15.99	1.25				
Age	-.15	.04	-.16			
Gender	-2.59	.87	-.14			
Cannabis Use Frequency	-.07	.01	-.29			
Model 2 (variables)				.24	.23	< .0005[a]
Constant	8.05	1.79				
Age	-.10	.04	-.11			
Gender	-1.76	.85	-.09			
Cannabis Use Frequency	-.07	.01	-.28			
Trait Negative Affect	.31	.05	.27			

[a]Value for change in R^2 when adding Trait NA to model

Average Distress Rating of Acute Adverse Reactions. The assumption of homoscedasticity was violated (i.e., increasing funnel-shaped distribution). One outlier was detected (i.e., studentized deleted residuals greater than 3 standard deviations), however, the outlier was valid (i.e., not due to data-entry errors) and was kept in the analysis. At the second block entry (i.e., "model 2"), the hierarchical multiple regression showed that negative affect did reveal a significant change in R^2 in predicting the average distress rating of acute adverse reactions experienced, $F(1,413) = 10.38$, $p = .001$. The variance explained increased by 2.1% with the addition of trait negative affect to the model. There was still a significant change in R^2 after controlling for social desirability, $F(1,408) = 5.96$, $p = .015$. Refer to Table 12 for a summary of the hierarchical multiple regression statistics for predicting the average distress rating of acute adverse reactions with negative affect as an added variable to the model.

Table 12

Hierarchical Multiple Regression Analysis for Trait Negative Affect Predicting Average Distress Rating of Acute Adverse Reactions to Cannabis

Dependent: Average Distress Rating of Acute Adverse Reactions	B	$SE\ B$	β	R^2	R^2_{adj}	p
Model 1 (covariates)				.14	.13	< .0005
Constant	1.76	.12				
Age	-.01	<.01	-.09			
Gender	-.29	.09	-.16			
Cannabis Use Frequency	-.01	<.01	-.26			
Model 2 (variable)				.16	.15	.001[a]
Constant	1.32	.18				
Age	-.01	<.01	-.06			
Gender	-.24	.09	-.14			
Cannabis Use Frequency	-.01	<.01	-.25			
Trait Negative Affect	.02	.01	.15			

[a]Value for change in R^2 when adding Trait NA to model

Exploratory Hypotheses

Body Weight Associations

Hypothesis 1a.

Total Acute Adverse Reactions. Two outliers were detected via scatterplot. However, upon further examination for both cases (e.g., checking for data-entry errors), and the large sample size, the outliers were included in the analyses. A correlation was not found between body weight and total acute adverse reactions, $r(447) = -.07$, $p = .133$. After controlling for social desirability via partial correlation, the relationship between body weight and total acute adverse reactions remained nonsignificant, $r_{partial}(442) = -.08$, $p = .085$.

Average Frequency of Acute Adverse Reactions. Three outliers were detected via scatterplot. However, upon further examination for both cases (e.g., data-entry errors), and the large sample size, the outliers were included in the analyses. A small negative correlation was observed between body weight and average frequency of acute adverse reactions experienced,

$r(450) = -.11$, $p = .021$. Additionally, when controlling for social desirability via partial correlation, this negative association remained significant, $r_{partial}(436) = -.12$, $p = .010$.

Average Distress Rating of Acute Adverse Reactions. Three outliers were detected via scatterplot. However, upon further examination for each case, and the large sample size, the outliers were included in the analyses. A small negative association was found between body weight and average distress rating of acute adverse reactions experienced, $r(435) = -.14$, $p = .004$. After controlling for social desirability, this relationship stayed negative and remained significant, $r_{partial}(430) = -.15$, $p = .002$.

Body Mass Index Associations

Hypothesis 1b.

Total Acute Adverse Reactions. One outlier was detected via scatterplot. Upon additional inspection of the case, and the large sample size, the outlier was included in the analysis. An association was not found between BMI and total acute adverse reactions, $r(446) = -.05$, $p = .278$. Analogous to exploratory hypothesis 1a, a partial correlation was also performed to control for social desirability. After partialling out social desirability, there was still no relationship between BMI and total acute adverse reactions, $r_{partial}(446) = -.07$, $p = .146$.

Average Frequency of Acute Adverse Reactions. Similar to above, upon further examination of the case, the outlier was included in the analysis. BMI was not correlated with average frequency of acute adverse reactions experienced, $r(449) = -.05$, $p = .282$. The relationship between BMI and average frequency of acute adverse reactions after partialling out social desirability remained nonsignificant, $r_{partial}(444) = -.07$, $p = .147$.

Average Distress Rating of Acute Adverse Reactions. One outlier was detected via scatterplot and was included in the analysis. BMI was not associated with average distress rating

of acute adverse reactions experienced, $r(434) = -.03$, $p = .520$. This finding also remained nonsignificant when controlling for social desirability, $r_{partial}(429) = -.04$, $p = .373$.

Discussion

The primary purpose of this study was to investigate how simultaneous polysubstance use of cannabis and trait affect were associated with acute adverse reactions to cannabis; specifically, on the total, average frequency, and average distress ratings of these acute adverse reactions. Additionally, an exploratory examination was conducted to determine if body weight and BMI were related to the three variables measuring acute adverse reactions to cannabis.

Simultaneous Polysubstance Use and Acute Adverse Reactions to Cannabis

Cannabis and Alcohol Comparisons and Associations

Hypothesis 1a was partially supported when statistically significant mean differences were found in the total acute adverse reaction scores, but not in the average frequencies or average distress ratings of acute adverse reactions when comparing participants that have consumed cannabis simultaneously with alcohol and participants who have never consumed cannabis simultaneously with alcohol. From our study, participants who engaged in simultaneous cannabis and alcohol use scored higher on total acute adverse reactions, meaning that consuming cannabis and alcohol on the same occasion increased the likelihood of experiencing more unique acute adverse reactions (e.g., anxiety and paranoia experiences versus only experiencing paranoia) than someone who consumed cannabis without alcohol in any one session. These findings are consistent with some previous studies where individuals who engage in SPU of cannabis and alcohol were more likely to have more unique negative acute adverse reactions to cannabis (Fernández-Calderón et al., 2020; Lipperman-Kreda et al., 2017; Manwell et al., 2019). These results are also comparable to an ecological momentary assessment study where SAM

(i.e., simultaneous alcohol and marijuana) use was related to more violence (i.e., argument, injury, or physical fight) the morning after compared to using marijuana alone (Lipperman-Kreda et al., 2017). Another study supporting these findings discovered that university students who participated in SAM use reported more substantial acute effects for symptoms such as clumsiness and difficulty concentrating than the young adults who consumed alcohol or marijuana only (Lee et al., 2017). These more prominent acute effects may be due to the synergistic effects (i.e., increase the effects of one or more drugs; Alsherbiny & Li, 2018) between cannabis and alcohol (Ramaekers et al., 2011). As both synergistic or additive effects have been observed to be positively associated with acute adverse reactions, these greater mean differences in total acute adverse reactions to cannabis may be the result of the synergistic (or potentially additive) effects from the simultaneous use of cannabis and alcohol (e.g., Chihuri et al., 2017; Meier & Hatsukami, 2016; Pape et al., 2009)

However, hypothesis 1c was not supported; there was not a statistically significant positive correlation between SPU of cannabis and alcohol frequency (i.e., "frequency" representing the percentage of cannabis uses in which alcohol was also used) and acute adverse reactions to cannabis. Even though there was no positive relationship between SPU of cannabis and alcohol frequency and acute adverse reactions to cannabis, our results support some previous literature where neither synergistic nor additive effects occurred when simultaneously using THC and ethanol products (Ballard & de Wit, 2011). This decrease in acute effects overall has previously been proposed to be due to either THC lessening the acute effects from ethanol or decreasing the desire to consume more alcohol (e.g., Ballard & de Wit, 2011).

Cannabis and Nicotine Comparisons and Associations

Hypothesis 1b was not supported, and after controlling for socially desirable responding, our results either showed no association or was opposite to what we hypothesized (depending on the acute adverse reaction scale); participants who have never consumed nicotine simultaneously with cannabis experienced a higher frequency of acute adverse reactions than participants who have never consumed both products simultaneously. Similarly, hypothesis 1d was not supported, even after accounting for social desirability; no positive correlation was found between simultaneous polysubstance use of cannabis and nicotine frequency (i.e., "frequency" representing the percentage of cannabis uses in which nicotine was also used) and acute adverse reactions to cannabis.

Although past research has shown that nicotine increases the acute adverse effects of THC (Crummy et al., 2020; Manwell et al., 2019), our study's findings (after controlling for socially desirable responses) revealed no relationships, or when we did uncover a connection, it was contrary to what we hypothesized; participants who engaged in cannabis and nicotine simultaneous use had lower mean scores on the average frequency of acute adverse reactions to cannabis compared to those that have never engaged in cannabis and nicotine simultaneous use. However, these findings support some emerging evidence on nicotine and cannabinoid combinations that discovered that prior nicotine use decreased locomotor sensitization to cannabinoids (i.e., *preceding nicotine use* decreased the behavioural response to the same dose of cannabinoid; Rigo et al., 2020) (Crummy et al., 2020). Also, and in parallel with our findings, Crummy and colleagues (2020) concluded that there was no change in locomotor sensitization to nicotine following cannabinoid use (i.e., *preceding cannabinoid use* did not change the behavioural response to the same dose of nicotine; Rigo et al., 2020) (Crummy et al., 2020).

These sensitization relationships (and lack of) may offer a potential explanation as to why our sample of simultaneous cannabis and nicotine users had a lower frequency of experiencing adverse reactions, or why our two groups did not differ on the other acute adverse reaction scales. The likelihood of experiencing acute reactions, in general, is possibly influenced by the order in which the person uses cannabis and nicotine when engaging in SPU.

Trait Affect and Acute Adverse Reactions to Cannabis

Trait Positive Affect Associations and Predictions

Hypothesis 2a was also not supported; no significant negative correlation was found between positive affect and acute adverse reactions to cannabis. Hypothesis 3a was partially supported, although with small effect sizes; when factoring in the covariates, age, gender, cannabis consumption frequency, and social desirability, the addition of trait positive affect did explain a statistically greater amount of the variation in the average frequency of acute adverse reactions to cannabis, specifically.

As previous studies have found a positive association between PA and 5-HT (e.g., William et al., 2006) and a negative association between PA and cortisol (e.g., Hoyt et al., 2015), a chemical reaction may be occurring between the cannabinoids and 5-HT and cortisol that may be serving as a protective factor against acute adverse reactions. Additionally, we may not have found a significant negative correlation or larger effect size as the scale we used to measure acute reactions to cannabis was specific to typically perceived *adverse* reactions. However, had this study also examined acute *positive* reactions, we may have seen a positive association between positive affect and acute positive reactions to cannabis. To further explore this possibility, future studies should examine the relationship between *positive* affect and acute *positive* reactions to

cannabis while simultaneously investigating the association between *negative* affect and acute *negative* reactions to cannabis.

Trait Negative Affect Associations and Predictions

However, hypothesis 2b was supported; people with higher trait negative affect reported more acute adverse reactions to cannabis. In addition, hypothesis 3b was also supported; the addition of trait negative affect did explain a statistically greater amount of the variation in acute adverse reactions to cannabis.

Although our findings support our hypotheses, these findings are not consistent with some previous studies investigating the relationship between negative affect and acute adverse responses to cannabis. LaFrance et al. (2020) measured depression, anxiety, and stress, which they classified as their *negative affect* variables, using the Depression Anxiety Stress Scale-21 (DASS-21). The researchers concluded that neither depression, anxiety, nor stress were significantly positively associated with acute adverse reactions to cannabis (LaFrance et al., 2020). However, they speculated that this was because the timeframe of their independent variable, measured by DASS-21, assessed negative affect over the last week (LaFrance et al., 2020). In contrast, their dependent variable, measured by ARS, was over one's lifetime (i.e., indefinite) (LaFrance et al., 2020). Fortunately, the PANAS scale used in this study to measure affect coincides with the timeframe of the ARS scale, so this is potentially why this study detected a relationship between negative affect, where some previous studies did not (e.g., LaFrance et al., 2020).

The effect of trait negative affect found in this study may be grounded in the set and setting theory, where the drug response, in this case, the cannabis response, is dependent on pharmacological or non-pharmacological influences like intention (i.e., "set") and environment

(i.e., "setting") (Hartogsohn, 2016; WHO, 2016). Similar to positive affect, earlier studies have

found associations between NA and cortisol, specifically a positive link (e.g., Piazza et al., 2013)

– people with higher NA scores also had higher blood cortisol levels. These higher cortisol levels

may be stress-inducing, thus providing a stressful mindset, or "set", while consuming cannabis

which may increase the likelihood of experiencing acute adverse reactions to cannabis. For

instance, if someone's intentions while consuming cannabis are negative (e.g., in a bad mindset),

their experience with cannabis may also be negative (e.g., experiencing an acute adverse

reaction). Therefore, if someone has high trait negative affect, a general tendency to respond

negatively to their environment, this negative predisposition may increase their chances of

experiencing acute *adverse* reactions to cannabis.

Exploratory Hypotheses

Body Weight and Body Mass Index and Acute Adverse Reactions to Cannabis

Exploratory hypothesis 1a was partially supported; a negative correlation was found

between body weight and the average frequency of acute adverse reactions experienced. Another

negative association was also found between body weight and average distress of acute adverse

reactions experienced; however, this negative association was not found for the total acute

adverse reactions experienced. Exploratory hypothesis 1b was not supported; no significant

negative correlation was found between BMI and cannabis acute adverse reactions.

Although BMI was not associated with any of the three facets of cannabis acute adverse

reactions measured here, body weight had a small negative correlation with the average

frequency and the average distress rating of the acute adverse responses experienced. A possible

explanation for this negative association between body weight and acute adverse reactions to

cannabis is the dose in relation to body weight. It may be that the lower the absolute body

weight, the more likely someone will over-consume cannabis for their weight. Previous studies

have shown that the higher the quantity of cannabis consumed increases the likelihood of

experiencing acute adverse effects, especially with cannabis products containing a greater

amount of THC (e.g., Hunault et al., 2009). Therefore, the susceptibility to cannabis acute

adverse reactions may increase as body weight decreases due to a lower physiological tolerance

per unit of cannabis and less body fat within which the cannabis can remain inactive.

Limitations

Nevertheless, the conclusions from this study should be evaluated along with the

limitations. As this was a retrospective cross-sectional design, participants may not accurately

remember their past experiences with cannabis use. In addition to their recall accuracy, we do

not know how far back in time they are reflecting and thus reporting. That is, some participants

may have been reporting incidents that occurred within the last few days, while others may have

been reporting events that occurred months or years ago. Future research should incorporate

longitudinal study designs to limit recall and timeframe reporting errors. Additionally,

statistically significant results found in this study were often associated with low effect sizes

(e.g., mean differences, correlations, proportion of variances), which can occur when analyzing

large sample sizes. Another limitation of this study revolves around measuring cannabis dose,

especially concerning retrospective studies, as the amount of cannabis consumed is associated

with acute effects (WHO, 2016). Furthermore, many participants are often inaccurate at

reporting the types of cannabinoids in their cannabis products and the quantity of which they

consume them. Because of these issues, we could not incorporate cannabis dose as a covariate in

our analyses. Studies of the typical amounts of THC and other cannabinoids in commonly used

cannabis preparations should be priorities for future retrospective research on the short-term

health effects of cannabis.

For our exploratory hypotheses, self-reported BMI was being used as an indirect measure

of body fat percentage (Yu et al., 2013), and in-laboratory BMI assessments, or other more direct

methods of BFP estimation should be used in future studies, such as skinfold calliper

measurements or dual-energy X-ray absorptiometry (DEXA) (Harvard, 2020). Also, the design

of this study was cross-sectional. Therefore, the associations and predictions found between

simultaneous polysubstance use, trait affect, and body composition cannot be attributed as a

cause of acute adverse experiences due to cannabis use.

Implications

Investigating the association between SPU, trait affect, body composition, and acute

adverse reactions to cannabis has implications for cannabis users, prescribing physicians, nurse

practitioners, and public health educators. As non-medicinal cannabis use in Canada has been

legalized since 2018, there may be an increase in people interested in trying cannabis for the first

time, and they should be aware of their vulnerability to experiencing these acute adverse

reactions. Additionally, physicians and practitioners prescribing medicinal cannabis should be

mindful of their patients' susceptibility to these acute adverse reactions. Therefore, these

findings, in particular the trait NA findings, may aid those who are inexperienced with cannabis

and physicians by increasing their awareness of who may be at risk and why they may be at risk.

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Appendix A

Demographic Information Questionnaire

#	Question	Response Format
1	What is your age?	_____ years old (numerical)
2	What was your biological sex at birth?	1. Female 2. Male 3. I do not identify with the options listed 4. Prefer not to say
3	What is your gender?	1. Female 2. Male 3. Non-binary 4. Transgender 5. I do not identify with the options listed 6. Prefer not to say
4	What is your race/ethnicity?	1. Asian 2. Black 3. Caucasian (White) 4. Hispanic/Latino/Latina/Latinx 5. Indigenous (First Nations, Métis, or Inuit) 6. Middle Eastern 7. I do not identify with the options listed 8. Prefer not to say
5	What is your sexual orientation?	1. Exclusively heterosexual 2. Predominantly heterosexual, only incidentally homosexual 3. Predominately heterosexual, but more than incidentally homosexual 4. Equally heterosexual and homosexual 5. Predominately homosexual, but more than incidentally heterosexual 6. Predominately homosexual, only incidentally heterosexual 7. Exclusively homosexual 8. No socio-sexual contacts or reactions (asexual) 9. I do not identify with the options listed. 10. Prefer not to say
6	What is your nationality (i.e., country citizenship)?	11. Canadian 12. Canadian with multiple citizenship. 13. None of the above. Please specify country/countries: _____
7	What country do you currently live in?	1. Canada 2. Not in Canada. Please specify country: _____

8	What country did you spend most of your life in?	1. Canada 2. Not in Canada. Please specify country: _____
9	What is the highest level of education you have completed?	1. None 2. Elementary School 3. Some High School 4. High School Completed 5. Some College or Technical 6. College Completed 7. Some Undergraduate 8. Undergraduate Degree Completed 9. Some Post Graduate 10. Completed Post Graduate
10	What is your work/employment status?	1. Employed full-time 2. Employed part-time 3. Unemployed
11	Are you currently a student at a university or college?	1. Yes – full time 2. Yes – part time 3. No
12	What is your marital status?	1. Common-Law 2. In a committed relationship (not married or common-law) 3. Married 4. Separated or Divorced 5. Single 6. Widowed
13	What is your religious affiliation?	1. Buddhist 2. Catholic 3. Christian 4. Eastern Orthodox (e.g., Shinto, Jainism) 5. Hindu 6. Jewish 7. Muslim 8. Protestant 9. Sikh 10. No religious affiliation 11. None of these
14	What is the strength of your religious beliefs?	1. Not applicable (no religious affiliation) 2. Not strong at all 3. Not very strong 4. Somewhat strong 5. Very strong 6. Extremely strong
15	Which unit of height would you prefer to	1. Centimeter (cm) 2. Feet (ft) and inches (in)

	report with for your <u>height</u>?	
16	What is your height in centimeters (cm)?	1. _____ (cm) (numerical)
17	What is your height in feet and inches? *For example, if you are 5 feet and 4 inches, write: 5'4"*	1. _____ (ft)(in) (numerical)
18	Which <u>unit of weight</u> would you prefer to report with for your <u>weight</u>?	1. Kilogram (kg) 2. Pound (lb)
19	How much do you weight in kilograms (kgs)?	1. _____ (kg) (numerical)
20	How much do you weight in pounds (lbs)?	1. _____ (lb) (numerical)

Appendix B

The Cannabis Reason, Age, Frequency, Type, and Setting Questionnaire (CRAFTS-Q)

Instructions: Please read the definition for *Cannabis* provided below. Additionally, some examples of common *Cannabis* terminology and products have been provided along with the definition.

Term	Definition
Cannabis (e.g., marijuana, weed, pot, hash/hashish, THC, CBD)	Refers to the generic name for drugs or compounds that come from plants belonging to the genus *Cannabis*.

#	Question	Response Format
1	Have you read the definition for *Cannabis* stated above? (If not, please read the definition for *Cannabis* and then continue to the remaining questions)	1. Yes, and I understand the definition for *Cannabis* stated above. 2. Yes, but I did not understand the definition for *Cannabis* stated above. 3. No, I have not read the definition for *Cannabis* stated above.
2	Have you ever consumed cannabis (marijuana, weed, CBD, THC, etc.) in your lifetime?	0. No 1. Yes
3	How old were you when you consumed cannabis for the first time?	1. _____ years old (numerical)
4	Do you currently consume any cannabis products (e.g., marijuana, weed, THC, CBD)?	0. No 1. Yes
5	Have/Do you consider(ed) yourself to be a regular cannabis user?	0. No 1. Yes
6	What **cannabinoids (e.g., THC, CBD)** have you consumed in your cannabis products in your lifetime? Please select all that apply.	2. THC (Tetrahydrocannabinol) 3. CBD (Cannabidiol) 4. Other: Please specify _____ 5. Unsure
7	What **cannabinoid (e.g., THC, CBD) profiles** have you consumed in your cannabis products in <u>your lifetime</u> from the below options? Please select all that apply.	1. **THC (Tetrahydrocannabinol) dominant cannabis product (e.g., "High THC")** (i.e., a higher percentage of THC than CBD) 2. **CBD (Cannabidiol) dominant cannabis product (e.g., "High CBD")** (i.e., a higher percentage of CBD than THC)

		3. **A balanced cannabis product of THC and CBD (e.g., "Balanced 1:1")** (i.e., similar percentage of both THC and CBD) 4. Unsure
8	What **cannabinoid (e.g., THC, CBD) profile** have/do you consume(d) in your cannabis products <u>most of the time</u> from the below options? **Please select one option only.**	1. **THC (Tetrahydrocannabinol) dominant cannabis product (e.g., "High THC")** (i.e., a higher percentage of THC than CBD) 2. **CBD (Cannabidiol) dominant cannabis product (e.g., High CBD")** (i.e., a higher percentage of CBD than THC) 3. **A balanced cannabis product of THC and CBD (e.g., "Balanced 1:1")** (i.e., similar percentage of both THC and CBD) 4. Unsure
9	What method(s) have you used to consume cannabis? **Please select all that apply.**	1. **Capsules** (e.g., pills, liquid gels) 2. **Dabbing** (e.g., dab rig, dab pen) 3. **Edibles** (e.g., brownies) 4. **Smoking** (e.g., joint, pipe, bong, hookah) 5. **Tinctures** (e.g., liquid extract dropped under tongue) 6. **Topicals** (e.g., creams) 7. **Vaping** (i.e., using a vaporizer) (e.g., vape pen, dry herb vaporizer)
10	What method did/do you use **most of the time** to consume cannabis?	1. **Capsules** (e.g., pills, liquid gels) 2. **Dabbing** (e.g., dab rig, dab pen) 3. **Edibles** (e.g., brownies) 4. **Smoking** (e.g., joint, pipe, bong, hookah) 5. **Tinctures** (e.g., liquid extract dropped under tongue) 6. **Topicals** (e.g., creams) 7. **Vaping** (i.e., using a vaporizer) (e.g., vape pen, dry herb vaporizer)
11	For what purposes(s) did/do you consume cannabis **most of the time**?	1. *Mainly/always* **for medicinal/therapeutic** (i.e., lessening symptoms and/or treating disease; self-prescribed or prescribed by a physician) purposes 2. *Mainly/always* **for non-medicinal/recreational** purposes

		3. *Equal (i.e., 50/50)* **cannabis consumption for medicinal/therapeutic and non-medicinal/recreational** purposes
12	What purpose(s) did/do you consume cannabis for in your lifetime?	1. *Only* for medicinal/therapeutic (i.e., lessening symptoms and/or treating disease; self-prescribed or prescribed by a physician) purposes 2. *Only* for non-medicinal/recreational purposes 3. *Both* medicinal/therapeutic *and* non-medicinal/recreational purposes
13	If you did consume cannabis for medicinal/therapeutic (i.e., lessening symptoms and/or treating disease) purposes, is it self-prescribed or prescribed by a physician?	1. **Self-prescribed** (i.e., not prescribed by a physician) 2. **Prescribed by a physician** (e.g., family doctor) 3. **Both. Self-prescribe and prescribed by a physician.** *For example, I self-prescribe cannabis to help me fall asleep, and I have prescription from a physician for cannabis to alleviate my anxiety.*
14	What condition(s) led you to seek out cannabis for medicinal/therapeutic purposes (i.e., what is it self-prescribed/prescribed for)? **Please select all that apply.**	1. Anxiety 2. Post-traumatic stress disorder (PTSD) 3. Chronic pain 4. Depression 5. Stress 6. Epilepsy 7. Insomnia (i.e., a sleep disorder characterized by sleeplessness) 8. Headaches 9. Nightmares 10. Appetite 11. Muscle spasms 12. Nausea 13. Other: Please specify: _____
15	In the **last week (i.e., 7 days) from today**, how many **days** did you consume cannabis? *For example, if today is Friday, how many days out of the week did you consume cannabis from last Friday?*	_____ day(s) in the last week (numerical)
16	In the **last month (i.e., 4 weeks) from today**, how many **days** did you consume cannabis?	_____ day(s) in the last month (numerical)

	*For example, if today is March 1st, how many **days** did you consume cannabis from February 1st?*	
17	In the **last 3 months (i.e., 12 weeks) from today**, how many **days** did you consume cannabis? *For example, if today is July 1st, how many **days** did you consume cannabis from April 1st?*	_____ day(s) in the last 3 months (numerical)
18	When you have consumed cannabis, how many people were you around (regardless if they are consuming cannabis or not), **most of the time?**	0. **Not applicable** (i.e., I mostly or have only ever consumed cannabis by myself when no one else is around) 1. With **one** other person 2. With **two** other people 3. With **three** other people 4. With **four** other people 5. With **five** other people 6. With **six or more** people
19	When you have consumed cannabis, how many of the people around you were *ALSO* consuming cannabis, **most of the time**?	0. **Not applicable** (i.e., I mostly or have only ever consumed cannabis by myself when no one else is around) 1. **None of the people around me** are consuming cannabis 2. **Less than half of the people around me** are consuming cannabis 3. **Half of the people around me** are consuming cannabis when I am also consuming cannabis 4. **More than half of the people around me** are consuming cannabis when I am also consuming cannabis 5. **All of the people around me** are consuming cannabis when I am also consuming cannabis
20	What environment did/do you consume cannabis in **most of the time?**	1. Inside my own home/apartment 2. Inside someone else's home/apartment 3. Outside in non-public space (e.g., private backyard) 4. Outside in public space (e.g., public park, public hiking trails) 5. At work

		6. School 7. Bars/Nightclub 8. Cannabis lounge/cafe 9. Other. Please specify: _____
21	What environment were/are you <u>experiencing the effects of cannabis</u> in **most of the time***?*	1. Inside my own home/apartment 2. Inside someone else's home/apartment 3. Outside in non-public space (e.g., private backyard) 4. Outside in public space (e.g., public park, public hiking trails) 5. At work 6. School 7. Bars/Nightclub 8. Cannabis lounge/cafe 9. Other. Please specify: _____

Appendix C

Simultaneous Polysubstance Use – Cannabis, Alcohol and Nicotine Questionnaire (SPU-CAN)

Instructions: Please read the definition for *Cannabis* provided below. Additionally, some examples of common *Cannabis* terminology and products have been provided along with the definition.

Term	Definition
Cannabis (e.g., marijuana, weed, pot, hash/hashish, THC/CBD)	Refers to the generic name for drugs or compounds that come from plants belonging to the genus *Cannabis*.

#	Question	Response Format
1	Have you ever used cannabis in your lifetime? *Skip logic 1: If "Yes" is answered in Q1, participant goes to Q2. If "No" is answered in Q1, participant skips to end of SPU-CAN questionnaire*	0. No 1. Yes
2	Have you ever consumed alcohol in your lifetime? *Skip logic 1: If "Yes" is answered in Q2, participant goes to Q3. If "No" is answered in Q2, participant skips to Q5.*	0. No 1. Yes
3	Have you every consumed **alcohol simultaneously with cannabis** (i.e., administering alcohol and cannabis on the same occasion)? *Skip logic 1: If "Yes" is answered in Q3, participant goes to Q4. If "No" is answered in Q3, participant skips to Q5.*	0. No 1. Yes
4	When you use(d) cannabis, what percentage of those times on average do/did you simultaneously consume alcohol (i.e., **consuming <u>alcohol and cannabis</u> on the same occasion**)?	_____ % (numerical)

	For example, if you consumed cannabis on average 4 times a week, and on average simultaneously consumed alcohol 1 of those times, your answer would be the following: 25 %.	
5	Have you ever used nicotine (e.g., cigarettes, cigars, etc.) in your lifetime? **Skip logic 1:** *If "Yes" is answered in Q5, participant goes to Q6. If "No" is answered in Q5, participant skips to Q8.*	0. No 1. Yes
6	Have you ever **used nicotine simultaneously with cannabis** (i.e., administering nicotine and cannabis on the same occasion)? **Skip logic 1:** *If "Yes" is answered in Q6, participant goes to Q7. If "No" is answered in Q6, participant skips to Q8.*	0. No 1. Yes
7	When you use(d) cannabis, what percentage of those times on average do/did you simultaneously consume nicotine (i.e., **consuming <u>nicotine and cannabis</u> on the same occasion**)? *For example, if you consumed cannabis on average 4 times a week, and on average simultaneously consumed nicotine 1 of those times, your answer would be the following: 25 %.*	_____ % (numerical)

Appendix D

Adverse Reactions Scale

Instructions: We are interested in whether you have experienced any of the following adverse reactions to acute cannabis intoxication. When providing your answers please only consider times when you were high on cannabis and when the symptom was a direct result of cannabis.

#	Question	Response Format
1	Anxiety	Yes/No
2	Panic Attack	Yes/No
3	Feeling out of control	Yes/No
4	Migraine/Headache	Yes/No
5	Vomiting	Yes/No
6	Nausea	Yes/No
7	Cold Sweats	Yes/No
8	Hot Flash	Yes/No
9	Tunnel Vision	Yes/No
10	Dizzy	Yes/No
11	Light headed/head rush	Yes/No
12*	Off balance/unsteady	Yes/No
13	Seeing black spots	Yes/No
14	Fainting/passing out	Yes/No
15	Racing heart	Yes/No
16	Heart palpitations/arrhythmia	Yes/No
17	Chest/lung discomfort	Yes/No
18	Trouble breathing	Yes/No
19	Coughing fit	Yes/No
20	Paranoia	Yes/No
21	Auditory hallucinations	Yes/No
22	Visual hallucinations	Yes/No
23	Other hallucinations	Yes/No
24	Dissociation (i.e. feeling disconnected from self or reality)	Yes/No
25*	Numbness	Yes/No
26*	Feelings of body humming or vibrating	Yes/No
27**	Cutaneous (i.e., skin) sensitivity	Yes/No
28**	Misophonia (i.e., negative reaction(s) to specific common sound(s))	Yes/No
29**	Hyperosmia (i.e., enhanced smelling abilities)	Yes/No

Display these questions for any symptoms for which [Yes] is selected above:

#	Question	Response Format
1	Approximately what percentage of the time that you use cannabis do you experience [symptom name (e.g. Anxiety)]?	_____ % (numerical)
2	On average, how distressing was experiencing _____ [symptom name (e.g. Anxiety)] while under the influence of cannabis?	0 = Not at all distressing 1 = Mildly distressing 2 = Moderately distressing 3 = Quite distressing 4 = Severely distressing

*Authors of this scale have suggested that these items may be taken out for future research studies.

** Exploratory adverse reactions added and not from the original "Adverse Reactions Scale". These items were not included in the analyses of this study.

Appendix E

Positive and Negative Affect Schedule

Please rate how you feel in general, that is on average, for each of the following words:

#	Question	Response Format
1	Enthusiastic	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
2	Interested	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
3	Determined	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
4	Excited	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
5	Inspired	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
6	Alert	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
7	Active	1. Very slightly or not at all 2. A little 3. Moderately

		4. Quite a bit 5. Extremely
8	Strong	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
9	Proud	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
10	Attentive	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
11	Scared	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
12	Afraid	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
13	Upset	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
14	Distressed	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
15	Jittery	1. Very slightly or not at all

		2. A little 3. Moderately 4. Quite a bit 5. Extremely
16	Nervous	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
17	Ashamed	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
18	Guilty	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
19	Irritable	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely
20	Hostile	1. Very slightly or not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely

Appendix F

Desirability Scale – Personality Research Form

Read each statement and decide whether or not it describes you. If you agree with the statement or decide that it does describe you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer every item either true or false, even if you are not completely sure of your answer.

#	Question	Response Format
1	I am quite able to make correct decisions on difficult questions.	0. False 1. True
2	I am never able to do things as well as I should.	0. False 1. True
3	My life is full of interesting activities.	0. False 1. True
4	I believe people tell lies any time it is to their advantage.	0. False 1. True
5	If someone gave me too much change, I would tell him.	0. False 1. True
6	I would be willing to do something a little unfair to get something that was important to me.	0. False 1. True
7	I get along with people at parties quite well.	0. False 1. True
8	I did many very bad things as a child.	0. False 1. True
9	I am glad I grew up the way I did.	0. False 1. True
10	I often question whether life is worthwhile.	0. False 1. True
11	I am always prepared to do what is expected of me.	0. False 1. True
12	My daily life includes many activities I dislike.	0. False 1. True
13	I am one of the lucky people who could talk with my parents about my problems.	0. False 1. True
14	Many things make me feel uneasy.	0. False 1. True
15	I am careful to plan for my distant goals.	0. False 1. True
16	I find it very difficult to concentrate.	0. False 1. True

Appendix G

Infrequency Scale – Personality Research Form

Read each statement and decide whether or not it describes you. If you agree with the statement or decide that it does describe you, answer TRUE. If you disagree with a statement or feel that it is not descriptive of you, answer FALSE. Answer every item either true or false, even if you are not completely sure of your answer.

#	Question	Response Format
1	I have never bought anything in a store.	0. False 1. True
2	I could easily count from one to twenty-five.	0. False 1. True
3	I can run a mile (1.6 km) in less than four minutes.	0. False 1. True
4	I have never talked to anyone by telephone.	0. False 1. True
5	I usually wear something warm when I go outside on a very cold day.	0. False 1. True
6	I make all my own clothes and shoes.	0. False 1. True
7	I have never brushed or cleaned my teeth.	0. False 1. True
8	Things with sugar in them usually taste sweet to me.	0. False 1. True
9	Sometimes I see cars near my home.	0. False 1. True
10	I have never had any hair on my head.	0. False 1. True
11	I have traveled away from my hometown.	0. False 1. True
12	I have never ridden in an automobile.	0. False 1. True
13	I have never felt sad.	0. False 1. True
14	I try to get at least some sleep every night.	0. False 1. True
15	Sometimes I feel thirsty or hungry.	0. False 1. True
16	I have attended school at some time during my life.	0. False 1. True

Appendix H

Cannabis Use During COVID-19 Restrictions Information Questionnaire

Term	Definition
Cannabis (e.g., marijuana, weed, THC, CBD)	Refers to the generic name for drugs or compounds that come from plants belonging to the genus *Cannabis*.
COVID-19 restrictions:	Refers to a period of time of measures set in place (e.g., physical distancing, travel bans, closed borders, lockdowns, etc.) to restrict human contact because of the Coronavirus disease 2019 (COVID-19) disease which was upgraded to pandemic status on March 11th, 2020 by the World Health Organization (WHO).

#	Question	Response Format
1	Have you experienced a lockdown, or other similar type of government-imposed restrictions, during the COVID-19 pandemic? ***Skip logic 1:*** *If participant endorses "No", participant skips to end of COVID-19 Information Questionnaire. If participant endorses "Yes", participant will be directed to Q2.*	0. No 1. Yes
2	During the COVID-19 restrictions, how would you describe the frequency (i.e., different sessions) of your ***cannabis*** consumption? ***Skip logic 1:*** *If participant endorses Q2 (1), participant will be directed Q3 and will skip Q4.* ***Skip logic 2:*** *If participant endorses Q2 (2), participant will skip Q3 and be directed to Q4.* ***Skip logic 3:*** *If participant endorses Q2 (3), participant will skip Q3 & Q4 and be directed to Q5.*	1. I have **decreased** the frequency of my *cannabis* consumption during the COVID-19 restrictions. 2. My *cannabis* consumption frequency has **not changed** during the COVID-19 restrictions. 3. I have **increased** the frequency of my *cannabis* consumption during the COVID-19 restrictions.
3	If the frequency of your ***cannabis*** consumption has **increased** during the COVID-19 restrictions, how often do you consume ***cannabis***?	1. Less than once a month 2. Once a month 3. Once a week 4. Two or more times a week 5. Once daily 6. Multiple times daily

4	If the frequency of your *cannabis* consumption has **decreased** during the COVID-19 restrictions, how often do you consume *cannabis*?	1. Less than once a month 2. Once a month 3. Once a week 4. Two or more times a week 5. Once daily 6. Multiple times daily
5	Have you consumed a *cannabis product* for the **first time** during the COVID-19 pandemic?	0. No 1. Yes
6	During the COVID-19 restrictions, how would you describe your mental health overall?	1. I have experienced a **decline** in my *mental health* overall during the COVID-19 restrictions. 2. My *mental health* overall has **not changed** during the COVID-19 restrictions. 3. I have experienced an **improvement** in my *mental health* overall during the COVID-19 restrictions.

Appendix I

Email to Lakehead University Professors and Students

Hello [insert professor name here],

My name is Shayna Cummings and I am currently recruiting volunteers to participate in my master's thesis project, **The Cannabis Experiences Study (The CAN-E Study)**, conducted under the supervision of Dr. Mazmanian.

We would greatly appreciate your willingness to send the following information to your students.

Please feel free to contact myself if you have any questions.

Thank you,

Shayna

_____

Hello Undergraduate/Graduate Student,

My name is Shayna Cummings and I am currently recruiting volunteers to participate in my master's thesis project, **The Cannabis Experiences Study (The CAN-E Study)**, conducted under the supervision of Dr. Mazmanian.

The main purpose of this study is to examine individuals' short-term reactions to cannabis use.

Format and Time Requirement:
- **Online survey**
- **No more than 1 hour**

Compensation:
- **You may select one out of the following two options:**
  1. Earn **1 bonus mark** towards any psychology course accepting bonus credits.
  2. If you are ineligible or do not want a bonus mark, you may **enter in a draw for a chance to win 1 out of 5 $20.00 electronic gift cards**. If you enter into the draw and win, you will have the choice of either a Chapters or Boston Pizza electronic gift card.

Eligibility:
- **Any sex or gender**
- **18 years of age or older**
- **Past/current cannabis user OR non-cannabis user (i.e., have never tried cannabis in your lifetime)**

If you are interested in participating and are a Lakehead University student taking at least one <u>psychology course</u>, click: <u>https://lupsych.sona-systems.com/</u> to access our study through the Lakehead Sona System, under the project titled, The Cannabis Experiences Study – The CAN-E Study.

If you have any further questions regarding this study, you may contact myself:

Shayna Cummings –
<u>slcummin@lakeheadu.ca</u>

Thank you!

Appendix J

Poster for Participant Recruitment

Appendix K

Information Letter [General Public]

Dear Potential Participant,

Thank you for your interest in the "The Cannabis Experiences Study" (The CAN-E Study). This study is being conducted by Shayna Cummings, a MSc Psychological Science student, and is supervised by Dr. Dwight Mazmanian, a full-time faculty member in the Department of Psychology at Lakehead University. Your participation in this study will help us better understand the short-term effects of cannabis use. Before you decide to take part in this study, please carefully review the information below to understand what is involved.

What is the purpose of the study?

The main purpose of this study is to examine participants' short-term effects from cannabis. This study will ask questions about your cannabis experiences, but participants do NOT have to use cannabis to participate.

How long will the study take to complete?

This survey is not expected to last longer than 1 hour. It is online and hosted on the SurveyMonkey platform, so you may complete it at a time and location of your choosing. If you have any questions about this study, please contact the research team.

Contact Information:

If you would like to contact the research team, please send an email to the Student Investigator (Shayna Cummings) or the Principal Investigator (Dr. Dwight Mazmanian):
- hhab.laboratory@gmail.com (Shayna Cummings, HBSc, MSc Psychological Science student)
- dmazmani@lakeheadu.ca (Dwight Mazmanian, PhD, CPsych)

Is the study anonymous?

This study is anonymous. No identifying information will be collected. As no identifying information will be collected, no identifying information will be alongside or associated with any of the data, analyses, or methods of dissemination. For publication purposes, all survey information and responses will be securely stored at Lakehead University for five years. Please note, however, that the online survey tool used in the study (SurveyMonkey.com) is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full anonymity of your data. With your consent to participate in this study, you acknowledge this.

Do I have the right to decline to answer any questions?

Participants maintain the right to decline to answer any question(s). Your participation in this research is completely voluntary, and if you choose not to participate, you may do so without consequence or the need to explain why. You may also discontinue your participation at any time without explanation or penalty. Once you submit your data it cannot be withdrawn due to its anonymity.

What will the survey be used for?

Participant responses will be used for the thesis of the student investigator, Shayna Cummings. The study findings will also be used for research publications and/or presentations at conferences. Your identity will remain anonymous throughout these processes as well. Researchers who will have access to the data will be limited to Shayna Cummings (MSc Psychological Science Student), Casey Oliver (MA Clinical Psychology Student), Erika Puiras (MA Clinical Psychology Student), and Dr. Dwight Mazmanian.

How can you benefit from this study?

Potential benefits include participating in research that aims to help in better predicting some cannabis short-term reactions. As a "thank you" for participating in this research, you may enter into a draw to win one of ten $25 (CAD) electronic gift cards of your choosing (Indigo, Tim Hortons, or Walmart). If you enter into the draw to win the electronic gift card, you will be asked for your email address in order to be contacted and sent the electronic gift card should you win. This email address will not be associated with your responses.

What are the risks of participating in this study?

There are no known physical risks associated with participating. However, some of the material in the survey asks questions on sensitive subject matter that might result in some minor psychological discomfort for some people. If this occurs, please contact the Crisis Services Canada phoneline at 1-833-456-4566.

Can I see the results?

A summary of the research findings may also be available to you once the study is completed. Please note that it might take up to 1 year from the time of your participation before the study is completed and the findings are available. If you wish to receive a summary of the findings, please provide your email address to the researcher at the end of the survey. Your email address will not be linked to your survey responses.

Ethics Information:

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of

the research team, please contact Sue Wright at the Research Ethics Board at 1-807-343-8283 or research@lakeheadu.ca.

Thank you for your interest and participation, it is greatly appreciated!
Consent Form for Participants

MY CONSENT:

I have read the information letter and I agree to the following:
- I have read and understand the information contained in the information letter.
- I agree to participate.
- I understand the risks and benefits to the study.
- That I am a volunteer and can withdraw from the study at any time and may choose not to answer any question. (Please note that after you submit your responses they cannot be retrieved due to the anonymous nature of the study.)
- That the data will be securely stored at Lakehead University for a minimum of 5 years following completion of the research project.
- I understand that the research findings will be made available to me upon request. We anticipate the study results will be available within 1 year after you complete the study.
- I will remain anonymous.
- All of my questions related to the study have been answered.

By consenting to participate, I have not waived any rights to legal recourse in the event of research-related harm.

I have read and agree to the above information, **I am at least 18 years of age**, and by completing and submitting this study agree to participate.

If you consent to participate in the study, please click the "Next" button at the bottom of the page to continue.

Appendix L

Information Letter [Lakehead University Students]

Dear Potential Participant,

Thank you for your interest in the "The Cannabis Experiences Study" (The CAN-E Study).
This study is being conducted by Shayna Cummings, a MSc Psychological Science student, and is supervised by Dr. Dwight Mazmanian, a full-time faculty member in the Department of Psychology at Lakehead University. Your participation in this study will help us better understand the short-term effects of cannabis use. Before you decide to take part in this study, please carefully review the information below to understand what is involved.

What is the purpose of the study?

The purpose of this study is to examine participants' short-term effects from cannabis. This study will ask questions about your cannabis experiences, but participants do NOT have to use cannabis to participate.

How long will the study take to complete?

This survey is not expected to last longer than 1 hour. It is online and hosted on the SurveyMonkey platform, so you may complete it at a time and location of your choosing. If you have any questions about this study, please contact one of the research team members.

Contact Information:

If you would like to contact the research team, please send an email to the Student Investigator (Shayna Cummings) or the Principal Investigator (Dr. Dwight Mazmanian):
- slcummin@lakeheadu.ca (Shayna Cummings, HBSc, MSc Psychological Science student)
- dmazmani@lakeheadu.ca (Dwight Mazmanian, PhD, CPsych)

Is the study anonymous?

This study is anonymous. No identifying information will be collected. As no identifying information will be collected, no identifying information will be alongside or associated with any of the data, analyses, or methods of dissemination. For publication purposes, all survey information and responses will be securely stored at Lakehead University for five years. Please note, however, that the online survey tool used in the study (SurveyMonkey.com) is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full anonymity of your data. With your consent to participate in this study, you acknowledge this.

Do I have the right to decline to answer any questions?

Participants maintain the right to decline to answer any question(s). Your participation in this research is completely voluntary, and if you choose not to participate, you may do so without consequence or the need to explain why. You may also discontinue your participation at any time without explanation or penalty. Once you submit your data it cannot be withdrawn due to its anonymity.

What will the survey be used for?

Participant responses will be used for the thesis of the student investigator, Shayna Cummings. The study findings will also be used for research publications and/or presentations at conferences. Your identity will remain anonymous throughout these processes as well. Researchers who will have access to the data will be limited to Shayna Cummings (MSc Psychological Science Student), Casey Oliver (MA Clinical Psychology Student), Erika Puiras (MA Clinical Psychology Student), and Dr. Dwight Mazmanian.

How can you benefit from this study?

Potential benefits include participating in research that aims to help in better predicting some cannabis short-term reactions. As a "thank you" for participating in this research, you may choose to be entered into a draw to win one of five $20 (CDN) electronic gift cards or, if you are a student at Lakehead University, you may elect to receive one bonus mark towards an eligible psychology course. If you choose to be entered into the draw to win the gift card, you will be asked for your email address so you can be contacted if you win. This email will not be associated with your responses. If you choose to receive the bonus mark, your instructor at Lakehead University must allow the acquisition of bonus marks and you must sign up through the Sona System.

What are the risks of participating in this study?

There are no known physical risks associated with participating. However, some of the material in the survey asks questions on sensitive subject matter that might result in some minor psychological discomfort for some people. If this occurs, please contact the Canadian Mental Health Association at 416-646-5557. You may also contact Crisis Services Canada at 1-833-456-4566. If you are a student at Lakehead University, you may also contact Student Health and Wellness at 1-807-343-8361 (Thunder Bay) or at 1-705-330- 4008 ext. 2116 (Orillia).

Can I see the results?

A summary of the research findings may also be available to you once the study is completed. Please note that it might take up to 1 year from the time of your participation before the study is completed and the findings are available. If you wish to receive a summary of the findings, please provide your email address to the researcher at the end of the survey. Your email address will not be linked to your survey responses.

Ethics Information:

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 1-807-343-8283 or research@lakeheadu.ca.

Thank you for your interest and participation, it is greatly appreciated!

Consent Form for Participants

MY CONSENT:

I have read the information letter and I agree to the following:
- I have read and understand the information contained in the information letter.
- I agree to participate.
- I understand the risks and benefits to the study.
- That I am a volunteer and can withdraw from the study at any time and may choose not to answer any question. (Please note that after you submit your responses they cannot be retrieved due to the anonymous nature of the study.)
- That the data will be securely stored at Lakehead University for a minimum of 5 years following completion of the research project.
- I understand that the research findings will be made available to me upon request. We anticipate the study results will be available within 1 year after you complete the study.
- I will remain anonymous.
- All of my questions related to the study have been answered.

By consenting to participate, I have not waived any rights to legal recourse in the event of research-related harm.

I have read and agree to the above information, **I am at least 18 years of age**, and by completing and submitting this study agree to participate.

If you consent to participate in the study, please click the "Next" button at the bottom of the page to continue.

Appendix M

Debriefing Form [General Public]
(Please print this page for your information)

Thank you for your participation in this research project on short-term cannabis reactions and cannabis experiences. We hope that this study will help provide information about potential predictors of short-term cannabis reactions. Information on potential predictors of cannabis short-term reactions may better inform and help inexperienced cannabis users, physicians, and public health officials.

Information about study results:

A summary of the results can be made available to you by email once the study has been completed. If you are interested in receiving these results, please email the Student Investigator, Shayna Cummings, at [hhab.laboratory@gmail.com] with the subject heading "Results Summary Request for CAN-E Study". We will email you a copy of the Results Summary once it is available. Please note that this may take up to 1 year from the time of your participation.

Electronic Gift Card Draw:

In order to show our appreciation for participating in this research, you may choose to be entered into a draw to win one of ten $25 (CAD) electronic gift cards of your choosing (Indigo, Tim Hortons, or Walmart). If you enter into the draw to win the electronic gift card, you will be asked for your email address in order to be contacted and sent the electronic gift card should you win. If you do not wish to enter the draw, click "DONE" to exit the survey.

Contact Information:

If you have specific questions about the survey, you may contact the Student Investigator, Shayna Cummings, [hhab.laboratory@gmail.com] or the Principal Investigator, Dwight Mazmanian, PhD, CPsych, [dmazmani@lakeheadu.ca, 807-343-8257].

Other Resources:

If completing this survey has raised any issues about mental health concerns that you would like to discuss, you may contact the Crisis Services Canada phoneline at 1-833-456-4566.

Thank you for your participation!

Click **HERE** to enter your email for the electronic gift card draw.

Please note that clicking on the above link will bring you to a new page that is not connected to the survey results. Therefore, if you choose to add your email for the electronic gift card draw, it will not be associated with your previous responses, which will remain anonymous.

(On a separate page).

Gift Card Draw:

If you would like to be entered into the draw for an electronic gift card, please include your email address below in order to be contacted and sent the electronic gift card should you win.

Email:

Thank you for participating in this study!

Appendix N

Debriefing Form [Lakehead University Students]
(Please print this page for your information)

Thank you for your participation in this research project on short-term cannabis reactions.
We hope that this study will help provide information about potential predictors of short-term
cannabis reactions. Information on potential predictors of cannabis short-term reactions may
better inform and help inexperienced cannabis users, physicians, and public health officials.

Information about study results:

A summary of the results can be made available to you by email once the study has been
completed. If you are interested in receiving these results, please email the Student Investigator,
Shayna Cummings, at [slcummin@lakeheadu.ca] with the subject heading "Results Summary
Request". We will email you a copy of the Results Summary once it is available. Please note that
this may take up to 1 year from the time of your participation.

Bonus Mark or Gift Card Draw:

In order to show our appreciation for participating in this research, you may choose to be entered
into a draw to win one of five $20 (CDN) electronic gift cards, or you may choose to receive one
bonus mark towards an eligible Lakehead University psychology course if you are a student at
Lakehead University. **If you choose to be entered into the draw to win the gift card, you will
be asked for your email address in order to be contacted if you win. Your instructor must
allow the acquisition of bonus marks to receive one from this study. If you do not wish to
enter the draw, click "DONE" to exit the survey.**

Contact Information:

If you have specific questions about the survey, you may contact the Student Investigator,
Shayna Cummings, [slcummin@lakeheadu.ca] or the Principle Investigator, Dwight Mazmanian,
PhD, CPsych, [dmazmani@lakeheadu.ca, 807-343-8257].

Other Resources:

If completing this survey has raised any issues about mental health concerns that you would like
to discuss, you may contact the Canadian Mental Health Association at 416-646-5557. You may
also contact Crisis Services Canada at 1-833-456-4566. If you are a student at Lakehead
University, you may also contact Student Health and Wellness at 1-807-343-8361 (Thunder Bay)
or at 1-705-330- 4008 ext. 2116 (Orillia).

Thank you for your participation!

Click <u>HERE</u> to enter your email for the gift card draw.

Please note that clicking on <u>the above link will bring you to a new page that is not connected to the survey results.</u> Therefore, if you choose to add your email for the gift card draw, it will not be associated with your previous responses, which will remain anonymous.